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NUREG-1936, Vol. 2

Environmental Impact Statement for the Combined License (COL) for Calvert Cliffs Nuclear Power Plant Unit 3

Draft Report for Comment

U.S. Nuclear Regulatory Commission
Office of New Reactors
Washington, DC 20555-0001

U.S. Army Corps of Engineers
U.S. Army Engineer District, Baltimore
Baltimore, MD 21203-1715

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This NUREG references information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). There were no new information collection requirements in this NUREG. The existing information collections in the NUREG were previously approved by the Office of Management and Budget, approval numbers 3150-0014; 3150-0011; 3150-0021; 3150-0151; 3150-0008; 3150-0002; and 3150-0093.

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Abstract

This environmental impact statement (EIS) has been prepared to satisfy the requirements of the National Environmental Policy Act of 1969, as amended (NEPA). The EIS has been prepared in response to an application submitted to the U.S. Nuclear Regulatory Commission (NRC) by UniStar Nuclear Development, LLC, on behalf of Calvert Cliffs 3 Nuclear Project, LLC, and UniStar Nuclear Operating Services, LLC, (collectively known as UniStar) for a combined construction permit and operating license (combined license or COL). UniStar also submitted a joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland to the U.S. Army Corps of Engineers (USACE or Corps) and the Maryland Department of the Environment (MDE). The proposed actions related to the UniStar application are (1) NRC issuance of a COL for a new power reactor unit (Unit 3) at the Calvert Cliffs Nuclear Power Plant (CCNPP) in Calvert County, Maryland and (2) Corps permit action on a Department of the Army (DA) Individual Permit application to perform certain activities on the site. The Corps is participating with the NRC in preparing this EIS as a cooperating agency and participates collaboratively on the review team.

This EIS includes the analysis by the NRC and Corps staff that considers and weighs the environmental impacts of constructing and operating a new nuclear unit at the Calvert Cliffs site and at alternative sites and mitigation measures available for reducing or avoiding adverse impacts. This EIS also addresses consultation for Federally listed species, cultural resources, and essential fish habitat (EFH).

This EIS includes the evaluation of the proposed project's impacts to waters of the United States pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The Corps will base its evaluation of the DA Individual Permit application on the requirements of Corps regulations, the Clean Water Act Section 404(b)(1) Guidelines, and the Corps public interest review (PIR) process.

After considering the environmental aspects of the proposed NRC action, the NRC staff's preliminary recommendation to the Commission is that the COL be issued as requested. This recommendation is based on (1) the application, including the Environmental Report (ER), submitted by UniStar and responses to requests for additional information (RAI); (2) consultation with Federal, State, Tribal, and local agencies; (3) the staff's independent review; (4) the staff's consideration of comments related to the environmental review that were received during the public scoping process; and (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER and this EIS. The Corps permit decision will be made following issuance of the final EIS.

Contents

Figures

Tables

Executive Summary

By letter dated July 13, 2007, the U.S. Nuclear Regulatory Commission (NRC) received a partial application from UniStar Nuclear Development, LLC, on behalf of Constellation Generation Group, LLC and UniStar Nuclear Operating Services, LLC (collectively known as UniStar), for a combined construction permit and operating license (combined license or COL) for Calvert Cliffs Nuclear Power Plant (CCNPP) Unit 3 to be located adjacent to the existing Units 1 and 2 in Calvert County, Maryland. Part 1 of the application contained the applicant's Environmental Report (ER) and site suitability information and was accepted on January 25, 2008. Part 2, which contained the balance of information required for a COL application, was received on March 14, 2008 and was accepted on June 3, 2008. On July 7, 2008, Constellation Generation Group, LLC withdrew as an applicant and Calvert Cliffs 3 Nuclear Project, LLC joined as an applicant. The application was supplemented by letters between June 2008 and September 2009. Revision 6 of the application was submitted on September 30, 2009. The NRC staff's review is based on Revision 6 of the application, the applicant's responses to staff's requests for additional information (RAI), and supplemental letters from the applicant.

On May 16, 2008, UniStar submitted a joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland to the U.S. Army Corps of Engineers (USACE or Corps) and the Maryland Department of the Environment (MDE). The Corps application number is NAB-2007-08123-M05 (Calvert Cliffs 3 Nuclear Project, LLC/UniStar Nuclear Operating Service, LLC), on behalf of co-applicants, Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC. The MDE Tidal Application number is Calvert Cliffs 3 Nuclear Project, LLC/200862371/08-WL-1462. The MDE Nontidal Application number is Calvert Cliffs 3 Nuclear Project, LLC/200862335/08-NT-0191.

The proposed actions related to the Calvert Cliffs Unit 3 application are (1) NRC issuance of a COL for construction and operation of a new nuclear unit at the Calvert Cliffs site and (2) Corps permit action on a Department of the Army (DA) Individual Permit application pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. The U.S. Environmental Protection Agency (EPA) has the authority to review and veto Corps decisions of Section 404 permits. The Corps is participating with the NRC in preparing this environmental impact statement (EIS) as a cooperating agency and participates collaboratively on the review team.

Section 102 of the National Environmental Policy Act of 1969, as amended (NEPA), directs that an EIS be prepared for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in Title 10 of the Code of Federal Regulations (CFR) Part 51. Further, in 10 CFR 51.20, the NRC has determined that the issuance of a COL under 10 CFR Part 52 is an action that requires an EIS.

The purpose of UniStar's requested NRC action is to obtain a COL to construct and operate a baseload nuclear power plant. This license is necessary but not sufficient by itself for construction and operation of the unit. A COL applicant must obtain and maintain the necessary permits from other Federal, State, and local agencies and permitting authorities. Therefore, the purpose of the NRC's environmental review of the UniStar application is to determine the impacts on the human environment if one new nuclear power plant of the proposed U.S. EPR design is constructed and operated at the Calvert Cliffs site. The purpose of UniStar's requested Corps action is to obtain a DA permit decision on the Individual Permit application to construct the proposed structures in and under navigable waters and to discharge dredged, excavated, and/or fill material into waters of the United States, including jurisdictional wetlands.

Upon acceptance of the UniStar application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a Notice of Intent (73 FR 8719) to prepare an EIS and conduct scoping in the *Federal Register* (FR). On March 19, 2008, the NRC held two scoping meetings in Solomons, Maryland, to obtain public input on the scope of the environmental review. To gather information and to become familiar with the proposed and alternative sites and their environs, the NRC and its contractor, Pacific Northwest National Laboratory (PNNL), visited the Calvert Cliffs site in March 2008 and the alternative site, the former Thiokol brownfield site, in October 2008. The NRC, PNNL, and the Corps visited the alternative sites Eastalco and Bainbridge in August 2009. During the site visits, the NRC, PNNL, and Corps staff met with UniStar staff and public officials. During the scoping process, the NRC staff reviewed the comments received and contacted Federal, State, Tribal, regional, and local agencies to solicit comments.

Included in this EIS are (1) the results of the joint NRC/Corps review team's analyses, which consider and weigh the environmental effects of the NRC's proposed action (i.e., issuance of the COL) and of constructing and operating a new nuclear unit at the Calvert Cliffs site; (2) mitigation measures for reducing or avoiding adverse effects; (3) the environmental impacts of alternatives to the proposed action; and (4) the staff's recommendation regarding the proposed action.

To guide its assessment of the environmental impacts of a proposed action or alternative actions, the NRC has established a standard of significance for impacts based on Council on Environmental Quality (CEQ) guidance. Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, provides the following definitions of the three significance levels – SMALL, MODERATE, and LARGE:

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

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

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

Potential mitigation measures were considered for each resource category and are discussed in the appropriate sections of the EIS.

In preparing this EIS, the review team reviewed the applications, including the ER submitted by UniStar; consulted with Federal, State, Tribal, and local agencies; and followed the guidance set forth in NUREG-1555, *Environmental Standard Review Plan* (ESRP). In addition, the review team considered the public comments related to the environmental review received during the scoping process. Comments within the scope of the environmental review are included in Appendix D of this EIS.

The NRC staff's preliminary recommendation to the Commission related to the environmental aspects of the proposed action is that the COL be issued as requested. This recommendation is based on (1) the application, including the ER submitted by UniStar and the applicant's supplemental letters and responses to staff's RAIs; (2) consultation with Federal, State, Tribal, and local agencies; (3) the staff's independent review; (4) the staff's consideration of comments related to the environmental review that were received during the scoping process; and (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER. The Corps will base its evaluation of the DA Individual Permit application on the requirements of Corps regulations, the Clean Water Act Section 404(b)(1) Guidelines, and the Corps public interest review (PIR) process. The Corps permit decision will be made following issuance of the final EIS.

A 75-day comment period will begin on the date of publication of the EPA Notice of Availability of the filing of the draft EIS to allow members of the public to comment on the results of the NRC and Corps staffs' review. During this period, the NRC and Corps staff will conduct a public meeting near the Calvert Cliffs site to describe the results of the environmental review, provide members of the public with information to assist them in formulating comments on this EIS, respond to questions, and accept public comment. The public meeting also serves as the Corps public hearing, which means a public proceeding conducted for the purpose of acquiring information or evidence that will be considered in evaluating a proposed DA permit action and affords the public an opportunity to present their views, opinions, and information on such permit actions or Federal projects. After the comment period, the review team will consider all the comments received. The final EIS will include these comments and the review team responses.

The NRC staff's evaluation of the site safety and emergency preparedness aspects of the proposed action will be addressed in the NRC's final Safety Evaluation Report (SER), currently anticipated to be published in July 2012. The reactor specified in the application is the AREVA NP Inc.'s U.S. EPR design, which is currently undergoing a design certification review. The NRC staff's evaluation of the design certification and final rulemaking is currently anticipated to be completed in June 2012.

Abbreviations/Acronyms

χ/Q	dispersion values
°C	degree(s) Celsius
°F	degree(s) Fahrenheit
ac	acre(s)
ADAMS	Agencywide Documents Access and Management System
AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
ANC	acid neutralizing capacity
ANSI	American National Standards Institute
APE	Area of Potential Effects
AREVA	AREVA NP Inc.
AQCR	Air Quality Control Region
B&O	Baltimore and Ohio
BA	biological assessment
BACT	best available control technology
BEA	U.S. Department of Commerce Bureau of Economic Analysis
BEIR	Biological Effects of Ionizing Radiation
BGE	Baltimore Gas and Electric Company
B-IBI	Benthic Index of Biotic Integrity
BMP	best management practice(s)
Bq	becquerels
BRAC	base realignment and closure
Btu	British thermal unit
C&O	Chesapeake and Ohio
CAC	Critical Area Commission
CAES	compressed air energy storage
CBCA	Chesapeake Bay Critical Area
CBP	Chesapeake Bay Program
CCNPP	Calvert Cliffs Nuclear Power Plant
CCPS	Calvert County Public Schools
CCWS	component cooling water system
CDC	Centers for Disease Control and Prevention
CDF	core damage frequency
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations

cfs	cubic feet per second (water flow)
Ci	curies
cm	centimeters
CMH	Calvert Memorial Hospital
CO	carbon monoxide
CO_2	carbon dioxide
COL	combined license
COMAR	Code of Maryland Regulations
Constellation	Constellation Energy Nuclear Group, LLC
Corps	U.S. Army Corps of Engineers (also USACE)
CPCN	Certificate of Public Convenience and Necessity
CWMA	Cooperative Wildlife Management Area
CWP	Center for Watershed Protection
CWS	circulating water supply system
CZMA	Coastal Zone Management Act
d	day
D/Q	deposition values
DA	Department of the Army
dB	decibel(s)
dBA	decibel(s) (acoustic)
DBA	design basis accidents
DC	District of Columbia
DE	Delaware
DECOM	decommissioning
DO	dissolved oxygen
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPS	distinct population segments
D/Q	deposition values
EAB	exclusion area boundary
EDG	emergency diesel generators
EFH	essential fish habitat
EIA	Department of Energy’s Energy Information Administration
EIS	environmental impact statement
ELF	extremely low frequency
EMF	electromagnetic field(s)
EMS	Emergency Medical Services
EO	Executive Order
EPA	U.S. Environmental Protection Agency

EPR	Evolutionary Power Reactor
EPRI	Electric Power Research Institute
EPT	Ephemeroptera-Plecoptera-Trichoptera
EPZ	emergency planning zone
ER	Environmental Report
ESA	U.S. Endangered Species Act of 1973, as amended
ESP	Energy Storage and Power LLC
ESRP	*Environmental Standard Review Plan*
ESWS	essential service water system
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWG	Fisheries Hydroacoustic Working Group
FIDS	forest interior dwelling species
fps	feet per second
FONSI	finding of no significant impact
FR	*Federal Register*
FSAR	Final Safety Analysis Report
ft	foot/feet
ft^2	square feet
ft^3	cubic feet
FTE	full-time equivalent
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
g	gram(s)
GAI	GAI Consultants, Inc.
gal	gallon(s)
GBq	gigabecquerel
GC	gas centrifuge
GCC	global climate change
GD	gaseous diffusion
GEIS	generic environmental impact statement
GHG	greenhouse gas
GI-LLI	adult lower intestine
GIS	geographical information system
GIT	Georgia Institute of Technology
gpd	gallon(s) per day
gpm	gallon(s) per minute

ha	hectare(s)
HAP	hazardous air pollutants
HAPC	habitat areas of particular concern
HLW	high level waste
HQUSACE	Headquarters, U.S. Army Corps of Engineers
hr	hour
Hz	hertz
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IDAs	Intensely Developed Areas
IGCC	integrated gasification combined cycle
in.	inch(es)
INEEL	Idaho National Engineering and Environmental Laboratory
IRSA	interim resin storage area
ISFSI	independent spent fuel storage installation
Kcal	kilocalorie
kg	kilogram
km	kilometer(s)
km^2	square kilometer(s)
kV	kilovolt(s)
kW(e)	kilowatts electric
kWh	kilowatt hour(s)
L	liter(s)
lb	pound(s)
LDAs	Limited Development Areas
LEAs	Local Educational Agencies
LEDPA	least environmentally damaging practicable alternative
LFAA	Low Flow Allocation Agreement
LLW	low-level waste
LNG	liquefied natural gas
LOS	level of service
LPZ	low population zone
LR	license renewal
LRF	large release frequencies
LWR	light-water reactor
m	meter(s)
m^2	square meter
m^3	cubic meter(s)

mA	milliamperes
MACCS2	MELCOR Accident Consequence Code System
MAPP	Mid-Atlantic Power Pathway
MBq	million becquerels
mCi	millicuries
MBTA	Migratory Bird Treaty Act
MD	Maryland
MBSS	Maryland Biological Stream Survey
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDOT	Maryland Department of Transportation
MDP	Maryland Department of Planning
MDSDAT	Maryland State Department of Assessments and Taxation
MEA	Maryland Energy Administration
MEI	maximally exposed individual
mg	milligram(s)
MGD	million gallon(s) per day
mGy	milligray
MHT	Maryland Historical Trust
MHW	mean high water
mi	mile(s)
mi^2	square mile(s)
MISO	Midwest Independent Transmission System Operator, Inc.
MIT	Massachusetts Institute of Technology
mL	millilitres
mm	millimetres
MMS	Minerals Management Service
mo	month
MOA	memorandum of agreement
MOU	memorandum of understanding
mph	mile(s) per hour
MPSC	Maryland Public Service Commission
mR	milliroentgen
mrad	millirad(s)
mrem	millirem(s)
MSA	Metropolitan Statistical Area
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act of 1976
MSL	mean sea level
mSv	millisievert(s)
MSX	Multinucleate Sphere X
MT	metric ton(s) (or tonne[s])

MTU	metric ton of uranium
MVA	motor vehicle accidents
MW	megawatt(s)
MW(e)	megawatt(s) electric
MW(t)	megawatt(s) thermal
MWd	megawatt-day(s)
MWh	megawatt hour(s)
NA	Not Applicable
NAGPRA	Native American Graves Protection & Repatriation Act
NA-NSR	Nonattainment New Source Review
NCES	National Center for Education Statistics
NCI	National Cancer Institute
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act of 1969, as amended
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NETL	National Energy Technology Laboratory
NHPA	National Historic Preservation Act of 1966, as amended
NIEHS	National Institute of Environmental Health Sciences
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NOB	Natural Oyster Bar
NO_x	nitrogen oxide(s)
NPCC	Northeast Power Coordinating Council
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NUREG	NRC publication
NYSDEC	New York State Department of Environmental Conservation
ODCM	Offsite Dose Calculation Manual
OSHA	Occupational Safety and Health Administration
Pa	pascal
PATH	Potomac-Appalachian Transmission Highline Project
PCB	polychlorinated biphenyls
pCi	picocuries

PDCC	Port Deposit Chamber of Commerce
PIR	public interest review
P-IBI	phytoplankton index of biotic integrity
PJM	PJM Interconnection, LLC
PM	particulate matter
PM_{10}	particulate matter with a diameter of 10 microns or less
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns or less
PNNL	Pacific Northwest National Laboratory
PPRP	Power Plant Research Program
ppt	parts per thousand
PRA	probabilistic risk assessment
PSD	prevention of significant deterioration
PWR	pressurized water reactor(s)
rad	radiation absorbed dose
RAI	Request for Additional Information
RCAs	resource conservation areas
RCP	reinforced concrete pipe
RCRA	Resource Conservation and Recovery Act of 1976, as amended
RCS	reactor coolant system
rem	Roentgen equivalent man (a special unit of radiation dose)
REMP	radiological environmental monitoring program
RFC	Reliability*First* Corporation
RIMS	Regional Input-Output Multiplier System
ROD	Record of Decision
ROI	region of interest
ROW	rights-of-way
RSICC	Radiation Safety Information Computational Center
Ryr	reactor year
s	second(s)
SAMA	severe accident mitigation alternative
SAMDA	severe accident mitigation design alternative
SAV	submerged aquatic vegetation
SBO	station blackout
SCR	selective catalytic reduction
SEL	sound exposure level
SER	Safety Evaluation Report
SERC	SERC Reliability Corporation
SHA	State Highway Administration
SHPO	State Historic Preservation Office

SMCMC	St. Mary's County Metropolitan Commission
SNE-MA	Southern New England/Middle Atlantic
SO_2	sulfur dioxide
SO_x	sulfur oxide(s)
SPCC	Spill Prevention Control and Countermeasures
SSC	structures, systems, or components
Sv	sievert(s)
SWPPP	Stormwater Pollution Prevention Plan
TAP	toxic air pollutant(s)
TBq	tera becquerel(s)
TDS	total dissolved solids
TEDE	total effective dose equivalent
TIA	Traffic Impact Analysis
TLD	thermoluminescent dosimeter(s)
TOC	total organic carbon
TRU	Transuranic waste
TSP	total suspended particulates
U.S.	United States
U.S. EPR	U.S. Evolutionary Power Reactor
U_3O_8	triuranium octaoxide ("yellowcake")
UHS	ultimate heat sink
UMTRI	University of Michigan Transportation Research Institute
UniStar	UniStar Nuclear Operating Services, LLC and Calvert Cliffs 3 Nuclear Project, LLC (collective applicant)
UO_2	uranium(IV) oxide
USACE	U.S. Army Corps of Engineers (also Corps)
USBLS	United States Bureau of Labor Statistics
U.S.C.	United States Code
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VA	Virginia
VIMS	Virginia Institute of Marine Science
VOC	volatile organic compound(s)
WHO	World Health Organization
WNA	World Nuclear Association
WV	West Virginia

yd	yard
yd^3	cubic yards
yr	year(s)

Appendix A

Contributors to the Environmental Impact Statement

Appendix A

Contributors to the Environmental Impact Statement

The overall responsibility for the preparation of this environmental impact statement was assigned to the Office of New Reactors, U.S. Nuclear Regulatory Commission (NRC). The U.S. Army Corps of Engineers (Corps) is participating as a cooperating agency. The statement was prepared by members of the Office of New Reactors with assistance from other NRC organizations, the Corps, and Pacific Northwest National Laboratory.

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Stan Echols	Office of Nuclear Material Safety and Safeguards	Fuel Cycle
US ARMY CORPS OF ENGINEERS		
Kathy Anderson	Baltimore District, Operations Division, Regulatory Branch	Project Manager/Biologist
Woody Francis	Baltimore District, Operations Division, Regulatory Branch	Project Manager/Biologist
PACIFIC NORTHWEST NATIONAL LABORATORY[(a)]		
Mary Ann Parkhurst		Task Leader/Site Selection Alternatives
Elaine Chapman		Deputy Task Leader
Robin Durham		Deputy Task Leader
Michael Fayer		Hydrology and Geology
Lance Vail		Hydrology/System Alternatives
Corey Duberstein		Terrestrial Ecology
Roy Kropp		Aquatic Ecology
Michelle Niemeyer		Socioeconomics/Environmental Justice/Benefit-Cost
Tom Secrest		Socioeconomics and Environmental Justice
Tara O'Neil		Historic and Cultural Resources
J.V. Ramsdell, Jr.		Meteorology and Air Quality/Accidents
Philip Daling		Transportation
Lissa Staven		Radiation Protection/Health Physics/Decommissioning
Paul Hendrickson		Land Use/Need for Power/Energy Alternatives
David Payson		Technical Editing
Charity Plata		Technical Editing
Mike Parker		Text Processing
Christine Ross		Text Processing
Sharon Johnson		References
Tomiann Parker		References
Donna Austin-Workman		Graphics
AMEC EARTH & ENVIRONMENTAL, INC.		
Michael French		Cultural Resources

(a) Pacific Northwest National Laboratory is operated by Battelle for the U.S. Department of Energy.

Appendix B

Organizations Contacted

Appendix B

Organizations Contacted

The following Federal, State, regional, Tribal, and local organizations were contacted during the course of the U.S. Nuclear Regulatory Commission (NRC) staff's and the U.S. Army Corps of Engineers (Corps) independent review of potential environmental impacts from the construction and operation of one new nuclear unit (Unit 3) at the Calvert Cliffs site in Calvert County, Maryland:

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

Alcoa, Inc., Frederick, Maryland

Bainbridge Development Corp, Port Deposit, Maryland

Calvert County Department of Community Resources, Prince Frederick, Maryland

Calvert County Department of Economic Development, Prince Frederick, Maryland

Calvert County Department of Finance and Budget, Prince Frederick, Maryland

Calvert County Department of Planning and Zoning, Prince Frederick, Maryland

Calvert County Department of Public Safety, Prince Frederick, Maryland

Calvert County Department of Public Works, Prince Frederick, Maryland

Calvert County Emergency Management Office, Prince Frederick, Maryland

Calvert County Housing Authority, Prince Frederick, Maryland

Calvert County Minority Business Alliance, Huntingtown, Maryland

Calvert County Sheriff's Department, Prince Frederick, Maryland

Cedarville Band of Piscataway Indians, Inc., Waldorf, Maryland

Commission on African History and Culture, Annapolis, Maryland

Maryland Department of the Environment, Baltimore, Maryland

Maryland Department of Natural Resources, Annapolis, Maryland

Maryland Department of Transportation, Hanover, Maryland

Maryland Emergency Management Agency, Reisterstown, Maryland

Maryland Historical Trust, Crownsville, Maryland

National Marine Fisheries Service, Annapolis, Maryland

National Marine Fisheries Service, Gloucester, Massachusetts

National Park Service, Washington, DC

New York State Department of Environmental Conservation, Bureau of Habitat, Albany, New York

Pennsylvania Fish and Boat Commission, Harrisburg, Pennsylvania

Pennsylvania Game Commission, Harrisburg, Pennsylvania

Piscataway Conoy Confederacy and Subtribes, Inc., La Plata, Maryland

Piscataway Indian Nation, Accokeek, Maryland

St. Mary’s County Department of Economic & Community Development, Leonardtown, Maryland

St. Mary’s County Department of Land Use & Growth Management, Leonardtown, Maryland

St. Mary’s County Department of Social Services, Leonardtown, Maryland

Susquehanna River Basin Commission, Harrisburg, Pennsylvania

United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada, Road Sprinkler Fitters Local Union 669, Columbia, Maryland

United States Fish and Wildlife Service, Annapolis, Maryland

United Way of Calvert County, Prince Frederick, Maryland

Virginia Department of Game and Inland Fisheries, Richmond, Virginia

Virginia Marine Resources Commission, Newport News, Virginia

The following Federal, State, regional, Tribal, and local organizations were sent the U.S. Army Corps of Engineers public notice dated September 3, 2008, which solicited comments from the public; Federal, State, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the proposed construction of one new nuclear unit (Unit 3) at the Calvert Cliffs site in Calvert County, Maryland:

Anne Arundel County, Maryland

Audubon Naturalist Society

Baltimore County, Maryland

Baltimore County Public Schools, Maryland

Blair County Conservation District, Pennsylvania

Calvert County, Maryland

Campaign to Reinvest in Oxon Hill

Carroll Citizens

Carroll County, Maryland

Charles County, Maryland

Chesapeake Bay Foundation

Citizens to Save South Valley Park and Whetstone Run, Maryland

City of Alexandria, Virginia

City of Baltimore, Maryland

City of Greenbelt, Maryland

City of Rockville, Maryland

City of Sunbury, Pennsylvania

College of Southern Maryland

Conservancy for Charles County, Inc.

Earth Conservation Corps

Fairfax County, Virginia

Fairfax County Water Authority, Virginia

Federal Highway Administration

Garrett County, Maryland

Georgetown University Law Center

Government of the Commonwealth of Pennsylvania

Government of the District of Columbia

Government of the State of Delaware

Government of the State of Maryland

Harford County, Maryland

Herring Run Watershed Association, Baltimore, Maryland

Historic Preservation Trust of Lancaster County, Pennsylvania

Huntington Township, Pennsylvania

Kent County, Maryland

Luzerne Conservation District

Manheim Township, Lancaster County, Pennsylvania

Mattawoman Watershed Society, Inc.

Maryland Association of Soil Conservation Districts, Inc.

Maryland Bass Federation

Maryland Coastal Bays Program

Maryland Department of Business and Economic Development

Maryland Department of the Environment

Maryland Department of Health and Mental Hygiene

Maryland Department of Natural Resources

Maryland Department of Planning

Maryland Department of Transportation

Maryland Military Department

Maryland National Capital Building Industry Association

Montgomery County Sierra Club, Maryland

National Oceanic and Atmospheric Administration

National Park Service

National Trust for Historic Preservation

Naval Research Laboratory

Nuclear Regulatory Commission

Organization of American States

Pennsylvania Association of Soil Conservation Districts, Inc.

Prince George’s County Planning Department, Maryland

Queen Anne’s County, Maryland

Saint Mary’s County, Maryland

Somerset County, Maryland

Southern Maryland Electric Cooperative

Sparrows Point Action, Maryland

Talbot County, Maryland

Tri-County Regional Planning Commission, Harrisburg, Pennsylvania

United States Coast Guard

United States Department of Agriculture

United States Department of Energy

United States Department of Housing and Urban Development

United States Department of Transportation

United States Environmental Protection Agency

United States Fish and Wildlife Service

University of Maryland

University of Maryland Center for Environmental Science

Virginia Department of Conservation and Recreation

Virginia Department of Environmental Quality

Virginia Institute of Marine Science

Washington County, Maryland

West Shore Community Association, Maryland

Appendix C

Chronology of NRC and Corps Environmental Review Correspondence

Appendix C

Chronology of NRC and Corps Environmental Review Correspondence

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and UniStar, and other correspondence related to the NRC staff's environmental review, under Title 10 of the Code of Federal Regulations (CFR) Part 51, for a Combined License (COL) application for the Calvert Cliffs Nuclear Power Plant (CCNPP) near Lusby, Maryland. This application was submitted by UniStar Nuclear Development, LLC on behalf of Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC (collectively referred to as UniStar). The appendix also includes correspondence between the U.S. Army Corps of Engineers (USACE or Corps) and UniStar relating to UniStar's request for a Department of the Army permit for wetland and shoreline development.

All documents, with the exception of those containing proprietary information, are available through the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike (first floor), Rockville, MD, and are available electronically from the Public Electronic Reading Room found on the Internet at the following web address: http://www.nrc.gov/reading-rm.html. From this site, the public can gain access to the NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents in the component of ADAMS. The ADAMS accession numbers for each document are included below.

July 13, 2007	Letter from Mr. R.M. Krich, UniStar, to NRC transmitting application for Combined License for the Calvert Cliffs Nuclear Power Plant (Accession No. ML071980294).
August 15, 2007	Federal Register Notice of Receipt and Availability of the partial COL application for Calvert Cliffs Nuclear Power Plant (72 FR 45832).
December 14, 2007	Letter from Mr. R. M. Krich to NRC transmitting revision 1 of the application for a Combined License for the Calvert Cliffs Nuclear Power Plant (Accession No. ML073520191).
January 25, 2008	Letter from Mr. David B. Matthews, NRC, to Mr. R.M. Krich, UniStar, accepting and docketing the partial COL application for Calvert Cliffs Nuclear Power Plant (Accession No. ML080160547).

January 25, 2008	Press Release No. 08-013: NRC Accepts Partial Application for New Reactor at Calvert Cliffs (Accession No. ML080250401).
January 31, 2008	Federal Register Notice of Acceptance for Part 1 of the COL application for Calvert Cliffs Nuclear Power Plant (73 FR 5877).
February 5, 2008	Letter from Mr. Thomas Fredrichs, NRC, to Mr. Robert Gatton, Calvert Library Southern Branch, regarding maintenance of reference materials for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML080290168).
February 5, 2008	Letter from Mr. Thomas Fredrichs, NRC, to Ms. Pamela Perrygo, Calvert Library Prince Frederick, regarding maintenance of reference materials for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML080290195).
February 7, 2008	Letter from Mr. James E. Lyons, NRC, to Mr. John E. Price, UniStar, transmitting Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Related to a Combined License for Calvert Cliffs Nuclear Power Plant (Accession No. ML080390115).
February 14, 2008	Federal Register Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for the partial Calvert Cliffs Nuclear Power Plant Combined License Application (73 FR 8719).
February 15, 2008	Telecom Summary between the NRC and Maryland Historic Trust (Accession No. ML091350331).
February 20, 2008	Telecom Summary between the NRC and Maryland Historic Trust (Accession No. ML080730294).
February 28, 2008	Press Release No. 08-039: NRC Meeting with Public March 19 on Environmental Issues for Calvert Cliffs New Reactor Application (Accession No. ML080590136).
February 29, 2008	Letter from Mr. Richard Raione, NRC, to Mr. Don Klima, Advisory Council on Historic Preservation, regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080430649).

February 29, 2008	Letter from Mr. Richard Raione, NRC, to Ms. Patricia Kurkul, NOAA National Marine Fisheries Service, regarding request for participation in environmental scoping process and a list of protected species within the area under evaluation for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080370414).
February 29, 2008	Letter from Mr. Richard Raione, NRC, to Mr. J. Rodney Little, Director and State Historic Preservation Officer, regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080430656).
February 29, 2008	Letter from Mr. Richard Raione, NRC, to Mr. Dan Murphy, U.S. Fish and Wildlife Service, regarding request for participation in the environmental scoping process and a list of protected species within the area under evaluation for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080390482).
March 3, 2008	Letter from Mr. Richard Raione, NRC, to Mr. Douglas J. Austin, Pennsylvania Fish and Boat Commission, regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080520182).
March 3, 2008	Letter from Mr. Richard Raione, NRC, to The Honorable Natalie Proctor, Cedarville Band of Piscataway Indians, Inc., regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080570335).
March 5, 2008	Letter from Mr. Richard Raione, NRC, to Mr. Steven G. Bowman, Virginia Marine Resources Commission, regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080520160).
March 5, 2008	Letter from Mr. Richard Raione, NRC, to Mr. Robert W. Duncan, Virginia Department of Game and Inland Fisheries, regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080520092).

March 5, 2008	Letter from Mr. Richard Raione, NRC, to Mr. John R. Griffin, Maryland Department of Natural Resources, regarding request for participation in the scoping process for the Calvert Cliffs Nuclear Power Plant combined license application review (Accession No. ML080450160).
March 5, 2008	Letter from Mr. Richard Raione, NRC, to Ms. Tonya Hardy, Commission on African History and Culture, regarding request for participation in the scoping process for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML080570370).
March 5, 2008	Letter from Mr. Richard Raione, NRC, to Mr. Carl Roe, Pennsylvania Game Commission, regarding request for participation in the scoping process for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML080520172).
March 5, 2008	Letter from Mr. Richard Raione, NRC, to The Honorable Mervin Savory, Piscataway Conoy Confederacy and Subtribes, regarding request for participation in the scoping process for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML080510408).
March 5, 2008	Letter from Mr. Richard Raione, NRC, to The Honorable William “Red Wing” Tayac, Piscataway Indian Nation, regarding request for participation in the scoping process for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML080570294).
March 5, 2008	Memo from Mr. Thomas Fredrichs, NRC, to Mr. Richard Raione, NRC, transmitting the Meeting Notice of Public Meeting to Discuss Environmental Scoping Process for the Calvert Cliffs Nuclear Power Plant Combined License Application (Accession No. ML080460479).
March 14, 2008	Letter from Mr. George Vanderheyden, UniStar, to NRC transmitting Revision 2 of the partial combined license application for Calvert Cliffs Nuclear Power Plant (Accession No. ML080990114).
April 3, 2008	Press Release No. 08-071: Corrected Scoping Comment End Date for Calvert Cliffs New Reactor Application (Accession No. ML080940321).

April 11, 2008	Letter from Ms. Margaret E. Gaffney-Smith, U.S. Army Corps of Engineers, to NRC regarding cooperating status on the Calvert Cliffs Nuclear Power Plant Environmental Impact Statement (Accession No. ML081130278).
April 16, 2008	Letter from Ms. Susan T. Gray, Maryland Department of Natural Resources, to NRC regarding the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML081130284).
April 18, 2008	Press Release No. 08-079: Complete Calvert Cliffs Application for New Reactor Available on NRC Website (Accession No. ML081090082).
April 25, 2008	Letter from Mr. John Rycyna, NRC, to Mr. George Vanderheyden, UniStar, acknowledging receipt of the combined license application for Calvert Cliffs Nuclear Power Plant (Accession No. ML081060307).
May 7, 2008	Letter from Dr. Mary J. Ratnaswamy, U.S. Fish and Wildlife Service, to Ms. Harriet Nash, NRC, providing information on endangered and threatened species within the project area for the Calvert Cliffs Nuclear Power Plant (Accession No. ML081340645).
May 8, 2008	Memo from Mr. Thomas Fredrichs, NRC, to Mr. Richard Raione, NRC, transmitting the Summary of the Public Scoping Meeting to Support the Review of the Calvert Cliffs Nuclear Power Plant Combined License Application (Accession No. ML091690293).
May 13, 2008	Email from Mr. Thomas Fredrichs, NRC, to Mr. George Wrobel, UniStar, transmitting Requests for Additional Information for the Environmental Review of the Calvert Cliffs Combined License Application (Accession No. ML081430521).
May 16, 2008	Letter from Mr. Dimitri Lutchenkov, UniStar to the U.S. Army Corps of Engineers transmitting Joint Federal / State Application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland (Accession No. ML081840343).
May 20, 2008	Letter from Robin D. Leone, on behalf of UniStar, to the Maryland Public Service Commission, transmitting the Joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland for Calvert Cliffs (Accession No. ML093370101).

May 30, 2008	Letter from Mr. John E. Price, UniStar, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, supplementing Joint Federal/State Application for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML093630079).
June 3, 2008	Letter from Mr. John Rycyna, NRC, to Mr. George Vanderheyden, UniStar, accepting and docketing Part 2 of the combined license application for Calvert Cliffs Nuclear Power Plant (Accession No. ML081510149).
June 4, 2008	Press Release No. 08-110: NRC Accepts Application for the New Reactor at Calvert Cliffs (Accession No. ML081560749).
June 9, 2008	Federal Register Notice of Acceptance for Part 2 of the combined license application for Calvert Cliffs Nuclear Power Plant (73 FR 32606).
June 10, 2008	Letter from Mr. George Vanderheyden, UniStar, to NRC transmitting the responses to the May 13, 2008 requests for additional information (Accession No. ML100040300.
June 11, 2008	Letter from Mr. Nilesh Chokshi, NRC, to Ms. Margaret E. Gaffney-Smith, U.S. Army Corps of Engineers, responding to cooperating agency status request for the Calvert Cliffs Nuclear Power Plant Environmental Impact Statement (Accession No. ML081570139).
July 10, 2008	Memo from Mr. Thomas Fredrichs, NRC, to Mr. Richard Raione, NRC, transmitting the Trip Report for the Calvert Cliffs Environmental Site Audit from March 17-20, 2008 (Accession No. ML081900202).
July 10, 2008	Memo from Mr. Robert Tabisz, Maryland Department of the Environment, to Calvert Cliffs 3 Nuclear Project LLC and Bechtel Power Corporation regarding permit request (Accession No. ML093630084).
July 14, 2008	Letter from Mr. Dimitri Lutchenkov, UniStar, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, providing supplemental information for Joint Federal / State Application (Accession No. ML091671199).
August 1, 2008	Letter from Ms. Robin D. Leone, Saul Ewing Attorneys at Law representing UniStar, to Ms. Terry J. Romine, Maryland Public Service Commission, transmitting revised information for the Certificate of Public Convenience and Necessity to Construct a Nuclear Power Plant at Calvert Cliffs (Accession No. ML091671372).

August 18, 2008	Letter from Mr. George Vanderheyden, UniStar, to NRC transmitting responses to environmental requests for additional information for the combined license application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML083480179).
August 20, 2008	Letter from Mr. George Wrobel, UniStar, to NRC transmitting Revision 3 of the Calvert Cliffs Combined License Application (Accession No ML082390786).
August 29, 2008	E-mail from Mr. Thomas Fredrichs, NRC, to Mr. George Wrobel, UniStar, transmitting feedback on UniStar responses to environmental requests for additional information for the combined license application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML082910710).
September 3, 2008	U.S. Army Corps of Engineers Public Notice for comment period for Calvert Cliffs Nuclear Power Plant (Accession No. ML082550288).
September 10, 2008	E-mail from Mr. Thomas Fredrichs, NRC, to Mr. George Wrobel, UniStar, transmitting supplemental terrestrial ecology requests for additional information for the combined license application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML082910713).
September 18, 2008	Letter from Mr. John Rycyna, NRC, to Mr. George Vanderheyden, UniStar, enclosing Notice of Hearing and Opportunity to Petition for Leave to Intervene and Order Imposing Procedures for Access to Sensitive Unclassified Non-Safeguards Information (SUNSI) and Safeguards Information (SGI) for Contention Preparation on a Combined License for the Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML082530335).
September 19, 2008	E-mail from Mr. Thomas Fredrichs, NRC, to Mr. George Wrobel, UniStar, transmitting revised terrestrial ecology requests for additional information for the combined license application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML082910711).
September 19, 2008	Letter from Mr. George Vanderheyden, UniStar, to NRC transmitting Request for Additional Information Response related to LADTAP and GASPAR Files (Accession No. ML093370357).
September 22, 2008	Email from Mr. Jim Burkman, Constellation, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, transmitting revision 3 corrections to the work description for the Corps review (Accession No. ML091350328).

September 25, 2008	Comment form submitted by Maryland Historical Trust in response to U.S. Army Corps of Engineers public notice (Accession No. ML093630083).
September 26, 2008	Federal Register Notice of Hearing and Opportunity to Petition for Leave to Intervene and Order Imposing Procedures for Access to SUNSI and SGI for Contention Preparation on a Combined License for the Calvert Cliffs Nuclear Power Plant Unit 3 (73 FR 55876).
September 26, 2008	Press Release No. 08-178: NRC Announces Opportunity to Participate in the Hearing on the New Reactor Application for Calvert Cliffs (Accession No. ML082700493).
September 29, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting responses to supplemental aquatic ecology requests for additional information (Accession No. ML090420560).
September 30, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting updated response to environmental request for additional information (Accession No. ML082770047).
September 30, 2008	Letter from Mr. Leopoldo Miranda, U.S. Fish and Wildlife Service, to Colonel Peter W. Mueller, U.S. Army Corps of Engineers- Baltimore District, responding to public notice (Accession No. ML093630080).
October 3, 2008	Letter from Mr. John Nichols, NOAA, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, regarding the Calvert Cliffs Nuclear Power Plant combined operating license application environmental review (Application No. ML082910715).
October 9, 2008	Memo from Mr. Thomas Fredrichs, NRC, to Mr. Andrew Kugler, NRC transmitting the Scoping Summary Report Related to the Environmental Scoping Process for the Calvert Cliffs Unit 3 Combined License Application Review (Accession No. ML093290199).
October 14, 2008	E-mail from Mr. John Rycyna, NRC, to Mr. George Wrobel, UniStar, transmitting supplemental environmental requests for additional information (Accession No. ML082900834).
October 17, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting responses to terrestrial ecology requests for additional information (Accession No. ML082960400).

October 21, 2008	Memo from Mr. Thomas Fredrichs, NRC, to Mr. Gregory Hatchett, NRC, transmitting the Trip report from Calvert Cliffs intake structure and Thiokol Alternative site visits (Accession No. ML082910218).
October 23, 2008	Letter from Ms. Linda C. Janey, Maryland Department of Planning, to Mr. Dimitri Lutchenkov, UniStar, transmitting comments on the proposed Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML093630081).
October 27, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting supplemental responses to aquatic ecology requests for additional information (Accession No. ML083080068).
October 27, 2008	Letter from Mr. Dimitri Lutchenkov, UniStar, to the Ms. Kathy Anderson, U.S. Army Corps of Engineers, requesting a decision on wetlands permits to be made within 30 days of publication of the final environmental impact statement (Accession No. ML083230532).
October 28, 2008	Letter from Mr. William P. Seib, U.S. Army Corps of Engineers, to Mr. Thomas E. Roberts, Calvert Cliffs 3 Nuclear Project LLC, in response to application to build a nuclear power plant at the Calvert Cliffs site (Accession No. ML083170295).
October 31, 2008	Letter from Mr. Elder Ghigiarelli, Jr., Maryland Department of the Environment, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, regarding Section 401 Water Quality Certification for Calvert Cliffs Nuclear Power Plant (Accession No. ML093630082).
October 31, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting responses to environmental requests for additional information (Accession No. ML083110676).
October 31, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting response to request for additional information related to intake structure relocation affected sections in the combined license application (Accession No. ML0831008361).
November 11, 2008	Letter from Mr. Dimitri Lutchenkov, UniStar, to Mr. William P. Seib, U.S. Army Corps of Engineers, transmitting responses to information needs detailed in October 28, 2008 letter (Accession No. ML091530687).

November 25, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting corrected revision 3 to the combined license application (Accession No. ML083470549).
December 4, 2008	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting supplemental response to environmental impact statement issue #5 (Accession No. ML083440067).
January 9, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting supplemental responses to hydrology requests for additional information (Accession No. ML090710106).
January 14, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting intake structure relocation changes for the Environmental Report (Accession No. ML090220368).
January 16, 2009	Letter from Mr. Joseph Colaccino, NRC, to Mr. Greg Gibson, UniStar, indicating a change in the schedule for the environmental review (Accession No. ML083570651).
January 20, 2009	Letter from Mr. Dimitri Lutchenkov, UniStar, to Mr. William P. Seib, U.S. Army Corps of Engineers- Baltimore District, providing updated responses to questions on the Joint Federal/State Application (Accession No. ML093630095).
January 30, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting draft Unanticipated Discoveries Plan (Accession No. ML090350358).
February 3, 2009	Letter from Mr. Thomas L. Fredrichs, NRC, to Mr. Greg Gibson, UniStar, transmitting environmental requests for additional information (Accession No. ML083310256).
February 12, 2009	Letter from Mr. Dimitri Lutchenkov, UniStar, to Mr. William P. Seib, U.S. Army Corps of Engineers in regards to multi-agency site visit on January 15 and 16, 2009 (Accession No. ML090620242).
February 13, 2009	Letter from Mr. J. Rodney Little, Maryland Historical Trust, to Mr. William P. Seib, U.S. Army Corps of Engineers regarding effects on cultural resources (Accession No. ML090570416).

February 18, 2009	Letter from Mr. Dimitri Lutchenkov, UniStar, to Ms. Amanda Sigillito, Maryland Department of the Environment, transmitting Phase I Compensatory Mitigation Plan for Non-Tidal and Stream Impacts associated with Calvert Cliffs Unit 3 (Accession No. ML093630094).
February 19, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting supplemental response to hydrology requests for additional information (Accession No. ML090550125).
February 27, 2009	Letter from Mr. Dimitri Lutchenkov, UniStar, to Mr. William P. Seib, U.S. Army Corps of Engineers, transmitting responses to information needs detailed in October 28, 2008 letter (Accession No. ML091480200).
February 27, 2009	Telecom Summaries for Telecoms held with UniStar from February 13, 2009 to February 24, 2009 regarding Requests for Additional Information issued February 3, 2009 (Accession No ML090820698).
March 3, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting the Phase I Wetland/Stream Mitigation Plan (Accession No. ML093380593)
March 5, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC responding to environmental requests for additional information (Accession No. ML090710146).
March 9, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Revision 4 to the Combined License Application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML090860325).
March 16, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting schedule for revisions to the Combined License Application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML090770890).
March 17, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Steve Sanford, Bureau of Habitat, regarding request for participation in the scoping process for the environmental review of the Calvert Cliffs Nuclear Power Plant combined license application (Accession No. ML083400571).
March 23, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Greg Gibson, UniStar, regarding project manager change for the combined license environmental review for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML090700448).

March 23, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC responding to environmental requests for additional information (Accession No. ML090840149).
March 27, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC describing scope of Revision 5 to the Combined License Application for the Calvert Cliffs Nuclear Power Plant (Accession No. ML090900186).
March 30, 2009	Memo from Mr. Thomas Fredrichs, NRC, to Mr. Robert Schaaf, NRC, transmitting the Trip Report from Calvert Cliffs alternative site visits (Accession No. ML090650192).
April 2, 2009	Email from Mr. Chuck Nieder, New York Natural Heritage Program to Ms. Laura Quinn, NRC, regarding information request on the alternative sites located in New York State (Accession No. ML 091170694).
April 14, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC regarding restrictions of construction and refurbishment of the barge slip and unloading facility and associated dredging (Accession No. ML091060748).
April 22, 2009	Letter from Ms. Laura Quinn, NRC, to Mr. Greg Gibson, UniStar, transmitting supplemental environmental requests for additional information (Accession No. ML090580042).
April 24, 2009	Memo from Ms. Laura Quinn, NRC, to Mr. Robert Schaaf, NRC transmitting the Meeting Notice for the Public Meeting to Discuss the Alternative Siting Process for the Proposed Calvert Cliffs Combined License Application for Unit 3 (Accession No. ML091180022).
April 27, 2009	Letter from Ms. Kelly P. Neff, Maryland Department of the Environment, to Mr. Dimitri Lutchenkov, UniStar, approving the Phase I Mitigation Plan for Calvert Cliffs Nuclear Power Plant (Accession No. ML091270980).
May 13, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting the Federal Fish and Wildlife Permit for Eagle Scientific Collecting (Accession No. ML091340643).
May 19, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting responses to environmental requests for additional information (Accession No. ML091410432).

May 22, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Biological Evaluation for Tiger Beetles (Accession No. ML091480389).
May 22, 2009	Letter from Mr. Greg Gibson, UniStar, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, transmitting Mitigation Summary for National Register of Historic Places- Eligible Historic Properties (Accession No. ML091660537).
May 22, 2009	Letter from Mr. Greg Gibson, UniStar, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, transmitting the Maryland Department of the Environment approval letter for the Calvert Cliffs Nuclear Power Plant Unit 3 Phase I Nontidal Wetlands Mitigation Plan (Accession No. ML091660577).
June 1, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC regarding Alternate Site Evaluation Report Submittal Schedule (Accession No. ML091540279).
June 2, 2009	Memo from Ms. Laura Quinn, NRC, to Mr. Robert Schaaf, NRC transmitting the Meeting Summary of the Alternative Site Selection Process Meeting for the Calvert Cliffs Nuclear Power Plant Combined License Application (Accession No. ML091390621).
June 3, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC regarding request for Portable Document Format Meteorological Data (Accession No. ML091620273).
June 8, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting U.S. Department of Energy contract in response to environmental request for additional information (Accession No. ML091610666).
June 11, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC, transmitting figure in response to environmental request for additional information (Accession No. ML091690067).
June 30, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Revision 5 of the Calvert Cliffs Nuclear Power Plant Combined License Application (Accession No. ML0918805530).
July 15, 2009	Letter from Ms. Beth Bachur, U.S. Army Corps of Engineers, to Mr. Reid J. Nelson, Advisory Council on Historic Preservation, notifying the Council of a Memorandum of Agreement for the review of the Calvert Cliffs application (Accession No. ML0930602350).

July 17, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing revised alternate site evaluation (Accession No. ML092020313).
July 24, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing follow-up responses to environmental requests for additional information (Accession No. ML092150728).
July 24, 2009	Letter from Mr. Raymond Wallace, Advisory Council on Historic Preservation, to Ms. Beth E. Bachur, U.S. Army Corps of Engineers, regarding the Memorandum of Agreement for the Calvert Cliffs application review (Accession No. ML093060220).
July 29, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing follow-up responses to environmental requests for additional information (Accession No. ML092120061).
July 30, 2009	Letter from Ms. Beth E. Bachur, U.S. Army Corps of Engineers, to Mr. Michael Lesar, NRC, regarding the Corps' comments on the Phase I Stream and Wetland Mitigation Plan for the Calvert Cliffs project (Accession No. ML093240035).
July 31, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing follow-up responses to environmental requests for additional information (Accession No. ML092190635).
August 7, 2009	Email from Ms. Laura Quinn, NRC, to Mr. Dimitri Lutchenkov, UniStar, transmitting the Calvert Cliffs Site Audit Information Needs for the Revised Alternative Site Audit and Visit (Accession No. ML092340028).
August 20, 2009	Letter from Mr. Joseph Colaccino, NRC, to Mr. George Vanderheyden, UniStar, transmitting revised environmental schedule for the combined license application review for the Calvert Cliffs Nuclear Power Plant, Unit 3 (Accession No. ML092190214).
August 27, 2009	Letter from Ms. Laura Quinn, NRC, to Mr. Greg Gibson, UniStar, transmitting Request for Additional Information Related to the Environmental Report for the Calvert Cliffs Combined License Application – Ozone Air Emissions During Construction and Operation (Accession No. ML092260454).

August 29, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing revision 1 of the alternate site evaluation and Environmental Report Chapter 9.3 (Accession No. ML092450557).
September 3, 2009	Letter from Ms. Laura Quinn, NRC, to Mr. Mark Stiffler, Alcoa Corporate Center, expressing appreciation for site tour of the Alcoa Eastalco Works Frederick, Maryland site (Accession No. ML092370676).
September 3, 2009	Letter from Ms. Laura Quinn, NRC, to Ms. Donna C. Tapley, Bainbridge Development Corporation, expressing appreciation for site tour of the former Bainbridge Naval Training Center site in Port Deposit, Maryland (Accession No. ML092390270).
September 10, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing input/output files from TRAGIS and RADTRAN programs for alternative sites (Accession No. ML092570249).
September 16, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Dimitri Lutchenkov, UniStar, regarding Calvert Cliffs Nuclear Power Plant combined license application online reference portal (Accession No. ML092520671).
September 17, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing follow-up response to environmental request for additional information (Accession No. ML092640140).
September 18, 2009	Letter from Ms. Laura Quinn, NRC, to Mr. Greg Gibson, UniStar, to NRC transmitting environmental requests for additional information on revised alternative sites (Accession No. ML092450423).
September 21, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC accepting terms of online reference portal operation (Accession No. ML092670169).
September 25, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing responses to environmental requests for additional information (Accession No. ML092730188).
September 25, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing response to environmental requests for additional information (Accession No. ML092730202).

September 25, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting the response to request for additional information number 1019 (Accession No. ML092730187).
September 25, 2009	Letter from Mr. Greg Gibson, UniStar, to Ms. Beth Bachur, U.S. Army Corps of Engineers, transmitting the Summary of the Phase I Mitigation Plan for the Non-Tidal Wetland and Stream Impacts (Accession No. ML093380280).
September 30, 2009	Letter from Mr. Greg Gibson, UniStar to NRC transmitting Revision 6 of the Calvert Cliffs Nuclear Power Plant Combined License Application (Accession No. ML092880200).
October 2, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC providing schedule for completion of updated construction emissions analysis for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092800159).
October 9, 2009	Letter from Mr. Greg Gibson, UniStar, to Mr. J. Rodney Little, Director and State Historic Preservation Officer, providing Architectural and Historical Resources Field Documentation Update (Accession No. ML092870437).
October 14, 2009	Letter from Mr. Greg Gibson, UniStar, to Ms. Marian Honeczy, Maryland Forest Service, transmitting the Forest Conservation Plan (ML093380281).
October 15, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting supplemental response to Questions No. 1 and No. 5 of the U.S. Army Corps of Engineers request for additional information No. 1019 (Accession No. ML092920352).
October 19, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Revised Supplemental Response to request for additional information SE-2 (Accession No. ML092940343).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Douglas Austin, Pennsylvania Fish and Boat Commission, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660314).

October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Steven G. Bowman, Virginia Marine Resources Commission, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660325).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Robert W. Duncan, Virginia Department of Game and Inland Fisheries, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660318).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. John R. Griffin, Maryland Department of Natural Resources, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660202).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Ms. Patricia Kurkul, National Marine Fisheries Service, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660237).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Leopoldo Miranda, U.S. Fish & Wildlife Service, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660268).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Carl Roe, Pennsylvania Game Commission, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660259).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Mr. Paul Swartz, Susquehanna River Basin Commission, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660186).
October 26, 2009	Letter from Mr. Robert G. Schaaf, NRC, to Ms. Shari Wilson, Maryland Department of the Environment, requesting information on new alternative sites identified for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML092660193).

October 26, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC, transmitting updated responses to requests for additional information number 1006 and 1013 (Accession No. ML093020150).
October 29, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC responding to questions on Combined License Application Revision 5 changes (Accession No. ML093070286).
November 4, 2009	Email from Dr. Diana Post, Rachel Carson Council, to Ms. Laura Quinn, NRC, regarding opposition to the Calvert Cliffs Unit 3 Project (Accession No. ML093550177).
November 4, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting supplemental response to Request for Additional Information number 37, “Hydraulic Dredging” (Accession No. ML093130127).
November 13, 2009	Letter from Ms. Susan T. Gray, Maryland Department of Natural Resources, to Ms. Laura Quinn, NRC, transmitting the response to the request for information on the new alternative sites for the Calvert Cliffs review (Accession No. ML093280756).
November 16, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Supplemental Response to Request for Additional Information Number 124, Estimated Tax Benefit (Accession No. ML093220193).
November 16, 2009	Email from Mr. Dave Spotts, Pennsylvania Fish and Boat Commission, to Ms. Laura Quinn, NRC, responding to the information request on the revised alternative sites (Accession No. ML093290145).
November 20, 2009	Letter from Ms. Deborah E Jennings, DLA Piper on behalf of UniStar, to Ms. Terry J. Romine, Public Service Commission of Maryland, transmitting Application of Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC for a Certificate of Public Convenience and Necessity Authorizing the Modification of the Calvert Cliffs Unit 3 Project at Calvert Cliffs in Calvert County, Maryland (Accession No. ML093380229).
December 3, 2009	Letter from Mr. Greg Gibson, UniStar, to Ms. Kathy Anderson, U.S. Army Corps of Engineers, transmitting Temporary Impacts to Wetlands and Streams Associated with Mitigation Construction Activities for Calvert Cliffs Unit 3 (Accession No. ML093370671).

December 4, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting responses to NRC telecom questions regarding Combined License Application Revision 6 (Accession No. ML093421232).
December 7, 2009	Email from Mr. Ernie Aschenbach, Virginia Dept. of Game and Inland Fisheries to Ms. Laura Quinn, NRC, regarding the Information Request on the New Alternative Sites (Accession No. ML093520692).
December 8, 2009	Letter from Mr. Greg Gibson, UniStar, to Ms. Amanda Sigillito, Maryland Department of the Environment and Ms. Kathy Anderson, Corps transmitting the Conceptual Phase II Non-Tidal Wetland and Stream Mitigation Plan for Calvert Cliffs Unit 3 (Accession No. ML0935206940).
December 9, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Low level Waste Disposal Plans for Calvert Cliffs Unit 3 (Accession No. ML093480069).
December 10, 2009	Memo from Mr. John Nichols, National Oceanic and Atmospheric Administration, to Ms. Laura Quinn, NRC, transmitting Calvert Cliffs Nuclear Power Plant, Unit 3 Alternative Sites Analysis Information (Accession No. ML093520687).
December 11, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting RAI No. 1014 NOx and VOC Air Emissions during Construction and Operation (Accession No. ML093491087).
December 17, 2009	Letter from Mr. Greg Gibson, UniStar, to Kathy Anderson, Corps, transmitting the Summary of the Conceptual Phase II Non-Tidal Wetland and Stream Mitigation Plan for Calvert Cliffs Unit 3 (Accession No. ML093620517).
December 23, 2009	Letter from Mr. Robert Schaaf, NRC, to Dr. Diana Post, Rachel Carson Council, Inc., regarding Comments on the Environmental Review for the Combined License Application for Calvert Cliffs (Accession No. ML093290154).
December 31, 2009	Letter from Mr. Greg Gibson, UniStar, to NRC transmitting Summary - Refinements between the Phase I Conceptual Phase II Nontidal Wetland and Stream Cliffs Nuclear Power Plant, Unit 3 (Accession No. ML100050191)

January 28, 2010	Letter from Mr. Leopoldo Miranda, U.S. Fish and Wildlife Service, to Mr. Robert Schaaf, NRC, transmitting Information and Consultation request regarding the combined license application for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML100430613).
February 23, 2010	Letter from Mr. Frank Akstulewicz, NRC, to Mr. George Vanderheyden, UniStar, transmitting Revised Environmental Schedule for the Combined License Application Review for the Calvert Cliffs Nuclear Power Plant, Unit 3 (Accession No. ML100540412).
February 25, 2010	Letter from Mr. Leopoldo Miranda, U.S. FWS, to Mr. Robert Schaaf, NRC, regarding New Alternative Sites in Maryland for Calvert Cliffs Nuclear Power Plant Unit 3 (Accession No. ML100640429).
March 2, 2010	Memo from Ms. Laura Quinn, NRC, to Mr. Robert Schaaf, NRC, transmitting the Trip Report to Calvert Cliffs for the Tiger Beetle and Phase I Mitigation Plan Activities (Accession No. ML100070711).
March 2, 2010	Memo from Ms. Laura Quinn, NRC, to Mr. Robert Schaaf, NRC, transmitting Trip Report: Interviews with Public Officials regarding Socioeconomic and Environmental Justice Information for Calvert Cliffs Unit 3 (Accession No. ML100050174).
March 11, 2010	Letter from Mr. Greg Gibson, UniStar, to Ms. Laura Quinn, NRC, transmitting UniStar Nuclear Energy, NRC Docket No. 52-016 Calvert Cliffs Nuclear Power Plant, Unit 3 CZMA Certification (Accession No. ML100740273).
March 16, 2010	Memo from Ms. Laura Quinn, NRC, to Robert Schaaf, NRC, transmitting the Calvert Cliffs Site Audit Summary for the Revised Alternative Sites (Accession No. ML100040227).
March 16, 2010	Letter from Ms. Kathy Anderson, Corps, to Mr. Reid Nelson, ACHP, transmitting the Memorandum of Agreement for Cultural and Historic Resources for the Proposed Unit 3 at Calvert Cliffs (Accession No. ML100810272.

Appendix D

Scoping Comments and Responses

Appendix D

Scoping Comments and Responses

On February 14, 2008, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process in the *Federal Register* (73 FR 8719) (ML080390115). The Notice of Intent notified the public of the staff's intent to prepare an environmental impact statement (EIS) and conduct scoping for the combined license (COL) application received from UniStar Nuclear Development, LLC (UniStar) for a new nuclear plant, identified as Calvert Cliffs Unit 3, to be located at the existing Calvert Cliffs site, located approximately 60 mi south of Baltimore. This EIS has been prepared in accordance with provisions of the National Environmental Policy Act of 1969, as amended (NEPA); Council on Environmental Quality guidelines; and Title 10 of the Code of Federal Regulations (CFR) Parts 51 and 52. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the *Federal Register* Notice. The NRC invited the applicant; Federal, Tribal, State, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at two scheduled public meetings and/or by submitting written suggestions and comments no later than April 14, 2008.

The scoping process provides an opportunity for public participation to identify items to be addressed in the EIS and highlight public concerns and issues. The Notice of Intent identified the following objectives of the scoping process:

- Define the proposed action that is to be the subject of the EIS.
- Determine the scope of the EIS and identify significant issues to be analyzed in depth.
- Identify and eliminate from detailed study those issues that are peripheral or that are not significant.
- Identify any environmental assessments and other EISs that are being prepared or will be prepared that are related to, but not part of, the scope of the EIS being considered.
- Identify other environmental review and consultation requirements related to the proposed action.
- Identify parties consulting with the NRC under the NHPA, as set forth in 36 CFR 800.8(c)(1)(i).
- Indicate the relationship between the timing of the preparation of the environmental analyses and the Commission's tentative planning and decision-making schedule.

- Identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completing the EIS to the NRC and any cooperating agencies.
- Describe how the EIS will be prepared, and identify any contractor assistance to be used.

Two public scoping meetings were held in Solomons, Maryland, on March 19, 2008. Approximately 250 people attended the afternoon session, and approximately 225 people attended the evening session. Each meeting began with NRC staff members providing a brief overview of NRC's review process for COL applications and the NEPA process. After the NRC's prepared statements, the meetings were opened for public comments. Twenty-seven (27) afternoon scoping meeting attendees and 21 evening scoping meeting attendees provided oral comments that were recorded and transcribed by a certified court reporter. Five written statements were received during the meetings. In addition to the oral and written statements provided at the public scoping meetings, six letters and 201 emails were received during the scoping period.

Transcripts for both the afternoon and evening scoping meetings can be found in the NRC's Agency Document Access and Management System (ADAMS), under accession numbers ML081160460 and ML081160468, respectively. ADAMS is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams/web-based.html (in the Public Electronic Reading Room; note that the URL is case-sensitive). A meeting summary (ML091690293) was issued May 8, 2008.

At the conclusion of the scoping period, the NRC staff reviewed the scoping meeting transcripts and all written material received during the comment period and identified individual comments. These comments were organized according to topic within the proposed EIS or according to the general topic if outside the scope of the EIS. Once comments were grouped according to subject area, the staff determined the appropriate response for the comment. The staff made a determination on each comment that it was one of the following:

- a comment that was actually a question and introduced no new information.
- a comment that was either related to support or opposition of combined licensing in general (or specifically the Calvert Cliffs COL) or that made a general statement about the COL process. In addition, it provided no new information and did not pertain to 10 CFR Part 52.
- a comment about an environmental issue that
  - provided new information that would require evaluation during the review
  - provided no new information.
- a comment that was outside the scope of the COL, which included, but was not limited to, a comment on the safety of the existing units.

After comments were grouped according to subject area, the staff prepared responses to the comments, identifying which were within the scope of the EIS. The *Calvert Cliffs Unit 3 Combined License Scoping Summary Report* was released in October 2008 and is available in ADAMS at accession number ML082630585.

Each comment applicable (in scope) to this environmental review is summarized in this appendix. This information, which was extracted from the *Calvert Cliffs Unit 3 Combined License Scoping Summary Report*, is provided for convenience of those interested in the scoping comments. The comments that are outside of the scope of the environmental review for the proposed Unit 3 site are not included here. These include comments related to

- Safety
- Emergency preparedness
- NRC oversight for operating plants
- Security and terrorism
- Support or opposition to the licensing action, licensing process, nuclear power, hearing process, or the existing plant.

Changes to a few of the responses have made since the publication of the Scoping Summary Report (e.g., revisions to the EIS outline) and are indicated within brackets. Most of these refer to changes or the addition of EIS chapter or section numbers for the reader's convenience.

Table D-1 identifies, in alphabetical order, the individuals providing comments during the scoping period; their affiliation, if given; and the ADAMS accession number that can be used to locate the correspondence. Although all commenters are listed to maintain consistency with the scoping summary report numbering system, the comments presented in this appendix are limited to those within the scope of the environmental review. Table D-2 lists the comment categories in alphabetical order and commenter names and comment numbers for each category. The balance of this appendix presents the comments themselves with NRC staff responses organized by topic category.

Table D-1. Individuals Providing Comments During the Comment Period

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Acevedo, NK	Self	Email (ML081510581)
Aitken, Keith	Self	Email (ML081510623)
Albright, Evan	Self	Email (ML081510692)
Andereson, David	Self	Email (ML081510716)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Arist, Phyllis	Self	Email (ML081510632)
Armas, Zoe	Self	Email (ML081510729)
Arndt, Gunter	Self	Email (ML081510518)
Avance, Kenneth	Self	Email (ML081510635)
Bainum, Meghan	Self	Email (ML081510728)
Bakalian, Craig	Self	Email (ML081510684)
Baldwin, Natylie	Self	Email (ML081510549)
Barr, Phillip	Self	Email (ML081510560)
Bartholomew, Alice	Self	Email (ML081510640)
Baummer, Thomas	Self	Email (ML081510546)
Be, Maya	Self	Email (ML081510776)
Becker, Rochelle	Self	Email (ML081510698)
Bedding, Gerhard	Self	Email (ML081510586)
Behabadi, Bardia	Self	Email (ML081510659)
Benton, Mike	Self	Meeting Transcript (ML081160460)
Bissonnette, Rick	Self	Email (ML081510714)
Black, Monica Latka	Self	Email (ML081510585)
Blomstrom, Eric	Self	Email (ML081510525)
Borrowman, Ellen	Self	Email (ML081510711)
Boswell, William	Self	Email (ML081510521)
Boxwell, Bob	Self	Meeting Transcript (ML081160460)
Briggs, Ruth	Self	Email (ML081510673)
Brown, Jr., Edsel	NAACP of Calvert County	Email (ML081510736)
Buchanan, Bill	Self	Meeting Transcript (ML081160468)
Burton, Bob	Anne Arundel County Chamber of Commerce	Meeting Transcript

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
		(ML081160460)
C, Suzy [per email]	Self	Email (ML081510568)
Chambers, Bill	Self	Meeting Transcript (ML081160468)
Chinn, Jason	Self	Email (ML081510688)
Clark, Gerald	Board Of County Commissioners, Calvert County	Letter (ML081160363)
Clark, Kevin	Self	Email (ML081510783)
Clark, Loralee	Self	Email (ML081510703)
Cleaver, Melissa	Self	Email (ML081510602)
Coster, Steven	Self	Email (ML081510519)
Cox, Duncan	Self	Email (ML081510667)
Crawley, Jackie	Self	Email (ML081510791)
Crocca, Carol	Self	Email (ML081510641)
Culp, Richard	Self	Email (ML081510672)
Curington, Diana	Self	Email (ML081510725)
Daddy, Big [per email]	Self	Email (ML081510784)
Darbyshire, David	Self	Email (ML081510792)
DesHarnais, Gaston	Self	Email (ML081510651)
Diaz, Lorenzo	Self	Email (ML081510638)
Dolly, William	Self	Email (ML081510637)
Donn, Marjory	Self	Letter (ML0808404265)
Dubois, Gwen	Physicians for Social Responsibility	Meeting Transcript (ML081160468)
Dufay, Frank	Self	Email (ML081510627)
Emmons, Cheryl	Self	Email (ML081510697)
Erdesohn, Cynthia	Self	Email (ML081510721)
Evans, Michael	Self	Email (ML081510628)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Faigle, Susan	Self	Email (ML081510609)
Fernow, Geoff	Self	Email (ML081510679)
Finnelli, Marilyn and Tom	Self	Email (ML081510685)
Fisher, Allison	Self	Email (ML081510544)
Foppe, Paul	Self	Email (ML081510686)
Fuller, Alfred	Self	Email (ML081510539)
Futterer, Joe	Self	Email (ML081510524)
Gaffney-Smith, Margaret	Department of the Army	Letter (ML0811302781)
Gannaway, Gloria	Self	Email (ML081510526)
Garbato, Kelly	Self	Email (ML081510622)
Garner, Patrick	Self	Email (ML081510678)
Garrett, Nick	Calvert County Tourism Advisory Commission	Meeting Transcript (ML081160468)
Gilpin, John	Self	Email (ML081510709)
Good, Riana	Self	Email (ML081510528)
Goodrich, Anne	Self	Email (ML081510536)
Grad, Robert	Self	Email (ML081510582)
Grand, Robert	Self	Email (ML081510608)
Grassi, Rosemarie	Self	Email (ML081510796)
Gray, Susan	Maryland Department of Natural Resources	Letter (ML0811302840)
Green, Bonnie	Patuxent Partnership	Meeting Transcript (ML081160460)
Guay-Brezner, Colette	Self	Email (ML081510580)
Gunter, Paul	Nuclear Information and Research Service	Meeting Transcript (ML081160468)
Harberson, Laurie	Self	Email (ML081510639)
Hauck, Molly	Self	Email (ML081510587)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Hedlund, Cara	Self	Email (ML081510732)
Helvick, Steven	Self	Email (ML081510726)
Henderson, Sherry	Self	Email (ML081510777)
Hinton, Georgia	Self	Email (ML081510574)
Hodge, Gary	Tri-County Council for Southern Maryland	Letter (ML081130650)
Hoffman, Lilli	Self	Email (ML081510569)
Holzer, Frederick	Self	Email (ML081510664)
Hood, Marilyn	Self	Email (ML081510605)
Hooker, Betsy	Self	Email (ML081510778)
Huffman, Debbie	Self	Email (ML081510643)
Hughey, Patricia	Self	Email (ML081510648)
Hung, Shiu	Self	Email (ML081510541)
Hunter, Theresa	Self	Meeting Transcript (ML081160460)
Hutchinson, Richard	Self	Email (ML081510720)
Ireland, John	Self	Email (ML081510694)
Johnston, Bill		Meeting Transcript (ML081160460)
Jones, Hollis	Self	Email (ML081510572)
Jones-Giampalo, Mary	Self	Email (ML081510702)
Joos, Sandra	Self	Email (ML081510530)
Jula, Patty	Self	Email (ML081510547)
Kaliski, Raymond	Self	Email (ML081510590)
Kamps, Kevin	Beyond Nuclear	Meeting Transcript (ML081160468)
Kanaley, Mike	Clean and Safe Energy Coalition	Meeting Transcript (ML081160468)
Kane, Donna	Self	Email (ML081510588)
Karbowsky, Brad	United Association of Plumbers, Steamfitters,	Meeting Transcript

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
	and Sprinkler fitters	(ML081160468)
Katz, Shari	Self	Email (ML081510607)
Kelley, Linda	Calvert County Board of Commissioners	Letter (ML081160363)
Kjer, Timothy	Self	Email (ML081510520)
Klusman, Eric	Self	Email (ML081510534)
Knechel, David	Self	Email (ML081510550)
Kramer, Loren	Self	Email (ML081510657)
Kuintzle, Gaylene	Self	Email (ML081510738)
Lack, Robert	Self	Email (ML081510537)
Lallo, Patrick	Self	Email (ML081510680)
LaLumia, Anne Marie	Self	Email (ML081510567)
LaMonica, Francoise	Self	Email (ML081510592)
Latham, Rhonda	Self	Email (ML081510789)
LaVigne, Carole	Self	Email (ML081510625)
Lee, Angela	Self	Email (ML081510674)
Loew, Brenda	Self	Email (ML081510774)
Luczkowiak, Christopher	Self	Email (ML081510645)
M, Crystal [per email]	Self	Email (ML081510781)
Mackall, Kimberly	The Concerned Black Women of Calvert County, Inc.	Email (ML081510770)
MacNulty, Joy	Self	Email (ML081510675)
Magee, L	Self	Email (ML081510730)
Manske, Jill	Self	Email (ML081510646)
Marcus, Jack David	Self	Email (ML081510797)
Mariotte, Michael	Nuclear Information and Resource Service for Chesapeake Safe Energy Coalition	Meeting Transcript (ML081160460)
Mariotte, Michael	Nuclear Information and Resource Service for Chesapeake Safe Energy Coalition	Email (ML081510772)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Marks, John	Self	Email (ML081510689)
Marsh, Rauni	Self	Email (ML081510603)
Martins, Darren	Calvert County Chamber of Commerce	Meeting Transcript (ML081160460)
Massey, Tom	Self	Email (ML081510671)
McAndrew-Benevides, Elizabeth	North American Young Generation in Nuclear	Meeting Transcript (ML081160468)
McArthur, Richard	Self	Email (ML081510676)
McClure, Matthew	Self	Email (ML081510647)
McCoy, Timothy	Self	Email (ML081510734)
McGarvey, Sean	Building and Construction Trades Department, AFL-CIO	Meeting Transcript (ML081160460)
McGough, Mike	Self	Meeting Transcript (ML081160460)
McKenna, Chris	Self	Email (ML081510611)
McKenna, Kathy	Self	Email (ML081510619)
McKenna, Lauren	Self	Email (ML081510614)
McKenna, Rick	Self	Email (ML081510615)
Meadow, Karen	Maryland Conservation Council	Meeting Transcript (ML081160460)
Meadow, Norman	Maryland Conservation Council	Email (ML081510706)
Metz, Richard	Self	Email (ML081510629)
Minault, Kent	Self	Email (ML081510690)
Miranda, Tina	Self	Email (ML081510687)
Moore, Kerry	Self	Email (ML081510773)
Mostov, Liz	Self	Email (ML081510696)
Munson, Clarence William	Self	Email (ML081510565)
Nagle, Thomas	Self	Email (ML081510691)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Nanfra, Freya	Self	Email (ML081510794)
Nash, James	Self	Email (ML081510583)
Nerode, Gregory	Self	Email (ML081510786)
Neumann, Johanna	Maryland Public Interest Group	Meeting Transcript (ML081160468)
Novick, Wesley	Self	Email (ML081510624)
Nunez, Albert	Self	Email (ML081510571)
Nunez, Carlos	Self	Email (ML081510559)
Oakes, Bonnie	Self	Email (ML081510561)
O'Donnell, Anthony	The Maryland House of Delegates	Letter (ML081160364)
Olmstead, Harry	Self	Email (ML081510707)
O'Meara, Patrick	Self	Email (ML081510682)
Pacheco-Theard, Lauren	Self	Email (ML081510700)
Paquet, Kevin	Self	Email (ML081510633)
Parran, Wilson	Calvert County Board of Commissioners	Meeting Transcript (ML081160468)
Parsons, Barry	Self	Email (ML081510718)
Paul, Georgia	Self	Email (ML081510782)
Pedraza-Tucker, Liette	Self	Email (ML081510535)
Petkiewicz, Margaret	Self	Email (ML081510553)
Phipps, Donald	Self	Email (ML081510548)
Piner, Lisa	Self	Email (ML081510542)
Piser, Daniel	Self	Email (ML081510538)
Polya, Lance	Self	Email (ML081510681)
Pope, Nate	Calvert County Economic Development Commission	Meeting Transcript (ML081160468)
Pretto-Simmons, Nancy	Self	Meeting Transcript (ML081160460)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Putney, Louis	Self	Email (ML081510564)
Rader, Nancy	Self	Email (ML081510555)
Radford Jr., Roger	Self	Email (ML081510556)
Raines, Mary	Self	Email (ML081510636)
Ramstrom, Eric G and Shirley S	Self	Email (ML081510658)
Randall, David	Self	Email (ML081510665)
Rankin, Susan	Self	Email (ML081510670)
Reidenbach, Gregory	Self	Email (ML081510790)
Rosenblum, Stephen	Self	Email (ML081510699)
Ross, Anne	Self	Email (ML081510788)
Rudy, Mike	Self	Email (ML081510522)
Russell, Jack	St. Mary's County Commissioners	Meeting Transcript (ML081160460)
Sather, Alice	Self	Email (ML081510708)
Sauer, Elizabeth	Self	Email (ML081510563)
Scarafia, Bill	St. Mary's County Chamber of Commerce	Meeting Transcript (ML081160460)
Schlager, Robert	Calvert Memorial Hospital	Meeting Transcript (ML081160468)
Schmidt, Jason	Self	Email (ML081510531)
Schopp, Ricky	Self	Email (ML081510787)
Schwarz, Walter	Self	Email (ML081510626)
See, Bud	Self	Email (ML081510660)
Shafer, Scott	Self	Email (ML081510606)
Shannahan, Brittany	Self	Email (ML081510545)
Shashani, Linda	Self	Email (ML081510662)
Shaw, Susan	Board of County Commissioners, Calvert County	Letter (ML081160363)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
Sherrow, Sarah	Self	Email (ML081510655)
Shively, Daniel	Self	Email (ML081510731)
Siecke, Martin	Self	Email (ML081510557)
Simila, Owen	Self	Email (ML081510653)
Sinclair, Jim	Self	Meeting Transcript (ML081160460)
Skercevic, Maria	Self	Email (ML081510558)
Smith, Enoch	Self	Email (ML081510552)
Smith, Martha	Self	Email (ML081510656)
Snowden, Patricia	Self	Email (ML081510570)
Sorin, Susanna	Self	Email (ML081510597)
Soroos, Marvin S	Self	Email (ML081510663)
Soto, Yvonne	Self	Email (ML081510733)
Stevens, Denise	Self	Email (ML081510723)
Stilwell, Lisa	Self	Email (ML081510722)
Stinnett, Barbara	Board of County Commissioners, Calvert County	Letter (ML081160363)
Strange, Linda	Self	Email (ML081510540)
Tarhan, Diane	Solomons Business Association	Meeting Transcript (ML081160460)
Theil, Tony	Self	Email (ML081510620)
Thiele, Abhaya	Self	Email (ML081510576)
Tornatore, James	Self	Email (ML081510683)
Trenholme, Art	Self	Email (ML081510669)
Tucker, Dawn	Calvert County Minority Business Alliance	Email (ML081510768)
Turner, Tamisha	Self	Email (ML081510589)
Valliere, Cliff	Self	Email (ML081510737)
Vanderheyden, George	Unistar Nuclear Energy	Meeting Transcript (ML081160468)

Table D-1. (contd)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession #
VanEtten, Margot	Self	Email (ML081510701)
Vieg, Jeannette	Self	Email (ML081510573)
Voeller, Estelle	Self	Email (ML081510577)
Vogt, Peter	Self	Email (ML081510516)
Wadkins, Melanie	Self	Email (ML081510551)
Waldman, Sam	Self	Email (ML081510529)
Walker-Meere, Susan	Self	Email (ML081510724)
Walsh, Donald	Self	Email (ML081510533)
Walters, Betty	Self	Email (ML081510719)
Walther, Robert	Clean and Safe Energy Coalition	Meeting Transcript (ML081160460)
Wanner, Gabrielle	Self	Email (ML081510523)
Ward, John	Self	Email (ML081510727)
Welch, Irene	Self	Email (ML081510775)
Wilkins, Paul	Self	Email (ML081510584)
Willoughby, CaraLea	Self	Email (ML081510566)
Wilson, Deb	Self	Email (ML081510710)
Yeatts, Jordan	Self	Email (ML081510780)
Zahniser, Albert	Self	Letter (ML081160362)
Zastawecky, Margaret	Self	Email (ML081510769)
Zelikson, Linda	Self	Email (ML081510644)

Table D-2. Comment Categories

Comment Category	Commenter (Comment ID)
Accidents	• Acevedo, NK (0008-3)
	• Aitken, Keith (0008-3)
	• Albright, Evan (0008-3)
	• Andereson, David (0008-3)
	• Arist, Phyllis (0008-3)
	• Armas, Zoe (0008-3)
	• Avance, Kenneth (0008-3)
	• Bainum, Meghan (0008-3)
	• Bakalian, Craig (0008-3)
	• Baldwin, Natylie (0008-3)
	• Barr, Phillip (0008-3)
	• Bartholomew, Alice (0008-3)
	• Be, Maya (0008-3)
	• Becker, Rochelle (0008-3)
	• Bedding, Gerhard (0008-3)
	• Behabadi, Bardia (0008-3)
	• Bissonnette, Rick (0008-3)
	• Black, Monica Latka (0008-3)
	• Blomstrom, Eric (0008-3)
	• Borrowman, Ellen (0008-3)
	• Briggs, Ruth (0008-3)
	• C, Suzy (0008-3)
	• Chinn, Jason (0008-3)
	• Clark, Kevin (0008-3)
	• Clark, Loralee (0008-3)
	• Cleaver, Melissa (0008-3)
	• Cox, Duncan (0008-3)
	• Crawley, Jackie (0008-3)
	• Crocca, Carol (0008-3)
	• Culp, Richard (0008-3)
	• Curington, Diana (0008-3)
	• Daddy, Big (0008-3)
	• Darbyshire, David (0008-3)
	• DesHarnais, Gaston (0008-3)
	• Diaz, Lorenzo (0008-3)
	• Dolly, William (0008-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Emmons, Cheryl (0008-3) • Erdesohn, Cynthia (0008-3) • Evans, Michael (0008-3) • Faigle, Susan (0008-3) • Fernow, Geoff (0008-3) • Finnelli, Marilyn and Tom (0008-3) • Fisher, Allison (0008-3) • Foppe, Paul (0008-3) • Fuller, Alfred (0008-3) • Futterer, Joe (0008-3) • Gannaway, Gloria (0008-3) • Garbato, Kelly (0008-3) • Garner, Patrick (0008-3) • Gilpin, John (0008-3) • Good, Riana (0008-3) • Goodrich, Anne (0008-3) • Grad, Robert (0008-3) • Grand, Robert (0008-3) • Grassi, Rosemarie (0008-3) • Guay-Brezner, Colette (0008-3) • Harberson, Laurie (0008-3) • Hauck, Molly (0008-3) • Hedlund, Cara (0008-3) • Helvick, Steven (0008-3) • Henderson, Sherry (0008-3) • Hinton, Georgia (0008-3) • Hoffman, Lilli (0008-3) • Holzer, Frederick (0008-3) • Hood, Marilyn (0008-3) • Hooker, Betsy (0008-3) • Huffman, Debbie (0008-3) • Hughey, Patricia (0008-3) • Hung, Shiu (0008-3) • Hutchinson, Richard (0008-3) • Jones, Hollis (0008-3) • Jones-Giampalo, Mary (0008-3) • Joos, Sandra (0008-3) • Jula, Patty (0008-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Kaliski, Raymond (0008-3) • Kamps, Kevin (0024-76) (0024-77) (0024-79) (0024-84) • Kane, Donna (0008-3) • Katz, Shari (0008-3) • Klusman, Eric (0008-3) • Knechel, David (0008-3) • Kramer, Loren (0008-3) • Kuintzle, Gaylene (0008-3) • Lack, Robert (0008-3) • Lallo, Patrick (0008-3) • LaLumia, Anne Marie (0008-3) • LaMonica, Francoise (0008-3) • Latham, Rhonda (0008-3) • LaVigne, Carole (0008-3) • Lee, Angela (0008-3) • Loew, Brenda (0008-3) • Luczkowiak, Christopher (0008-3) • M, Crystal (0008-3) • Mackall, Kimberly (0018-1) (0018-9) • MacNulty, Joy (0008-3) • Magee, L (0008-3) • Manske, Jill (0008-3) • Marcus, Jack David (0008-3) • Mariotte, Michael (0019-7) (0019-8) • Mariotte, Michael (0019-18) (0019-19) (0019-23) (0025-43) • Marks, John (0008-3) • Marsh, Rauni (0008-3) (0026-3) • Massey, Tom (0008-3) • McArthur, Richard (0008-3) • McClure, Matthew (0008-3) • McCoy, Timothy (0008-3) • McKenna, Chris (0008-3) • McKenna, Kathy (0008-3) • McKenna, Lauren (0008-3) • McKenna, Rick (0008-3) • Metz, Richard (0008-3) • Minault, Kent (0008-3) • Miranda, Tina (0008-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Moore, Kerry (0008-3) • Mostov, Liz (0008-3) • Munson, Clarence William (0008-3) • Nagle, Thomas (0008-3) • Nanfra, Freya (0008-3) • Nash, James (0008-3) • Nerode, Gregory (0008-3) • Novick, Wesley (0008-3) • Nunez, Albert (0008-3) • Nunez, Carlos (0008-3) • Oakes, Bonnie (0008-3) • Olmstead, Harry (0008-3) • O'Meara, Patrick (0008-3) • Pacheco-Theard, Lauren (0008-3) • Paquet, Kevin (0008-3) • Parsons, Barry (0008-3) • Paul, Georgia (0008-3) • Pedraza-Tucker, Liette (0008-3) • Petkiewicz, Margaret (0008-3) • Phipps, Donald (0008-3) • Piner, Lisa (0008-3) • Piser, Daniel (0008-3) • Putney, Louis (0008-3) • Rader, Nancy (0008-3) • Radford Jr., Roger (0008-3) • Raines, Mary (0008-3) • Ramstrom, Eric G and Shirley S (0008-3) • Randall, David (0008-3) • Rankin, Susan (0008-3) • Reidenbach, Gregory (0008-3) • Rosenblum, Stephen (0008-3) • Ross, Anne (0008-3) • Sather, Alice (0008-3) • Sauer, Elizabeth (0008-3) • Schmidt, Jason (0008-3) • Schopp, Ricky (0008-3) • Schwarz, Walter (0008-3) • See, Bud (0008-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Shafer, Scott (0008-3) • Shashani, Linda (0008-3) • Sherrow, Sarah (0008-3) • Shively, Daniel (0008-3) • Siecke, Martin (0008-3) • Simila, Owen (0008-3) • Skercevic, Maria (0008-3) • Smith, Enoch (0008-3) • Smith, Martha (0008-3) • Snowden, Patricia (0008-3) • Sorin, Susanna (0008-3) • Soroos, Marvin S (0008-3) • Soto, Yvonne (0008-3) • Stevens, Denise (0008-3) • Stilwell, Lisa (0008-3) • Strange, Linda (0008-3) • Theil, Tony (0008-3) • Thiele, Abhaya (0008-3) • Tornatore, James (0008-3) • Trenholme, Art (0008-3) • Turner, Tamisha (0008-3) • Valliere, Cliff (0008-3) • VanEtten, Margot (0008-3) • Vieg, Jeannette (0008-3) • Voeller, Estelle (0008-3) • Wadkins, Melanie (0008-3) • Waldman, Sam (0008-3) • Walker-Meere, Susan (0008-3) • Walsh, Donald (0008-3) • Walters, Betty (0008-3) • Wanner, Gabrielle (0008-3) • Ward, John (0008-3) • Welch, Irene (0008-3) • Wilkins, Paul (0008-3) • Willoughby, CaraLea (0008-3) • Wilson, Deb (0008-3) • Yeatts, Jordan (0008-3) • Zastawecky, Margaret (0008-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Zelikson, Linda (0008-3)
Alternatives-Energy	• Donn, Marjory (0020-1) (0020-8) • Dubois, Gwen (0024-60) • Hunter, Theresa (0025-160) (0025-161) • Johnston, Bill (0025-109) (0025-110) (0025-113) • Kamps, Kevin (0024-80) (0024-81) (0024-82) • Kanaley, Mike (0024-22) • Mariotte, Michael (0019-4) • Marsh, Rauni (0026-2) (0026-5) • McGarvey, Sean (0025-145) • Meadow, Karen (0025-65) (0025-67) (0025-68) (0025-69) (0025-70) (0025-71) (0025-72) (0025-73) • Meadow, Norman (0028-1) (0028-4) (0028-6) (0028-7) (0028-9) (0028-10) (0028-11) (0028-12) (0028-13) (0028-14) (0028-15) (0028-16) (0028-17) (0028-18) (0028-19) (0028-20) (0028-21) (0028-34) • Neumann, Johanna (0024-34) (0024-36) • Parran, Wilson (0024-9) (0024-10) (0025-11) (0025-12) • Shannahan, Brittany (0007-5) • Sinclair, Jim (0025-140) (0025-141) • Vogt, Peter (0005-19) (0005-23) (0005-25) (0005-26) (0005-27) (0005-29) • Walther, Robert (0025-120)
Alternatives-No-Action	• Mariotte, Michael (0019-5) (0025-47) • McGarvey, Sean (0025-146) (0025-147)
Benefit-Cost Balance	• Donn, Marjory (0020-3) • Fisher, Allison (0025-91) • Kamps, Kevin (0024-78) (0024-89) (0024-90) • Mariotte, Michael (0019-1) (0019-2) (0019-3) (0025-48) (0025-49) • Meadow, Karen (0025-66) • Meadow, Norman (0028-26) (0028-27) • Neumann, Johanna (0024-37) • Vanderheyden, George (0024-116) • Vogt, Peter (0005-28)
Cumulative Impacts	• Buchanan, Bill (0024-109)
Ecology-Terrestrial	• Meadow, Norm (0025-59) (0028-2)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Vogt, Peter (0005-13)
Environmental Justice	• Mackall, Kimberly (0018-2) (0018-3)
Geology	• Mariotte, Michael (0019-35)
Health-Radiological	• Dubois, Gwen (0024-68) • Mackall, Kimberly (0018-10) • Mariotte, Michael (0019-17) (0019-22) (0025-53) • Meadow, Norm (0025-57) (0025-58) (0028-5) (0028-28) (0028-29) (0028-30) (0028-31) (0028-32) (0028-33) • Shannahan, Brittany (0007-3)
Historic and Cultural Resources	• Fisher, Allison (0025-94)
Hydrology-Surface Water	• Baummer, Thomas (0006-4) (0006-7) • Buchanan, Bill (0024-110) (0024-110) • Fisher, Allison (0025-93)
Land Use-Site and vicinity	• Baummer, Thomas (0006-8)
Land Use-Transmission lines	• Clark, Gerald (0014-2) • Kelley, Linda (0014-2) • Parran, Wilson (0014-2) (0024-4) (0025-5) • Shaw, Susan (0014-2) • Stinnett, Barbara (0014-2) • Vogt, Peter (0005-14) (0005-15) (0005-16) (0005-17)
Meteorology and Air Quality	• Baummer, Thomas (0006-5) (0006-6) • Mariotte, Michael (0019-29) (0019-30) (0019-31) (0025-45) (0025-46)
Need for Power	• Arndt, Gunter (0004-3) • Burton, Bob (0025-32) • Clark, Gerald (0014-3) • Green, Bonnie (0025-128) • Green, Joseph (0025-86) • Hodge, Gary (0023-3) • Hunter, Theresa (0025-162) • Kanaley, Mike (0024-21) • Kelley, Linda (0014-3)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Meadow, Karen (0025-74) (0025-75) (0028-8) • Meadow, Norman (0028-22) (0028-23) (0028-24) • O'Donnell, Anthony (0015-2) • Parran, Wilson (0014-3) (0024-8) (0025-7) (0025-10) • Pretto-Simmons, Nancy (0025-166) • Russell, Jack (0025-22) • Scarafia, Bill (0025-83) • Shaw, Susan (0014-3) • Sinclair, Jim (0025-139) • Stinnett, Barbara (0014-3) • Vogt, Peter (0005-20) (0005-21) (0005-22) • Walther, Robert (0025-118) (0025-119) • Zahniser, Albert (0016-3)
Process-ESP-COL	• Baummer, Thomas (0006-2) (0006-3) • Brown, Jr., Edsel (0017-1) • Coster, Steven (0003-1) • Fisher, Allison (0025-88) (0025-89) (0025-90) • Gaffney-Smith, Margaret (0021-1) (0021-2) • Gray, Susan (0022-1) • Hodge, Gary (0024-15) (0025-107) • Kamps, Kevin (0024-88) • Kjer, Timothy (0003-1) • Mackall, Kimberly (0018-14) • Mariotte, Michael (0019-20) (0025-41) • Martins, Darren (0025-26) (0024-3) (0024-13) (0025-3) (0025-17) • Shannahan, Brittany (0003-1)
Site Layout and Design	• Parran, Wilson (0024-2) (0025-2) • Scarafia, Bill (0024-96) • Sinclair, Jim (0025-133) • Vanderheyden, George (0024-113) (0024-115) (0024-118) (0024-119) (0025-168) (0025-169) (0025-171) (0025-172) (0025-173)
Socioeconomics	• Boswell, William (0002-2) • Brown, Jr., Edsel (0017-7) (0017-9) • Burton, Bob (0025-35) (0025-36) (0025-37) (0025-38) • Chambers, Bill (0024-42) (0024-43) (0024-44) • Kanaley, Mike (0024-26) • Karbowsky, Brad (0024-107) (0025-78) (0025-80)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• McClure, Deborah (0024-29) • O'Donnell, Anthony (0015-5) • Parran, Wilson L. (0024-56) • Scarafia, Bill (0024-93) (0024-94) (0025-82) • Sinclair, Jim (0025-137) (0025-138) • Tarhan, Diane (0025-175) (0005-4) (0005-6) (0005-8) (0005-9) • Vogt, Peter (0005-10) (0005-11) (0005-12) • Walther, Robert (0025-123)
Transportation	• Acevedo, NK (0008-5) • Aitken, Keith (0008-5) • Albright, Evan (0008-5) • Andereson, David (0008-5) • Arist, Phyllis (0008-5) • Armas, Zoe (0008-5) • Avance, Kenneth (0008-5) • Bainum, Meghan (0008-5) • Bakalian, Craig (0008-5) • Baldwin, Natylie (0008-5) • Barr, Phillip (0008-5) • Bartholomew, Alice (0008-5) • Be, Maya (0008-5) • Becker, Rochelle (0008-5) • Bedding, Gerhard (0008-5) • Behabadi, Bardia (0008-5) • Bissonnette, Rick (0008-5) • Black, Monica Latka (0008-5) • Blomstrom, Eric (0008-5) • Borrowman, Ellen (0008-5) • Briggs, Ruth (0008-5) • Brown, Jr., Edsel (0017-2) • C, Suzy (0008-5) • Chinn, Jason (0008-5) • Clark, Kevin (0008-5) • Clark, Loralee (0008-5) • Cleaver, Melissa (0008-5) • Cox, Duncan (0008-5) • Crawley, Jackie (0008-5)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Crocca, Carol (0008-5) • Culp, Richard (0008-5) • Curington, Diana (0008-5) • Daddy, Big (0008-5) • Darbyshire, David (0008-5) • DesHarnais, Gaston (0008-5) • Diaz, Lorenzo (0008-5) • Dolly, William (0008-5) • Donn, Marjory (0020-6) • Emmons, Cheryl (0008-5) • Erdesohn, Cynthia (0008-5) • Evans, Michael (0008-5) • Faigle, Susan (0008-5) • Fernow, Geoff (0008-5) • Finnelli, Marilyn and Tom (0008-5) • Fisher, Allison (0008-5) • Foppe, Paul (0008-5) • Fuller, Alfred (0008-5) • Futterer, Joe (0008-5) • Gannaway, Gloria (0008-5) • Garbato, Kelly (0008-5) • Garner, Patrick (0008-5) • Gilpin, John (0008-5) • Good, Riana (0008-5) • Goodrich, Anne (0008-5) • Grad, Robert (0008-5) • Grand, Robert (0008-5) • Grassi, Rosemarie (0008-5) • Guay-Brezner, Colette (0008-5) • Harberson, Laurie (0008-5) • Hauck, Molly (0008-5) • Hedlund, Cara (0008-5) • Helvick, Steven (0008-5) • Henderson, Sherry (0008-5) • Hinton, Georgia (0008-5) • Hoffman, Lilli (0008-5) • Holzer, Frederick (0008-5) • Hood, Marilyn (0008-5)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Hooker, Betsy (0008-5) • Huffman, Debbie (0008-5) • Hughey, Patricia (0008-5) • Hung, Shiu (0008-5) • Hutchinson, Richard (0008-5) • Jones, Hollis (0008-5) • Jones-Giampalo, Mary (0008-5) • Joos, Sandra (0008-5) • Jula, Patty (0008-5) • Kaliski, Raymond (0008-5) • Kamps, Kevin (0025-100) (0025-101) (0025-102) • Kane, Donna (0008-5) • Katz, Shari (0008-5) • Klusman, Eric (0008-5) • Knechel, David (0008-5) • Kramer, Loren (0008-5) • Kuintzle, Gaylene (0008-5) • Lack, Robert (0008-5) • Lallo, Patrick (0008-5) • LaLumia, Anne Marie (0008-5) • LaMonica, Francoise (0008-5) • Latham, Rhonda (0008-5) • LaVigne, Carole (0008-5) • Lee, Angela (0008-5) • Loew, Brenda (0008-5) • Luczkowiak, Christopher (0008-5) • M, Crystal (0008-5) • MacNulty, Joy (0008-5) • Magee, L (0008-5) • Manske, Jill (0008-5) • Marcus, Jack David (0008-5) • Mariotte, Michael (0019-10) (0019-12) • Marks, John (0008-5) • Marsh, Rauni (0008-5) • Massey, Tom (0008-5) • McArthur, Richard (0008-5) • McClure, Matthew (0008-5) • McCoy, Timothy (0008-5)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• McKenna, Chris (0008-5) • McKenna, Kathy (0008-5) • McKenna, Lauren (0008-5) • McKenna, Rick (0008-5) • Meadow, Norm (0025-63) • Meadow, Norman (0028-37) (0028-38) • Metz, Richard (0008-5) • Minault, Kent (0008-5) • Miranda, Tina (0008-5) • Moore, Kerry (0008-5) • Mostov, Liz (0008-5) • Munson, Clarence William (0008-5) • Nagle, Thomas (0008-5) • Nanfra, Freya (0008-5) • Nash, James (0008-5) • Nerode, Gregory (0008-5) • Novick, Wesley (0008-5) • Nunez, Albert (0008-5) • Nunez, Carlos (0008-5) • Oakes, Bonnie (0008-5) • Olmstead, Harry (0008-5) • O'Meara, Patrick (0008-5) • Pacheco-Theard, Lauren (0008-5) • Paquet, Kevin (0008-5) • Parsons, Barry (0008-5) • Paul, Georgia (0008-5) • Pedraza-Tucker, Liette (0008-5) • Petkiewicz, Margaret (0008-5) • Phipps, Donald (0008-5) • Piner, Lisa (0008-5) • Piser, Daniel (0008-5) • Putney, Louis (0008-5) • Rader, Nancy (0008-5) • Radford Jr., Roger (0008-5) • Raines, Mary (0008-5) • Ramstrom, Eric G and Shirley S (0008-5) • Randall, David (0008-5) • Rankin, Susan (0008-5)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Reidenbach, Gregory (0008-5) • Rosenblum, Stephen (0008-5) • Ross, Anne (0008-5) • Sather, Alice (0008-5) • Sauer, Elizabeth (0008-5) • Schmidt, Jason (0008-5) • Schopp, Ricky (0008-5) • Schwarz, Walter (0008-5) • See, Bud (0008-5) • Shafer, Scott (0008-5) • Shashani, Linda (0008-5) • Sherrow, Sarah (0008-5) • Shively, Daniel (0008-5) • Siecke, Martin (0008-5) • Simila, Owen (0008-5) • Skercevic, Maria (0008-5) • Smith, Enoch (0008-5) • Smith, Martha (0008-5) • Snowden, Patricia (0008-5) • Sorin, Susanna (0008-5) • Soroos, Marvin S (0008-5) • Soto, Yvonne (0008-5) • Stevens, Denise (0008-5) • Stilwell, Lisa (0008-5) • Strange, Linda (0008-5) • Theil, Tony (0008-5) • Thiele, Abhaya (0008-5) • Tornatore, James (0008-5) • Trenholme, Art (0008-5) • Turner, Tamisha (0008-5) • Valliere, Cliff (0008-5) • VanEtten, Margot (0008-5) • Vieg, Jeannette (0008-5) • Voeller, Estelle (0008-5) • Wadkins, Melanie (0008-5) • Waldman, Sam (0008-5) • Walker-Meere, Susan (0008-5) • Walsh, Donald (0008-5)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Walters, Betty (0008-5) • Wanner, Gabrielle (0008-5) • Ward, John (0008-5) • Welch, Irene (0008-5) • Wilkins, Paul (0008-5) • Willoughby, CaraLea (0008-5) • Wilson, Deb (0008-5) • Yeatts, Jordan (0008-5) • Zastawecky, Margaret (0008-5) • Zelikson, Linda (0008-5)
Uranium Fuel Cycle	• Acevedo, NK (0008-1) (0008-2) (0008-4) (0008-6) • Aitken, Keith (0008-1) (0008-2) (0008-4) (0008-6) • Albright, Evan (0008-1) (0008-2) (0008-4) (0008-6) • Andereson, David (0008-1) (0008-2) (0008-4) (0008-6) • Arist, Phyllis (0008-1) (0008-2) (0008-4) (0008-6) • Armas, Zoe (0008-1) (0008-2) (0008-4) (0008-6) • Arndt, Gunter (0004-5) • Avance, Kenneth (0008-1) (0008-2) (0008-4) (0008-6) • Bainum, Meghan (0008-1) (0008-2) (0008-4) (0008-6) • Bakalian, Craig (0008-1) (0008-2) (0008-4) (0008-6) • Baldwin, Natylie (0008-1) (0008-2) (0008-4) (0008-6) • Barr, Phillip (0008-1) (0008-2) (0008-4) (0008-6) • Bartholomew, Alice (0008-1) (0008-2) (0008-4) (0008-6) • Be, Maya (0008-1) (0008-2) (0008-4) (0008-6) • Becker, Rochelle (0008-1) (0008-2) (0008-4) (0008-6) • Bedding, Gerhard (0008-1) (0008-2) (0008-4) (0008-6) • Behabadi, Bardia (0008-1) (0008-2) (0008-4) (0008-6) • Bissonnette, Rick (0008-1) (0008-2) (0008-4) (0008-6) • Black, Monica Latka (0008-1) (0008-2) (0008-4) (0008-6) • Blomstrom, Eric (0008-1) (0008-2) (0008-4) (0008-6) • Borrowman, Ellen (0008-1) (0008-2) (0008-4) (0008-6) • Boxwell, Bob (0025-159) • Briggs, Ruth (0008-1) (0008-2) (0008-4) (0008-6) • C, Suzy (0008-1) (0008-2) (0008-4) (0008-6) • Chinn, Jason (0008-1) (0008-2) (0008-4) (0008-6) • Clark, Kevin (0008-1) (0008-2) (0008-4) (0008-6) • Clark, Loralee (0008-1) (0008-2) (0008-4) (0008-6)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Cleaver, Melissa (0008-1) (0008-2) (0008-4) (0008-6) • Cox, Duncan (0008-1) (0008-2) (0008-4) (0008-6) • Crawley, Jackie (0008-1) (0008-2) (0008-4) (0008-6) • Crocca, Carol (0008-1) (0008-2) (0008-4) (0008-6) • Culp, Richard (0008-1) (0008-2) (0008-4) (0008-6) • Curington, Diana (0008-1) (0008-2) (0008-4) (0008-6) • Daddy, Big (0008-1) (0008-2) (0008-4) (0008-6) • Darbyshire, David (0008-1) (0008-2) (0008-4) (0008-6) • DesHarnais, Gaston (0008-1) (0008-2) (0008-4) (0008-6) • Diaz, Lorenzo (0008-1) (0008-2) (0008-4) (0008-6) • Dolly, William (0008-1) (0008-2) (0008-4) (0008-6) • Donn, Marjory (0020-2) (0020-5) • Emmons, Cheryl (0008-1) (0008-2) (0008-4) (0008-6) • Erdesohn, Cynthia (0008-1) (0008-2) (0008-4) (0008-6) • Evans, Michael (0008-1) (0008-2) (0008-4) (0008-6) • Faigle, Susan (0008-1) (0008-2) (0008-4) (0008-6) • Fernow, Geoff (0008-1) (0008-2) (0008-4) (0008-6) • Finnelli, Marilyn and Tom (0008-1) (0008-2) (0008-4) (0008-6) • Fisher, Allison (0008-1) (0008-2) (0008-4) (0008-6) • Foppe, Paul (0008-1) (0008-2) (0008-4) (0008-6) • Fuller, Alfred (0008-1) (0008-2) (0008-4) (0008-6) • Futterer, Joe (0008-1) (0008-2) (0008-4) (0008-6) • Gannaway, Gloria (0008-1) (0008-2) (0008-4) (0008-6) • Garbato, Kelly (0008-1) (0008-2) (0008-4) (0008-6) • Garner, Patrick (0008-1) (0008-2) (0008-4) (0008-6) • Gilpin, John (0008-1) (0008-2) (0008-4) (0008-6) • Good, Riana (0008-1) (0008-2) (0008-4) (0008-6) • Goodrich, Anne (0008-1) (0008-2) (0008-4) (0008-6) • Grad, Robert (0008-1) (0008-2) (0008-4) (0008-6) • Grand, Robert (0008-1) (0008-2) (0008-4) (0008-6) • Grassi, Rosemarie (0008-1) (0008-2) (0008-4) (0008-6) • Guay-Brezner, Colette (0008-1) (0008-2) (0008-4) (0008-6) • Harberson, Laurie (0008-1) (0008-2) (0008-4) (0008-6) • Hauck, Molly (0008-1) (0008-2) (0008-4) (0008-6) • Hedlund, Cara (0008-1) (0008-2) (0008-4) (0008-6) • Helvick, Steven (0008-1) (0008-2) (0008-4) (0008-6) • Henderson, Sherry (0008-1) (0008-2) (0008-4) (0008-6) • Hinton, Georgia (0008-1) (0008-2) (0008-4) (0008-6)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Hoffman, Lilli (0008-1) (0008-2) (0008-4) (0008-6) • Holzer, Frederick (0008-1) (0008-2) (0008-4) (0008-6) • Hood, Marilyn (0008-1) (0008-2) (0008-4) (0008-6) • Hooker, Betsy (0008-1) (0008-2) (0008-4) (0008-6) • Huffman, Debbie (0008-1) (0008-2) (0008-4) (0008-6) • Hughey, Patricia (0008-1) (0008-2) (0008-4) (0008-6) • Hung, Shiu (0008-1) (0008-2) (0008-4) (0008-6) • Hutchinson, Richard (0008-1) (0008-2) (0008-4) (0008-6) • Ireland, John (0012-1) • Johnston, Bill (0025-111) • Jones, Hollis (0008-1) (0008-2) 0008-4) (0008-6) • Jones-Giampalo, Mary (0008-1) (0008-2) (0008-4) (0008-6) • Joos, Sandra (0008-1) (0008-2) (0008-4) (0008-6) • Jula, Patty (0008-1) (0008-2) (0008-4) (0008-6) • Kaliski, Raymond (0008-1) (0008-2) (0008-4) (0008-6) • Kamps, Kevin (0024-85) (0024-86) (0025-95) (0025-96) (0025-98) • Kane, Donna (0008-1) (0008-2) (0008-4) (0008-6) • Katz, Shari (0008-1) (0008-2) (0008-4) (0008-6) • Klusman, Eric (0008-1) Eric (0008-2) (0008-4) (0008-6) • Knechel, David (0008-1) (0008-2) (0008-4) (0008-6) • Kramer, Loren (0008-1) (0008-2) (0008-4) (0008-6) • Kuintzle, Gaylene (0008-1) (0008-2) (0008-4) (0008-6) • Lack, Robert (0008-1) (0008-2) (0008-4) (0008-6) • Lallo, Patrick (0008-1) (0008-2) (0008-4) (0008-6) • LaLumia, Anne Marie (0008-1) (0008-2) (0008-4) (0008-6) • LaMonica, Francoise (0008-1) (0008-2) (0008-4) (0008-6) • Latham, Rhonda (0008-1) (0008-2) (0008-4) (0008-6) • LaVigne, Carole (0008-1) (0008-2) (0008-4) (0008-6) • Lee, Angela (0008-1) (0008-2) (0008-4) (0008-6) • Loew, Brenda (0008-1) (0008-2) (0008-4) (0008-6) • Luczkowiak, Christopher (0008-1) (0008-2) (0008-4) (0008-6) • M, Crystal (0008-1) (0008-2) (0008-4) (0008-6) • Mackall, Kimberly (0018-4) • MacNulty, Joy (0008-1) (0008-2) (0008-4) (0008-6) • Magee, L (0008-1) (0008-2) (0008-4) (0008-6) • Manske, Jill (0008-1) (0008-2) (0008-4) (0008-6) • Marcus, Jack David (0008-1) (0008-2) (0008-4) (0008-6) (0019-6) • Mariotte, Michael (0019-9) (0019-13) (0019-14) (0019-15) (0019-16)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	(0025-50) (0025-51) (0025-52) • Marks, John (0008-1) (0008-2) (0008-4) (0008-6) • Marsh, Rauni (0008-1) (0008-2) (0008-4) (0008-6) (0026-1) (0026-4) • Massey, Tom (0008-1) (0008-2) (0008-4) (0008-6) • McArthur, Richard (0008-1) (0008-2) (0008-4) (0008-6) • McClure, Matthew (0008-1) (0008-2) (0008-4) (0008-6) • McCoy, Timothy (0008-1) (0008-2) (0008-4) (0008-6) • McGough, Mike (0024-103) • McKenna, Chris (0008-1) (0008-2) (0008-4) (0008-6) • McKenna, Kathy (0008-1) (0008-2) (0008-4) (0008-6) • McKenna, Lauren (0008-1) (0008-2) (0008-4) (0008-6) • McKenna, Rick (0008-1) (0008-2) (0008-4) (0008-6) • Meadow, Norm (0025-61) (0025-62) • Meadow, Norman (0028-35) (0028-36) • Metz, Richard (0008-1) (0008-2) (0008-4) (0008-6) • Minault, Kent (0008-1) (0008-2) (0008-4) (0008-6) • Miranda, Tina (0008-1) (0008-2) (0008-4) (0008-6) • Moore, Kerry (0008-1) (0008-2) (0008-4) (0008-6) • Mostov, Liz (0008-1) (0008-2) (0008-4) (0008-6) • Munson, Clarence William (0008-1) (0008-2) (0008-4) (0008-6) • Nagle, Thomas (0008-1) (0008-2) (0008-4) (0008-6) • Nanfra, Freya (0008-1) (0008-2) (0008-4) (0008-6) • Nash, James (0008-1) (0008-2) (0008-4) (0008-6) • Nerode, Gregory (0008-1) (0008-2) (0008-4) (0008-6) • Novick, Wesley (0008-1) (0008-2) (0008-4) (0008-6) • Nunez, Albert (0008-1) (0008-2) (0008-4) (0008-6) • Nunez, Carlos (0008-1) (0008-2) (0008-4) (0008-6) • Oakes, Bonnie (0008-1) (0008-2) (0008-4) (0008-6) • Olmstead, Harry (0008-1) (0008-2) (0008-4) (0008-6) • O'Meara, Patrick (0008-1) (0008-2) (0008-4) (0008-6) • Pacheco-Theard, Lauren (0008-1) (0008-2) (0008-4) (0008-6) • Paquet, Kevin (0008-1) (0008-2) (0008-4) (0008-6) • Parsons, Barry (0008-1) (0008-2) (0008-4) (0008-6) • Paul, Georgia (0008-1) (0008-2) (0008-4) (0008-6) • Pedraza-Tucker, Liette (0008-1) (0008-2) (0008-4) (0008-6) • Petkiewicz, Margaret (0008-1) (0008-2) (0008-4) (0008-6) • Phipps, Donald (0008-1) (0008-2) (0008-4) (0008-6) • Piner, Lisa (0008-1) (0008-2) (0008-4) (0008-6)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Piser, Daniel (0008-1) (0008-2) (0008-4) (0008-6) • Polya, Lance (0010-1) • Putney, Louis (0008-1) (0008-2) (0008-4) (0008-6) • Rader, Nancy (0008-1) (0008-2) (0008-4) (0008-6) • Radford Jr., Roger (0008-1) (0008-2) (0008-4) (0008-6) • Raines, Mary (0008-1) (0008-2) (0008-4) (0008-6) • Ramstrom, Eric G and Shirley S (0008-1) (0008-2) (0008-4) (0008-6) • Randall, David (0008-1) (0008-2) (0008-4) (0008-6) • Rankin, Susan (0008-1) (0008-2) (0008-4) (0008-6) • Reidenbach, Gregory (0008-1) (0008-2) (0008-4) (0008-6) • Rosenblum, Stephen (0008-1) (0008-2) (0008-4) (0008-6) • Ross, Anne (0008-1) (0008-2) (0008-4) (0008-6) • Sather, Alice (0008-1) (0008-2) (0008-4) (0008-6) • Sauer, Elizabeth (0008-1) (0008-2) (0008-4) (0008-6) • Schmidt, Jason (0008-1) (0008-2) (0008-4) (0008-6) • Schopp, Ricky (0008-1) (0008-2) (0008-4) (0008-6) • Schwarz, Walter (0008-1) (0008-2) (0008-4) (0008-6) • See, Bud (0008-1) (0008-2) (0008-4) (0008-6) • Shafer, Scott (0008-1) (0008-2) (0008-4) (0008-6) • Shannahan, Brittany (0007-2) • Shashani, Linda (0008-1) (0008-2) (0008-4) (0008-6) • Sherrow, Sarah (0008-1) (0008-2) (0008-4) (0008-6) • Shively, Daniel (0008-1) (0008-2) (0008-4) (0008-6) • Siecke, Martin (0008-1) (0008-2) (0008-4) (0008-6) • Simila, Owen (0008-1) (0008-2) (0008-4) (0008-6) • Skercevic, Maria (0008-1) (0008-2) (0008-4) (0008-6) • Smith, Enoch (0008-1) (0008-2) (0008-4) (0008-6) • Smith, Martha (0008-1) (0008-2) (0008-4) (0008-6) • Snowden, Patricia (0008-1) (0008-2) (0008-4) (0008-6) • Sorin, Susanna (0008-1) (0008-2) (0008-4) (0008-6) • Soroos, Marvin S (0008-1) (0008-2) (0008-4) (0008-6) • Soto, Yvonne (0008-1) (0008-2) (0008-4) (0008-6) • Stevens, Denise (0008-1) (0008-2) (0008-4) (0008-6) • Stilwell, Lisa (0008-1) (0008-2) (0008-4) (0008-6) • Strange, Linda (0008-1) (0008-2) (0008-4) (0008-6) • Theil, Tony (0008-1) (0008-2) (0008-4) (0008-6) • Thiele, Abhaya (0008-1) (0008-2) (0008-4) (0008-6) (0009-1) • Tornatore, James (0008-1) (0008-2)

Table D-2. (contd)

Comment Category	Commenter (Comment ID)
	• Tornatore, James (0008-4) • Tornatore, James (0008-6) • Trenholme, Art (0008-1) (0008-2) (0008-4) (0008-6) (0011-1) • Turner, Tamisha (0008-1) (0008-2) (0008-4) (0008-6) • Valliere, Cliff (0008-1) (0008-2) (0008-4) (0008-6) • VanEtten, Margot (0008-1) (0008-2) (0008-4) (0008-6) • Vieg, Jeannette (0008-1) (0008-2) (0008-4) (0008-6) • Voeller, Estelle (0008-1) (0008-2) (0008-4) (0008-6) • Wadkins, Melanie (0008-1) (0008-2) (0008-4) (0008-6) • Waldman, Sam (0008-1) (0008-2) (0008-4) (0008-6) • Walker-Meere, Susan (0008-1) (0008-2) (0008-4) (0008-6) • Walsh, Donald (0008-1) (0008-2) (0008-4) (0008-6) • Walters, Betty (0008-1) (0008-2) (0008-4) (0008-6) • Wanner, Gabrielle (0008-1) (0008-2) (0008-4) (0008-6) • Ward, John (0008-1) (0008-2) (0008-4) (0008-6) • Welch, Irene (0008-1) (0008-2) (0008-4) (0008-6) • Wilkins, Paul (0008-1) (0008-2) (0008-4) (0008-6) • Willoughby, CaraLea (0008-1) (0008-2) (0008-4) (0008-6) • Wilson, Deb (0008-1) (0008-2) (0008-4) (0008-6) • Yeatts, Jordan (0008-1) (0008-2) (0008-4) (0008-6) • Zastawecky, Margaret (0008-1) (0008-2) (0008-4) (0008-6) • Zelikson, Linda (0008-1) (0008-2) (0008-4) (0008-6)

D.1 In-Scope Comments and Responses

The in-scope comments are listed by their categories and associated page numbers in Table D-3 in the order that they are presented in this EIS. Parenthetical numbers after each comment refer to the Comment Identification (ID) number (document number-comment number) and the commenter name.

Table D-3. Comment Categories

1. Comments Concerning the COL Process

Comment: The proposed project is located in the Chesapeake Bay and unnamed tributaries to the Chesapeake Bay, forested nontidal wetlands, Johns Creek and Goldstein Branch and their unnamed tributaries at UniStar's Calvert Cliffs site near Lusby, Calvert County, Maryland. The Corps is responsible for making decisions pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. It is our understanding that the NRC final rule governing Limited Work Authorizations (LWA) for Nuclear Power Plants (10 CFR Parts 2, 50, 51, 52, and 100) allows certain construction activities on production and utilization facilities to commence before a construction permit or combined license is issued. We believe that because our authority to regulate work in jurisdictional waters of the U.S., including wetlands, is a smaller component of the overall project, that the NRC has greater Federal control, responsibility and expertise for evaluating the effects of this proposed action on the environment, and therefore it is appropriate that the NRC be the lead agency for compliance with the National Environmental Policy Act (NEPA) for the proposed action. It would be inappropriate for the Corps to segment the limited infrastructure components associated with, the overall Calvert Cliffs Nuclear Power Plant Unit 3 expansion where the NRC possesses the expertise in determining the environmental consequences associated with the proposed construction of the AREVA EPR and has the ultimate approval/disapproval authority for the proposal. However, given our responsibility for regulating work which is proposed for the LWA and/or license, we request to serve as a cooperating agency in the preparation of the EIS for the Calvert Cliffs Nuclear Power Plant Unit-3 project. (**0021-1** [Gaffney-Smith, Margaret])

Comment: The Corps has the responsibility and authority to regulate portions of the proposal that affect waters of the U.S., including jurisdictional wetlands, and has the expertise necessary to assist the NRC with meeting its statutory requirements. Therefore, in accordance with the CEQ regulations we [the Corps of Engineers] are requesting to be designated as a cooperating agency for the EIS for this project. (**0021-2** [Gaffney-Smith, Margaret])

Response: *The NRC received official notice of the U.S. Army Corps of Engineers' interest in becoming a cooperating agency for the Calvert Cliffs COL EIS. The NRC has agreed by letter dated June 11, 2008 (ML081570139), to invite the U.S. Army Corps of Engineers to serve as a cooperating agency in the preparation of the EIS for this licensing action.*

Comment: The environmental impact statement scoping process should factor in long-term and short term impacts of the proposed new reactor at Calvert Cliffs. I urge NRC to include researching alternatives to a new reactor, a comprehensive cost-benefit analysis, a study of high and low level radioactive waste, safety and emergency planning into its scoping process. (**0003-1** [Coster, Steven] [Kjer, Timothy] [Shannahan, Brittany])

Response: *The NRC staff will prepare an Environmental Impact Statement (EIS) in accordance with its regulatory requirements. In its review, the staff will focus on the environmental effects of construction and operation of the proposed reactor and associated facilities and equipment. Alternative energy sources, a benefit-cost analysis, onsite treatment and handling of radiological waste, and short-term and long-term impacts are within the scope of this licensing action and will be addressed in the EIS. Safety and emergency planning are not within the scope of the EIS but are addressed in separate NRC reviews.*

Comment: I understand that the new NRC rules do not consider certain site-preparation activities as construction and therefore allow these activities to occur before the final Environmental Impact Study is issued. Nonetheless, I urge you to consider the impact of these activities in the EIS so that changes can be made to the work in progress if necessary. (**0006-3** [Baummer, Thomas])

Comment: The NRC under a recently promulgated change to its regulations has redefined what the word "construction" means and effectively 90 percent of the construction of this new reactor, NRC no longer considers falling under the National Environmental Policy Act. They can do a lot of construction at the Calvert Cliffs 3 site without doing an environmental assessment of the environmental impacts, and I just ask how does that comport with protecting the coastline of the Chesapeake? (**0024-88** [Kamps, Kevin])

Comment: [A]bout a year ago the nuclear industry was able to successfully convince the NRC to redefine, as Jim said, the word "construction." Redefining this word effectively circumvents the 1971 court decision. So while they are not technically violating this law, they are certainly violating the spirit of NEPA, the National Environmental Protection [Policy] Act that mandates that they prepare an EIS. (**0025-88** [Fisher, Allison])

Comment: I'd like you to consider the following for your EIS – to assure that these [LWA construction] activities are being conducted in an environmentally responsible manner, and to restore the NRC's compliance responsibilities, not to mention to restore the appearance of being overseers rather than promoters of nuclear power. (**0025-89** [Fisher, Allison])

Comment: You should consider all construction activities in the EIS, especially the before-mentioned, and withhold permission from Constellation, who is intending to take advantage of this new construction rule, until you have issued your final EIS. (**0025-90** [Fisher, Allison])

Response: *These comments refer to the NRC's change in the definition of "construction" based on its regulatory authority. As authorized by the Atomic Energy Act of 1954, as amended, NRC is charged with protecting the public health and safety with regard to the civilian use of nuclear material. As defined in 10 CFR 51.4, construction now refers to building safety-related structures, systems, or components (SSCs) necessary for power plant construction. Construction also includes SSCs required to provide physical protection and onsite emergency planning. Activities such as clearing and grading; excavating; building transmission lines; and erecting support buildings that are not required for nuclear safety, physical protection, or emergency planning are now considered "preconstruction" activities. Most of these activities are regulated by other agencies and require permits to proceed. For example, the Maryland Power Plant Research Program conducts its own environmental review and makes recommendations for the issuance of a Certificate of Public Convenience and Necessity. Activities affecting wetlands and navigable waters of the United States require permits from the U.S. Army Corps of Engineers (Army Corps). The Army Corps will participate as a cooperating* *agency with the NRC in the preparation of the EIS. The NRC will consider the environmental impacts of preconstruction activities in the context of cumulative impacts. These impacts will be evaluated in Chapter 4 [and 7] of the EIS.*

Comment: I am also a member of the local community and an advocate of the environment, so I want to ensure that the construction and operation of Unit 3 is done in a way that will have minimal impact on the environment. (**0006-2** [Baummer, Thomas])

Comment: NAACPCCB [National Association for the Advancement of Colored People Calvery County Branch] would like the NRC to conduct a comprehensive analysis of the potential environmental impact of a 3rd reactor at Calvert Cliffs. This impact study should not only consider the impact of the new reactor itself but the potential impact it will have in concert with the other two reactors. (**0017-1** [Brown, Jr., Edsel])

Comment: [W]e again request that you continue to provide an open and transparent public process where everyone has an opportunity to ask questions, express their opinions and learn more about the regulatory process. (**0024-13** [Parran, Wilson])

Comment: We trust the NRC’s open process and respectfully request that the NRC keep public comment for the draft environmental impact statement specific to the environmental report findings. (**0024-15** [Hodge, Gary])

Comment: We understand that there will be environmental impacts during construction, several of which have been identified by Unistar. We ask that the NRC look into the identified impacts and during your independent review determine the most appropriate mitigation measures where needed. (**0024-3** [Parran, Wilson])

Comment: We encourage and trust the NRC’s open process, and respectfully request that the NRC keep public comment for the draft environmental impact statement specific to the environmental report findings. (**0025-107** [Hodge, Gary])

Comment: [W]e again request that you continue to provide an open, transparent public process where everyone has an opportunity to ask questions, express their opinions, and learn more about the regulatory process. (**0025-17** [Parran, Wilson])

Comment: Last August I asked that the NRC provide assurance that Calvert Cliffs and their partners be given fair regulatory treatment regardless of opposition. (**0025-26** [Martins, Darren])

Comment: We ask that the NRC look into the identified impacts and, during your independent review, determine the most appropriate mitigation measures when needed. (**0025-3** [Parran, Wilson])

Comment: Any shortcomings and deficiencies in this EIS will be protested, will be litigated, and will be legislated. (**0025-41** [Mariotte, Michael])

Response: *The NRC reviews the plans for construction and operation of a proposed unit and evaluates the impacts and mitigation measures. As part of the NRC process, it seeks public comment through the public scoping meetings and the scoping period. Impacts of construction and operation including cumulative impacts with the existing Units 1 and 2 will be described in the EIS.*

Comment: It is our expectation that all of the questions and concerns noted in this letter will be answered by the NRC and Calvert Cliffs Nuclear Power Plant. We hope that your desire is not just to build a nuclear reactor but assist in rebuilding the community and improving the quality of life for the people in the community. (**0018-14** [Mackall, Kimberly])

Response: The *NRC has an obligation under NEPA to identify and disclose the socioeconomic impacts of major Federal actions it undertakes. Socioeconomic impacts will be analyzed in the EIS. However, NRC's authority is limited to regulating the civilian use of nuclear materials. Community and quality of life issues that do not affect nuclear safety are more appropriately addressed by local authorities and the applicant.*

Comment: The Draft and Final EIS—as well as public hearings—must await certification of the EPR reactor design. (**0019-20** [Mariotte, Michael])

Response: *The Design Certification Documentation for the AREVA U.S. Evolutionary Power Reactor proposed for the Calvert Cliffs Unit 3 was submitted to the NRC in December 2007. The review of the design is ongoing. The submitted documentation provided sufficient details to evaluate issues relevant to the EIS. If substantive changes to the design are made as a result of the review, the changes will be evaluated to determine whether a supplement to the EIS will be needed.*

Comment: PPRP attended the NRC public scoping meeting on 19 March 2008, as well as portions of the site audit tour and meetings held on 17 and 18 March 2008. We appreciated the opportunity to meet the NRC staff and to share information about the State-level reviews taking place concurrently with the Federal-level evaluation. We look forward to a continuing open dialogue with the staff on issues important to Maryland. We have no specific input to the NRC's environmental impact statement (EIS) scoping process at this time. PPRP plans to thoroughly review the draft EIS when it is issued and will submit comments as appropriate. We welcome the opportunity to participate in the NRC licensing process for Calvert Cliffs Unit 3 and look forward to further interaction in the NRC's development of the EIS. (**0022-1** [Gray, Susan])

Response: The *NRC appreciates the opportunity to include the State of Maryland among the stakeholders participating in the licensing process for the proposed Unit 3 at the Calvert Cliffs facility.*

2. Comments Concerning Site Layout and Design

Comment: When UniStar Nuclear picked this design, we picked this design because of the two containments, the four safety trains, the amount of concrete and steel that is in this design. (**0024-113** [Vanderheyden, George])

Comment: [O]ur design is being constructed all over the world. It has already been approved by two regulatory agencies in two different countries, Finland and France. Our hope is, is that, as we go through this extensive open process with the NRC, that the U.S. Government and the Nuclear Regulatory Commission will be the third country and third regulatory agent to fully review and approve this design. (**0024-115** [Vanderheyden, George])

Comment: This design that we will produce is also going to have a very small environmental impact. We're the ones that are going to build a cooling tower that's not 5[00] or 600 feet like most people are used to seeing in the press, I mean in pictures. It's a 168 feet. It's going to have plume abatement on the cooling towers which means that vapor trail that people see that goes up into the air, you won't see that from our power plant. (**0024-118** [Vanderheyden, George])

Comment: [W]e're going to put a desalinization plant in. We're going to take a small amount of the Chesapeake Bay water, remove the salt, make fresh water with it and use it to provide the power plant systems. (**0024-119** [Vanderheyden, George])

Comment: UniStar has taken several additional key steps to minimize the environmental impact by selecting a hybrid cooling tower designed much lower to the ground and one that will take in approximately 98 percent less water from the Chesapeake Bay than the existing Calvert Cliffs Units 1 and 2, and a desalination plant that eliminates the need to use area groundwater sources once the plant is operational. (**0024-2** [Parran, Wilson])

Comment: I trust that since this may be the first design of this type in the United States but it's not just being reviewed by the NRC, it's being reviewed by other nations as well. (**0024-96** [Scarafia, Bill])

Comment: [W]e are the design that has the double containment building. The containment building, of course, is what houses the nuclear reactor subject to many of people's points. It is typically that four- to seven-foot thick concrete dome around it. Well, we have a second dome around ours. We have double containments. (**0025-168** [Vanderheyden, George])

Comment: Our design – and we will prove it in our safety analysis – is capable of handling a direct impact from a military aircraft, a personal aircraft, and a large commercial aircraft. (**0025-169** [Vanderheyden, George])

Comment: We are the design that will have 99 percent less heat input into the Chesapeake Bay. We will use 98 percent less cooling water than the existing two units use at Calvert Cliffs. We are going to do that through a new hybrid cooling tower. (**0025-171** [Vanderheyden, George])

Comment: It's a low cooling tower, only 168 feet, not 600 feet that you see at many of these power plants. And it's even going to have plume abatement on it, so you don't see that vapor trail going up into the sky. (**0025-172** [Vanderheyden, George])

Comment: I am well aware of the concerns of the quality of our groundwater and the amount of groundwater we have left in our aquifers here because of the continued population growth we are all seeing. So we decided to spend an additional $47 million to put a desalinization plant in, so that the plant will draw water from the Chesapeake, desalinate it, it turns out to be a small amount of water, and not use the groundwater. (**0025-173** [Vanderheyden, George])

Comment: UniStar has taken several additional key steps to minimize the environmental impact by selecting a hybrid cooling tower designed much lower to the ground and one that will take in approximately 98 percent less water from the Chesapeake Bay than the existing Calvert Cliffs Units 1 and 2, and a desalination plant that eliminates the need to use area groundwater sources once the plant is operational. (**0025-2** [Parran, Wilson])

Response: *These comments relate to UniStar's proposed plant design, cooling system, and plume abatement measures. Some, like the plan to build a desalination plant for cooling the reactor, relate to design measures intended to minimize resource use. The site layout, the reactor type, and the cooling water systems will be described in Chapter 3 of the EIS.*

Comment: I drive past the plant on Route 2/4 every day on my way back and forth to work. There are no visible clues that there is any kind of industrial activity there, except the signs at the entrance of the plant. No smokestacks, no smoke, no railway cars, no lines of trucks in and out, and no pipelines. (**0025-133** [Sinclair, Jim])

Response: *This comment reflects the lack of visible indications of industrial activity when viewing the plant entrance and surrounding site from the highway. An aesthetics evaluation of the proposed plant siting will be discussed as part of the socioeconomics analysis in the EIS.*

3. Comments Concerning Land Use – Site and Vicinity

Comment: How will clearing of additional land and any changes to the shoreline and cliffs impact the environment immediately surrounding the plant? (**0006-8** [Baummer, Thomas])

Response: *The land use and ecological impacts of constructing and operating the proposed new nuclear unit will be examined in Chapters 4 and 5 in the EIS.*

4. Comments Concerning Land Use – Transmission Lines

Comment: Constellation representatives have not to my knowledge explained to Calvert County how they will export the additional 1600 MW out of the County and into "the grid". Supporters of the new reactor seem to believe that Unistar will be able to upgrade the existing corridor, without having to condemn additional land from adjacent property owners. In contrast to Constellation/Unistar, representatives of the MAPP project have indicated that they do not intend to widen their 500 kV connector from Calvert Cliffs to Chalk Point—rather, they intend to upgrade the cables and towers. MAPP also plans to embed a 500 kV connector at shallow subbottom depth under the Chesapeake, thereby creating a connection with the Eastern Shore. (**0005-14** [Vogt, Peter])

Comment: [A]ny widening of the transmission corridor would have extremely negative effects on adjacent homeowners and on land owners who have gone the extra mile to preserve their land privately, thinking it would be 'in perpetuity'. Perhaps the worst impacts would fall on the large area of nature preserve in the watersheds of Parkers Creek and Governors Run. The environmental viability of this preserve area is already negatively impacted by the existing corridors, which fragment the forested preserve. (**0005-15** [Vogt, Peter])

Comment: The EIS needs to require any new reactor to export its power within the existing corridor. If necessary, pay the price of undergrounding—it's possible but costs more. (**0005-16** [Vogt, Peter])

Response: *The possible need for any additional land for transmission will be addressed in Chapter 4 of the EIS. If new land is needed, associated environmental impacts will also be addressed in the EIS.*

Comment: [W]hen comparing the impact of generating new power at Calvert Cliffs vs. at other potential sites, the EIS needs to compare the lengths of transmission corridor required to get the power into the grid. This would include the added line losses, transmission line and tower construction and maintenance costs for a longer corridor, as well as the environmental costs of keeping natural forest from reclaiming the corridors. (**0005-17** [Vogt, Peter])

Comment: We would like to make certain that our citizens understand one key construction fact: there are no new transmission corridors necessary to build Unit 3. It is important to note that Unit 3 not be confused with other proposed utility improvement projects in Calvert County. The 500kv transmission line currently serving Calvert Cliffs will accommodate the expansion with some upgrades to substations. (**0014-2** [Clark, Gerald] [Kelley, Linda] [Parran, Wilson] [Shaw, Susan] [Stinnett, Barbara])

Comment: [N]o new transmission corridors are needed to build Unit 3. We note this because it is important not to confuse the construction of Unit 3 with the other proposed utility improvement projects in Calvert County and we have several other projects in Calvert County that are not related to the building of Unit 3. (**0024-4** [Parran, Wilson])

Comment: [I]t is important not to confuse the construction of the Unit 3 and other proposed utility improvement projects in Calvert County. The 500-kilovolt transmission line currently serving Calvert Cliffs will accommodate the expansion with some upgrades to the substation (**0025-5** [Parran, Wilson])

Response: *The environmental impacts associated with transmitting power from the proposed new unit to the grid will be addressed in the EIS.*

5. <u>Comments Concerning Meteorology and Air Quality</u>

Comment: Will the water circulating in the cooling tower be raw bay water or treated or desalinated water? Any chemicals in this water, as well as salt and other minerals, are likely to be carried into the air and the local environment. The effect of this should be evaluated. (**0006-5** [Baummer, Thomas])

Comment: Is the plume abatement system on the cooling tower likely to work effectively throughout the plant's life? Or will a certain level of effectiveness be required? Legionnaire's disease and particulate salt emissions (with its effects on the local ecology and on nearby cars and equipment through corrosion) are two significant concerns. (**0006-6** [Baummer, Thomas])

Response: *The reactor cooling system including the water source and treatment and its operation will be discussed in Chapter 3 of the staff's EIS. The potential impacts of the cooling system operation will be addressed in several sections of Chapter 5 of the EIS. For example, impacts of drift on vegetation will be addressed in the section on terrestrial ecology, the potential impacts on human health will be addressed in the section on non-radiological health effects, and the aesthetics of cooling tower plumes will be addressed in the section on socioeconomic impacts.*

Comment: The EIS should fully examine the potential effects of climate change on the Calvert Cliffs 3 facility, including the possibility of severe weather-induced accidents. For example, tornados are occurring with greater frequency in the region and a strong tornado nearly hit the Calvert Cliffs site just a few years ago, whereas 30 years ago tornados were a rarity in the mid-Atlantic region. The EIS should consider the effect of stronger and more frequent tornados hitting the Calvert Cliffs site directly. (**0019-29** [Mariotte, Michael])

Comment: The EIS should address the effects of larger and more frequent hurricanes directly hitting the Calvert Cliffs site. (**0019-30** [Mariotte, Michael])

Comment: What is the effect of climate change on the operations of this plant? This plant would operate for at least 40 years, perhaps 60 years. It won't be online for another 10 years, so we are really projecting late this century the impacts of this plant. (**0025-45** [Mariotte, Michael])

Comment: What are the effects of the increasing likelihood of increasingly strong storms, tornadoes, on this plant? Is this plant being built to accommodate that? (**0025-46** [Mariotte, Michael])

Response: *The comments express concern over the effects of the environment on the operation of the plant. Evaluation of the design to withstand severe weather conditions is part of the licensing process, but outside the scope of the EIS. Wind loadings, tornados, and floods will be considered in the staff's safety evaluation report.*

Comment: The EIS should address the possible impacts of climate change on the Chesapeake Bay and the water supply for Calvert Cliffs-3. (**0019-31** [Mariotte, Michael])

Response: *The comment expresses concern over the effects of the environment on the operation of the plant. Evaluation of the water requirements to maintain the plant in a safe condition is part of the licensing process, but outside the scope of the EIS. The capability of the water supply source to provide necessary cooling of the reactor and essential equipment will be evaluated in the staff's safety evaluation report.*

6. Comments Concerning Geology

Comment: Careful mapping of the Miocene-aged sediment layers outcropping along the Calvert Cliffs has been done and published subsequent to the construction of the existing power plant in the mid-1970s. This new mapping shows--more accurately than was known before– he layers to be gently dipping (tilted) down to the southeast, and not disrupted by faults—except at one site, located about 1 mile south of the Calvert Cliffs Nuclear Power Plant, just north of Rocky Point. At this place along the cliffs, the layers appear to be offset a couple meters—that is, the layers are not continuous. The offset is such that the layers to the south are higher than those on the north. Detailed geological examination is needed to prove that the offset is not due to mapping errors--unlikely--, and, if a fault is indicated, boreholes will be needed to establish its strike (trend) and dip. (**0019-35** [Mariotte, Michael])

Response: *The EIS will contain a short description of local geology. Geotechnical and seismic issues are addressed in Chapter 2.5 [Section 2.8] of the staff's Safety Evaluation Report.*

7. Comments Concerning Water Resources

Comment: What will be done with the salt and other minerals extracted by the desalination plant? Returning these to the bay will have a disturbing effect on the salinity and ecology of the area. (**0006-4** [Baummer, Thomas])

Response: *Water quality impacts of operation of the plant will be evaluated by the staff and described in Chapter 5 of the EIS. This assessment will include consideration of the impacts of the effluents from the desalination system and its effect on aquatic ecology.*

Comment: How will sediment and chemical runoff be controlled during construction? (**0006-7** [Baummer, Thomas])

Response: *Water quality issues associated with construction activities will be assessed by the staff and discussed in Chapters 4 and 7 of the EIS. Control of pollutants in runoff is regulated by the State.*

Comment: You should address what effect runoff from the pre-construction activities will have on the Bay. (**0025-93** [Fisher, Allison])

Response: *The impacts of preconstruction activities will be considered in the staff's review of cumulative impacts. The assessment of cumulative impacts will be discussed in Chapters 4 and 7 of the EIS.*

Comment: [W]hat benchmarking can we do with regard to effluents to the Bay when we compare it to non-nuclear power plants that use the same water supply? (**0024-110** [Buchanan, Bill])

Response: *It is unclear whether this question refers to general or radiological effluents. General effluents are largely related to the amount of water used in the cooling system, its temperatures, and any water treatment chemicals used. Liquid effluents are regulated through the facility's National Pollutant Discharge Elimination System (NPDES) permit. Aside from the cooling system, the primary feature distinguishing the liquid effluents from a nuclear power plant with a non-nuclear power plant is that a nuclear plant discharges a small quantity of radionuclides into the normal effluent, and this quantity is limited by NRC regulation. Ambient radiological monitoring is conducted in the Bay to verify its quality. Current surface water quality and proposed impacts to the surface water from construction and operation of a new unit will be discussed in the EIS.*

8. Comments Concerning Ecology

Comment: According to Constellation sources, ca. 300 acres will have to be cleared of forest for new reactor construction. This forest forms part of the two remaining Calvert County areas of relatively contiguous forest, which represent “bioreserves”, for example for successful reproduction of numerous neotropical migrant bird species, whose populations have been steadily declining (at rates from ca. 1 to several % per year, depending on species) throughout the eastern US for some decades. One of the two areas extends from Flag Ponds Nature Park across through the Constellation forest buffer zone, and down into the Calvert Cliffs State Park and the buffer zone around the Dominion LNG terminal area. The Calvert Cliffs forest buffer zone, managed for wildlife under the WHIP program by the operator, is actually better for Forest Interior Dwelling species (FIDs) than parks opened to the public, which are more prone to disturbance. [The] 300 contiguous acres of forest lost to the new reactor would probably comprise the biggest single loss of contiguous forest (the ecologically valuable type) in Calvert County for decades, if not ever. The EIS needs to estimate the resulting loss of nesting sites etc. from the clearing of these 300 forested acres. (**0005-13** [Vogt, Peter])

Response: *Impacts to terrestrial resources from construction of the proposed unit, including changes in the landscape, will be discussed in Chapters 4 and 7 of the EIS.*

Comment: [T]he damage to wildlife from small releases should be contrasted with the damage to habitat that would result from the construction of thousands of wind turbines, either on or offshore, or the conversion of thousands of square miles of farm and forest to bioenergy production. (**0025-59** [Meadow, Norm])

Response: *Impacts of the construction and operation of the proposed unit on environmental resources will be discussed in Chapters 4 and 5 of the EIS. Impacts of alternative energy sources will be discussed in Chapter 9.*

Comment: [The EIS] must assign considerable importance to damage to habitat which diminishes both biological diversity and complexity. (**0028-2** [Meadow, Norman])

Response: *A discussion of the impacts of construction and operation of the proposed units and their impact on the environment will be discussed in Chapters 4 and 5 of the EIS.*

9. Comments Concerning Socioeconomics

Comment: I’ve lived here in Calvert for 25 years. All the farms are gone. They want to build new schools. Subdivisions are everyw[h]ere. But I guess no one thought about that. Calvert County Commissioners are not for the quality of life for this county. All they can think of is the next dollar in their pocket. (**0002-2** [Boswell, William])

Response: *Socioeconomic issues including existing land development and regional schools and changes resulting from the addition of the proposed new unit will be discussed in Chapters 4 and 5 of the EIS.*

Comment: The EIS needs to estimate the likely number of new children added to the school system as a result of a new reactor- and take into consideration that the new employees will likely be in their prime child-producing years. (**0005-11** [Vogt, Peter])

Comment: Your risk assessment must consider rapid population growth in the Calvert Cliffs Nuclear Power plant region. Calvert County itself has grown from ca. 20,000 when the first two units went online, to nearly 90,000 today. (**0005-4** [Vogt, Peter])

Comment: Constellation must demonstrate that its staff will have access to reasonable housing. Since Calvert County has limited apartment availability, plans must be established to ensure that the staff of the new reactor can acquire living quarters in the county. Over the last several years there have been major issues with healthcare, law enforcement, and other key professionals finding it difficult to acquire housing in the county. (**0017-9** [Brown, Jr., Edsel])

Response: *Socioeconomic impacts such as impacts on population, schools, public services, and housing associated with the construction and operation of a new unit at Calvert Cliffs will be considered in Chapters 4 and 5 of the EIS.*

Comment: EIS statisticians should be able to estimate, with some range of caveats/assumptions, the probable mean traffic delay imposed by reactor construction and operation, and what a mean 1 minute daily traffic delay would cost annually, as well as the likely number of additional accidents per year. Even neglecting the delays and cost due to increased accidents, I roughly estimate the total annual cost for every 1 min traffic delay at from $5 million to $50 million. It is unacceptable that this cost is ignored just because it is (like investor risk) dispersed among many thousands of people. (**0005-10** [Vogt, Peter])

Comment: Constellation states that the proposed third reactor would provide several thousand construction jobs and several hundred permanent jobs. Many of these new jobs, as well as visitors, and delivery trucks, will add substantial traffic to MD 2/4, which at present is a congested and dangerous highway. (**0005-6** [Vogt, Peter])

Comment: Traffic on this highway has been increasing even faster than the population-and Calvert has been at or near the top of population growth rates among Maryland counties for decades: Your estimate needs to consider the trend when you estimate traffic impact when reactor construction might begin. (**0005-8** [Vogt, Peter])

Comment: MD 2/4 is currently near failure (categories D or worse), especially during rush hour. The counter near Prince Frederick has reached 40,000 vehicles per day, and much of the new reactor traffic would have to pass through Prince Frederick. Your assessment needs to acknowledge the 'stutter-step' response of infrastructure (e.g., roads, schools, airports, etc.) to growth. (**0005-9** [Vogt, Peter])

Comment: [With regard] to the potential impact on traffic patterns in Calvert County as a result of the new reactor. With increased staff, deliveries, and related businesses to support the site expansion, what plans are being put in place to assure that the expansion will have little or no impact on travel. (**0017-7** [Brown, Jr., Edsel])

Response: *Socioeconomic impacts such as impacts on transportation and local infrastructure associated with the construction and operation of the Unit 3 will be considered in Chapters 4 and 5 of the EIS.*

Comment: The EIS process should include impartial estimates showing a breakdown of job and pay categories, in terms of the % likely filled by county residents. (**0005-12** [Vogt, Peter])

Response: *Socioeconomic impacts such as labor impacts associated with the construction and operation of Unit 3 will be considered in Chapters 4 and 5 of the EIS.*

Comment: Calvert Cliffs has served the citizens of Calvert County well over the past decades as the leading employer in our county. Additionally, Calvert Cliffs has contributed sixteen million dollars annually in taxes, which accounts for nine percent of the county's total revenue. Calvert Cliffs has assisted the county in numerous donations to various organizations and countless students. I have seen many positive results from their presence in Southern Maryland. I can truly say that Calvert Cliffs has greatly enriched our county and allowed for a better quality of life while meeting the energy needs of Maryland. (**0015-5** [O'Donnell, Anthony])

Comment: The reality of the fact is that nuclear power plants are going to be built in this country somewhere and at some time and there's no reason why this county and this region should not enjoy those economic benefits that I talked about earlier today and if it's job creation in this county that are good paying jobs with good benefits that aren't necessarily when we talk about the construction jobs as temporary jobs, those are not temporary jobs. They will afford —

with the rising costs of college education today many people will not be able to viably afford to go to college and our young people will have an opportunity to enter into the trade, learn a skill, get educated while they earn money and have a lifelong career with benefits, a defined benefit plan, and a health and welfare plan where they can take care of their needs. (**0024-107** [Karbowsky, Brad])

Comment: [A] nuclear plant makes a good neighbor, as many people here tonight have already indicated. It supports high-paying jobs directly at the plant, generates additional jobs in the community where it is located, and contributes by helping build good schools, roads, and other civic improvements. (**0024-26** [Kanaley, Mike])

Comment: We must seek and support development that will stimulate our economy, provide jobs, additional tax revenue, and new business opportunities. We have to be open-minded and flexible when considering what we're up against. We have to keep an eye on the important role that Calvert Cliffs plays in our economy. (**0024-29** [McClure, Deborah])

Comment: I read a letter to the editor recently blasting this potential expansion as related to a number of items, including job growth, the limited availability of labor and the fact that most of the higher-paying jobs related to the plant expansion would be highly specialized, with the eligible employee pool mostly trained on Navy nuclear submarines. Not only is this not true, I couldn't disagree more with that premise. It is true that the Navy trains many, many nuclear workers, but the fact is that universities across the United States, almost 900 of them, offer fields of study in undergraduate nuclear energy programs. (**0024-42** [Chambers, Bill])

Comment: [B]ecause job creation is critical here locally in Calvert County, an expanded Calvert Cliffs would be a huge economic and socioeconomic boon for Calvert County and the State of Maryland. (**0024-43** [Chambers, Bill])

Comment: So I ask the NRC to review the impact an expanded Calvert Cliffs may have on education and this request is not meant to be negative at all. In fact, I'd like this raised because I believe that creating opportunity for our local youth will allow our children to live and work in the community in which they are raised. (**0024-44** [Chambers, Bill])

Comment: The economy is in an area right now where we need jobs such as the third reactor coming to Calvert Cliffs. We as union employees are in a turmoil right now. That plant alone would bring most crafts back up to standards and that's what we are looking forward to. (**0024-56** [Parran, Wilson L.])

Comment: When we look at the potential for this new facility and the 2,000 on up construction jobs, another economic benefit. When we look at the 400 potential permanent jobs after completion, high-paying technically advanced jobs. (**0024-93** [Scarafia, Bill])

Comment: Our communities throughout Southern Maryland have all collaborated to build a feeder system throughout our public schools and our higher education in the areas of science, technology, engineering and math, what everybody in the country is calling STEM, so that our citizens will be able to produce the kind of workers that they will need and as one speaker said earlier, we will now have another opportunity for our local graduates to live and work here. (**0024-94** [Scarafia, Bill])

Comment: A nuclear power plant also makes a good neighbor. It supports high-paying jobs directly at the plant. It generates additional jobs in the community, and I have been told, and I have read, that for every job created at a plant three jobs are created in the community. And I believe it is 400 jobs that are going to be created, so that's 1,200 additional jobs in the community. (**0025-123** [Walther, Robert])

Comment: The community will benefit from the many construction jobs created over the near term, and permanent jobs long into the future, once the plant becomes operational. (**0025-137** [Sinclair, Jim])

Comment: The new plant will also make a significant contribution to the Calvert County tax base, which is already greatly supported by the existing units, reducing the burden on individual taxpayers. (**0025-138** [Sinclair, Jim])

Comment: In these tough economic times, it is economic development like the construction of a third reactor at Calvert Cliffs that will help provide the socioeconomic push many of our small businesses need to stay afloat and prosper. Solomons Business Association welcomes that development and looks forward to the new jobs, new businesses, and new visitors that it will bring to our region. (**0025-175** [Tarhan, Diane])

Comment: [T]he positive economic benefit that will come from the expansion and adding this third reactor at Calvert Cliffs, some $20 million in new revenue resources that would come just to Calvert County alone. (**0025-35** [Burton, Bob])

Comment: And let me just say that the environmental impact can be positive not only during and after the new reactor is put into place, but these additional monies that will come into Calvert County will be used to improve, upgrade, and expand infrastructure, public education, and public safety. (**0025-36** [Burton, Bob])

Comment: [W]hen we have the opportunity in our local jurisdictions, and the funding, to be able to go in there and upgrade this infrastructure, it will have to meet the new environmental standards, which will help create a cleaner environment for our communities when we begin upgrading this infrastructure. (**0025-37** [Burton, Bob])

Comment: When we begin putting additional monies into public education, we can expand the program offerings, as it was noted here earlier, in the area of math and science and engineering. (**0025-38** [Burton, Bob])

Comment: [W]e are talking about an infusion of jobs to this region of 2,000 construction jobs, many of which whom the last time there was a construction plant built in this county stayed here, with high-paying jobs that have high paying benefits that do not take from the county and the region’s government, but actually give back to those positions. (**0025-78** [Karbowsky, Brad])

Comment: It brings forth the ability of our young people to enter into the construction trade, as an alternative to going to college, for those who can't go to college with the skyrocketing costs of college, and provide opportunities for our residents to have jobs and stay in this county and live in this county. (**0025-80** [Karbowsky, Brad])

Comment: The estimated 2,000 to 4,000 construction jobs will be an economic boost to our region, but then the subsequent 400 permanent jobs will be well placed here, because in St. Mary's County and the rest of our region you will see that we have developed a huge technology base where people will be able to come with their expertise and blend and feel comfortable in this community. (**0025-82** [Scarafia, Bill])

Response: *These comments generally express support for the Calvert Cliffs Unit 3, based on the potential positive socioeconomic impacts it would be expected to bring to the region. Socioeconomic impacts of construction and operation will be discussed in Chapters 4 and 5 of the EIS.*

10. Comments Concerning Historic and Cultural Resources

Comment: [I]n the environmental report submitted by Unistar, they identify parcels within the proposed project area that is potentially eligible for the national registry of historic places. Since they're a moderate to high potential for containing archaeological resources in this general area, what mitigation measures will be required in order to protect the integrity of these resources, especially since they are no longer considered within the purview of the EIS? (**0025-94** [Fisher, Allison])

Response: *The NRC will comply with the National Historic Preservation Act (NHPA) through its normal NEPA process. Impacts to historical resources and possible mitigation measures will be discussed in Chapters 4 and 5 of the EIS. Then NHPA does not grant the authority to impose mitigation to the NRC. The applicant will need to work with the Maryland Historical Trust to identify any necessary mitigation measures.*

11. Comments Concerning Environmental Justice

Comment: African Americans make up about 13% of the population of Calvert County. A majority of African Americans live within 1 to 10 miles away from the nuclear power plant. There are several schools in close vicinity to the nuclear power plant and will be effected by the decision of the NRC. History tells us that prior to the new concepts of environmental justice and racism the African American neighborhoods have been recipients of toxic landfills and other hazardous materials. Due to the negative historical data throughout the country and potential of an emergency CBW would like to ask the following questions [all but the one below which are listed in the sections based on subject matter]. (**0018-2** [Mackall, Kimberly])

Comment: How are you implementing Environmental Justice Executive Order 12898 at the Calvert Cliffs Nuclear Power Plant? (**0018-3** [Mackall, Kimberly])

Response: *The NRC Environmental Justice Policy is available in the NRC Electronic Reading Room at http://www.nrc.gov/reading-rm/doc-collections/commission/policy/69fr52040.pdf. The policy states that NRC will identify and disclose disproportionately high and adverse impacts that fall heavily on a particular community as a result of a proposed agency action. The NRC will perform its environmental justice analysis through its NEPA review process. Environmental justice is evaluated on a plant-specific basis and will be addressed in Chapters 4 and 5 of the EIS.*

12. Comments Concerning Health – Radiological

Comment: I took a course in the history of the nuclear industry at university, studying under one of the most respected academic specialists on the subject. He says that there is no real 'safe' level of radiation for humans to be exposed to. All radiation is damaging, no matter what the nuclear companies say. (**0007-3** [Shannahan, Brittany])

Comment: What are your clean up standards? What are the standards for air quality and water quality? (**0018-10** [Mackall, Kimberly])

Comment: The EIS should address the additional cumulative effects of routine radiation releases on nearby populations and on aquatic life in and around the Chesapeake Bay from Calvert Cliffs-3, given 11 nuclear reactors (Susquehanna 1 & 2, Three Mile Island 1, Peach Bottom 2& 3, Calvert Cliffs-1 & 2, North Anna 1& 2, Surry 1& 2) already releasing radiation into the Bay. (**0019-22** [Mariotte, Michael])

Comment: [W]ith an accident at a nuclear power plant, it's, of course, different than an accident elsewhere. There is radioactive material that would be dispersed and citizens are at risk of ingestion and inhalation. Radioactive iodine can be a cause of thyroid cancer and then the other radioactive material can be risk factors down the line for cancers in the future. (**0024-68** [Dubois, Gwen])

Comment: [T]he scientific requirements for valid analysis of risk are clearly described in the publications of the National Research Council, known as the BEIR reports, B-E-I-R. And these should be carefully considered. The reports clearly state that the best estimates of risk are from studies for which there are data on individual dose, and for which an appropriate control population is available. (**0025-57** [Meadow, Norm])

Comment: The scientific requirements for valid analysis of risk are clearly described in publications of the National Research Council known as the BEIR Reports, which should be considered carefully. These reports clearly state that the best estimates of risk are from studies for which there are data on individual dose, and for which appropriate control populations are available. (**0028-28** [Meadow, Norman])

Comment: When evaluating risk from accidents of the magnitude of that at Three Mile Island (TMI), the quality of the available studies should be evaluated by the criteria in the BEIR Reports. (**0028-29** [Meadow, Norman])

Comment: The results most often given to the public are from weak, ecological studies; the paper most frequently cited by opponents of nuclear power as demonstrating that the releases at TMI2 caused damage to health is an ecological study. Two other groups of qualified researchers have not found evidence of cancer caused by TMI. (**0028-30** [Meadow, Norman])

Comment: The rate of incidence of cancer proposed by Wing, et al. is inconsistently high when compared to the rates that have been reported from exposures that were orders of magnitude higher than those which occurred at TMI [Three Mile Island]. ... This is one of the more convincing pieces of evidence that caused the MCC to conclude that there is no credible evidence that accidents at water moderated reactors have caused harm to health. (**0028-31** [Meadow, Norman])

Comment: Virtually all oncologists believe that solid tumors do not become clinically manifest until at least 5 years, and more often at least 10 years after the event that turns a cell malignant. (**0028-32** [Meadow, Norman])

Comment: [W]e believe that the potential for harm from commercial water-moderated nuclear reactors has been unjustifiably exaggerated, and that there is no credible evidence for death or cancer attributable to their operation. (**0028-5** [Meadow, Norman])

Response: *The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects of radiation on humans. These limits are presented in 10 CFR Part 20, "Standards for Protection Against Radiation" and are based on recommendations of national and international standards-setting organizations and the National Research Council's committee reports on the Biological Effects of Ionizing Radiation (the BEIR reports). The effects on workers and the public and environment from cumulative radiological releases from the proposed Unit 3, including those from Calvert Cliffs Units 1 and 2, will be described in Chapter 7 of the EIS.*

Comment: [W]hen investigating the environmental consequences of an accident at the proposed reactor, the EIS should consider many reports on the effects of radioactivity on wildlife, some of which are from carefully controlled experiments. Humans appear to be among the species most sensitive to radioactivity, which means that most other things out there are less sensitive. (**0025-58** [Meadow, Norm])

Comment: When evaluating the environmental consequences of an accident (environmental in the context of the preservation of nature) at the proposed reactor, the EIS should consider many reports on the effects of radioactivity on wildlife [footnote 5] and not gratuitous statements that extrapolate exaggerated claims of health damage from humans to the rest of the biological world. Humans appear to be among the species most sensitive to radioactivity. (**0028-33** [Meadow, Norman])

Response: *The radiological impacts of reactor operation, including impacts to biota, will be addressed in Chapter 5 of the EIS.*

Comment: The EIS must fully address the impact on flora and fauna in the Chesapeake Bay caused by Calvert Cliffs-3's planned release of 525,000 gallons per year of radioactive waste into the Bay, as indicated by Constellation Energy's Response to Question 1-13 of the Maryland Public Service Commission. (**0019-17** [Mariotte, Michael])

Comment: [A]ccording to documents filed with the Maryland Public Service Commission, this plant is going to dump 525,000 gallons per year of liquid radioactive waste into the Chesapeake Bay. What are the effects on the flora and fauna of that dumping? That is something that has to be looked at in the EIS and addressed carefully. (**0025-53** [Mariotte, Michael])

Response: *These comments concern the environmental impacts of liquid radioactive effluents on aquatic ecology during normal operations. The NRC staff will discuss such impacts in Chapter 5 of the EIS.*

13. <u>Comments Concerning Accidents</u>

Comment: While the nuclear reactor is said to stimulate the economy within Calvert County, CBW's [Concerned Black Women of Calvert County] primary concern is regarding the quality of life of the people who live near and are at risk if an accident occurs. CBW believes that the family is the foundation and core of the community. In order for the family to be viable the people must have the right to a clean, safe, just, healthy, and sustainable environment. (**0018-1** [Mackall, Kimberly])

Comment: What is your worst case scenario for a potential accident? What preventative measures will you put in place? (**0018-9** [Mackall, Kimberly])

Comment: I would even point out if an evacuation is carried out without a hitch, what does that mean if there's a major radioactivity release from Calvert Cliffs? That could mean that people can never come back. (**0024-84** [Kamps, Kevin])

Comment: One melt down of one of those plants – it's sci fi horror films manifested! (**0026-3** [Marsh, Rauni])

Response: *The staff's EIS will address the potential impacts of operation of the proposed reactor on public health and safety in Chapter 5. There will be sections on potential radiological and nonradiological impacts of normal reactor operation on public health. There will also be a section on the potential impacts of postulated reactor accidents on public health and the environment.*

Comment: The EIS should describe and address the potential consequences of a beyond design basis accident at Calvert Cliffs-3 and should address potential additional risks of its First-of-a-Kind reactor design. (**0019-18** [Mariotte, Michael])

Comment: Because the scoping period of this EIS is occurring well in advance—literally, years in advance—of certification of the EPR design chosen for this reactor site, we have to defer additional comments on the safety issues related to this project. However, we fail to understand how the EIS can possibly address the fundamental issue of the environmental consequences of a severe accident without knowing the specific vulnerabilities of the chosen reactor design. (**0019-19** [Mariotte, Michael])

Comment: This design does not exist anywhere in the world. There are no operating EPRs anywhere in the world. And one of the most important things that an EIS does is examine the potential environmental consequences of a severe accident. But until you know the design strengths and weaknesses, and how they will be implemented, you don't know what the potential accident is. (**0025-43** [Mariotte, Michael])

Response: *The staff's EIS will address the potential environmental impacts of postulated design-basis and severe accidents in Chapter 5. The U.S. EPR was selected as the design for the proposed Calvert Cliffs Unit 3. In a separate action, the staff is evaluating the potential consequences of design-basis accidents and the probability and consequences of severe accidents for the U.S. EPR as part of its review of the application for certification of the reactor design. A detailed description of the design certification review is beyond the scope of the EIS. However, the staff uses well-established methods to analyze a new design to determine the potential consequences of accidents. The results of the certification review process will be compared to the results of the evaluation of the environmental impacts of potential radiological releases to assure consistency.*

Comment: The EIS should address the potential adverse environmental impacts of an accident involving a significant release of radiation from at Units 1 & 2 on the safe operation of the new co-located unit. (**0019-23** [Mariotte, Michael])

Comment: The EIS must address possible consequences to Unit-3 of an accident at the Units 1 & 2 fuel pools and/or at their dry cask storage units. (**0019-8** [Mariotte, Michael])

Comment: I just wanted to point out the risks that will come with having two old reactors at Calvert Cliffs combined with having a new reactor at Calvert Cliffs. (**0024-76** [Kamps, Kevin])

Comment: The most recent such report that the agency has done way back in 1982, and the peak early fatalities that they estimated for Calvert Cliffs 1 and 2 were 5,600 peak early fatalities at each reactor in a major accident. The peak early injuries were 15,000 at each reactor. The peak cancer deaths were 23,000. So that's a lot of injuries and deaths. A grand total of 87,200 deaths and injuries if there's a major accident involving both reactors at that site right now. Adding a third reactor would add more risk there. (**0024-77** [Kamps, Kevin])

Response: *In Chapter 5 of the EIS, the staff will address risks associated with both normal operation of the proposed reactor and postulated severe accidents. The staff will also address the cumulative risks of operation of the existing reactors and the proposed new reactor.*

Comment: The EIS should address potential consequences of a serious accident in the irradiated fuel pool at new sites and in other potential high-level radioactive waste storage facilities. (**0008-3** [Acevedo, NK] [Aitken, Keith] [Albright, Evan] [Andereson, David] [Arist, Phyllis] [Armas, Zoe] [Avance, Kenneth] [Bainum, Meghan] [Bakalian, Craig] [Baldwin, Natylie] [Barr, Phillip] [Bartholomew, Alice] [Becker, Rochelle] [Bedding, Gerhard] [Behabadi, Bardia] [Be, Maya] [Bissonnette, Rick] [Black, Monica Latka] [Blomstrom, Eric] [Borrowman, Ellen] [Briggs, Ruth] [Chinn, Jason] [Clark, Kevin] [Clark, Loralee] [Cleaver, Melissa] [Cox, Duncan] [Crawley, Jackie] [Crocca, Carol] [C, Suzy] [Culp, Richard] [Curington, Diana] [Daddy, Big] [Darbyshire, David] [DesHarnais, Gaston] [Diaz, Lorenzo] [Dolly, William] [Emmons, Cheryl] [Erdesohn, Cynthia] [Evans, Michael] [Faigle, Susan] [Fernow, Geoff] [Finnelli, Marilyn and Tom] [Fisher, Allison] [Foppe, Paul] [Fuller, Alfred] [Futterer, Joe] [Gannaway, Gloria] [Garbato, Kelly] [Garner, Patrick] [Gilpin, John] [Good, Riana] [Goodrich, Anne] [Grad, Robert] [Grand, Robert] [Grassi, Rosemarie] [Guay-Brezner, Colette] [Harberson, Laurie] [Hauck, Molly] [Hedlund, Cara] [Helvick, Steven] [Henderson, Sherry] [Hinton, Georgia] [Hoffman, Lilli] [Holzer, Frederick] [Hood, Marilyn] [Hooker, Betsy] [Huffman, Debbie] [Hughey, Patricia] [Hung, Shiu] [Hutchinson, Richard] [Jones-Giampalo, Mary] [Jones, Hollis] [Joos, Sandra] [Jula, Patty] [Kaliski, Raymond] [Kane, Donna] [Katz, Shari] [Klusman, Eric] [Knechel, David] [Kramer, Loren] [Kuintzle, Gaylene] [Lack, Robert] [Lallo, Patrick] [LaLumia, Anne Marie] [LaMonica, Francoise] [Latham, Rhonda] [LaVigne, Carole] [Lee, Angela] [Loew, Brenda] [Luczkowiak, Christopher] [MacNulty, Joy] [Magee, L] [Manske, Jill] [Marcus, Jack David] [Marks, John] [Marsh, Rauni] [Massey, Tom] [McArthur, Richard] [McClure, Matthew] [McCoy, Timothy] [McKenna, Chris] [McKenna, Kathy] [McKenna, Lauren] [McKenna, Rick] [M, Crystal] [Metz, Richard] [Minault, Kent] [Miranda, Tina] [Moore, Kerry] [Mostov, Liz] [Munson, Clarence William] [Nagle, Thomas] [Nanfra, Freya] [Nash, James] [Nerode, Gregory] [Novick, Wesley] [Nunez, Albert] [Nunez, Carlos] [Oakes, Bonnie] [Olmstead, Harry] [O'Meara, Patrick] [Pacheco-Theard, Lauren] [Paquet, Kevin] [Parsons, Barry] [Paul, Georgia] [Pedraza-Tucker, Liette] [Petkiewicz, Margaret] [Phipps, Donald] [Piner, Lisa] [Piser, Daniel] [Putney, Louis] [Rader, Nancy] [Radford Jr., Roger] [Raines, Mary] [Ramstrom, Eric G and Shirley S] [Randall, David] [Rankin, Susan] [Reidenbach, Gregory] [Rosenblum, Stephen] [Ross, Anne] [Sather, Alice] [Sauer, Elizabeth] [Schmidt, Jason] [Schopp, Ricky] [Schwarz, Walter] [See, Bud] [Shafer, Scott] [Shashani, Linda] [Sherrow, Sarah] [Shively, Daniel] [Siecke, Martin] [Simila, Owen] [Skercevic, Maria] [Smith, Enoch] [Smith, Martha] [Snowden, Patricia] [Sorin, Susanna] [Soroos, Marvin S] [Soto, Yvonne] [Stevens, Denise] [Stilwell, Lisa] [Strange, Linda] [Theil, Tony] [Thiele, Abhaya]

[Tornatore, James] [Trenholme, Art] [Turner, Tamisha] [Valliere, Cliff] [VanEtten, Margot] [Vieg, Jeannette] [Voeller, Estelle] [Wadkins, Melanie] [Waldman, Sam] [Walker-Meere, Susan] [Walsh, Donald] [Walters, Betty] [Wanner, Gabrielle] [Ward, John] [Welch, Irene] [Wilkins, Paul] [Willoughby, CaraLea] [Wilson, Deb] [Yeatts, Jordan] [Zastawecky, Margaret] [Zelikson, Linda])

Comment: The EIS must address potential consequences (on the Bay, on people, on flora and fauna in the region) of a serious accident in the irradiated fuel pool at Calvert Cliffs-3, and in other potential high-level radioactive waste storage facilities. (**0019-7** [Mariotte, Michael])

Response: *The staff will assess the impacts of postulated fuel handling accidents in the spent fuel pool in Chapter 5 of the EIS. Evaluation of the consequences of postulated accidents at the Calvert Cliffs Independent Spent Fuel Storage Installation, which is licensed separately, is outside the scope of the environmental review for the proposed reactors.*

Comment: I would point out that if there's an accident at Calvert Cliffs, even a minor one, that there will be radiological stigma associated with that. The NRC should consider that in its socioeconomic analysis. The impact on tourism, the impact on fisheries, the impact on all aspects of the economy in this region, if there's even a small accident at Calvert Cliffs, let alone a major one. (**0024-79** [Kamps, Kevin])

Response: *The environmental review focuses on the radioactive material releases and radiation doses and risks to humans from postulated accidents. The results of the accident evaluation will be presented in Chapter 5 of the EIS. However, environmental impacts related to "radiological stigma" are outside the scope of the review.*

14. Comments Concerning the Uranium Fuel Cycle

Comment: Spent reactor fuel, which some call high level waste, is not a problem. It is easily sealed from the biosphere and stored. Do not succumb to rants and raves. Future generations will much more easily cope with stored spent fuel than with the consequences of global climate change. (**0012-1** [Ireland, John])

Response: *This comment does not provide specific information relating to the environmental effects of the proposed action. It is outside the scope of the EIS and is listed to compile a complete record of the comments received.*

Comment: While I favor increased nuclear power development I am very concerned about the disposal or re-processing of waste. The best idea seems to me to be reprocessing it. We would need to repeal the presidential directive against this but the directive is very out of date with current technology. Be that as it may, we must deal with the waste disposal issue up front! (**0011-1** [Trenholme, Art])

Comment: [T]he EIS should consider recent proposals that storage of spent fuel for several hundred years will reduce its radioactivity to the point where reprocessing will be far less difficult than if it were reprocessed a few years after removal from the reactor. Such intermediate term storage would eliminate the necessity for materials stored in Yucca Mountain to remain physically and chemically stable for hundreds of millennia. (**0025-61** [Meadow, Norm]) (**0028-36** [Meadow, Norman])

Response: *Federal policy no longer prohibits reprocessing. The Energy Policy Act of 2005, P.L. 109-58, authorized the DOE to conduct an advanced fuel recycling technology research and development program to evaluate proliferation-resistant fuel recycling and transmutation technologies that minimize environmental or public health and safety impacts. Additional work is needed before commercial reprocessing and recycling of spent fuel produced in the U.S. commercial nuclear power program is likely. Reprocessing as part of the fuel cycle and waste management will be discussed in Chapter 6.*

Comment: There is going to have to be a method obtained for storage of low-level waste or you are going to shut down a lot of very valuable medical diagnoses, because diagnostic procedures and therapeutic procedures all involve the production of what's known as low-level waste. (**0025-62** [Meadow, Norm])

Response: *This comment expresses the concern for storage and disposal of medical low-level waste. Although waste disposal issues are similar, because medical waste is not generated from nuclear power production, this comment is outside the scope of this EIS.*

Comment: The EIS should address the possible effects of new reactors on existing dry cask irradiated fuel storage units at the plant, including their potential degradation over time as well as the potential impacts of a large expansion of the dry cask units to store high-level radioactive waste from new reactors. (**0008-4** [Acevedo, NK] [Aitken, Keith] [Albright, Evan] [Andereson, David] [Arist, Phyllis] [Armas, Zoe] [Avance, Kenneth] [Bainum, Meghan] [Bakalian, Craig] [Baldwin, Natylie] [Barr, Phillip] [Bartholomew, Alice] [Becker, Rochelle] [Bedding, Gerhard] [Behabadi, Bardia] [Be, Maya] [Bissonnette, Rick] [Black, Monica Latka] [Blomstrom, Eric] [Borrowman, Ellen] [Briggs, Ruth] [Chinn, Jason] [Clark, Kevin] [Clark, Loralee] [Cleaver, Melissa] [Cox, Duncan] [Crawley, Jackie] [Crocca, Carol] [C, Suzy] [Culp, Richard] [Curington, Diana] [Daddy, Big] [Darbyshire, David] [DesHarnais, Gaston] [Diaz, Lorenzo] [Dolly, William] [Emmons, Cheryl] [Erdesohn, Cynthia] [Evans, Michael] [Faigle, Susan] [Fernow, Geoff] [Finnelli, Marilyn and Tom] [Fisher, Allison] [Foppe, Paul] [Fuller, Alfred] [Futterer, Joe] [Gannaway, Gloria] [Garbato, Kelly] [Garner, Patrick] [Gilpin, John] [Good, Riana] [Goodrich, Anne] [Grad, Robert] [Grand, Robert] [Grassi, Rosemarie] [Guay-Brezner, Colette] [Harberson, Laurie] [Hauck, Molly] [Hedlund, Cara] [Helvick, Steven] [Henderson, Sherry] [Hinton, Georgia] [Hoffman, Lilli] [Holzer, Frederick] [Hood, Marilyn] [Hooker, Betsy] [Huffman, Debbie] [Hughey, Patricia] [Hung, Shiu] [Hutchinson, Richard] [Jones-Giampalo, Mary] [Jones, Hollis] [Joos, Sandra] [Jula, Patty] [Kaliski, Raymond] [Kane, Donna] [Katz, Shari] [Klusman, Eric] [Knechel, David] [Kramer, Loren] [Kuintzle, Gaylene] [Lack, Robert] [Lallo, Patrick] [LaLumia, Anne Marie] [LaMonica, Francoise] [Latham, Rhonda] [LaVigne, Carole] [Lee, Angela] [Loew, Brenda] [Luczkowiak, Christopher] [MacNulty, Joy] [Magee, L] [Manske, Jill] [Marcus, Jack David] [Marks, John] [Marsh, Rauni] [Massey, Tom] [McArthur, Richard] [McClure, Matthew] [McCoy, Timothy] [McKenna, Chris] [McKenna, Kathy] [McKenna, Lauren] [McKenna, Rick] [M, Crystal] [Metz, Richard] [Minault, Kent] [Miranda, Tina] [Moore, Kerry] [Mostov, Liz] [Munson, Clarence William] [Nagle, Thomas] [Nanfra, Freya] [Nash, James] [Nerode, Gregory] [Novick, Wesley] [Nunez, Albert] [Nunez, Carlos] [Oakes, Bonnie] [Olmstead, Harry] [O'Meara, Patrick] [Pacheco-Theard, Lauren] [Paquet, Kevin] [Parsons, Barry] [Paul, Georgia] [Pedraza-Tucker, Liette] [Petkiewicz, Margaret] [Phipps, Donald] [Piner, Lisa] [Piser, Daniel] [Putney, Louis] [Rader, Nancy] [Radford Jr., Roger] [Raines, Mary] [Ramstrom, Eric G and Shirley S] [Randall, David] [Rankin, Susan] [Reidenbach, Gregory] [Rosenblum, Stephen] [Ross, Anne] [Sather, Alice] [Sauer, Elizabeth] [Schmidt, Jason] [Schopp, Ricky] [Schwarz, Walter] [See, Bud] [Shafer, Scott] [Shashani, Linda] [Sherrow, Sarah] [Shively, Daniel] [Siecke, Martin] [Simila, Owen] [Skercevic, Maria] [Smith, Enoch] [Smith, Martha] [Snowden, Patricia] [Sorin, Susanna] [Soroos, Marvin S] [Soto, Yvonne] [Stevens, Denise] [Stilwell, Lisa] [Strange, Linda] [Theil, Tony] [Thiele, Abhaya] [Tornatore, James] [Trenholme, Art] [Turner, Tamisha] [Valliere, Cliff] [VanEtten, Margot] [Vieg, Jeannette] [Voeller, Estelle] [Wadkins, Melanie] [Waldman, Sam] [Walker-Meere, Susan] [Walsh, Donald] [Walters, Betty] [Wanner, Gabrielle] [Ward, John] [Welch, Irene] [Wilkins, Paul] [Willoughby, CaraLea] [Wilson, Deb] [Yeatts, Jordan] [Zastawecky, Margaret] [Zelikson, Linda])

Comment: The EIS must address the possible effects of Calvert Cliffs-3 on the existing dry cask irradiated fuel storage units at the Calvert Cliffs site, including their potential degradation over time as well as the potential impacts of a large expansion of the dry cask units to store high-level radioactive waste from Calvert Cliffs-3. (**0019-9** [Mariotte, Michael])

Comment: I just want to touch, before I close, on the risks that high-level radioactive waste presents to the Chesapeake Bay and to local residents and residents who live as far away as Prince George's County where I live. There is the risks of storage. The wastes are stored in the indoor pool and the outdoor dry casks. These wastes in the pool and in the dry casks are vulnerable to accidents, they are vulnerable to attacks. (**0025-96** [Kamps, Kevin])

Comment: We are really looking at this dilemma of what to do. We're looking at a century or more of dry cask storage, and people should just remember that these containers are made out of concrete and steel, both of which deteriorate with age and with exposure to the elements. (**0025-98** [Kamps, Kevin])

Comment: The MCC [Maryland Conservation Council] believes that current methods for on-site storage of spent fuel have proven adequate and safe for several decades. (**0028-35** [Meadow, Norman])

Response: *The safety and environmental effects of long-term storage of spent fuel onsite has been evaluated by the NRC, and, as set forth in the Waste Confidence Rule, the NRC generically determined that such storage can be accomplished without significant environmental impact. In the Waste Confidence Rule, the Commission determined that spent fuel can be stored onsite for at least 30 years beyond the licensed operating life, which includes the term of a renewed license. The NRC has a certification process for casks, regulated by 10 CFR Part*

72. Such wastes are under continual licensing control. The uranium fuel cycle will be discussed in Chapter 6 of the EIS.

Comment: [T]o be more accepted by the US society, the nuclear industry must solve the nuclear waste disposal issue, its most prominent Achilles heel. Any attempt at renewing or expanding nuclear power as a source of electricity would be greatly advanced if this issue finally were settled after decades of debate without resolution. If the industry is to renew or expand, now is the time to finally settle the waste disposal issue, both technically and socially. (**0004-5** [Arndt, Gunter])

Comment: Nuclear waste is dangerous and there is no permanent destination where it can be stored safely. Although nuclear power stations provide energy to millions of people in various countries worldwide, no one has come up with a clean and safe solution for what to do with nuclear waste. It will only build up, and should anything happen to it, it will be nightmarish for the local councils to deal with. (**0007-2** [Shannahan, Brittany])

Comment: The Nuclear Waste Confidence Decision provides little solace to the nuclear waste management issue. In the nearly thirty years since the decision was issued we have gotten no closer to licensing a geologic repository. In the meanwhile, high-level radioactive waste is mounting up at 104 reactors sites throughout the country. If the nuclear industry wants to seriously consider moving forward with a new generation of nuclear reactors, then the true cost of waste issues must be evaluated accordingly. (**0008-1** [Acevedo, NK] [Aitken, Keith] [Albright, Evan] [Andereson, David] [Arist, Phyllis] [Armas, Zoe] [Avance, Kenneth] [Bainum, Meghan] [Bakalian, Craig] [Baldwin, Natylie] [Barr, Phillip] [Bartholomew, Alice] [Becker, Rochelle] [Bedding, Gerhard] [Behabadi, Bardia] [Be, Maya] [Bissonnette, Rick] [Black, Monica Latka] [Blomstrom, Eric] [Borrowman, Ellen] [Briggs, Ruth] [Chinn, Jason] [Clark, Kevin] [Clark, Loralee] [Cleaver, Melissa] [Cox, Duncan] [Crawley, Jackie] [Crocca, Carol] [C, Suzy] [Culp, Richard] [Curington, Diana] [Daddy, Big] [Darbyshire, David] [DesHarnais, Gaston] [Diaz, Lorenzo] [Dolly, William] [Emmons, Cheryl] [Erdesohn, Cynthia] [Evans, Michael] [Faigle, Susan] [Fernow, Geoff] [Finnelli, Marilyn and Tom] [Fisher, Allison] [Foppe, Paul] [Fuller, Alfred] [Futterer, Joe] [Gannaway, Gloria] [Garbato, Kelly] [Garner, Patrick] [Gilpin, John] [Good, Riana] [Goodrich, Anne] [Grad, Robert] [Grand, Robert] [Grassi, Rosemarie] [Guay-Brezner, Colette] [Harberson, Laurie] [Hauck, Molly] [Hedlund, Cara] [Helvick, Steven] [Henderson, Sherry] [Hinton, Georgia] [Hoffman, Lilli] [Holzer, Frederick] [Hood, Marilyn] [Hooker, Betsy] [Huffman, Debbie] [Hughey, Patricia] [Hung, Shiu] [Hutchinson, Richard] [Jones-Giampalo, Mary] [Jones, Hollis] [Joos, Sandra] [Jula, Patty] [Kaliski, Raymond] [Kane, Donna] [Katz, Shari] [Klusman, Eric] [Knechel, David] [Kramer, Loren] [Kuintzle, Gaylene] [Lack, Robert] [Lallo, Patrick] [LaLumia, Anne Marie] [LaMonica, Francoise] [Latham, Rhonda] [LaVigne, Carole] [Lee, Angela] [Loew, Brenda] [Luczkowiak, Christopher] [MacNulty, Joy] [Magee, L] [Manske, Jill] [Marcus, Jack David] [Marks, John] [Marsh, Rauni] [Massey, Tom] [McArthur, Richard] [McClure, Matthew] [McCoy, Timothy] [McKenna, Chris] [McKenna, Kathy] [McKenna, Lauren] [McKenna, Rick] [M, Crystal] [Metz, Richard] [Minault, Kent] [Miranda, Tina] [Moore, Kerry] [Mostov, Liz] [Munson, Clarence William] [Nagle, Thomas] [Nanfra, Freya] [Nash, James] [Nerode, Gregory] [Novick, Wesley] [Nunez, Albert] [Nunez, Carlos] [Oakes, Bonnie] [Olmstead, Harry] [O'Meara, Patrick] [Pacheco-Theard, Lauren] [Paquet, Kevin] [Parsons, Barry] [Paul, Georgia] [Pedraza-Tucker, Liette] [Petkiewicz, Margaret] [Phipps, Donald] [Piner, Lisa] [Piser, Daniel] [Putney, Louis] [Rader, Nancy] [Radford Jr., Roger] [Raines, Mary] [Ramstrom, Eric G and Shirley S] [Randall, David] [Rankin, Susan] [Reidenbach, Gregory] [Rosenblum, Stephen] [Ross, Anne] [Sather, Alice] [Sauer, Elizabeth] [Schmidt, Jason] [Schopp, Ricky] [Schwarz, Walter] [See, Bud] [Shafer, Scott] [Shashani, Linda] [Sherrow, Sarah] [Shively, Daniel] [Siecke, Martin] [Simila, Owen] [Skercevic, Maria] [Smith, Enoch] [Smith, Martha] [Snowden, Patricia] [Sorin, Susanna] [Soroos, Marvin S] [Soto, Yvonne] [Stevens, Denise] [Stilwell, Lisa] [Strange, Linda] [Theil, Tony] [Thiele, Abhaya] [Tornatore, James] [Trenholme, Art] [Turner, Tamisha] [Valliere, Cliff] [VanEtten, Margot] [Vieg, Jeannette] [Voeller, Estelle] [Wadkins, Melanie] [Waldman, Sam] [Walker-Meere, Susan] [Walsh, Donald] [Walters, Betty] [Wanner, Gabrielle] [Ward, John] [Welch, Irene] [Wilkins, Paul] [Willoughby, CaraLea] [Wilson, Deb] [Yeatts, Jordan] [Zastawecky, Margaret] [Zelikson, Linda])

Comment: The Environmental Impact Statements (EIS) should fully address the potential consequences of permanent storage of high-level radioactive waste. Because there is no permanent storage facility for high-level radioactive waste, and it appears increasingly unlikely that there will be one during the lifetime of a new generation of reactors, the EIS should address how and where all of the high-level radioactive waste will be stored. (**0008-2** [Acevedo, NK] [Aitken, Keith] [Albright, Evan] [Andereson, David] [Arist, Phyllis] [Armas, Zoe] [Avance, Kenneth] [Bainum, Meghan] [Bakalian, Craig] [Baldwin, Natylie] [Barr, Phillip] [Bartholomew, Alice] [Becker, Rochelle] [Bedding, Gerhard] [Behabadi, Bardia] [Be, Maya] [Bissonnette, Rick] [Black, Monica Latka] [Blomstrom, Eric] [Borrowman, Ellen] [Briggs, Ruth] [Chinn, Jason] [Clark, Kevin] [Clark, Loralee] [Cleaver, Melissa] [Cox, Duncan] [Crawley, Jackie] [Crocca, Carol] [C, Suzy] [Culp, Richard] [Curington, Diana] [Daddy, Big] [Darbyshire, David] [DesHarnais, Gaston] [Diaz, Lorenzo] [Dolly, William] [Emmons, Cheryl] [Erdesohn, Cynthia] [Evans, Michael] [Faigle, Susan] [Fernow, Geoff] [Finnelli, Marilyn and Tom] [Fisher, Allison] [Foppe, Paul] [Fuller, Alfred] [Futterer, Joe] [Gannaway, Gloria] [Garbato, Kelly] [Garner, Patrick] [Gilpin, John] [Good, Riana] [Goodrich, Anne] [Grad, Robert] [Grand, Robert] [Grassi, Rosemarie] [Guay-Brezner, Colette] [Harberson, Laurie] [Hauck, Molly] [Hedlund, Cara] [Helvick, Steven] [Henderson, Sherry] [Hinton, Georgia] [Hoffman, Lilli] [Holzer, Frederick] [Hood, Marilyn] [Hooker, Betsy] [Huffman, Debbie] [Hughey, Patricia] [Hung, Shiu] [Hutchinson, Richard] [Jones-Giampalo, Mary] [Jones, Hollis] [Joos, Sandra] [Jula, Patty] [Kaliski, Raymond] [Kane, Donna] [Katz, Shari] [Klusman, Eric] [Knechel, David] [Kramer, Loren] [Kuintzle, Gaylene] [Lack, Robert] [Lallo, Patrick] [LaLumia, Anne Marie] [LaMonica, Francoise] [Latham, Rhonda] [LaVigne, Carole] [Lee, Angela] [Loew, Brenda] [Luczkowiak, Christopher] [MacNulty, Joy] [Magee, L] [Manske, Jill] [Marcus, Jack David] [Marks, John] [Marsh, Rauni] [Massey, Tom] [McArthur, Richard] [McClure, Matthew] [McCoy, Timothy] [McKenna, Chris] [McKenna, Kathy] [McKenna, Lauren] [McKenna, Rick] [M, Crystal] [Metz, Richard] [Minault, Kent] [Miranda, Tina] [Moore, Kerry] [Mostov, Liz] [Munson, Clarence William] [Nagle, Thomas] [Nanfra, Freya] [Nash, James] [Nerode, Gregory] [Novick, Wesley] [Nunez, Albert] [Nunez, Carlos] [Oakes, Bonnie] [Olmstead, Harry] [O'Meara, Patrick] [Pacheco-Theard, Lauren] [Paquet, Kevin] [Parsons, Barry] [Paul, Georgia] [Pedraza-Tucker, Liette] [Petkiewicz, Margaret] [Phipps, Donald] [Piner, Lisa] [Piser, Daniel] [Putney, Louis] [Rader, Nancy] [Radford Jr., Roger] [Raines, Mary] [Ramstrom, Eric G and Shirley S] [Randall, David] [Rankin, Susan] [Reidenbach, Gregory] [Rosenblum, Stephen] [Ross, Anne] [Sather, Alice] [Sauer, Elizabeth] [Schmidt, Jason] [Schopp, Ricky] [Schwarz, Walter] [See, Bud] [Shafer, Scott] [Shashani, Linda] [Sherrow, Sarah] [Shively, Daniel] [Siecke, Martin] [Simila, Owen] [Skercevic, Maria] [Smith, Enoch] [Smith, Martha] [Snowden, Patricia] [Sorin, Susanna] [Soroos, Marvin S] [Soto, Yvonne] [Stevens, Denise] [Stilwell, Lisa] [Strange, Linda] [Theil, Tony] [Thiele, Abhaya] [Tornatore, James] [Trenholme, Art] [Turner, Tamisha] [Valliere, Cliff] [VanEtten, Margot] [Vieg, Jeannette] [Voeller, Estelle] [Wadkins, Melanie] [Waldman, Sam] [Walker-

Meere, Susan] [Walsh, Donald] [Walters, Betty] [Wanner, Gabrielle] [Ward, John] [Welch, Irene] [Wilkins, Paul] [Willoughby, CaraLea] [Wilson, Deb] [Yeatts, Jordan] [Zastawecky, Margaret] [Zelikson, Linda])

Comment: We cannot begin to consider the expansion of nuclear power, while the issues of the previous generation remain unresolved. (**0008-6** [Acevedo, NK] [Aitken, Keith] [Albright, Evan] [Andereson, David] [Arist, Phyllis] [Armas, Zoe] [Avance, Kenneth] [Bainum, Meghan] [Bakalian, Craig] [Baldwin, Natylie] [Barr, Phillip] [Bartholomew, Alice] [Becker, Rochelle] [Bedding, Gerhard] [Behabadi, Bardia] [Be, Maya] [Bissonnette, Rick] [Black, Monica Latka] [Blomstrom, Eric] [Borrowman, Ellen] [Briggs, Ruth] [Chinn, Jason] [Clark, Kevin] [Clark, Loralee] [Cleaver, Melissa] [Cox, Duncan] [Crawley, Jackie] [Crocca, Carol] [C, Suzy] [Culp, Richard] [Curington, Diana] [Daddy, Big] [Darbyshire, David] [DesHarnais, Gaston] [Diaz, Lorenzo] [Dolly, William] [Emmons, Cheryl] [Erdesohn, Cynthia] [Evans, Michael] [Faigle, Susan] [Fernow, Geoff] [Finnelli, Marilyn and Tom] [Fisher, Allison] [Foppe, Paul] [Fuller, Alfred] [Futterer, Joe] [Gannaway, Gloria] [Garbato, Kelly] [Garner, Patrick] [Gilpin, John] [Good, Riana] [Goodrich, Anne] [Grad, Robert] [Grand, Robert] [Grassi, Rosemarie] [Guay-Brezner, Colette] [Harberson, Laurie] [Hauck, Molly] [Hedlund, Cara] [Helvick, Steven] [Henderson, Sherry] [Hinton, Georgia] [Hoffman, Lilli] [Holzer, Frederick] [Hood, Marilyn] [Hooker, Betsy] [Huffman, Debbie] [Hughey, Patricia] [Hung, Shiu] [Hutchinson, Richard] [Jones-Giampalo, Mary] [Jones, Hollis] [Joos, Sandra] [Jula, Patty] [Kaliski, Raymond] [Kane, Donna] [Katz, Shari] [Klusman, Eric] [Knechel, David] [Kramer, Loren] [Kuintzle, Gaylene] [Lack, Robert] [Lallo, Patrick] [LaLumia, Anne Marie] [LaMonica, Francoise] [Latham, Rhonda] [LaVigne, Carole] [Lee, Angela] [Loew, Brenda] [Luczkowiak, Christopher] [MacNulty, Joy] [Magee, L] [Manske, Jill] [Marcus, Jack David] [Marks, John] [Marsh, Rauni] [Massey, Tom] [McArthur, Richard] [McClure, Matthew] [McCoy, Timothy] [McKenna, Chris] [McKenna, Kathy] [McKenna, Lauren] [McKenna, Rick] [M, Crystal] [Metz, Richard] [Minault, Kent] [Miranda, Tina] [Moore, Kerry] [Mostov, Liz] [Munson, Clarence William] [Nagle, Thomas] [Nanfra, Freya] [Nash, James] [Nerode, Gregory] [Novick, Wesley] [Nunez, Albert] [Nunez, Carlos] [Oakes, Bonnie] [Olmstead, Harry] [O'Meara, Patrick] [Pacheco-Theard, Lauren] [Paquet, Kevin] [Parsons, Barry] [Paul, Georgia] [Pedraza-Tucker, Liette] [Petkiewicz, Margaret] [Phipps, Donald] [Piner, Lisa] [Piser, Daniel] [Putney, Louis] [Rader, Nancy] [Radford Jr., Roger] [Raines, Mary] [Ramstrom, Eric G and Shirley S] [Randall, David] [Rankin, Susan] [Reidenbach, Gregory] [Rosenblum, Stephen] [Ross, Anne] [Sather, Alice] [Sauer, Elizabeth] [Schmidt, Jason] [Schopp, Ricky] [Schwarz, Walter] [See, Bud] [Shafer, Scott] [Shashani, Linda] [Sherrow, Sarah] [Shively, Daniel] [Siecke, Martin] [Simila, Owen] [Skercevic, Maria] [Smith, Enoch] [Smith, Martha] [Snowden, Patricia] [Sorin, Susanna] [Soroos, Marvin S] [Soto, Yvonne] [Stevens, Denise] [Stilwell, Lisa] [Strange, Linda] [Theil, Tony] [Thiele, Abhaya] [Tornatore, James] [Trenholme, Art] [Turner, Tamisha] [Valliere, Cliff] [VanEtten, Margot] [Vieg, Jeannette] [Voeller, Estelle] [Wadkins, Melanie] [Waldman, Sam] [Walker-Meere, Susan] [Walsh, Donald] [Walters, Betty] [Wanner, Gabrielle] [Ward, John] [Welch, Irene] [Wilkins, Paul] [Willoughby, CaraLea] [Wilson, Deb] [Yeatts, Jordan] [Zastawecky, Margaret] [Zelikson, Linda])

Comment: The Environmental Impact Statements (EIS) should fully address the potential consequences of permanent storage of high-level radioactive waste. The EIS should address how and where all of the high-level radioactive waste will be stored. (**0009-1** [Thiele, Abhaya])

Comment: The Environmental Impact Statements (EIS) should fully address the potential consequences of permanent storage of high-level radioactive waste. Because there is no permanent storage facility for high-level radioactive waste, and it appears increasingly unlikely that there will be one during the lifetime of a new generation of reactors, the EIS should address how and where all of the high-level radioactive waste will be stored. (**0010-1** [Polya, Lance])

Comment: How and where will you dispose of hazardous waste material? Where do you currently dispose of waste? How will you manage debris from building the reactor? How much waste do you currently dispose and how much will this increase with the new reactor? What qualifies as hazardous by the regulatory committee? (**0018-4** [Mackall, Kimberly])

Comment: The EIS must address how and where all of the "low-level" radioactive waste Calvert Cliffs-3 can be expected to generate during its lifetime will be stored. (**0019-13** [Mariotte, Michael])

Comment: [T]he EIS should assume that all Class B and above "low-level" radioactive waste generated by Calvert Cliffs-3 will be stored on-site for its licensed lifetime and describe how this material will remain isolated from the environment in perpetuity. (**0019-14** [Mariotte, Michael])

Comment: [T]he EIS should report the amount of "low-level" nuclear waste, in volume and radioactivity, that Calvert Cliffs' operators plan to treat as if not radioactive--that is, plan to send to facilities without specific licenses for nuclear waste. These include solid and hazardous treatment, processing and disposal facilities as well as recyclers whose materials are released for restricted or unrestricted use, and should be identified and the radiological impacts and risks identified. (**0019-15** [Mariotte, Michael])

Comment: Since radioactive waste could remain onsite forever, the site should be evaluated under 10 CFR 61, which include NRC's regulations for the disposal of radioactive waste. (**0019-16** [Mariotte, Michael])

Comment: The EIS must fully address the potential consequences of permanent storage of high- level radioactive waste adjacent to the Chesapeake Bay. There is no currently no permanent storage facility for high-level radioactive waste. Even if the proposed Yucca Mountain site opens during the operating lifetime of Calvert Cliffs-3, this reactor will, by law, not be eligible to have its high-level waste stored there. Thus, the EIS must assume that there will be no available high-level radioactive waste repository for the full operating lifetime (plus possible license extension) of this unit, and the EIS must fully address how and where all of the high-level radioactive waste generated by Calvert Cliffs-3 will be stored on-site, and what measures will be taken to ensure that the radioactivity from this waste remains permanently isolated from the environment. (**0019-6** [Mariotte, Michael])

Comment: [P]lease look carefully and impartially at the problems entailed in dealing with radioactive waste. (**0020-2** [Donn, Marjory])

Comment: [W]e still do not have good ways to deal with the radioactive material that nuclear power produces. I do not believe there is any good way to store it, yet we keep on producing it, poisoning the earth that we will pass on to future generations. (**0020-5** [Donn, Marjory])

Comment: It is true that the Barnwell facility in South Carolina will be closed to low-level waste from the State of Maryland scheduled for June of this year. However, a very large majority, I think it's upward of 75 percent, of the low-level waste generated at commercial nuclear plants in the United States are shipped and disposed of in Clive, Utah, near Salt Lake City. (**0024-103** [McGough, Mike])

Comment: I would point out that Yucca Mountain is looking more and more likely to never open which means that Calvert Cliffs will sit on thousands of tons of radioactive waste if that dump never opens. It already has a thousand tons. It will double or triple or quadruple that amount as time goes on. (**0024-85** [Kamps, Kevin])

Comment: [T]he place where Calvert Cliffs has for decades dumped its so-called low level wastes, Barnwell, South Carolina, is closing for business, at least to the State of Maryland, June 30th of this year. So not only is the high-level waste going to build but so will the low-level waste at Calvert Cliffs. A radioactive waste dilemma with no solution. (**0024-86** [Kamps, Kevin])

Comment: I, as a resident of this state, don't want to be creating a waste product that has to be forced down the throats of the people in another state, especially if there is a reasonable alternative ... You know, we are just now becoming aware of the fact that we are releasing a lot of pollutants into the environment. We are changing the basic biochemistry and the biology and physics of the planet at an ever-accelerating rate, and we are starting to lose the species. (**0025-111** [Johnston, Bill])

Comment: The storage of the radiation, that's an amazing amount of radiation that is already here, radioactive material that is already here. We're not even going to get to put it into Yucca; we're going to have to come up with another place. Think about this, people: this stuff is going to be here forever. (**0025-159** [Boxwell, Bob])

Comment: [E]ven if the proposed Yucca Mountain, Nevada waste dump were to open, and that seems increasingly unlikely, Calvert Cliffs 3 would not be eligible to put its waste there. So the high-level waste from this plant has nowhere to go until and unless the United States builds not the first one, which it has been trying to do for 30 years, but a second radioactive waste dump. (**0025-50** [Mariotte, Michael])

Comment: This EIS has to consider the very real possibility that the waste generated at this facility will stay on the shores of the Chesapeake Bay in perpetuity, and what are the environmental impacts of that. (**0025-51** [Mariotte, Michael])

Comment: [C]urrently, Calvert Cliffs is allowed to send its low-level waste to Barnwell, South Carolina for disposal. That ends this June. Barnwell is closing to outside waste. There are no plans to build a low-level waste facility to handle Maryland's waste. That means the low-level waste is going to have to stay onsite for the foreseeable future. The EIS has to look at the implications of 40, 60 years of generation of low level waste. Where is that going to go onsite? How is that going to be protected from the environment? (**0025-52** [Mariotte, Michael])

Comment: [E]very pound of high-level waste that is generated by Calvert Cliffs 3 will be excess to Yucca's capacity. (**0025-95** [Kamps, Kevin])

Comment: If you don't have an immediate solution to dealing with waste, then what makes you think one will be forthcoming in the future? (**0026-1** [Marsh, Rauni])

Comment: Additionally, our plant in AZ has to store those waste rods in cool water until such time, that it's our turn to dispose of them. Water, Cool water, here in the Blatant hot dry desert. (**0026-4** [Marsh, Rauni])

Response: *The NRC staff will evaluate the environmental impacts of the uranium fuel cycle including the impacts of fuel manufacturing, waste, transportation, and the onsite storage and eventual disposal of spent fuel. The results of this analysis will be presented in Chapter 6 of the EIS.*

15. Comments Concerning Transportation

Comment: The EIS should address possible effects of transportation of radioactive waste generated at the sites, in the unlikely event a waste repository ever will be built. This should include road, rail and barge transportation. (**0008-5** [Acevedo, NK] [Aitken, Keith] [Albright, Evan] [Andereson, David] [Arist, Phyllis] [Armas, Zoe] [Avance, Kenneth] [Bainum, Meghan] [Bakalian, Craig] [Baldwin, Natylie] [Barr, Phillip] [Bartholomew, Alice] [Becker, Rochelle] [Bedding, Gerhard] [Behabadi, Bardia] [Be, Maya] [Bissonnette, Rick] [Black, Monica Latka] [Blomstrom, Eric] [Borrowman, Ellen] [Briggs, Ruth] [Chinn, Jason] [Clark, Kevin] [Clark, Loralee] [Cleaver, Melissa] [Cox, Duncan] [Crawley, Jackie] [Crocca, Carol] [C, Suzy] [Culp, Richard] [Curington, Diana] [Daddy, Big] [Darbyshire, David] [DesHarnais, Gaston] [Diaz, Lorenzo] [Dolly, William] [Emmons, Cheryl] [Erdesohn, Cynthia] [Evans, Michael] [Faigle, Susan] [Fernow, Geoff] [Finnelli, Marilyn and Tom] [Fisher, Allison] [Foppe, Paul] [Fuller, Alfred] [Futterer, Joe] [Gannaway, Gloria] [Garbato, Kelly] [Garner, Patrick] [Gilpin, John] [Good, Riana] [Goodrich, Anne] [Grad, Robert] [Grand, Robert] [Grassi, Rosemarie] [Guay-Brezner, Colette] [Harberson, Laurie] [Hauck, Molly] [Hedlund, Cara] [Helvick, Steven] [Henderson, Sherry] [Hinton, Georgia] [Hoffman, Lilli] [Holzer, Frederick] [Hood, Marilyn] [Hooker, Betsy] [Huffman, Debbie] [Hughey, Patricia] [Hung, Shiu] [Hutchinson, Richard] [Jones-Giampalo, Mary] [Jones, Hollis] [Joos, Sandra] [Jula, Patty] [Kaliski, Raymond] [Kane, Donna] [Katz, Shari] [Klusman, Eric] [Knechel, David] [Kramer, Loren] [Kuintzle, Gaylene] [Lack, Robert] [Lallo, Patrick] [LaLumia, Anne Marie] [LaMonica, Francoise] [Latham, Rhonda] [LaVigne, Carole] [Lee, Angela] [Loew, Brenda] [Luczkowiak, Christopher] [MacNulty, Joy] [Magee, L] [Manske, Jill] [Marcus, Jack David] [Marks, John] [Marsh, Rauni] [Massey, Tom] [McArthur, Richard]

[McClure, Matthew] [McCoy, Timothy] [McKenna, Chris] [McKenna, Kathy] [McKenna, Lauren] [McKenna, Rick] [M, Crystal] [Metz, Richard] [Minault, Kent] [Miranda, Tina] [Moore, Kerry] [Mostov, Liz] [Munson, Clarence William] [Nagle, Thomas] [Nanfra, Freya] [Nash, James] [Nerode, Gregory] [Novick, Wesley] [Nunez, Albert] [Nunez, Carlos] [Oakes, Bonnie] [Olmstead, Harry] [O'Meara, Patrick] [Pacheco-Theard, Lauren] [Paquet, Kevin] [Parsons, Barry] [Paul, Georgia] [Pedraza-Tucker, Liette] [Petkiewicz, Margaret] [Phipps, Donald] [Piner, Lisa] [Piser, Daniel] [Putney, Louis] [Rader, Nancy] [Radford Jr., Roger] [Raines, Mary] [Ramstrom, Eric G and Shirley S] [Randall, David] [Rankin, Susan] [Reidenbach, Gregory] [Rosenblum, Stephen] [Ross, Anne] [Sather, Alice] [Sauer, Elizabeth] [Schmidt, Jason] [Schopp, Ricky] [Schwarz, Walter] [See, Bud] [Shafer, Scott] [Shashani, Linda] [Sherrow, Sarah] [Shively, Daniel] [Siecke, Martin] [Simila, Owen] [Skercevic, Maria] [Smith, Enoch] [Smith, Martha] [Snowden, Patricia] [Sorin, Susanna] [Soroos, Marvin S] [Soto, Yvonne] [Stevens, Denise] [Stilwell, Lisa] [Strange, Linda] [Theil, Tony] [Thiele, Abhaya] [Tornatore, James] [Trenholme, Art] [Turner, Tamisha] [Valliere, Cliff] [VanEtten, Margot] [Vieg, Jeannette] [Voeller, Estelle] [Wadkins, Melanie] [Waldman, Sam] [Walker-Meere, Susan] [Walsh, Donald] [Walters, Betty] [Wanner, Gabrielle] [Ward, John] [Welch, Irene] [Wilkins, Paul] [Willoughby, CaraLea] [Wilson, Deb] [Yeatts, Jordan] [Zastawecky, Margaret] [Zelikson, Linda])

Comment: The EIS must address the possible effects of transportation of radioactive waste generated at Calvert Cliffs, in the unlikely event a waste repository ever will be built. This should include road, rail and barge transportation on the Chesapeake Bay into the Port of Baltimore. (**0019-10** [Mariotte, Michael])

Comment: If barges are not used, then trucks or trains would be. The Baltimore train tunnel fire of 2001 could have killed thousands if high-level radioactive waste had been on board, and that route has been targeted by the Dept. of Energy in the past. DOE truck shipment routes criss-cross the State of Maryland. (**0019-12** [Mariotte, Michael])

Comment: I hope your process includes careful inspection of the dry cask irradiated fuel storage units at Calvert Cliffs as well as the problems involved in transporting this waste to another site. Have the casks degraded over time? How could such dangerous material be transported safely, avoiding densely populated areas -- which is where our rail lines and highways go -- without risk to the ecosystem of the Chesapeake Bay or the human population of the area? (**0020-6** [Donn, Marjory])

Comment: The transportation risks, again, are -- there are vulnerabilities to accidents and attacks. (**0025-100** [Kamps, Kevin])

Comment: And even if there are no accidents or attacks on these transportation containers, they are like mobile X-ray machines rolling down the railroad tracks, down the highways, in the Port of Baltimore, and there are certain people like pregnant women who should not be exposed to any radioactivity if it can be avoided. (**0025-102** [Kamps, Kevin])

Response: *The EIS will evaluate the radiological impacts of transporting fuel and waste to and from the proposed Calvert Cliffs Nuclear Power Plant (CCNPP) site. The impacts will be* *calculated for truck shipments of fuel and waste to and from the plant because the impact of truck shipping bounds the impacts of transporting these materials. The EIS will also include an analysis of the impacts of severe transportation accidents that could potentially occur along a spent fuel transportation route.*

Comment: A system of disposal is already in place for the existing two reactors at Calvert Cliffs. NAACPCCB [National Association for the Advancement of Colored People Calvert County Branch] is concerned about the existing disposal program especially in terms of transport of the waste out of the county, and the impact an accident could have on the community. In addition, a 3 rd reactor will create more waste, and more possibilities for accidents. NAACPCCB insists on the facility having a detailed plan outlining the disposal of all waste, and contingency plans in the event of accident. (**0017-2** [Brown, Jr., Edsel])

Comment: [A]nother accident scenario that folks around here need to worry about is the sinking of a barge on the Chesapeake Bay, because another proposal for removing these wastes from Calvert Cliffs is to barge them up to the Port of Baltimore. There's enough fissile material in the waste containers that, in the presence of water, if water were to infiltrate into a sunken container, a chain reaction could be initiated, and that would make emergency response a suicide mission at that point, because it would be giving off deadly doses of radioactivity. (**0025-101** [Kamps, Kevin])

Response: *A detailed analysis of the health and safety impacts of transporting fuel and waste by truck to and from the proposed Calvert Cliffs Nuclear Power Plant site will be conducted and included in Chapter 6 of the EIS. Emergency preparedness planning and preparations to respond to transportation accidents is described in detail in the "Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada" (DOE/EIS-0250F).*

Comment: [T]he EIS should evaluate the strength of transportation casks from tests conducted at the Sandia National Laboratory and consider the likelihood of a breach in any expected rail accident, including protracted fire and lengthy submersion. We suspect that the common opinion is that high-level waste would be shipped in containers resembling oil drums, and this is untrue. (**0025-63** [Meadow, Norm])

Comment: The EIS should evaluate the strength of transportation casks from tests conducted at the Sandia National Laboratory (http://www.sandia.gov/tp/SAFE_RAM/SEVERITY.HTM), and consider the likelihood of a breach in any expected rail accident, including protracted fire, and lengthy submersion. (**0028-37** [Meadow, Norman])

Comment: The MCC [Maryland Conservation Council] believes that the strength of transportation casks is sufficient to prevent releases of radioactive material in any conceivable transportation accident. (**0028-38** [Meadow, Norman])

Response: *The EIS will include an analysis of the radiological impacts of potential transportation accidents involving spent nuclear fuel [in Chapter 6]. Spent fuel is transported in massive, heavily-shielded shipping casks, referred to in 10 CFR Part 71 as Type B containers, and are designed to withstand severe transportation accident environments. The likelihood and consequences of shipping cask failures will be included in the transportation accident impact analysis in the EIS.*

16. Comments Concerning Cumulative Impacts

Comment: [W]hat are the implications of being 15 miles from a naval base? Does it work for us? Does it paint a particular bullseye? How does it weigh in, if at all? (**0024-109** [Buchanan, Bill])

Response: *The EIS will take into consideration other Federal projects in the vicinity, and any cumulative impacts of these projects will be assessed [in Chapter 7 of the EIS]. The concern about terrorism is an issue the NRC addresses separately and is out of the scope of this EIS.*

17. Comments Concerning the Need for Power

Comment: There is no end in sight to our rapidly expanding population - everywhere, not just in Calvert County - which means there is no end in sight for increasing energy demands. Alternative energy sources would be welcome but, so far, they are technologically inadequate to meet demand. (**0004-3** [Arndt, Gunter])

Comment: The EIS needs to ask the following question: Given the above, would not the per capita demand (kW hr per year, say) or the per household residential demand decrease at a rate equal to or exceeding the ca. 1% population growth rate? If the answer is yes, no additional power plants are needed, nuclear or otherwise. (**0005-20** [Vogt, Peter])

Comment: [T]he EIS needs to evaluate the likelihood that in the Mid-Atlantic grid area, per capita kWhrs/yr will level or has already leveled off. (**0005-21** [Vogt, Peter])

Comment: Initiatives taken by Maryland state government in 2007 aim to cut per capita electric consumption by 15% by the year 2015. Even if this goal is missed, what can easily be achieved can and probably will offset the 1% population growth rate. How close Maryland will come to reaching this goal cannot be evaluated/predicted just a year after the new measures were enacted. It is reasonable to expect that progress can be evaluated after 3 years, i.e. by 2010. (**0005-22** [Vogt, Peter])

Comment: Both Maryland and the nation are at a critical juncture. While conservation and energy efficiency will be important responses to increased electricity demand, and we support those efforts as does Constellation Energy and UniStar, conservation and energy efficiency will not offset the need for new base-load generation in Maryland or across the country. We need new energy generation and we need to reduce our dependence on foreign energy supply. (**0014-3** [Clark, Gerald] [Kelley, Linda] [Parran, Wilson] [Shaw, Susan] [Stinnett, Barbara])

Comment: I have long recognized the importance of nuclear energy in the electric power industry as a primary source for supplying our country's energy needs. The additional unit will positively contribute to the economic health of not only Calvert County, but the entire state of Maryland and the United States, through the availability of safe and affordable power. Expansion of the Calvert Cliffs, allows diversification of energy sources through the use of non polluting nuclear fuel. The additional unit will meet the increasing energy demands of the state of Maryland and the entire Mid-Atlantic Region. (**0015-2** [O'Donnell, Anthony])

Comment: The world is not going to fill its need for clean and environmentally friendly energy without pursuing all the many options available. Nuclear energy is emissions free when managed safely, less damaging to the environment and the technology is here today. We need to go forward with this project. It will be beneficial to my County and the Country by supplying needed energy and reducing our dependence on fossil fuel and all its damaging emissions. (**0016-3** [Zahniser, Albert])

Comment: [T]he construction of a third nuclear reactor at Calvert Cliffs would dramatically increase Maryland's energy self-sufficiency, nearly doubling the plant's present capacity and generating enough electricity to serve approximately 2.5 million homes, more than the total number of households projected for the State of Maryland in 2015. (**0023-3** [Hodge, Gary])

Comment: As technology advances, our economy and our population increases, so, too, will our need for energy grow. (**0024-21** [Kanaley, Mike])

Comment: Maryland is at a critical juncture in the availability of baseload generation, specifically the state's desire to generate enough reliable supply to reduce the import of energy to the state. (**0024-8** [Parran, Wilson])

Comment: Maryland is at a critical juncture in the availability of base load generation, specifically the state's desire to generate enough reliable supply to reduce the import of energy to the state. (**0025-10** [Parran, Wilson])

Comment: The U.S. Department of Energy estimates that our electricity demand will increase 25 percent by the year 2030. (**0025-118** [Walther, Robert])

Comment: As our technology advances, our economy expands, and our population increases, so, too, will our need for electricity grow. (**0025-119** [Walther, Robert])

Comment: According to the U.S. Department of Energy, the United States' demand for electricity will rise approximately 25 percent by 2030. That means our nation will need hundreds of new power plants to provide electricity for our homes and for our continued economic growth. (**0025-128** [Green, Bonnie])

Comment: I believe the power from this plant is absolutely necessary. I have read in the Baltimore and Washington newspapers that we may be looking forward to brownouts as early as 2011, because generation is not keeping up with the demand. (**0025-139** [Sinclair, Jim])

Comment: I think that by constantly focusing on how we need to increase supply, and not focusing on how we should be decreasing demand, is really putting the horse -- or the cart before the horse. (**0025-162** [Hunter, Theresa])

Comment: I believe that without the addition of the new generating facilities I personally believe that this will leave Maryland at a significant disadvantage. So, basically, we will be forced to import and pay more for electricity that's generated outside of the state. So I know that the environmental reports consider a variety of facts, and I just ask and encourage that you consider the electricity demand as part of your independent review. (**0025-166** [Pretto-Simmons, Nancy])

Comment: We do need electricity on the grid. (**0025-22** [Russell, Jack])

Comment: [B]usinesses, not only here in Calvert County and St. Mary's County, as it was just mentioned, but also to your neighbor to the north and more regionally, depend upon reliable energy sources to be able to conduct their businesses, and our consumers depend upon reliable energy sources. (**0025-32** [Burton, Bob])

Comment: [A]s a state, we have a critical energy supply problem. We need new energy generation, and we need to reduce our dependence on foreign energy supply. (**0025-7** [Parran, Wilson])

Comment: While energy efficiency and conservation are very desirable, the EIS must consider the rate of growth of the population in Maryland. These measures will perhaps only slow the rate of growth of demand. (**0025-74** [Meadow, Karen])

Comment: The PJM itself is estimating the need for a one and a half percent increase per year of summer production capacity over the next 15 years to meet demand. That means an increase of 25 percent of current capacity -- an amount that will be difficult to attain through energy efficiency and conservation alone, or even in concert with renewables. (**0025-75** [Meadow, Karen])

Comment: [W]hen you look at the stats and the figures from the State of Maryland, where privately we are being told, "Get ready, because by 2011 we'll have the rolling brownouts," in St. Mary's County we can't afford that. We are a growing community. Our energy needs are not going to decrease, and with conservation we might be able to keep them stable at the current levels. (**0025-83** [Scarafia, Bill])

Comment: We feel that it's critical to -- for growth in our region to have this additional supply on hand. We know it's down the road, but as our regions continue to grow we need to make sure that we have enough power to support key development in government agencies and other organizations that come to the State of Maryland and our region. (**0025-86** [Green, Joseph])

Comment: [T]he EIS must consider the projected rate of growth of demand for electricity which will be driven significantly by population growth as projected by the U.S. Census Bureau. (**0028-22** [Meadow, Norman])

Comment: Efficiency and conservation can only slow the rate of growth of energy need, they will not be able to reduce absolute demand. (**0028-23** [Meadow, Norman])

Comment: The PJM estimates a 1.5% increase per year of summer peak load capacity over the next 15 years to meet demand, resulting in a total increase of 25% of current capacity. Compared to the year 2000, the US Census Bureau estimates that Maryland's population will be 33% larger by 2030 and 260% larger by 2100. (**0028-24** [Meadow, Norman])

Comment: It is important to acknowledge that demand for electricity in our grid region is significantly higher in the summer as compared to the winter months (the next highest demand season of the year). (**0028-8** [Meadow, Norman])

Response: *These comments acknowledge or question the need for power based on an expanding population. The State of Maryland has examined the need for new electricity generation capacity in Maryland (Maryland Public Service Commission (MPSC). 2007. Electric Supply Adequacy Report of 2007. Online at: http://www.psc.state.md.us/psc/Reports/home.htm.) These studies will be reviewed in conjunction with preparing the need for power section [Chapter 8] in the EIS.*

18. Comments Concerning Alternatives - No Action

Comment: The EIS should fully and transparently consider alternatives to Calvert Cliffs-3, including ... the "no action" alternative. (**0019-5** [Mariotte, Michael])

Comment: Alternatives to this plant -- the EIS must consider alternatives to the plant, including the "no action" alternative. The EIS should very carefully look at whether and how Maryland's electric supply and its needs can be met through renewables, through energy efficiency, and the cost factors of those. I believe that a very strong case can be made -- and we'll be making that later this year to the Public Service Commission -- that Calvert Cliffs is the most expensive choice to meet Maryland's electric needs and they can be met much cheaper and much more cleanly through renewables and efficiency. (**0025-47** [Mariotte, Michael])

Response: *Alternatives to the proposed action, including siting alternatives, energy alternatives, and the no-action alternative, will be considered in Chapter 9 of the EIS.*

19. Comments Concerning Alternatives – Energy

Comment: Recent years have seen dramatic Improvements in appliance efficiency (e.g., refrigerators), insulation, light bulbs, etc., paralleled by rapidly decreasing cost of solar photovoltaics, (panel prices are declining at around 8% per year, largely due to reduced manufacturing costs caused by higher production volumes). Passive and PV solar, as well as ground source "geothermal", are very practical in the grid area served by the Calvert Cliffs Nuclear Power Plant. (**0005-19** [Vogt, Peter])

Comment: Most will agree that we have to arrest greenhouse gas emissions from fossil carbon fuels, because of likely widespread adverse impacts caused by resultant climate change. The mere fact that nuclear power greatly reduces C02 emissions does not by itself justify the US renaissance of nuclear power plants advocated by the nuclear industry/lobby and financially "greased' by EPACT. If nuclear were the only viable alternative to current C02-emitting coal-fired plants, most would agree we need more nuclear power plants. However, nuclear is absolutely not the only alternative, and is arguably the most risky and environmentally hazardous alternative. (**0005-23** [Vogt, Peter])

Comment: The EIS needs also to evaluate carbon sequestration (to offset C02 emissions from coal) and better scrubbing of other pollutants from coal, which the US has in abundance. Coal-fired plants are not inviting terrorist targets, there is no long-term waste issue, and many US jobs depend on coal mining, transport, and utilization. (**0005-25** [Vogt, Peter])

Comment: [I]t is safe to assume that nuclear fusion reactors will still not be operational even in the middle of this century (if ever). However, PV solar, ground-source geothermal, and solar passive air or water heating are not rocket science-- only the start-up investment and public inertia has slowed their acceptance. (**0005-26** [Vogt, Peter])

Comment: Recent trends in solar photovoltaic electric generation technology and pricing are dramatic. The EIS needs to extrapolate these trends not just to the time a potential third reactor would go on line (2015?) but for the probable lifetime of such a reactor (2075?). (**0005-27** [Vogt, Peter])

Comment: Solar power will never cover ALL our electricity needs, but will become a significant fraction of the total power mix. Solar, energy by itself is completely free and clean, and will be available for some billions of years! (**0005-29** [Vogt, Peter])

Comment: [W]e are lucky enough to be a coastal state. Nuclear reactors are extremely expensive - why can't we just build a great big wind farm out on the ocean like the one planned for Rehoboth, DE? (**0007-5** [Shannahan, Brittany])

Comment: The EIS should fully and transparently consider alternatives to Calvert Cliffs-3, including but not limited to:

- use of renewable energy to meet electricity demand and/or equivalent output of Calvert Cliff-3
- use of energy efficiency to reduce electricity demand to equivalent output of Calvert Cliffs-3, including various and aggressive energy efficiency program scenarios
- use of a combination of renewable energy and energy efficiency to meet electricity demand and obtain an equivalent output of Calvert Cliffs-3. (**0019-4** [Mariotte, Michael])

Comment: I hope the EIS will include in-depth consideration of alternatives to Calvert Cliffs –3. The area's power needs can be met by safer and more environmentally friendly means: through using renewable energy sources and by developing energy efficiency programs. (**0020-8** [Donn, Marjory])

Comment: Renewable energy sources will be valuable in diversifying the nation's energy supply, but their intermittent nature precludes their role as a reliable generation source. (**0024-10** [Parran, Wilson])

Comment: Conservation and more efficient electrical appliances help and a deeper commitment to renewable sources, such as wind, solar and geothermal, is needed, but conservation and renewable energy don't provide the baseload power we require to ensure the lights go on every time we flick a switch. (**0024-22** [Kanaley, Mike])

Comment: [I]t's our belief that through a combination of energy efficiency, clean renewables, like solar, wind, and geothermal, combined heat and power, and distributed generation, the state can meet its energy needs without investing a lot of money in a new nuclear power plant. (**0024-36** [Neumann, Johanna])

Comment: [I]f nuclear energy was the only way we could avoid climate change, global warming, then we'd have to weigh those risks, but there are alternatives, including wind power and solar energy and efficiency. (**0024-60** [Dubois, Gwen])

Comment: I would argue that there's reliable, fast, cheap, clean, safe, and more secure sources of electricity. Those would include efficiency and renewables. (**0024-80** [Kamps, Kevin])

Comment: Efficiency is seven times more cost effective dollar for dollar than nuclear power in reducing greenhouse gas emissions. So, given our limited resources and our limited time in addressing this crisis, we really have to go for the low-hanging fruit. (**0024-81** [Kamps, Kevin])

Comment: Nuclear is one of the most expensive and one of the most time-consuming ways to generate electricity, and I would like to commend Constellation Energy for its Super Bowl ad at the end of January where they showed wind power and the potential of wind power, but strangely enough, they didn't mention nuclear at all. So, I would call on Constellation to live up to its Super Bowl ad and pursue wind power. (**0024-82** [Kamps, Kevin])

Comment: Conservation and energy efficiency will be important responses to increased electricity demand and we support those efforts as does Constellation Energy and Unistar, but conservation and energy efficiency will not offset the need for new baseload generation in Maryland. (**0024-9** [Parran, Wilson])

Comment: [H]ow much of a reduction in peak energy demand do you think there would be if we went to smart metering? (**0025-109** [Johnston, Bill])

Comment: Conservation and energy efficiency will be important responses to increased electricity demand, and we support those efforts as does Constellation Energy and Unistar. But conservation and energy efficiency will not offset the need for new base load generation in Maryland. (**0025-11** [Parran, Wilson])

Comment: A single [solar energy] panel setup, 200 miles long, 200 miles wide, that square, would meet the energy demands for the United States in the year 2050. Coal burning uses more land than solar, once you take mining into account, that you are cutting off the mountain tops here and there, filling the ravines. (**0025-110** [Johnston, Bill])

Comment: Renewable energy sources will be valuable in diversifying the nation's energy supply, but their intermittent nature precludes their role as a reliable generation source. (**0025-12** [Parran, Wilson])

Comment: [G]reater conservation and renewable energy don't provide the round-the-clock base load power we require to ensure the lights go on any time we flip the switch. (**0025-120** [Walther, Robert])

Comment: I'm a great believer in renewables, such as wind power, and they should absolutely be part of the energy mix, but we can't rely on renewables alone. (**0025-140** [Sinclair, Jim])

Comment: I think we should avoid fossil fuel alternatives whenever possible. The effect of greenhouse gases on the environment is becoming very well documented. I truly believe the planet is in peril as a result of the use of fossil fuels. (**0025-141** [Sinclair, Jim])

Comment: [T]here is one group and one issue that I don't think anybody has touched on, and that's the new generation of power, and new technologies to generate power in the country is a national security issue. (**0025-145** [McGarvey, Sean])

Comment: It seems to me that one of the more important things that ... as a means by which we might help ourselves to become less dependent on any source of power generation, whether that be from nuclear or other sources, is through energy conservation and efficiency. (**0025-160** [Hunter, Theresa])

Comment: I think that it's through energy conservation and efficiency that we should be targeting our way forward to get to a point where we're able to support our region with the type of energy needs that we are going to need now and into the future, and not rely upon things such as an expansion of nuclear power. (**0025-161** [Hunter, Theresa])

Comment: When considering energy from wind, capacity factors should be documented by actual industry power production reports. For example, for wind installations in Pennsylvania, which are right next to where they want to put them in Maryland, and from the capacity value assigned by the PJM grid managers to the current wind installations, particularly for summer capacity when the demand is highest and the output is lowest. (**0025-65** [Meadow, Karen])

Comment: Environmental impact should include the actual land required for erecting those 4,800 turbines, plus the land required for the road system and the transmission lines. This land area would exceed 20,000 acres of cleared forest in the Appalachians, approximately 700 miles of ridge line, because they need to go on the ridge line to get the wind. (**0025-67** [Meadow, Karen])

Comment: [T]he EIS should examine the number of studies and their quality to measure bird and bat kills in the Appalachians, and should evaluate whether research done on wind installations in California, in a very different habitat, is applicable to the ecology of birds and bats in the Appalachians. (**0025-68** [Meadow, Karen])

Comment: Given that the wind installations proposed for western Maryland would be situated on major bird and bat migratory routes, the environmental impact of the turbines must be carefully considered. The habitat damage of the wind turbines far exceeds the actual cleared pads, since certain species of birds will not roost within 300 feet of a clearing. (**0025-69** [Meadow, Karen])

Comment: In regard to offshore wind, the EIS should evaluate the amount of research that has been done on the effects of noise and vibrations from the turbines on the ecology of the waters in which the turbines are placed. We are aware of only one brief study of something that could potentially cause extensive permanent damage to the ecology of these offshore waters, and that's wholly unacceptable. (**0025-70** [Meadow, Karen])

Comment: For bioenergy sources, such as with grass or short rotation forest crops, the amount of land required to replace the reactor's output should be investigated based on the known yield of these products. Land required for bioenergy crops would be approximately 6,000 square miles under cultivation. This is 60 percent of the State of Maryland. (**0025-71** [Meadow, Karen])

Comment: Photovoltaic power should be evaluated on the basis of capacity factors. Accordingly, in Maryland, it would require covering 100 square miles with very expensive solar panels, which is half the area of Calvert County. (**0025-72** [Meadow, Karen])

Comment: [W]e are living in a changing global warming environment, which may change the weather pattern, meaning alternatives to nuclear power that are based on weather, such as wind and sun, may well be ineffective in the years to come. (**0025-73** [Meadow, Karen])

Comment: I think if you insist on having nuclear power, and I insist there's very viable alternatives for anyone who is interested in looking into it, they should be located on the ocean where you get cooler water and higher operating efficiencies. (**0025-113** [Johnston, Bill])

Comment: There are cleaner forms of energy - solar for one, wind for another. Both are sustainable & with little or no public risk. (**0026-2** [Marsh, Rauni])

Comment: One mistake and we're all dead or worse. Nuclear power is not the answer! Sustainable natural energy from Nature is the only answer. (**0026-5** [Marsh, Rauni])

Comment: [N]uclear power must be compared to other methods for the generation of electricity on the basis of cost, reliability, and lack of carbon dioxide emissions, balanced against the potential for harm. (**0028-1** [Meadow, Norman])

Comment: Nuclear reactors work at approximately 90+% capacity year round. Calculated from the Capacity Values mentioned above, 5,500 2 MW wind turbines would be required to produce the same amount of electricity as the proposed reactor during the summer months when our region's demand is highest (and increasing most rapidly). (**0028-10** [Meadow, Norman])

Comment: Since nearly all commercial wind energy development is currently planned for the ridgetops along the Appalachian Mountain chain, and since the vast majority of these potential development sites are presently covered in dense forest, the impact resulting from construction of 5,500 huge wind turbines and their associated roads and transmission lines likely would result in the clearing of about 20,000 acres of forest along approximately 800 miles of ridge line. Wind energy facilities which have been built in the last 5 years in the PJM grid region have averaged about 3 to 5 acres of forest cleared per wind turbine, and they install on average about 7 or 8 wind turbines per mile of ridgeline. It should be noted that, in fact, there is not nearly enough suitably windy ridgetop in western Maryland to accommodate this intensity of wind energy development. (**0028-11** [Meadow, Norman])

Comment: Clearing 20,000 acres of forest releases a significant amount of carbon dioxide and eliminates a major carbon sequestration source, which has to be deducted from the environmental advantage of the wind installation. (**0028-12** [Meadow, Norman])

Comment: When investigating ecological damage caused by industrial wind installation, the NRC should examine the quality of the research done to measure bird and bat kills in the Appalachians and should evaluate whether research done on wind installations in CA is applicable to the ecology of birds and bats in the Appalachians. (**0028-13** [Meadow, Norman])

Comment: Given that the 20,000 acres of forest and ridgetop habitat in the mountains of Western MD and adjacent states likely would be needed to generate an equivalent amount of electricity from wind installations as compared to the single new reactor proposed to be added to Calvert Cliffs, and given that as many or more than 5,500 huge wind turbines therefore would be situated on major bird and bat migratory routes, the environmental impact of the wind energy alternative to this nuclear reactor must be carefully considered. (**0028-14** [Meadow, Norman])

Comment: The habitat damage of the wind turbines far exceeds the actual 20,000 acres cleared, since many forest interior dwelling species will not successfully persist or reproduce within at least 300 feet of a cleared edge, meaning that for the 700 mile length of the road and turbine clearings, an additional 300+ feet of forest interior habitat will be lost along <u>each</u> side of the road and turbine clearings' entire length. (**0028-15** [Meadow, Norman])

Comment: In regard to offshore wind, the EIS should evaluate the amount of research that's been done on the effects of noise from the turbines on the ecology of the waters in which the turbines are placed. ... The effects of the noise injected into the marine environment might not manifest themselves for several decades. (**0028-16** [Meadow, Norman])

Comment: About 1650 offshore turbines (3.5 MW using a summer Capacity Factor of 25%) would be required to equal the summer-time generating capacity of the proposed nuclear reactor. (**0028-17** [Meadow, Norman])

Comment: Bioenergy sources such as switch grass or short rotation forest crops are being proposed to fire steam boilers. The amount of land required to equal the proposed reactor???s output should be investigated based on the known energy output and productivity for any crop being considered for firing stream boilers. Current average yields should be used, not unconfirmed projections of yield. (**0028-18** [Meadow, Norman])

Comment: Approximately 6,000 square miles of land would be required for the cultivation of either switch grass or short rotation forest crops. This is 60% of the State's land area and is equal to the area of all current forest and agricultural land. (**0028-19** [Meadow, Norman])

Comment: The EIS should investigate the energy required to dry these crops as we have been unable to determine if this has been considered by proponents of the method. (**0028-20** [Meadow, Norman])

Comment: Photovoltaic power's potential to provide electricity must be evaluated by using the Capacity Factor appropriate for Maryland, and not by nameplate capacity of the installations. The MCC estimates that it would require covering 100 square miles with solar panels (this is 1/2 the area of Calvert County) at a cost of $86 billion to equal the output of the single reactor. (**0028-21** [Meadow, Norman])

Comment: The damage to wildlife from small releases should be contrasted with the damage to habitat that would result from the construction of thousands of wind turbines, either on-or off-shore, or the conversion of thousands of square miles of farm and forest to bioenergy production which you will hear about shortly. (**0028-34** [Meadow, Norman])

Comment: [W]e believe that these renewables cannot provide a sufficient amount of electric power to significantly reduce dependence on coal. (**0028-4** [Meadow, Norman])

Comment: When considering energy from wind, the potential for electricity generation from commercial installations should be estimated from the annual and summer-time Capacity Factors documented by actual power production reports of existing facilities. (**0028-6** [Meadow, Norman])

Comment: [T]he Capacity Value (i.e., the capacity factor achieved during the 4-hour summer afternoon expected peak demand period -- following the methodology used by PJM's grid managers) ought to be used in evaluating the capability of wind energy or other renewable energy projects to substitute for this proposed nuclear reactor. (**0028-7** [Meadow, Norman])

Comment: Nameplate capacity provided by the manufacturers of wind turbines is misleading for estimating the wind generation potential which possibly could come from facilities located in western Maryland or elsewhere in the Mid-Atlantic Highlands region. (**0028-9** [Meadow, Norman])

Response: *The comments identify alternative energy sources, request that NRC consider [energy] alternatives [in] its analysis, or comment that certain alternatives cannot meet the power need. Alternative energy sources, including energy conservation and renewable energy sources, will be considered in [Chapter 9 of] the EIS.*

Comment: In carrying out the Environmental Impact Statement (EIS) scoping process related to Constellation Energy/Unistar's proposed Calvert Cliffs – 3 reactor, please consider alternatives to building the reactor. (**0020-1** [Donn, Marjory])

Response: *[Chapter 9 of the EIS will discuss the no-action alternative, alternative sites, alternative energy sources, and alternative plant systems.*

Comment: We believe that there are cleaner, safer, and more affordable alternatives [to nuclear power], so that Maryland can meet its energy challenges while moving forward with a clean energy economy and, you know, ultimately a much more environmentally sound and much more conscious of public health energy future. (**0024-34** [Neumann, Johanna])

Response: *The EIS will be prepared in accordance with 10 CFR 51.75(c). Alternative energy sources, including energy conservation and renewable energy sources, will be discussed in Chapter 9 of the EIS.*

20. Comments Concerning Benefit – Cost Balance

Comment: UniStar/Constellation Energy's Environmental Report lacks credibility and appears more intended at deflecting and deterring public involvement in the EIS than contributing to careful and transparent analysis. Specifically, the applicant's assertion (and the NRC's apparent acceptance of that assertion) that all financial information, including basic estimates of construction cost, are to remain proprietary makes any discussion of cost/benefit analysis impossible, and thus irrelevant, and leaves the EIS unable to fulfill one of its most basic obligations. (**0019-1** [Mariotte, Michael])

Comment: Even if the NRC staff has access to this allegedly proprietary information, and prepares a cost/benefit analysis based upon its access, the public still would not have the ability to assess this information, add a public perspective the NRC staff may be lacking, and comment upon this information—legal requirements of the EIS. (**0019-2** [Mariotte, Michael])

Response: *The applicant is entitled by 10 CFR 2.390 to have trade secrets and commercial and financial information held by the NRC as privileged or confidential, subject to certain procedural controls. The Commission also determines whether the right of the public to be fully apprised as to whether the bases for and effects of the proposed action outweighs the demonstrated concern for protection of a competitive position, and whether the information should be withheld from public disclosure. The NRC has determined that the requested financial information shall be held as confidential. The comparison of alternatives in the EIS is an environmental comparison; financial issues are addressed if an alternative site is determined to be environmentally preferable to the proposed site.*

Comment: Will nuclear power become a dinosaur by mid-century? If so, will it be too costly to dismantle such a plant (none of the size even of Calvert Cliffs Units I and 2 have ever been dismantled-this would cost billions of dollars). (**0005-28** [Vogt, Peter])

Comment: All of the sunken costs related to these construction activities, they should be included in the total capital cost of the project, especially when comparing the costs per kilowatt hour between nuclear and the alternative options. (**0025-91** [Fisher, Allison])

Comment: Erecting 5500 wind turbines in western Maryland will cost $22 billion, using a cost of $2 million per installed MW. (**0028-27** [Meadow, Norman])

Comment: [G]iven the wide range of cost estimates already reported by other U.S. utility projects (for example, Florida Power & Light testimony before the Florida Public Service Commission estimates construction costs for a single new nuclear unit running from $6 to $12 billion--a huge range), the EIS should not limit itself to a single cost figure, but rather must conduct its cost/benefit analysis on a range of foreseeable construction costs. (**0019-3** [Mariotte, Michael])

Comment: I think there are many reasons why this new reactor should not be built. One of these reasons is the cost. Constellation Energy says they expect it to cost around 4-5 billion dollars, but other estimates have ranged all the way up to a possible 12 billion. Then there's the cost of decommissioning it after the relatively short lifetime of a nuclear reactor. (**0020-3** [Donn, Marjory])

Comment: We will provide a cost-benefit analysis for the new nuclear power plant. It will use the current costs of nuclear power that you're seeing in the press today. (**0024-116** [Vanderheyden, George])

Comment: [W]e strongly feel that there should be a cost-benefit analysis as part of the environmental impact statement. You know, when Constellation was first embarking on this process, they were thinking the reactor might cost, you know, $2.5 to $3 billion. You know, new analyses coming out of Florida suggest that the cost may be as much as $12 billion. Those are significantly different figures and before we embark on that kind of plan, we need to make sure we know what we're getting into and so a cost-benefit analysis, looking at the tiered construction costs, should be part of this environmental impact statement. (**0024-37** [Neumann, Johanna])

Comment: Right now, Constellation is talking, I don't know, somewhere on the order of $4 billion a reactor, but -- and that may give you one set of conclusions about the costs and benefits of this facility. But if the reactor costs $8 billion, that might give you a different set of conclusions. And in that regard, that reactor in Finland, the only one that is being built with this design, is, after three years of construction, two years behind schedule and 50 percent over budget. That kind of thing has to be considered. (**0025-48** [Mariotte, Michael])

Comment: This month, two different utilities in Florida submitted documents to the Florida Public Service Commission estimating single reactor costs ranging from $6- to $12 billion per reactor. That's a big difference, and that is going to change the cost benefit analysis substantially, and this EIS should look at all of those different possibilities and not just accept this single cost for this facility. (**0025-49** [Mariotte, Michael])

Comment: Cost-benefit analysis should include the actual cost per installed watt of generating capacity of the turbines, as well as the cost of transmission lines, not the net cost after tax benefits, which are always talked about. This cost would be somewhere in the range of $16 billion as opposed to the $6- to $8 billion attributed to the new reactor. (**0025-66** [Meadow, Karen])

Comment: Just last December, over $20 billion was approved in nuclear loan guarantees for new reactors and for uranium enrichment in the United States. This is to an industry that profits at each reactor about a million dollars per day and has already enjoyed hundreds of billions of dollars in subsidies over the decades. (**0024-89** [Kamps, Kevin]

Comment: [T]he Price-Anderson Act has been renewed. That means that if there's a major accident at Calvert Cliffs, that it will be the U.S. taxpayers who bear the brunt of that accident in large part. (**0024-90** [Kamps, Kevin])

Comment: Cost benefit analysis should include the actual cost for the per installed watt of generating capacity as well as the cost of extensive length of transmission lines that will be required for highly decentralized sources of electric power such as wind and photovoltaics, not the net cost to the purchaser after government tax liability relief. Projections of reductions in cost should not be treated as assured. (**0028-26** [Meadow, Norman])

Comment: The property damages from that 1982 report were around $90 billion at each reactor if there's a major accident. So, if you adjust for inflation, double that amount of money, and again these were 1980 era population figures. So, you have to increase the casualty rates because the population has grown since then. (**0024-78** [Kamps, Kevin])

Response: *NRC regulations require a reactor license applicant to be financially qualified to engage in licensed activities. The staff will evaluate the applicant's financial qualification in its Safety Evaluation Report, not the EIS. However, the EIS will address the benefit-cost of the proposed action. The benefit-cost balance for the project will rely on the best available estimate of project timing and duration, with uncertainties noted where appropriate. Chapter 11 [now Chapter 10] of the EIS will discuss the estimated overall costs and environmental impacts of the proposed project.*

Appendix E

Draft Environmental Impact Statement Comments and Responses

Appendix E

Draft Environmental Impact Statement Comments and Responses

This appendix is intentionally left blank. The final Environmental Impact Statement (EIS) will contain the comments on and responses to the draft EIS in this appendix.

Appendix F

Key Consultation Correspondence

Appendix F

Key Consultation Correspondence

Table F-1 identifies the consultation correspondence sent and received during the environmental review of the Calvert Cliffs Unit 3 combined license application. Full copies of the National Marine Fisheries Service (NMFS) Biological Assessment and Essential Fish Habitat Assessment are also included in this appendix.

Table F-1. List of Consultation Correspondence

Source	Recipient	Date Accession No.
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	National Marine Fisheries Service (Ms. Patricia Kurkul)	February 29, 2008 ML080370414
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Fish and Wildlife Service (Mr. Dan Murphy)	February 29, 2008 ML080390482
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Maryland Historic Trust (Mr. J. Rodney Little)	February 29, 2008 ML080430656
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Advisory Council on Historic Preservation (Mr. Don Klima)	February 29, 2008 ML080430649
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Pennsylvania Fish and Boat Commission (Mr. Douglas J. Austin)	March 03, 2008 ML080520182
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Cedarville Band of Piscataway Indians, Inc (Chief Natalie Proctor)	March 03, 2009 ML080570335
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Commission on African History and Culture (Ms. Tonya Hardy)	March 05, 2008 ML080570370
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Piscataway Indian Nation (Chief William “Red Wing” Tayac)	March 05, 2008 ML080570294
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Piscataway Conoy Confederacy and Subtribes, Inc. (Tribal Chairman Mervin Savory)	March 05, 2008 ML080510408
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Virginia Department of Game and Inland Fisheries (Mr. Robert W. Duncan)	March 05, 2008 ML080520092

Table F-1. (contd)

Source	Recipient	Date Accession No.
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Maryland Department of Natural Resources (Mr. John R. Griffin)	March 05, 2008 ML080450160
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Virginia Marine Resources Commission (Mr. Steven G. Bowman)	March 05, 2008 ML080520160
U.S. Nuclear Regulatory Commission (Mr. Richard Raione)	Pennsylvania Game Commission (Mr. Carl Roe)	March 05, 2008 ML080520172
U.S. Army Corps of Engineers (Ms. Margaret E. Gaffney-Smith)	U.S. Nuclear Regulatory Commission (Mr. Michael Lesar)	April 11, 2008 ML081130278
Maryland Department of Natural Resources (Ms. Susan T. Gray)	U.S. Nuclear Regulatory Commission (Chief, Rules and Directives Branch)	April 16, 2008 ML081130284
Fish and Wildlife Service (Ms. Mary J. Ratnaswamy)	U.S. Nuclear Regulatory Commission (Ms. Harriet Nash)	May 07, 2008 ML081340645
U.S. Nuclear Regulatory Commission (Mr. Nilesh Chokshi)	U.S. Army Corps of Engineers (Ms. Margaret E. Gaffney-Smith)	June 11, 2008 ML081570139
Maryland Historic Trust (Ms. Dixie Henry)	U.S. Army Corps of Engineers (Ms. Kathy Anderson)	September 25, 2008 ML093630083
Fish and Wildlife Service (Mr. Leopoldo Miranda)	U.S. Army Corps of Engineers (Colonel Peter W. Mueller)	September 30, 2008 ML093630080
National Marine Fisheries Service (Mr. John Nichols)	U.S. Army Corps of Engineers (Ms. Kathy Anderson)	October 3, 2008 ML082910715
Maryland Department of the Environment (Mr. Elder Ghigiarelli, Jr.)	U.S. Army Corps of Engineers (Ms. Kathy Anderson)	October 31, 2008 ML093630082
Maryland Historic Trust (Mr. Rodney Little)	U.S. Army Corps of Engineers (Mr. William Seib)	February 13, 2009 ML090570416
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	New York State Department of Environmental Conservation (Mr. Steve Sanford)	March 17, 2009 ML083400571

Table F-1. (contd)

Source	Recipient	Date Accession No.
New York State Department of Environmental Conservation (Mr. Chuck Nieder)	U.S. Nuclear Regulatory Commission (Ms. Laura Quinn)	April 02, 2009 ML091170694 (email)
U.S. Army Corps of Engineers (Ms. Beth E. Bachur)	Advisory Council on Historic Preservation (Mr. Reid J. Nelson)	July 15, 2009 ML093060235
Advisory Council on Historic Preservation (Mr. Raymond V. Wallace)	U.S. Army Corps of Engineers (Ms. Beth E. Bachur)	July 24, 2009 ML093060220
U.S. Army Corps of Engineers (Ms. Beth E. Bachur)	U.S. Nuclear Regulatory Commission (Mr. Michael Lesar)	July 30, 2009 ML093240035
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Susquehanna River Basin Commission (Mr. Paul Swartz)	October 26, 2009 ML092660186
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Maryland Department of the Environment (Ms. Shari Wilson)	October 26, 2009 ML092660193
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Maryland Department of Natural Resources (Mr. John R. Griffin)	October 26, 2009 ML092660202
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Pennsylvania Game Commission (Mr. Carl Roe)	October 26, 2009 ML092660259
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Virginia Marine Resource Commission (Mr. Steven G. Bowman)	October 26, 2009 ML092660325
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Virginia Department of Game and Inland Fisheries (Mr. Robert W. Duncan)	October 26, 2009 ML092660318
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Pennsylvania Fish and Boat Commission (Mr. Douglas J. Austin)	October 26, 2009 ML092660314
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	National Marine Fisheries Service (Ms. Patricia Kurkul)	October 26, 2009 ML092660237
U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	Fish and Wildlife Service (Mr. Leopoldo Miranda)	October 26, 2009 ML092660268
Maryland Department of Natural Resources (Ms. Susan T. Gray)	U.S. Nuclear Regulatory Commission (Ms. Laura Quinn)	November 13, 2009 ML093280756

Table F-1. (contd)

Source	Recipient	Date Accession No.
Pennsylvania Fish and Boat Commission (Mr. David Spotts)	U.S. Nuclear Regulatory Commission (Ms. Laura Quinn)	November 16, 2009 ML093290145
Virginia Department of Game and Inland Fisheries (Mr. Ernie Aschenbach)	U.S. Nuclear Regulatory Commission (Ms. Laura Quinn)	December 04, 2009 ML093520692
National Oceanic and Atmospheric Administration (Mr. John Nichols)	U.S. Nuclear Regulatory Commission (Ms. Laura Quinn)	December 10, 2009 ML093520687
Fish and Wildlife Service (Mr. Leopoldo J. Miranda)	U.S. Nuclear Regulatory Commission (Mr. Robert Schaaf)	February 25, 2010 ML100640429
U.S. Army Corps of Engineers (Ms. Kathy Anderson)	Advisory Council on Historic Preservation (Mr. Reid Nelson)	March 16, 2010 ML100810272

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401

May 7, 2008

Harriet Nash
Office of New Reactors
U.S. Nuclear Regulatory Commission
Mail Stop T-6D32
Washington, DC 20555

RE: Evaluation for the Calvert Cliffs Nuclear Power Plant, Unit 3 Combined License Partial Application, Calvert County, MD.

Dear Ms. Nash:

This responds to your letter, received May 2, 2008, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The federally threatened Puritan tiger beetle (*Cicindela puritana*) is known to occur within the vicinity of the above referenced project site. The Puritan tiger beetle occurs along shorelines of the Chesapeake Bay and its tidal tributaries in locations with sandy beaches, often narrow, below high bluffs. The larvae of the beetle live in deep burrows on non-vegetated portions of the bluff face; the adults use both the bluff and the beach below it. Populations have declined due to habitat alterations resulting from shoreline development and shoreline stabilization (bulkheads, revetments, groins, breakwaters). The beetle larvae, in particular, are sensitive to natural and human-induced changes to beaches and bluffs, as well as human traffic and water-borne pollution. Any potential impacts on Puritan tiger beetle habitat should be analyzed as part of your environmental assessment. If such impacts may occur, further Section 7 consultation with the U.S. Fish and Wildlife Service may be required.

The federally threatened northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) is known to occur within the vicinity of the above referenced project site. This beetle is most vulnerable to disturbance in the larval stage, which lasts two years. Larvae live in vertical burrows generally in the beach intertidal zone, where they are particularly sensitive to destruction by high levels of pedestrian traffic, off-road vehicles, and other factors such as beach changes due to coastal development and beach stabilization structures. Any potential impacts on northeastern beach tiger beetle habitat should be analyzed as part of your environmental assessment. If such impacts may occur, further Section 7 consultation with the U.S. Fish and Wildlife Service may be required.

We understand that Unistar Nuclear contracted with Dr. Barry Knisley to conduct tiger beetle studies and evaluate potential impacts of the project, resulting in two reports completed in 2006 and 2007. These studies may provide the necessary information to evaluate the proposed project. We look forward to receiving copies of these reports and any other analysis of impacts on tiger beetles that has been done.

Except for occasional transient individuals, no other federally proposed or listed endangered or threatened species are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

Effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (Service) removed (delisted) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle is still protected by the Bald and Golden Eagle Protection Act, Lacey Act, and the Migratory Bird Treaty Act. As a result, if your project may cause "disturbance" to the bald eagle, please consult the "National Bald Eagle Management Guidelines" dated May 2007. If any planned or ongoing activities cannot be conducted in compliance with the National Bald Eagle Management Guidelines (Eagle Management Guidelines), please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4573 for technical assistance. The Eagle Management Guidelines can be found at: **http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.**

In the future, if your project can not avoid disturbance to the bald eagle by complying with the Eagle Management Guidelines, you will be able to apply for a permit that authorizes the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities. This proposed permit process will not be available until the Service issues a final rule for the issuance of these take permits under the Bald and Golden Eagle Protection Act.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

Mary Ratnaswamy

Mary J. Ratnaswamy, Ph.D.
Program Supervisor, Threatened and Endangered Species

cc: Lori Byrne, Maryland Wildlife and Heritage Division, Annapolis, MD

Habitat Conservation Division
Chesapeake Bay Program Office
410 Severn Ave., Suite 107A
Annapolis, Maryland 21403

October 3, 2008

MEMORANDUM TO: Kathy Anderson
Baltimore District, Corps of Engineers
Regulatory, Maryland Permit – South

FROM: John Nichols

SUBJECT: CALVERT CLIFFS NUCLEAR PROJECT

This pertains to, Public Notice CENABOP-RMS 2007-08123, and your Essential Fish Habitat (EFH) Assessment, dated September 3, 2008, for the proposal by Unistar Nuclear Operating Services to perform site preparation activities and construct supporting facilities at the site of a proposed 1,710 MW nuclear power generation station (Unit 3).

The Nuclear Regulatory Commission (NRC), the lead Federal Agency for this proposal, is preparing an Environmental Impact Statement (EIS) for work associated with the expansion of the power plant facilities. The EIS will contain information important to our ability to make a comprehensive review of the project's impacts on National Marine Fisheries Service resources. Therefore, we wish to defer our final comments on this proposal until following our review of the EIS.

Based on our participation, to date, in the scoping process for this proposal, we have identified several issues of concern, which will be addressed further in our final comments. These issues are as follows.

1. The proposed new Unit 3 intake, relative to its impact from impingement and entrainment of adult, juvenile, and planktonic stages finfish and crustaceans, and other forms of local meroplankton.
2. The proposed new discharge pipe, relative to impacts on benthic habitat during installation, and the thermal quality of its effluent.
3. Restoration of a barge unloading facility, including maintenance and new dredging of an entrance channel, relative to impacts on benthic habitat and natural oyster bar.
4. Nontidal wetland and stream impacts (permanent and temporary) resulting from construction of the new Unit 3 facility and associated infrastructure.

I will be looking forward to further coordination with your agency and NRC, prior to, and following our forthcoming review of the EIS. If you have any questions, please contact me at (410) 267-5675; or, John.Nichols@NOAA.GOV.

MDE

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101

October 31, 2008

Ms. Kathy B. Anderson
Regulatory Branch
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

RE: Water Quality Certification - Unistar/Calvert Cliffs 3 Nuclear Project
USACE Tracking No. NAB-2007-08123-M05

Dear Ms. Anderson:

I am writing with regard to the Section 401 Water Quality Certification (WQC) for the referenced project. As you are aware, the Maryland Department of the Environment continues to review the proposed wetlands and waterways impacts resulting from the project.

The State is currently awaiting the release of the Draft Environmental Impact Statement (DEIS) which is currently scheduled for February, 2009. Upon its release, the Wetlands and Waterways Program will review the DEIS to ensure that the alternatives analysis meets the State's requirements and that proposed impacts to regulated resources have been minimized to the extent practicable.

Assuming the project ultimately satisfies all of Maryland's regulatory requirements, the WQC will be issued as part of the State's wetlands and waterways authorizations. Accordingly, the State reserves its opportunity to issue the WQC and requests that the Corps of Engineers not waive the WQC for the project.

If you have any questions, please contact me at (410) 537-3763.

Sincerely,

Elder Ghigiarelli, Jr.
Deputy Program Administrator
Wetlands and Waterways Program

cc: Gary Setzer
Adam Snyder

MDP

Maryland Department of Planning
Maryland Historical Trust

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor

Richard Eberhart Hall, Secretary
Matthew J. Power, Deputy Secretary

February 13, 2009

Mr. William Seib
Chief, Maryland Section Southern
Regulatory Branch, Baltimore District
U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Re: MHT Review of Phase II National Register Evaluations and Assessment of Effects for Cultural Resources, Calvert Cliffs Nuclear Power Plant Expansion, Calvert County, Maryland

Dear Mr. Seib:

The Maryland Historical Trust (Trust) has received additional information related to the above-referenced undertaking. The Trust first received notice of the proposed expansion of the Calvert Cliffs Nuclear Power Plant from UniStar Nuclear in October of 2006. Since that time, investigations have been undertaken to identify historic resources that may be within the project's area of potential effect and to assess the effects of the proposed construction on those resources. While other federal agencies will be involved in the regulating and permitting of the eventual operation of the plant, it is our understanding that the Corps is the primary federal agency that will be reviewing and permitting the site preparation activities and the actual construction of the facility. We are therefore writing to the Corps pursuant to Section 106 of the National Historic Preservation Act to continue consultation regarding effects on archeological resources (both terrestrial and underwater) and the historic built environment.

Archeology: The Trust has been provided with copies of the draft reports on the Phase I and Phase II archeological investigations that have been conducted for the above-referenced project. The primary draft report, *Phase I Cultural Resources Investigations and Phase II National Register Site Evaluations, Calvert Cliffs Nuclear Power Plant, Calvert County, Maryland* (Munford et al. 2008) was prepared by GAI Consultants, Inc. and presents the necessary documentation on the goals, methods, results, and recommendations of both Phase I and Phase II investigations that have been conducted within the project area. The document is notably well-organized and well-written and is consistent with the reporting requirements of the *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994). Please note, however, that the following items must be addressed in the preparation of the final document:

- The title for Figure 1-1 (Project Area) should include the appropriate quadrangle name (Cove Point).
- The report should specify that all materials remains and field records generated by the investigations will be deposited with the Maryland Archeological Laboratory for long-term preservation.

100 Community Place • Crownsville, Maryland 21032-2023
Telephone: 410.514.7600 • Fax: 410.987.4071 • Toll Free: 1.800.756.0119 • TTY Users: Maryland Relay
Internet: www.marylandhistoricaltrust.net

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- While the report acknowledges that site 18CV474 has the potential to address research questions relating to Maryland's slave economy, transformations following emancipation, and domestic agricultural sites in the nineteenth century, it may be helpful to include a list of more *specific* and more detailed research questions that could be explored through further investigation of this site.

As noted in our letter dated June 7, 2007, Phase I survey work resulted in the identification of fourteen archeological sites, and the Trust recommended that Phase II evaluative studies be conducted at four of these sites (18CV474, 18CV480, 18CV481, and 18CV482) to evaluate the resources in terms of their eligibility for the National Register of Historic Places. The Phase II investigations were carried out between March and May of 2008 and consisted of the excavation of 961 additional shovel test pits and 46 test units. Sites 18CV481 and 18CV482 have both been identified as late nineteenth century domestic sites. Both sites have been heavily disturbed by mechanical earth-moving activities, and GAI has recommended that the two sites are not eligible for listing in the National Register of Historic Places. Based on the information presented in the draft report, we concur that sites 18CV481 and 18CV482 do not meet the criteria for eligibility in the National Register given their loss of integrity and inability to yield any additional information. Further investigations of these two sites are not warranted.

Site 18CV480 represents the location of the former Parran's Park farmstead (CT-58) – a mid-nineteenth to twentieth century landowner's domestic complex that was demolished by BG&E in 1972. A total of 24, 938 artifacts have been recovered from the site, including a variety of historic ceramics (predominantly undecorated whiteware, but also transfer print, hand-painted, edge decorated, and sponge decorated whiteware), glassware, cut nails, brick fragments, window glass, porcelain doll fragments, glass marbles, buttons, coins, combs, medicine bottles, and tobacco pipe fragments. The remnants of seventeen cultural features were also identified, including a deep pit feature, five stone wall or pier sections, and several postholes/molds. Despite the high density of artifacts and the presence of partial features, the Phase II investigations have clearly revealed that the site has been heavily impacted by modern activities. The area where the house once stood was evidently bulldozed and graded when the structure was razed, and other areas have been excavated and used as borrow sites during the construction of the existing power plant. Due to the significantly reduced integrity of the site, GAI has recommended that site 18CV480 is not eligible for listing in the National Register. Based on the information presented in the draft report, we concur that site 18CV480 does not meet the criteria for eligibility in the National Register given its loss of integrity and inability to yield any additional information. Further investigation of this site is not warranted.

Site 18CV474, on the other hand, has been identified as a mid-nineteenth to early-twentieth century domestic site possessing remarkably good integrity. A total of 3,644 artifacts have been recovered from the site, including a variety of temporally diagnostic ceramics (pearlware, yellowware, and whiteware), bottle glass, cut nails, brick fragments, window glass, lamp chimney glass, buttons, tobacco pipe fragments, and a glass bead. Four intact features have also been identified, including a stone foundation and chimney base, a builder's trench, an area of stone paving, and a possible pier support for a north addition. The temporally diagnostic artifacts and cartographic sources indicate that this site was occupied from ca. 1850 to 1910, and the limited quantity and variety of decorated ceramics suggests that the residents were of a lower socioeconomic status than the landowners who were residing at site 18CV480. The property encompassing these sites was, in fact, owned and occupied by the Somervell family during the eighteenth and nineteenth centuries, and census data indicates that this locally prominent family relied heavily on enslaved labor throughout the first half of the nineteenth century. The Slave Schedule of the 1860 census, for example, identifies Alexander Somervell as the owner of 52 slaves, and Charles Somervell (Alexander's son) as the owner of sixteen slaves. Housing for these slaves may have been dispersed throughout the Somervell plantation, and the archeological investigations conducted at site 18CV474 indicate that the site may represent one such residence for some of the slaves and/or tenants, sharecroppers, or freed African Americans.

As noted above, site 18CV474 has retained much of its integrity and has the potential to yield significant information regarding domestic agricultural sites in nineteenth century southern Maryland. Specifically, additional archeological investigations may be able to address research questions relating to Maryland's slave economy and the wide variety of transformations that took place following emancipation. GAI has therefore recommended that site 18CV474 is eligible for listing in the National Register under Criterion D and that, if possible, the site should be preserved in place. Based on the information presented in the report, we concur that site 18CV474 is indeed eligible for inclusion in the National Register.

The expansion of the Calvert Cliffs Nuclear Power Plant, as currently proposed, would result in the destruction of site 18CV474 and would constitute an adverse effect on this significant archeological resource. To continue the Section 106 consultation process, the Corps of Engineers and UniStar Nuclear Development will need to continue to coordinate with the Trust on ways to avoid or mitigate the adverse effect on the site. If site avoidance is not possible, UniStar will need to provide the Trust with documentation detailing the constraints and providing justification as to why site 18CV474 cannot be avoided during construction. If site avoidance is not possible, Phase III data recovery investigations will be warranted to mitigate the undertaking's adverse effects on the archeological property. All parties will need to negotiate and execute a Memorandum of Agreement (MOA) that stipulates the agreed-upon mitigation measures, including the Phase III investigations, methods of public outreach and interpretation, and the curation of all artifacts and materials generated by the investigations conducted at site 18CV474. The Trust must be provided with a draft Data Recovery Plan for site 18CV474 so that we may provide appropriate comments and recommendations. Following our review and approval of the Data Recovery Plan, we will be happy to draft an MOA for the purposes of review and comment.

Please note that a supplemental Phase I Cultural Resources Investigation report was submitted to our office by UniStar on February 9, 2009. This document provided a summary of the methods, results, and recommendations of Phase I archeological investigations that were carried out at three new localities (Preston's Cliffs Wetland Mitigation Area, Camp Conoy Wetland Mitigation Area, and the Old Bay Farm Access Road). In short, the supplemental Phase I survey identified an extension of a previously-recorded site – 18CV7. This site represents an early nineteenth to twentieth century domestic component associated with the National Register eligible Preston's Cliffs Farmstead (CT-59). We understand that the portion of site 18CV7 that was most recently recorded by GAI is located within the Preston's Cliffs Wetland Mitigation Area and may be impacted by tree planting activities. GAI has recommended either site avoidance or further (Phase II) archeological investigations to evaluate the site's National Register eligibility prior to these activities. It is our opinion, however, that a Phase II study of the portion of site 18CV7 that is to be impacted would not be meaningful or appropriate at this time, as the purpose of a Phase II investigation is to evaluate an archeological resource in its *entirety* and to provide a definitive statement regarding the overall site's integrity, significance, and National Register eligibility. We are therefore recommending that the area containing a portion of site 18CV7 be reforested through the hand-planting of seedlings, as this practice is unlikely to have an adverse effect on the potentially significant nineteenth-century archeological resource. Please provide our office with a copy of the wetland mitigation plan and map (including proposed planting techniques) for the Preston's Cliffs Wetland Mitigation Area for our review, when this information becomes available. If UniStar is unable to

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utilize the hand-planting of seedlings technique in the area of site 18CV7, then further consultation regarding potential impacts to this site will be necessary.

Underwater Archeology: On January 20, 2009, the Maryland Historical Trust (Trust) received a copy of the draft report on the Phase I underwater archaeological survey that was conducted for the above-referenced project. The document was prepared by Panamerican Consultants, Inc, and prepared for MACTEC Federal Programs, Inc. We have reviewed the draft report in accordance with Section 106 of the national Historic Preservation Act of 1966, as amended, and are writing to provide our comments regarding effects on historic and archeological properties.

The draft report, *Submerged Cultural Resources Survey of a Proposed Outfall Pipe, Calvert Cliffs Nuclear Power Plant Unit 3 Construction, Calvert County, Maryland* (Faught 2008), is not consistent with the reporting requirements of the Trust's *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994) and will require revisions before the report can be accepted.

The Phase I survey was carried out during March of 2008 and consisted of an electronic remote-sensing survey within the proposed project area utilizing side-scan sonar, magnetometer, and sub-bottom profiler. Although the Maryland Inventory of Historic Properties records no known historic resources within the project area, the dredging activity has the potential for destroying currently unknown archeological, scientific, prehistoric, or historical data. While the draft Phase I report states that "none of the magnetic anomalies or side-scan targets are considered potentially significant for the purpose of this investigation", the Trust feels that the author of the report failed to adequately illustrate the lack of significance with clear figures and data. The lack of a clearly defined project APE within the report also hampered the Trust's ability to determine which of the targets might be impacted by the proposed construction of the outfall pipe. Much of the surveyed area appears well south of the proposed outfall pipe. The Trust is also confused by the use of 100-ft lane spacing, when the Trust often requires 50-ft lane spacing in submerged cultural resource surveys to ensure complete coverage and adequate resolution of the magnetic anomalies that might represent historic wrecks or other archeological resources. Specific comments and recommendations will follow.

Based on the documentation presented in this report, we concur that the proposed outfall pipe construction is unlikely to impact any significant cultural resources. For this reason, we believe that the portion of the Calvert Cliffs Nuclear Power Plant that includes the Proposed Outfall Pipe possesses no archeological research potential and that further archeological investigations are not warranted for Section 106 purposes. If the proposed outfall pipe is realigned, per the report recommendations, further consultation will be required and a resurvey of the area might be requested. The Section 106 requirements for this particular undertaking have, in fact been fulfilled. We look forward to receiving two copies of the final report, revised to address the Trust's comments, for our library.

Specific Comments:

- All maps should contain a North Arrow and a Scale
- P. 1 Introduction. The survey area should be stated in acres and hectares.
- P. 3 Environmental Setting: No evidence is provided for the statement, "The geologic beds of the cliffs (eroded portions of old sediment beds) apparently continue underwater according to the sidescan record."
- P. 4 figure 4 requires a citation

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- P. 7- 8 Methods: magnetometer - section needs to include the coverage of the magnetometer and the height towed above the seafloor.
- P. 12 Methods: GIS Mapping Locational Controls and Analysis – the bathymetric map referenced in this section was not included in the report
    - Figure 12– it would be helpful if a background image of the marine chart/USGS quad was included behind the track lines and magnetic data.
- P. 13-19 Results Section
    - There is not enough information in this section of the report to independently verify the author's results
        - M06, in particular, needs to be described in more detail, and the rationale for dismissing this object, which has a relatively large amplitude and long duration and is described as a complex dipole.
        - Higher resolution images of side-scan targets 1 – 4 need to be included for completeness, and so that the Trust can assess these objects.
        - Fig. 17-18 - it would be helpful if a background image of the marine chart/USGS quad was included behind the mosaics.
        - The results section references a paleochannel feature identified with the subbottom profiler, but there is no direct evidence of the presence of the paleochannel other than the green shading included on Figure 18. The section on the presence and interpretation of the paleochannel needs to be included so that individuals reading the report can clearly and independently verify its presence.

Historic Built Environment: Investigations to identify historic buildings, structures, and landscapes that might be affected by the proposed power plant expansion identified four places that are eligible for listing in the National Register of Historic Places. Parran's Park (CT-58) and Preston's Cliffs (CT-59) contain tobacco barns that are significant for their association with agricultural history. The Drum Point Railroad Bed (CT-1295) is significant for its association with local history and engineering. Camp Conoy (CT-1312) is significant for its association with important trends in recreational and social history.

The Trust has reviewed the recommendations in the report *Letter Report, Criteria of Effects Evaluation, Calvert Cliffs Nuclear Power Plant.* The report finds that the proposed power plant expansion will not adversely affect Parran's Park or Preston's Cliffs. The report also finds that the proposed work will require the alteration and demolition of portions of the Drum Point Railroad Bed and Camp Conoy. The Trust agrees that these changes would constitute an adverse effect to historic properties.

In the event of an adverse effect finding, 36 CFR 800.6 requires the responsible agency to continue consultation with the Trust, other interested parties, and the general public to identify and consider alternative plans that can avoid; minimize; and, if necessary, mitigate adverse effects. Interested parties should include the county government and local history groups. Examples of efforts to minimize adverse effects include using vegetative buffers to minimize visual effects and moving, rather than demolishing, historic buildings. Examples of efforts to mitigate adverse effects include documentation and the study, survey, or repair of historic resources that are similar to those that must be demolished.

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We recommend that the Corps's applicant proceed with the Section 106 process by consulting with as broad a range of interested parties as practical and compiling their recommendations about the best ways to avoid, minimize, and mitigate the adverse effects of the undertaking. As noted above, once the results of this consultation and detailed information about the nature of the adverse effects are provided to the Trust, the Trust will provide a draft MOA to the Corps and UniStar for review and consideration.

Thank you for providing us with this opportunity to comment. If you have questions or require assistance, please contact Dixie Henry (regarding terrestrial archeology) at 410-514-7638 \ dhenry@mdp.state.md.us, Jonathan Sager (regarding historic buildings and landscapes) at 410-514-7636 \ jsager@mdp.state.md.us, or Brian Jordan (regarding underwater archeology) at 410-514-7668 \ bjordan@mdp.state.md.us.

Sincerely,

J. Rodney Little
Director \ State Historic Preservation Officer
Maryland Historical Trust

JRL\DLH\JES
200803669
CC: Kathy Anderson (COE)
Susan Gray (PPRP)
R. McLean (DNR)
Yvonne F. Abernethy (Constellation Energy)
Dimitri Lutchenkov (UniStar)
Ben Resnick (GAI)
Barbar A. Munford (GAI)
Kirsti Uunila (Calvert County)

Preserving America's Heritage

July 24, 2009

Ms. Beth E. Bachur
Acting Chief, Maryland Section Southern
Baltimore District, U.S. Army Corps of Engineers
P.O. Box 1715
Baltimore, MD 21203-1715

Ref: Proposed Calvert Cliffs Nuclear Power Plant Project
Calvert County, Maryland

Dear Ms. Bachur:

On July 17, 2009, the Advisory Council on Historic Preservation (ACHP) received your notification and supporting documentation regarding the adverse effects of the referenced project on properties listed on and eligible for listing in the National Register of Historic Places. Based upon the information you provided, we have concluded that Appendix A, *Criteria for Council Involvement in Reviewing Individual Section 106 Cases,* of our regulations, "Protection of Historic Properties" (36 CFR Part 800), does not apply to this undertaking. Accordingly, we do not believe that our participation in the consultation to resolve adverse effects is needed. However, if we receive a request for participation from the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer, affected Indian tribe, a consulting party, or other party, we may reconsider this decision. Additionally, should circumstances change, and you determine that our participation is needed to conclude the consultation process, please notify us.

Pursuant to 36 CFR §800.6(b)(1)(iv), you will need to file the final Memorandum of Agreement (MOA), developed in consultation with the Maryland SHPO and any other consulting parties, and related documentation with the ACHP at the conclusion of the consultation process. The filing of the MOA and supporting documentation with the ACHP is required in order to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with the opportunity to review this undertaking. If you have any questions, please contact Tom McCulloch at 202-606-8554, or via email at tmcculloch@achp.gov.

Sincerely,

Raymond V. Wallace

Raymond V. Wallace
Historic Preservation Technician
Federal Property Management Section
Office of Federal Agency Programs

ADVISORY COUNCIL ON HISTORIC PRESERVATION
1100 Pennsylvania Avenue NW, Suite 803 Washington, DC 20004
Phone: 202-606-8503 ▯ Fax: 202-606-8647 ▯ achp@achp.gov ▯ www.achp.gov

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

REPLY TO ATTENTION OF

JUL 30 2009

Operations Division

Mr. Michael Lesar
Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T6-D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Lesar:

This is in reference to the Phase I Mitigation Plan for the Department of the Army (DA) permit application NAB-2007-08123-M05 (Calvert Cliffs 3 Nuclear Project, LLC/Unistar Nuclear Operating Services, LLC) to construct the proposed Calvert Cliffs Nuclear Power Plant Unit 3 in the Chesapeake Bay and unnamed tributaries to the Chesapeake Bay, forested non-tidal wetlands, Johns Creek and Goldstein Branch and their unnamed tributaries at Unistar's Calvert Cliffs site near Lusby, Calvert County, Maryland.

We have reviewed the Phase I Mitigation Plan dated February 18, 2009, and find that the proposal to enhance one manmade, abandoned sediment basin within the Lake Davies Disposal Area; to enhance portions of Johns Creek; to create forested and herbaceous wetland habitat within the largest manmade, abandoned, sediment basin on the Lake Davies disposal area; to create forested wetland habitat within the Camp Conoy area; to construct stream restoration; and to construct stream enhancement is conceptually acceptable as a suitable methodology to provide compensatory mitigation for the proposed project impacts to Waters of the U.S., including jurisdictional wetlands.

The proposed wetland mitigation includes creation of approximately 0.9 acres area of open water pond habitat; 1.3 acres of freshwater marsh; 7.2 acres of bottomland hardwood forest; eradication of invasive vegetation and enhancement of approximately 2.4 acres of bottomland hardwood forest; enhancement of wetlands abutting Johns Creek by eradication of invasive vegetation and enhancement of approximately 15.7 acres of bottomland hardwood forest; and creation of approximately 4.6 acres of forested wetland habitat. The proposed stream mitigation includes restoration of stream functions along approximately 6,283 linear feet of stream portions by employing treatments such as instream habitat structures (cover logs, lateral/longitudinal diversity and root wads); bank stabilization (vegetative and bioengineering solutions); and riparian wetland enhancements (hydraulic and vegetative). The proposed stream mitigation also includes enhancement of a total of approximately 4,146 linear feet of specific stream portions by improving aquatic habitat, constructing bank stabilization and planting native riparian vegetation. These proposed compensatory mitigation projects must be monitored for a 5-

year period and must be protected in perpetuity through establishment of a legally binding long-term protection mechanism. The final mitigation plan must comply with the U.S. Army Corps of Engineers Regulatory Guidance Letter No. 08-03 (Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment and/or Enhancement of Aquatic Resources, dated October 10, 2008). The Final Mitigation and Monitoring Plan should be an update of the Phase I Mitigation Plan based on actual field survey conditions and qualitative/quantitative data. In addition, the Final Mitigation and Monitoring Plan should include final construction design plans and the following:

1. Content of the final compensatory mitigation plan must be based on the final proposed project impacts and results of the ground truth surveys and analysis.
2. Detailed explanation for any deviations from the Phase I plan.
3. Detailed short-term and long-term plans to control *Phragmitis australis* (common reed) within and in the vicinity of the proposed wetland and stream creation, enhancement and restoration areas before, during and after the proposed mitigation work.
4. A summary of the various assessment methods or analytical models used and definition of the basis for the ratings or criteria.
5. A description of upland conditions on site that could have a detrimental impact on the mitigation areas and a description of work in uplands on site that could ameliorate future potential impacts to mitigation areas.
6. A declaration and a plan sheet illustration showing that work in the 100-foot wide stream mitigation area centered at the confluence of the stream with the Chesapeake Bay will be restricted from June 1 through August 31, inclusive of any year, to avoid impacts to tiger beetle habitat.
7. A declaration that only wetland vegetation species that are native and non-persistent will be planted in the wetland mitigation areas
8. A declaration ensuring the wetland and stream creation, enhancement and restoration areas continue to function as wetlands as defined in the Corps Wetland Delineation Manual (87 Manual) (i.e., the areas must exhibit wetland hydrology, hydric soils and a predominance of hydrophytic vegetation) and the streams continue to function as designed after work is completed.
9. A declaration that the wetland creation and enhancement areas will be field checked to ensure that elevations will achieve the hydrology necessary to support the plants species proposed for planting in those areas. If the wetland creation and enhancement areas do not thrive, the reasons for failure will be determined; corrective measures will be taken and the area replanted.
10. A signed document that ensures appropriate financing will be set aside to cover the estimated potential costs of remediation for the compensatory mitigation projects if stipulation number 8 above is not accomplished as required by the Corps.

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In addition, Calvert Cliffs 3 Nuclear Project, LLC/Unistar Nuclear Operating Services, LLC must provide a draft restrictive covenant document for permanent conservation easements on the wetland and stream creation, enhancement and restoration areas to the Corps at least 45 days prior to completion of the Final Mitigation and Monitoring Plan. Once the document is approved by the Corps, a copy of the signed document and confirmatory evidence that the said documents have been filed in the land records of the appropriate County must be included in the Final Mitigation and Monitoring Plan.

A copy of this letter will be furnished to Ms. Laura Quinn, NRC, Ms. Cheryl Kerr, MDE, Mr. Michael Milbradt, Calvert Cliffs 3 Nuclear Project, LLC, and Mr. Dimitri Lutchenkov, Unistar Nuclear Operating Services, LLC. If you have any questions concerning this letter, please call Mrs. Kathy Anderson, of this office, at (410) 962- 5690.

Sincerely,

Beth E. Bachur

Beth E. Bachur
Acting Chief, Maryland Section Southern

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Martin O'Malley, Governor
Anthony G. Brown, Lt. Governor
John R. Griffin, Secretary
Eric Schwaab, Deputy Secretary

November 13, 2009

Ms Laura Quinn, Environmental Program Manager
Office of New Reactors
US Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

SUBJECT: INFORMATION REQUEST AND CONSULTATION REGARDING THE COMBINED LICENSE APPLICATION FOR CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3

Dear Ms. Quinn:

This letter responds to Mr. Robert Schaaf's letter of October 26, 2009 to Secretary Shari Wilson, of the Maryland Department of the Environment, regarding the combined license application for Calvert Cliffs Nuclear Power Plant Unit 3.

As you know, the State of Maryland is participating as an Interested State in the subject case. The State lead is the Power Plant Research Program, who has been actively engaged in the process, including participating in the recent site visits to Eastalco and Bainbridge.

In 2007, UniStar applied to the Maryland Public Service Commission (PSC) for a Certificate of Convenience and Necessity (see http://webapp.psc.state.md.us; select Case 9127). Pursuant to the case, the State of Maryland undertook an environmental review process similar to the one the NRC is currently undergoing. The Maryland Department of Natural Resources, the Maryland Department of the Environment, as well as 5 other executive branch State agencies, conducted a coordinated, consolidated review of the Calvert Cliffs Unit 3 project. The review resulted in recommending almost one hundred licensing conditions to the PSC. The PSC approved the project on June 26, 2009, and these conditions, in their final form, are presented in items 114 and 139 of the PSC 9127 case jacket. In particular, please note Conditions 43-53, which cover terrestrial and ecological aspects, including threatened and endangered species.

With regard to alternative site evaluation, Maryland no longer requires alternative siting studies as a part of our power plant evaluations. However, PPRP has conducted site specific evaluations at the Bainbridge site as well as the Eastalco site. The Environmental Review Documents related to these two sites were provided to Ms. Maryann Parkhurst of your evaluation team shortly after the Bainbridge and Eastalco site visits. Although these evaluations were done based on other

Tawes State Office Building • 580 Taylor Avenue • Annapolis, Maryland 21401
410.260.8DNR or toll free in Maryland 877.620.8DNR • www.dnr.maryland.gov • TTY users call via Maryland Relay

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power plant designs, we believe they provide an excellent overview of general site conditions, including terrestrial and aquatic ecology. We have not conducted any studies of the Thiokol site.

We appreciate the opportunity to provide you with feedback on these and other important matters. If you have any questions, please give me call (410-260-8661) or send me an email (sgray@dnr.state.md.us).

Sincerely,

Susan T. Gray
Manager, Nuclear Programs
Power Plant Research Program

cc: Shari Wilson, Secretary MDE
Bill Paul, Chief, ARMA
Pete Dunbar, Director, PPRP
Brent Hare, AAG
Brent Bolea, AAG

Habitat Conservation Division
Chesapeake Bay Program Office
410 Severn Ave., Suite 107A
Annapolis, Maryland 21403

December 10, 2009

MEMORANDUM TO: Laura Quinn
Environment Projects Branch 3
Nuclear Regulatory Commission

FROM: John Nichols

SUBJECT: Calvert Cliffs Nuclear Power Plant, Unit 3
Alternative Sites Analysis

This pertains to your request, dated October 26, 2009, for information on National Marine Fisheries Service (NMFS) trust resources, and NMFS regulatory review issues that should be considered in evaluating three alternative sites the Environmental Impact Statement (in preparation) for the proposed Calvert Cliffs Nuclear Power Plant, Unit 3, in Calvert County, Maryland. The three alternative sites (all in Maryland) include: 1) the Bainbridge Site, in Port Deposit, Cecil County; 2) the Thiokol Site, near Mechanicsville, St. Mary's County, and; 3) the Eastaclo Site, in Frederick County. I have provided the following information.

Bainbridge Site
Of the three alternative sites, Bainbridge is of highest value to living marine resources under NMFS purview. The Susquehanna River is a documented migratory corridor and/or spawning/nursery ground for several species of anadromous and catadromous fish, including striped bass, white perch, yellow perch, alewife, blueback herring, hickory shad, American shad, and American eel. Generally firm/hard bottom along the Port Deposit shoreline provides ideal habitat for anadromous species with demersal eggs (deposited on, and adhering to bottom substrate); i.e., alewife, blueback herring, hickory shad, and American shad.

The Port Deposit shoreline is also a historically important area for submerged aquatic vegetation (SAV). Dense, multi-species beds occur annually at Marina Park in Port Deposit, extending channelward up to 100 feet from the mean high water shoreline. SAV significantly enhances nursery ground values for the above anadromous species. Virginia Institute of Marine Science annual aerial SAV surveys for the Chesapeake Bay (Havre de Grace Quad) should be referenced to determine historical occurrence and distribution of SAV along the Port Deposit shoreline.

Power plant cooling water intakes, such as that which would be required for a nuclear facility at Bainbridge, can jeopardize reproductive potential of spawning anadromous fish through impingement and entrainment of eggs and larvae. It is preferable that such intakes **not be sited** within anadromous fish spawning grounds. Where spawning ground locations are unavoidable, NMFS recommends strict intake design criteria to minimize egg and larvae mortality, including the following measures.

1. Wedge wire screening on intake openings, preferably with 1 mm mesh size, but not greater than 2mm mesh size. Back-flush mechanisms are generally required to maintain the latter small-mesh screening free from clogging.
2. Intake velocities which do not exceed 0.5 feet per second.
3. Recessed intakes, constructed off the main waterway, which are less accessible to anadromous fish life stages.

Dredging of an intake channel for a Bainbridge Power Plant intake, required to maintain adequate flow velocities and volumes, would also permanently convert hard bottom and SAV bed to fine-grain unvegetated substrate, of lower value to anadromous fish reproductive activities.

The Susquehanna River at Port Deposit is essentially freshwater riverine, near the head of tidal influence, and upstream of Essential Fish Habitat, as designated under the Magnuson-Stevens Fishery Conservation & Management Act (MSA). Consequently, selection of the Bainbridge site would not directly affect federally managed species under MSA, such as bluefish and summer flounder. However, anadromous fish that spawn in the Port Deposit area are important prey for bluefish and summer flounder in the Chesapeake Bay, and impacts to the reproductive potential of these prey species would indirectly affect managed predatory species. While addressing the impacts of the Bainbridge site under MSA consultation is not required, it is recommended, because of the importance of the lower Susquehanna to anadromous prey species. Addressing of the Bainbridge site under MSA consultation could be included as an addition to the Essential Fish Habitat assessment currently being prepared by your agency for the Calvert Cliffs site.

The lower Susquehanna River below Conowingo Dam has been determined to be important forage habitat for the endangered shortnose sturgeon, and may also support spawning activity for this species. Your agency should contact Julie Crocker of our Protected Resources Division in Gloucester, MA; (978) 281-9328; ext. 6530, or Julie.Crocker@NOAA.GOV, to determine your Section 7 consultation responsibilities for the Bainbridge site under the Endangered Species Act.

Thiokol Site
Withdrawal of cooling water from the Patuxent River would our agency's primary concern with selection of the Thiokol Site. Such an intake would be located downstream of the anadromous fish spawning grounds in the river. However, juveniles and adults of anadromous species seasonally migrate through the lower Patuxent River, including striped bass, white perch, yellow perch, alewife, and blueback herring. The latter life stages are mobile, pelagic in occurrence, and would, to a lesser degree than eggs and larvae, be susceptible to impingement and entrainment from a cooling water intake.

Other commercially important estuarine species that forage and nursery in the lower Patuxent River, which would be susceptible to impingement and entrainment from a cooling water intake, include blue crab, spot, croaker, weakfish, menhaden, American eel, winter flounder; and, veliger larvae of American oysters, produced by adult oysters on Natural Oyster Bars (NOB). A cooling water intake should located as far as possible away from NOBs, to minimize oyster larvae mortality.

Annual salinities in the Jack Bay area of the lower Patuxent River range from 9 to 13 ppt, and the lower Patuxent River has been designated as EFH for several federally managed species under MSA. Based on species ecology and salinity tolerances, federally managed species that occur in the lower Patuxent River include adult and juvenile bluefish, and adult and juvenile summer flounder. A bottom oriented intake would increase susceptibility of summer flounder to impingement/entrainment, and should be factored into impact considerations for this site. Addressing potential impacts to EFH and managed species from a cooling water intake in the lower Patuxent River could be as an expansion of the EFH assessment currently in preparation for the Calvert Cliffs site.

The Thiokol site lies along the drainage divide between the Patuxent and Potomac Rivers. Nontidal streams associated with the site are headwater systems, such as Tom Swamp Run and Rich Neck Creek, tributaries to McIntosh Run. Both streams likely provide nursery/forage ground for female American eel. White perch and yellow perch spawning grounds occur downstream of the Thiokol Site, and would be indirectly affected by adverse changes to the hydrology of upstream tributaries resulting from development of the site.

Eastaclo Site
The Potomac River drainage in Frederick County lies upstream of Great Falls, a natural barrier to migratory fish, with the exception of American eel. Due to limited manpower, NMFS Habitat considers the Potomac River above Great Falls as a No Resources area, and does not participate in regulatory review of projects located in the upper Potomac drainage. We, therefore, have no resource or regulatory input for the Eastaclo Site.

If you have any questions, or additional information needs, please contact me at (410) 962-5675; or, John.Nichols@NOAA.GOV.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573-4575

January 28, 2010

United States
Nuclear regulatory commission
Washington, D.C. 20555-0001

RE: Information and Consultation request regarding the combined license application for Calvert cliffs Nuclear Power Plant Unit 3

Dear: Robert G. Schaaf

This responds to your letter, received November 16, 2009, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project area. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The federally threatened bog turtle (*Clemmys muhlenbergii*) may be present within the project area or within the vicinity of the project. Bog turtles primarily inhabit palustrine wetlands comprised of a muddy bottom or shallow water, and tussocks of vegetation. A survey for bog turtle habitat and bog turtles may be appropriate. These surveys should be conducted at any location where the Maryland Wildlife and Heritage Division recommends. Upon completion, survey reports should be forwarded to both the Service and the Maryland Wildlife and Heritage Division for review. If you have not already sent a copy of your request for threatened and endangered species information to the Maryland Department of Natural Resources Wildlife and Heritage Division (580 Taylor Avenue, E-1, Annapolis MD 21401), please do so. Ms. Lori Byrne of the Wildlife and Heritage Division will provide additional information regarding the need for surveys and a list of experts who are qualified to perform such surveys.

Except for occasional transient individuals, no other federally proposed or listed endangered or threatened species are known to exist within the project impact area. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

1

Effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (Service) removed (delist) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle will still be protected by the Bald and Golden Eagle Protection Act, Lacey Act and the Migratory Bird Treaty Act. As a result, starting on August 8, 2007, if your project may cause "disturbance" to the bald eagle, please consult the "National Bald Eagle Management Guidelines" dated May 2007.

If any planned or ongoing activities cannot be conducted in compliance with the National Bald Eagle Management Guidelines (Eagle Management Guidelines), please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4573 for technical assistance. The Eagle Management Guidelines can be found at:
http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

In the future, if your project can not avoid disturbance to the bald eagle by complying with the Eagle Management Guidelines, you will be able to apply for a permit that authorizes the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities. This proposed permit process will not be available until the Service issues a final rule for the issuance of these take permits under the Bald and Golden Eagle Protection Act.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

Leopoldo Miranda
Field Supervisor

cc: Lori Byrne, Maryland Wildlife and Heritage Division, Annapolis, MD

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573-4575

February 25, 2010

Mr. Robert G. Schaaf
United States
Nuclear regulatory commission
Washington, D.C. 20555-0001

RE: New alternative sites in Maryland for Calvert cliffs Nuclear Power Plant Unit 3: Bainbridge Naval Training Facility site, Cecil County; Thiokol site, St. Mary's County; Eastalco site, Frederick County.

Dear Robert G. Schaaf:

This responds to your letter, received November 16, 2009, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the above referenced project areas and your February 12, 2010, request for more specific information concerning these alternative sites. We have reviewed the information you enclosed and are providing comments in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

The federally threatened bog turtle (*Clemmys muhlenbergii*) may be present within the project area or within the vicinity of the Bainbridge Naval Training Facility site. Bog turtles primarily inhabit palustrine wetlands comprised of a muddy bottom or shallow water, and tussocks of vegetation. A survey for bog turtle habitat and bog turtles may be appropriate. These surveys should be conducted at any location where the Maryland Wildlife and Heritage Division recommends. Upon completion, survey reports should be forwarded to both the Service and the Maryland Wildlife and Heritage Division for review. If you have not already sent a copy of your request for threatened and endangered species information to the Maryland Department of Natural Resources Wildlife and Heritage Division (580 Taylor Avenue, E-1, Annapolis MD 21401), please do so. Ms. Lori Byrne of the Wildlife and Heritage Division will provide additional information regarding the need for surveys and a list of experts who are qualified to perform such surveys.

1 The Federally endangered dwarf wedge mussel (*Alasmidonta heterodon*) may be present within the area affected by the development of the Thiokol site. This freshwater mussel occurs in McIntosh Run and may be affected by changes in flow or water quality in tributary streams which originate near the Thiokol site.

Except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the vicinity of the Eastalco site.. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For information on the presence of other rare species, you should contact Lori Byrne of the Maryland Wildlife and Heritage Division at (410) 260-8573.

Effective August 8, 2007, under the authority of the Endangered Species Act of 1973, as amended, the U.S. Fish and Wildlife Service (Service) removed (delist) the bald eagle in the lower 48 States of the United States from the Federal List of Endangered and Threatened Wildlife. However, the bald eagle will still be protected by the Bald and Golden Eagle Protection Act, Lacey Act and the Migratory Bird Treaty Act. As a result, starting on August 8, 2007, if your project may cause "disturbance" to the bald eagle, please consult the "National Bald Eagle Management Guidelines" dated May 2007.

If any planned or ongoing activities cannot be conducted in compliance with the National Bald Eagle Management Guidelines (Eagle Management Guidelines), please contact the Chesapeake Bay Ecological Services Field Office at 410-573-4573 for technical assistance. The Eagle Management Guidelines can be found at: **http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.**

In the future, if your project can not avoid disturbance to the bald eagle by complying with the Eagle Management Guidelines, you will be able to apply for a permit that authorizes the take of bald and golden eagles under the Bald and Golden Eagle Protection Act, generally where the take to be authorized is associated with otherwise lawful activities. This proposed permit process will not be available until the Service issues a final rule for the issuance of these take permits under the Bald and Golden Eagle Protection Act.

An additional concern of the Service is wetlands protection. Federal and state partners of the Chesapeake Bay Program have adopted an interim goal of no overall net loss of the Basin's remaining wetlands, and the long term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of this policy and the functions and values wetlands perform, the Service recommends avoiding wetland impacts. All wetlands within the project area should be identified, and if construction in wetlands is proposed, the U.S. Army Corps of Engineers, Baltimore District, should be contacted for permit requirements. They can be reached at (410) 962-3670.

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Andy Moser at (410) 573-4537.

Sincerely,

June Slac[illegible]

For Leopoldo Miranda
Field Supervisor

cc: Lori Byrne, Maryland Wildlife and Heritage Division, Annapolis, MD

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, U.S. ARMY CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MD 21203-1715

REPLY TO ATTENTION OF

MAR 16 2010

Operations Division

Mr. Reid J. Nelson, Director
Office of Federal Agency Programs
Advisory Council on Historic Preservation
Old Post Office Building, Suite 803
1100 Pennsylvania Avenue, N.W.
Washington, DC 20004

Dear Mr. Nelson:

I am writing to conclude the review by the U.S. Army Corps of Engineers, Baltimore District (Corps) in consultation with the Maryland State Historic Preservation Officer (MD SHPO), regarding the Department of the Army (DA) application CENAB-OP-RMS (Calvert Cliffs 3 Nuclear Project, LLC/Unistar Nuclear Operating Services, LLC)2007-08123, pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended.

In a letter dated July 15, 2009, (Enclosure 1) and in consultation with the MD SHPO, we notified you that the proposed undertaking would have an adverse effect on historic properties in accordance with 36 CFR 800.6(a) (1). We also provided documentation referenced in 36 CFR 800.11(e): *Finding of no adverse effect or adverse effect.*

There have been no substantive revisions or additions to previous documentation provided to your office regarding this project. However, the Corps, the MD SHPO and the permit applicant have entered into a Memorandum of Agreement (MOA) to resolve the adverse effects associated with this undertaking. As described in the subject MOA, the applicant, in consultation with the Corps and MD SHPO, has agreed to implement cultural resource studies for ancillary environmental stewardship opportunities, reforestation activities, or other modifications to the previously reviewed Project for which cultural resource studies have not been completed, even though such treatment may exceed the Corps' scope of authority as published in Appendix C, and has participated in the consultation, has responsibilities for implementing stipulations under the Memorandum of Agreement ("MOA"), and is a concurring party to this MOA. The Corps, and the MD SHPO agree that the requirement for appropriate public notice and involvement stated in 36 CFR 800.14 (b) (2) (ii) is satisfied by a combination of past public notice and public and agency hearings and reviews, which includes consideration of the Project's effects on historic properties. All of the parties to the MOA are satisfied that the stipulations in the MOA successfully take into account the effect of the project on historic properties. As further described in the MOA, the public was provided the opportunity to comment on the DA application CENAB-OP-RMS (Calvert Cliffs 3

Nuclear Project, LLC/Unistar Nuclear Operating Services, LLC) 2007-08123 by public notice dated September 3, 2008. No comments were received from the public on this project. Finally, by letter dated July 24, 2009, the Advisory Council on Historic Preservation declined to participate in the Section 106 consultation regarding this project, by advising the Corps that further participation and consultation, to resolve adverse effects, was not needed, (Enclosure 2).

The **MEMORANDUM OF AGREEMENT AMONG THE U.S. ARMY CORPS OF ENGINEERS AND THE MARYLAND STATE HISTORIC PRESERVATION OFFICER AND CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC (AS CONCURRING PARTY) PURSUANT TO 36 CFR 800 AND 33 CFR PART 325 APPENDIX C REGARDING THE CALVERT CLIFFS NUCLEAR POWER PLANT CALVERT COUNTY, MARYLAND** was developed to mitigate adverse effects to historic properties. In accordance with 36 CFR 800.6(b)(1)(iv), we are filing a copy of this MOA (Enclosure 3) with your office to conclude the Corps' requirements under Section 106 of the National Historic Preservation Act for this project. Further, any Department of the Army Section 10/404 permit that may be issued will include special conditions for implementation of this executed MOA.

Copies of the signed MOA are being provided to all of the signatories as well as Ms. Laura Quinn, Nuclear Regulatory Commission, and Ms. Cheryl Kerr, Maryland Department of the Environment. Please file the material enclosed and contact Mr. Woody Francis, of this office, at 410-962-5689 if you have any questions.

Sincerely,

Kathy Anderson

Kathy B. Anderson
Chief, Maryland Section Southern

Enclosures

Biological Assessment

National Marine Fisheries Service

Calvert Cliffs Nuclear Power Plant Unit 3
Calvert County, Maryland

U.S. Nuclear Regulatory Commission Combined License Application
Docket No. 52-016

U. S. Army Corps of Engineers Permit Application
Permit Application No. NAB-2007-08123-M05 (Calvert Cliffs 3 Nuclear Project, LLC/UniStar Nuclear Operating Services, LLC)

April 2010

U.S. Nuclear Regulatory Commission
Rockville, Maryland

U.S. Army Corps of Engineers
Baltimore District

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application from Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC (UniStar or applicant) for a combined license (COL) to construct and operate a new nuclear reactor with a design-rated gross electrical output of 1710 megawatts-electric (MW(e)) on the Calvert Cliffs site. The U.S. Army Corps of Engineers (USACE or Corps) is reviewing an application from UniStar for a Department of the Army (DA) Permit pursuant to Section 10 of the Rivers and Harbors Appropriation Act of 1899 (Rivers and Harbors Act) and Section 404 of the Clean Water Act (33 U.S.C. 1344) to perform site preparation and construction activities for the proposed new unit at the Calvert Cliffs site. Currently, there are two operating nuclear reactors on the Calvert Cliffs site, Units 1 and 2. The proposed new reactor – Unit 3 – would be located adjacent to existing Units 1 and 2. The site is located about 60 mi south of Baltimore; 40 mi southeast of Washington, D.C.; 10.5 mi southeast of Prince Frederick, Maryland; and 7.5 mi north of Solomons, Maryland (Figure 1).

Pursuant to National Environmental Policy Act of 1969, as amended (NEPA), the NRC and the Corps are cooperating agencies with the NRC being the lead agency, and they are preparing an environmental impact statement (EIS) as part of the agencies' review of the COL and DA permit applications. The Corps is cooperating with the NRC to ensure the information presented in the EIS is adequate to fulfill the requirements of Corps regulations; the Clean Water Act Section 404(b)(1) Guidelines, which contain the substantive environmental criteria used by the Corps in evaluating discharges of dredged or fill material into waters of the United States; and the Corps public interest review process. As required by Title 10 of the Code of Federal Regulations (CFR) Part 51.26, the NRC has published in the *Federal Register* a Notice of Intent (73 FR 8719) to prepare an EIS and to conduct scoping. The final EIS will be issued after considering public comments on the draft EIS. The impact analysis in the EIS includes an assessment of the potential environmental impacts of the construction and operation of a new nuclear power unit at the Calvert Cliffs site and along the associated transmission line corridors, including potential impacts to the threatened and endangered species. If issued, the COL would authorize UniStar to construct and operate the new unit. The Corps will finalize its Record of Decision after issuance of the final EIS.

The Corps and the NRC are conducting a joint consultation with the National Marine Fisheries Service (NMFS) pursuant to Section 7(c) of the Endangered Species Act of 1973, as amended (ESA) and have prepared this biological assessment (BA), which examines the potential impacts of construction and operation of the proposed Unit 3 at the Calvert Cliffs site on threatened or endangered species. This BA examines the potential impacts of the proposed actions on Federally listed species within the NMFS's jurisdiction. The BA focuses on five species, the shortnose sturgeon (*Acipenser brevirostrum*), the loggerhead turtle (*Caretta caretta*), the Kemp's ridley turtle (*Lepidochelys kempii*), the green turtle (*Chelonia mydas*), and the leatherback turtle (*Dermochelys coriacea*), that occur near the Calvert Cliffs site (Table 1). There are no areas designated as critical habitat near the Calvert Cliffs site.

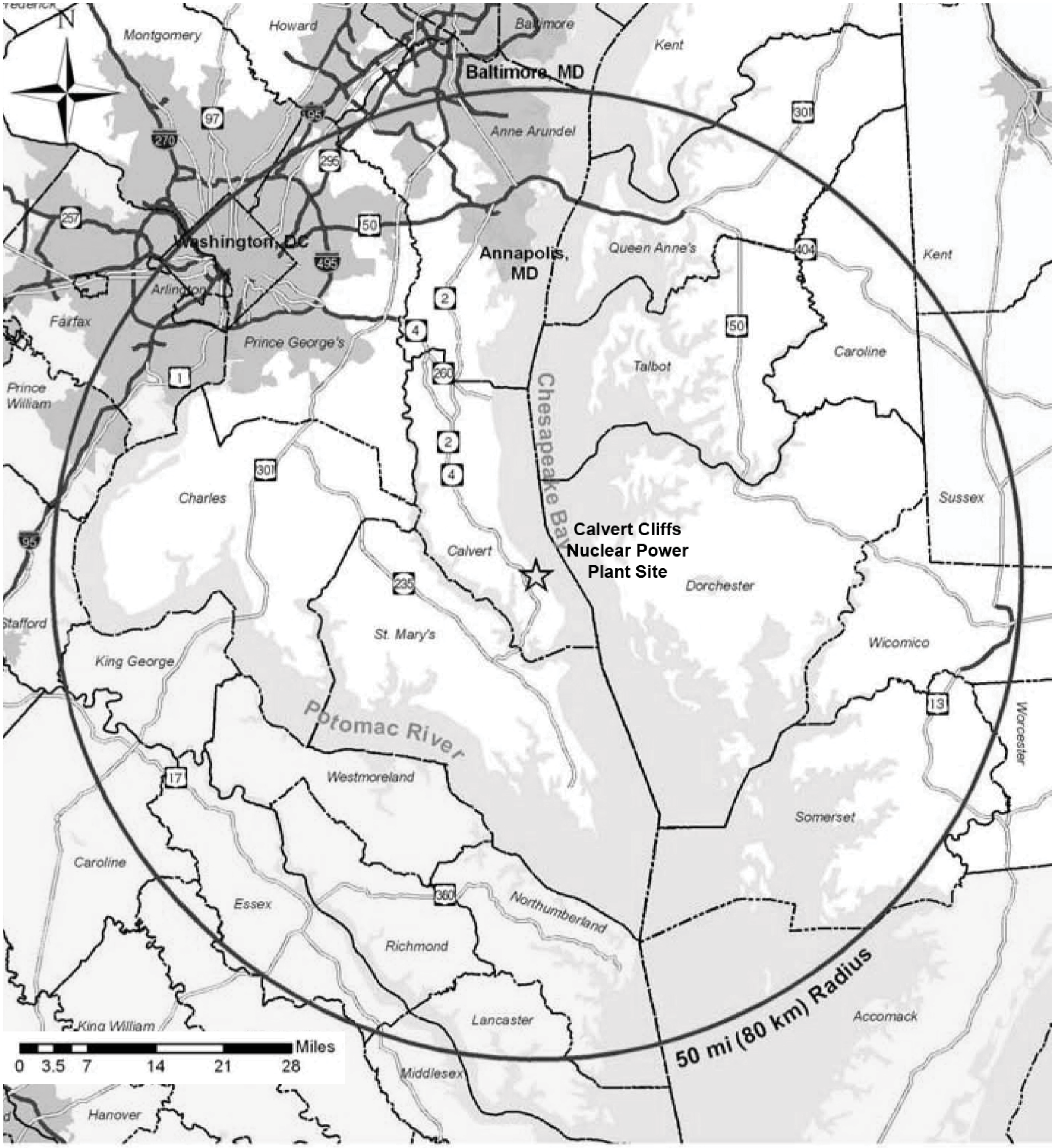

Figure 1. Location of the Calvert Cliffs Site, 50-mi Region (UniStar 2009a)

Table 1. Federally Listed Estuarine and Marine Species Occurring in Calvert County

Scientific Name	Common Name	Federal Status
Acipenser brevirostrum	shortnose sturgeon	Endangered
Caretta caretta	loggerhead turtle	Threatened
Lepidochelys kempii	Kemp's ridley turtle	Endangered
Chelonia mydas	green turtle	Threatened
Dermochelys coriacea	leatherback turtle	Endangered

Source: NMFS 2008

2.0 Calvert Cliffs Site Description

The Calvert Cliffs site is located on the Chesapeake Bay about 60 mi south of Baltimore; 40 mi southeast of Washington, D.C.; 10.5 mi southeast of Prince Frederick, Maryland; and 7.5 mi north of Solomons, Maryland (Figure 1). The site comprises about 2070 ac adjacent to Chesapeake Bay in an unincorporated area of Calvert County, Maryland. The NRC has licensed two existing nuclear generating units at the Calvert Cliffs site, Calvert Cliffs Nuclear Power Plant (CCNPP) Units 1 and 2, that have a combined net electric generating capacity of approximately 1700-1780 MW(e). Units 1 and 2 use once-through cooling systems and obtain water from the Chesapeake Bay. The combined flow of CCNPP Units 1 and 2 intakes is about 5332 cfs. There are two shoreline water intake structures for the existing units that share a common forebay, and each unit has its own fish-return system. The two existing units also share a discharge pipe that enters the Chesapeake Bay north of the intake structure. South of the intake structure is a barge slip for offloading heavy replacement components. The barge slip has been used several times since 2001 to receive replacement steam generators, transformers, and vessel reactor heads, and it is likely that there would be occasional use of the facility in the future for continued operation of CCNPP Units 1 and 2, which could require future maintenance dredging (UniStar 2009b). Both existing units would remain and continue to operate and would not be affected by the proposed action.

The Chesapeake Bay is one of the largest estuary systems in the world and currently supplies cooling water for CCNPP Units 1 and 2. The Bay is very productive and is an important part of the cultural and economic fabric of the area. Much of the Chesapeake Bay, including the reach that encompasses Calvert County, is considered impaired, primarily because of low dissolved oxygen (DO) and increased nutrients and sedimentation from human activities. The Chesapeake Bay Program (CBP) oversees monitoring at selected locations throughout the Bay and has developed average seasonal conditions from 1985 to 2008. One station, known as CB4.4, is in the middle of the Bay, east of the Calvert Cliffs site. The average monthly surface water temperature at this location has ranged from about 38°F (February) to about 81°F (July; August) (MDNR 2009a). The average monthly surface water salinity at station CB4.4 is typically lowest in late spring, ranging from about 10 to 11 ppt (April through June), and highest in late fall, ranging from about 15 to 16 ppt (September through November) (MDNR 2009b). Average monthly DO concentrations at station CB4.4 have ranged from about 0.3–0.4 mg/L (July; August) to 9.0–10.0 mg/L (January through March) (MDNR 2009c). Average June through September DO concentrations have been hypoxic (less than 2.0 mg/L) (Wicks et al. 2007). The minimum DO concentrations during those months occasionally may be anoxic (less than 0.2 mg/L).

Sediments near the CCNPP barge dock area primarily were composed of sand (94 to 96 percent) and gravel (2 to 5 percent) with a small percentage of clay (EA Engineering 2007) and were typical for the general region (Llansó et al. 2007). Total organic carbon (TOC) in the sediments ranged from about 2.4 to 3.1 percent. Most organic compounds analyzed in the CCNPP sediments were reported as not detected (EA Engineering 2007). The concentrations of metal compounds that were detected in the sediments were such that effects are expected to be rare (Buchman 2008). The benthic infaunal community found near the barge dock was generally sparse and comprised relatively few taxa (EA Engineering 2007) and were generally similar to the regional community (Llansó et al. 2007).

3.0 Proposed Federal Actions

The proposed Federal actions are the issuance of a COL for the construction and operation of a new nuclear reactor at the Calvert Cliffs site pursuant to 10 CFR 52.97 and the decision regarding a DA permit pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

The NRC, in a final rule dated October 9, 2007 (72 FR 57416), limited the definition of "construction" to those activities that fall within its regulatory authority in 10 CFR 51.4. Many of the activities required to construct a nuclear power plant are not part of the NRC action to license the plant. Activities associated with building the plant that are not within the purview of the NRC action are grouped under the term "preconstruction." Preconstruction activities include clearing and grading, excavating, erection of support buildings and transmission lines, and other associated activities. These preconstruction activities may take place before the application for a COL is submitted, during the staff's review of a COL application, or after a COL is granted. Although preconstruction activities are outside the NRC's regulatory authority, many of them are within the regulatory authority of local, State, or other Federal agencies. The distinction between construction and preconstruction is not carried forward in this BA, and they are being discussed together as construction activities for the purposes of this joint consultation.

The Corps action is the decision whether to issue a permit pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for proposed structures in and under navigable waters and the discharge of dredged, excavated, and/or fill material into waters of the United States, including jurisdictional wetlands.

Prerequisites to construction activities include, but are not limited to, documentation of existing site conditions within the Calvert Cliffs site and acquisition of the necessary permits (e.g., COL, local building permits, a National Pollutant Discharge Elimination System (NPDES) permit, a Clean Water Act Section 404 permit, a General Stormwater Permit, and other State and local permits). After these prerequisites are completed, planned construction activities could proceed and would include all or some of all the activities identified in 10 CFR 50.10(a)(1). Following construction, no separate operating license would be required.

Briefly, the construction and operation activities that could affect Federally protected species based on habitat affinities and life-history characteristics and the nature and spatial and temporal considerations of the activity are:

Construction

- Dredging and modification of the existing barge slip, including a sheet-pile wall and a stone apron, on the Chesapeake Bay shoreline
- Installation of the cooling water intake system including new sheet pile, armor removal, armor installation, and dredging, including the fish-return system
- Installation of the cooling water discharge system
- Increased vessel traffic associated with the construction activities.

Operation

- Impingement, entrainment, and entrapment associated with the cooling water intake system
- Discharge plume from the cooling water system (thermal, chemical, and physical effects)
- Maintenance dredging of the barge slip.

The construction footprint for the proposed Unit 3 and all associated facilities would cover about 460 ac, including about 175 ac of previously disturbed ground. UniStar has proposed to build and operate an AREVA NP, Inc. U.S. EPR design pressurized water reactor steam electric system, which is rated at 4590 MW(t) with a net electrical output of 1562 MW(e). Unit 3 would require cooling water intake and fish-return facilities that are separate from CCNPP Units 1 and 2 and would also have a separate plant access road and protected area. The proposed circulating water supply system (CWS) would be closed-cycle using a mechanical-draft cooling tower with plume abatement (UniStar 2009a). The project would affect about 5.7 ac of tidal open waters.

The existing transmission system for CCNPP Units 1 and 2, which consists of two circuits, would also be used to service Unit 3. No new transmission corridors would be constructed outside the construction footprint. Operation of the transmission system is not expected to affect Federally protected species in the Chesapeake Bay.

3.1 Cooling Water Intake System

A 180-ft-long sheet-pile wall, embedded 15 ft into the Bay bottom, would be built to extend from the existing baffle wall for CCNPP Units 1 and 2 to the shoreline south of the present intake forebay to create a 9000-ft^2 (0.21-ac) wedge-shaped pool that would become the intake embayment for the new unit (Figure 2) (UniStar 2008b). The wall would be built of steel sheet piling supported by 30-in.-diameter soldier piles placed on 10-ft centers. The new baffle wall would not have an opening that would allow the new wedge-shaped pool to communicate directly with the Bay. Therefore, Unit 3 would share the embayment now used by Units 1 and 2. A 50-ft section of shoreline armoring would be removed prior to the wall installation. The construction of the sheet-pile wall would take about 2 months. Once the wall is in place,

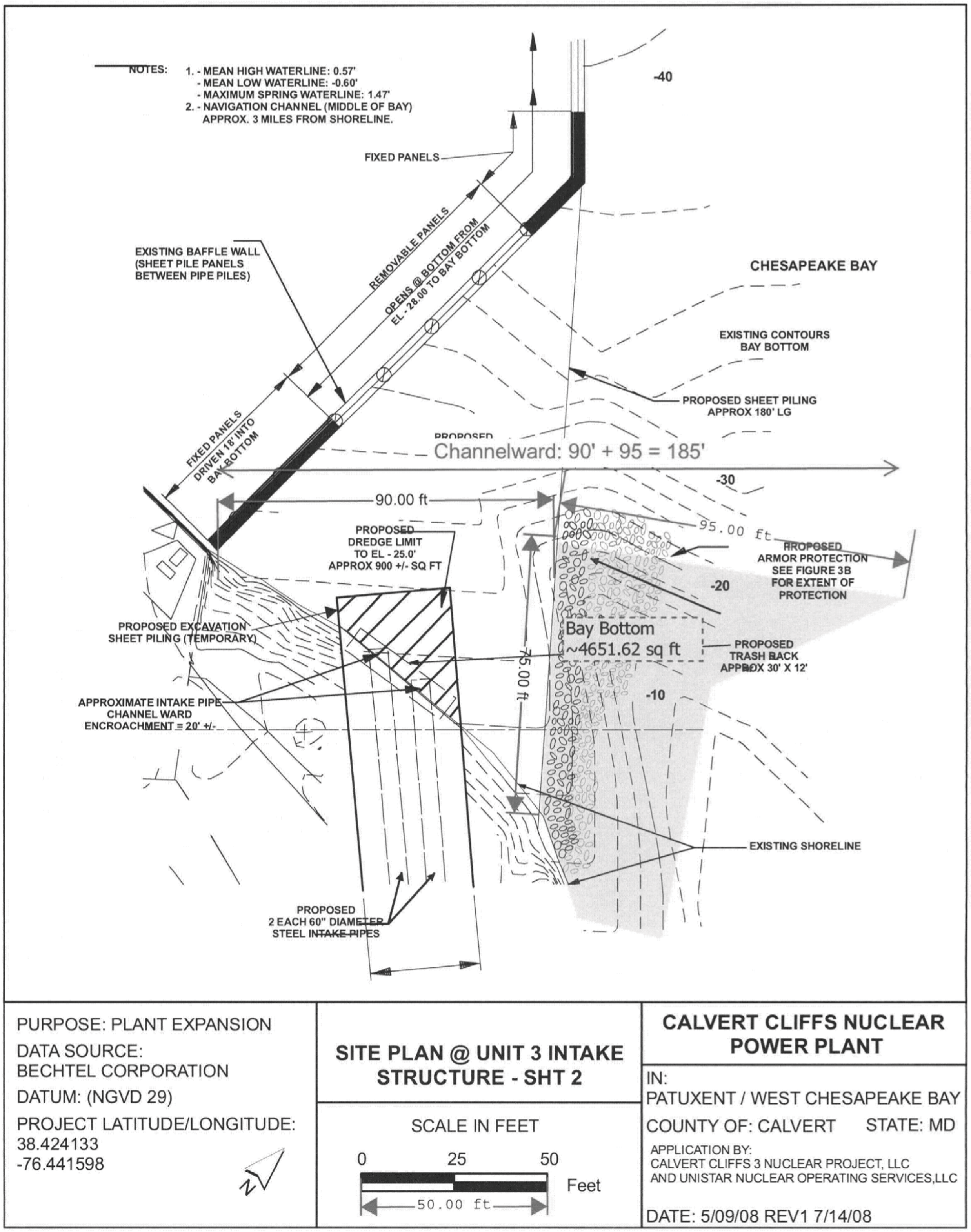

Figure 2. Site Plan at Unit 3 Intake Structure (UniStar 2009d)

about 60 ft of shoreline armor within the wedge-shaped pool would be removed, and a temporary sheet-pile wall would be installed upland along the intake water pipe route. The upland sheet-pile wall would extend about 30 ft into the wedge-shaped pool to create a small area that would be dewatered to facilitate dredging of a 30-ft by 30-ft area to a depth of 25 ft (900 ft^2; 0.02 ac). This excavation would house two 60-in.-diameter intake pipes that would extend about 20 ft channelward. The pipes would have trash racks but no screens at their openings. The intake piping would be perpendicular to the tidal flow of the Bay to minimize the component of the tidal flow parallel to the intake-area flow, reducing the potential of organisms entering the common forebay shared by the CWS and safety-related ultimate heat sink (UHS) intake structures for Unit 3. The flow velocity from the Bay into the existing intake area and the expected flow into the Unit 3 intake pipes are both less than 0.5 fps. About 80 ft of the shoreline within the pool would be armored, with the armoring extending about 10 ft from shore. The new sheet-pile wall would be armored by placing riprap on the Bay bottom extending about 75 ft from the shoreline and about 25 to 95 ft toward the channel (UniStar 2009d). The armoring would be added to the Bay bottom as a series of four overlying layers ranging from washed gravel on the bottom to large quarry rock (average about 2 tons each rock) on the top (UniStar 2009d). The overall thickness of the armoring would vary according to the water depth. About 4650 ft^2 (0.11 ac) of the Bay bottom would be armored (Figure 2). The temporary sheet-pile wall within the wedge-shaped pool would be removed. The construction of the intake system would take about 4 months.

The two intake pipes would be placed in trenches dug on land and would extend about 500 ft south to the location of common forebay (UniStar 2009a). The common forebay would be 100 ft long by 80 ft wide and would be about 12 ft deep (UniStar 2009a). The Unit 3 CWS makeup water intake structure would be a concrete structure about 78 ft long and 55 ft wide with individual pump bays. Three 50-percent-capacity, vertical, wet-pit CWS makeup pumps would provide up to 44,000 gpm of makeup water. The Unit 3 UHS makeup water intake structure would be a concrete structure about 75 ft long and 60 ft wide with individual pump bays. Four 100-percent-capacity, vertical, wet-pit UHS water makeup pumps would provide up to 3000 gpm of makeup water. Flow velocities at the CWS and UHS makeup structures would be less than 0.3 fps and less than 0.1 fps, respectively.

For the CWS makeup water intake structure, water would flow from the common forebay through trash racks and two traveling screens into a smaller forebay that feeds the three CWS makeup pumps. The trash bar spacing would be 3.5 in. from center to center. Debris collected by the trash racks would be collected in a debris basin for cleanout and disposal as solid waste. The traveling screens for each system would be dual-flow screens with a double-entry/center-exit flow pattern. The screen panels would be metallic or plastic mesh with a mesh size of 3/8 in. or smaller (UniStar 2009b). The screens would be mechanically rotated above the water for cleaning with a pressurized water spray. Screen wash water would be supplied by two screen wash pumps. Through-screen flow velocities would be less than 0.5 fps. For the UHS makeup intake structure, water flows from the common forebay to each makeup pump after passing through a trash rack and dual-flow screen. The screens for the UHS pumps would not be equipped with a fish-return system (UniStar 2009c).

3.2 Fish-Return System

A fish-return system similar to those for CCNPP Units 1 and 2 would be built (UniStar 2008b) for the Unit 3 CWS pumps. The final design details have not been determined. Organisms would enter the return system at the intake screens for the CWS intake structure located at the common forebay after the organisms traveled through the pipe originating at the shoreline intake about 500 ft north of the forebay. The UHS pumps would not be connected to the fish-return system because the UHS makeup system only operates periodically or in the case of a design-basis accident (DBA) (UniStar 2009c). The return system would be located on the east (Bay) side of the Unit 3 intake forebay about midway between the CCNPP Units 1 and 2 intake forebay and the existing barge dock. The proposed fish-return outfall pipe would extend about 40 ft into the Bay with end of the pipe emerging from the Bay floor but remaining below mean lower low tide level (UniStar 2009a). This design was chosen to minimize any drop at the exit point into the Chesapeake Bay (UniStar 2009a). Any bends in the pipes would be greater than 90 degrees to facilitate fish passage. The walls and joints of the pipes would be smooth to reduce potential fish abrasion (UniStar 2009b). About 40 linear ft of shoreline armoring would be removed to allow installation of the return pipe. A 6-ft-deep trench extending 40 ft from shore would be dredged to house the return pipe. The trench would be about 5 ft wide at the bottom and about 65 ft wide at the level of the Bay floor (UniStar 2008b). An area of about 2600 ft^2 would be directly disturbed by the dredging. After the return pipe is placed in the trench, the trench would be backfilled with the dredged sand and stone material. A 10-ft by 10-ft section of the Bay bottom would be covered to a depth of 2 ft by a riprap apron. The shoreline armoring would be replaced. The existing fish-return systems for CCNPP Units 1 and 2 would not be modified.

3.3 Cooling Water Discharge Structure

The 30-in.-diameter cooling water discharge pipe would be placed in a 550-ft-long trench dredged in a trapezoidal form at a 5:1 side slope to prevent sloughing of the trench sides (UniStar 2008b) (Figure 3). The trench bottom would range from 3 to 6 ft wide, and the maximum width of the trench at the level of the Bay bottom would be about 70 ft. UniStar proposes to use a three-port diffuser, which would rise 3 ft above the bed of the Chesapeake Bay, located 550 ft from the shoreline. Each diffuser port would direct water out of the pipe at an angle of 22.5° above horizontal (Figure 3). A minimum area of about 38,500 ft^2 (0.88 ac) of Bay bottom would be directly disturbed by the pipeline installation. About 7000 yd^3 of material would be dredged for the pipe installation. About 5,800 yd^3 of this material would be reused to backfill the trench with the remainder (about 1200 yd^3) being deposited at an existing upland (non-wetland), environmentally controlled disposal area at the Lake Davies laydown area on the site. Riprap with a median diameter of 12 in., and filter fabric would be placed on top of the backfilled material to provide a minimum 4 ft cover over the pipe. The riprap would be placed within discharge pipe trench to the top of the trench at the original grade of the Bay bottom, but would not extend above the existing Bay bottom. A 2-ft-deep riprap area would be placed to extend approximately 10 ft on each side of the 40-ft-long multiport diffuser. The area of Bay bottom covered by this riprap is about 800 ft^2.

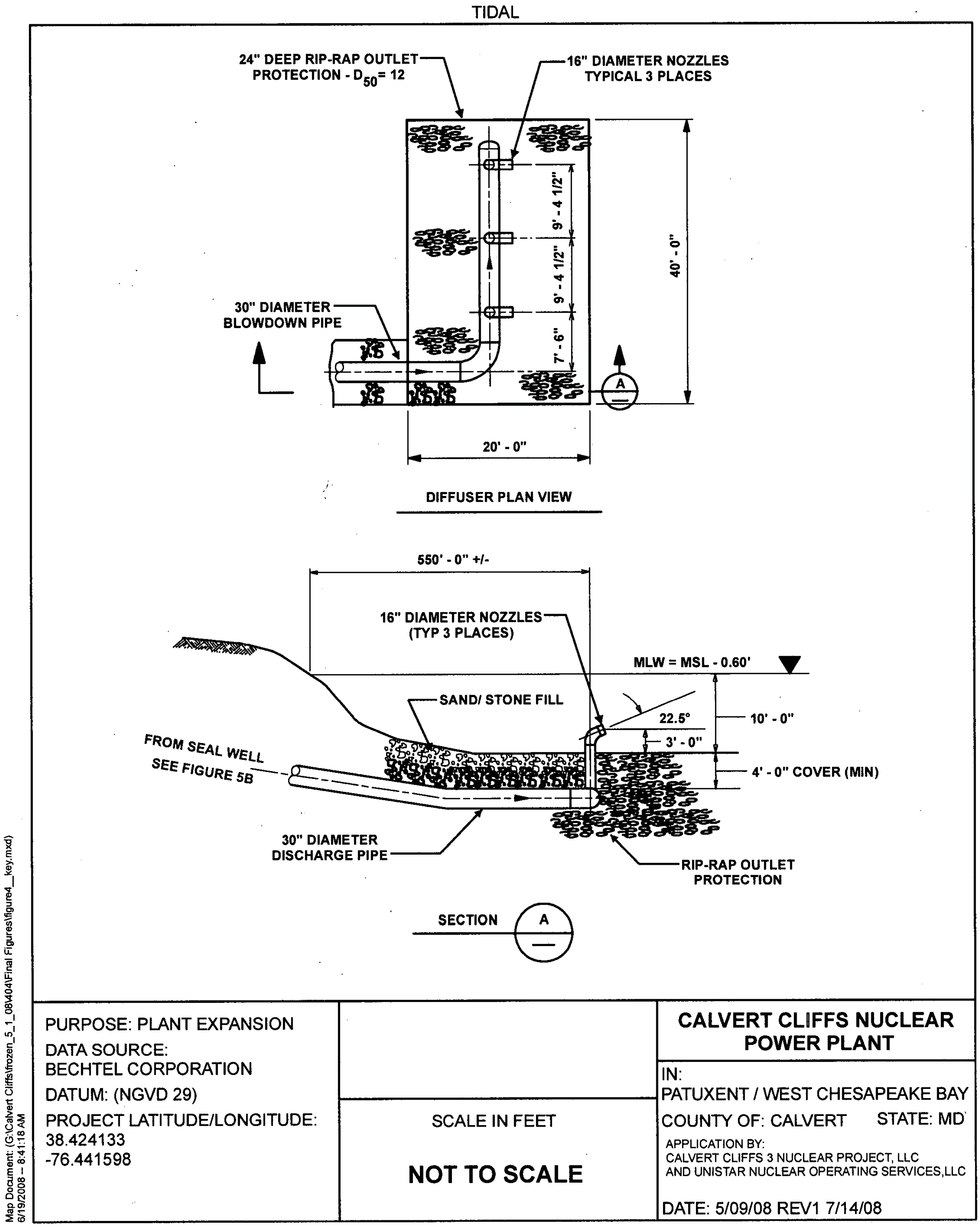

Figure 3. Details of the Proposed Unit 3 Cooling Water Discharge Outfall (UniStar 2008b)

3.4 Barge Dock Improvements

The existing barge slip for CCNPP Units 1 and 2 would be restored and extended to re-establish use during the construction of proposed Unit 3. An area about 1500 ft long by 130 ft wide (average width), covering about 195,000 ft^2 (4.5 ac) of Bay bottom would be dredged to a bottom depth of −16 ft mean low water (UniStar 2008b). This would require the mechanical dredging of about 50,000 yd^3 of bottom substrates. UniStar considers the removal of sediment from about 1065 ft of the total length, about 45,000 yd^3, as maintenance dredging, with the removal of material from the remaining 435 ft, about 5000 yd^3, as new dredging beyond the original dredging limits. This extension is necessary to extend the proposed channel to tie into the same depth as the existing natural depth contour of −16 ft mean low water. Prior to dredging, two existing crane piles and one mooring bollard may be removed from the channel area (UniStar 2008b) (Figure 4). Additional maintenance dredging would remove silt that has accumulated in the shoreward portion of the barge dock area during the past 30 years, altering the normal flow pattern from an existing culvert outfall. The area would be restored by installing a 12-ft by 90-ft concrete apron and a 90-ft-wide sheet-pile wall at the beach end of the area and building a 40-ft long by 40-ft wide by 2-ft deep riprap apron that would extend about 40 ft into the Bay, covering about 1600 ft^2 (0.04 ac). The sheet-pile wall would be constructed of steel sheet-piling supported by 30-in.-diameter soldier piles. The restoration would allow the discharge from the culvert outfall to flow directly in the Bay. The restoration is expected to take about two weeks.

Once the barge dock area has been refurbished, it would be used by barges that may be as large as 200 ft long and 50 ft wide. The numbers of barges that would be used has not been specified. Typically, the barges used are about 35 ft wide. Barge drafts range from 2 ft to 11 ft, depending on the load. UniStar expects that the barge dock would be in use for about five years during the construction, but stated that although there are no specific plans for maintenance dredging, eventual replacement of major components could require dredging in the future. UniStar has requested permission from the Corps to conduct maintenance dredging for 10 years (USACE 2008). The dredged material removed from the barge slip would be used during the plant construction as sand bedding for underground pipe installation or deposited at an existing upland (non-wetland), environmentally controlled disposal area onsite that was used for previous dredge disposal. The dredged material would be characterized prior to use or disposal.

4.0 Protected Estuarine and Marine Species Descriptions

This section describes the life history and habitat use for Federally listed estuarine and marine species that may occur on or near the Calvert Cliffs site (Table 1).

4.1 Shortnose Sturgeon (*Acipenser brevirostrum*)

The shortnose sturgeon is a long-lived fish species belonging to the Order Acipenseriformes, which includes sturgeons and paddlefishes. The species, which is Federally endangered, occurs along the western Atlantic coast from the Saint John River, New Brunswick, to the St.

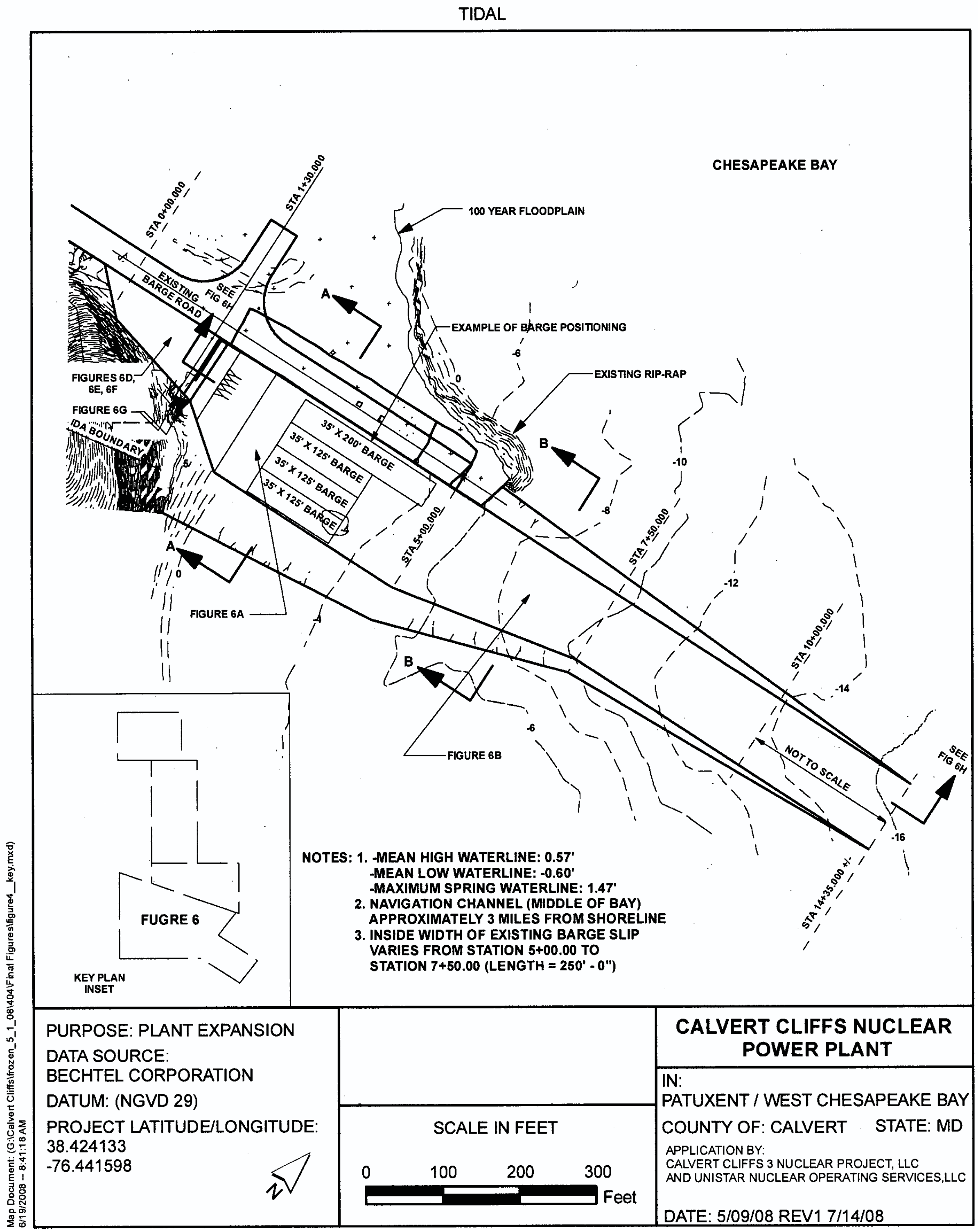

Figure 4. Proposed Restoration of Barge Slip (with existing contours) for the Construction of Proposed Unit 3 (UniStar 2008b)

Johns River, Florida (Kynard 1997; Murdy et al. 1997), with Chesapeake Bay the center of its distribution (Kynard et al. 2009). The range of the shortnose sturgeon coincides considerably with that of the Atlantic sturgeon (*Acipenser oxyrinchus*), although the latter ranges to the Gulf of Mexico (Murdy et al. 1997). The NMFS recognized 19 shortnose sturgeon population segments along its range, roughly divided into northern and southern regions (NMFS 1998). The northern region includes populations from about the Chesapeake Bay and Delaware River northward, and the southern region includes populations from about the Cape Fear River, North Carolina southward. The status of shortnose sturgeon in Chesapeake Bay is discussed in Section 4.1.2 of this BA.

The principal reasons for the severe declines in the abundance that led to the eventual listing of shortnose sturgeon as endangered were pollution and overfishing (NMFS 1998). Another important factor was the damming of many rivers used for spawning that restricted fish to lower-quality habitats. The U.S. Fish and Wildlife Service (FWS) listed the shortnose sturgeon as endangered in 1967 (NMFS 1998). NMFS assumed responsibility for the species in 1974. A recovery plan was prepared in 1998 (NMFS 1998). The 19 population segments considered by NMFS were not based on morphological or genetic differences among the various segments but were linked to major rivers or estuaries along the coast and differences in life-history properties among populations (Walsh et al. 2001; Wirgin et al. 2005). They do not represent distinct population segments (DPS) as defined under the ESA. Wirgin et al. (2005) studied the mitochondrial DNA of fish from 11 of the 19 segments to examine the population structure along the entire species' range. Wirgin et al. (2005) found that their data supported the possible existence of many genetically distinct populations of shortnose sturgeon in tributaries along the western Atlantic coast. However, these populations did not strictly segregate according to geographic region. A more recent study based on data from more sturgeons, including additional fish from the Potomac River, generally supported the population segments identified by NMFS (Wirgin et al. 2009). However, four populations, including the one found in the Chesapeake Bay, were not genetically distinct from the two closest neighboring populations. NMFS initiated a status review for the shortnose sturgeon in November 2007 to update the biological information on the status of the species and to consider if shortnose sturgeon should be identified and assessed as DPS rather than as a single unit (72 FR 67712).

4.1.1 Shortnose Sturgeon Biology

Shortnose sturgeon, which grow to a maximum length of 4.6 ft, is one of the smallest sturgeon species. Shortnose sturgeon are freshwater amphidromous fish, living primarily in freshwater or in low-salinity estuaries and occasionally swimming into higher salinity coastal waters to feed (Bemis and Kynard 1997; Murdy et al. 1997; NMFS 1998). Shortnose sturgeons spend most of their lives in their birth river systems, only rarely moving into marine waters (NMFS 1998). There is considerable latitudinal variation in the life-history characteristics of the species (Kynard 1997), which makes it difficult to identify specific features of sturgeons living in Chesapeake Bay. The information presented below is based primarily on northern populations. Shortnose sturgeons mature relatively late, with females maturing at about 12 to 18 years of age and males maturing at about 10 to 11 years of age at the most northern spawning location (Dadswell et al. 1984). Individuals mature much more quickly in southern locations. Individual shortnose sturgeon may not spawn every year and may go as long as 11 years between spawning in northern areas (Dadswell et al. 1984). Adults spawn from February to April, generally over the rocky bottoms in deeper channels of swiftly flowing rivers (Dadswell et al. 1984; Murdy et al. 1997). Spawning may be strongly related to temperature (Dadswell et al. 1984), although river flow conditions must be appropriate before ovulation and spawning occur (Kynard 1997). Females deposit eggs that attach to the bottom substrate and remain there for a few days (Kynard 1997). The eggs hatch into secretive, poorly swimming yolk-sac larvae that develop into feeding larvae within several days. The feeding larvae are able to move downstream but stop migrating before reaching the estuary. Growth of young-of-the-year fish is fairly rapid with young often reaching lengths of about 6 in. or more during the first season (Dadswell et al. 1984). Young-of-the-year sturgeons stay in freshwater (Kynard 1997). Young sturgeons, aged 1 to 3 years, often join adults in freshwater concentration areas that may be favorable places to feed. Adults and juveniles continue to associate in groups in estuaries and forage at the freshwater-saltwater interface (Kynard 1997). In the Chesapeake Bay, this interface, or salt front, typically occurs about 12 mi from the Susquehanna River mouth but can move several miles up or down the estuary because of changes in water flow from the river or strong up- or down-estuary wind events (North and Houde 2001; North et al. 2004). These groups at the salt front persist primarily during spring and summer, after which adults may swim to deeper waters in lower parts of estuaries to overwinter (Kynard 1997). Juvenile shortnose sturgeon feed primarily on benthic insect larvae and crustaceans, whereas the primary foods for adults are mollusks (Murdy et al. 1997; NMFS 1998). Northern adults typically stop feeding in November (Kynard 1997).

One of the primary threats to shortnose sturgeon is the blocking of natal rivers by dams or other obstructions. Shortnose sturgeon cannot be fished directly but are often caught as bycatch with other targeted fisheries, especially the American shad (*Alosa sapidissima*) gillnet fishery (Kynard 1997).

4.1.2 Shortnose Sturgeon in Chesapeake Bay

The occurrence and status of the shortnose sturgeon in Chesapeake Bay are enigmatic. Historically, the shortnose sturgeon was found in the Potomac and Susquehanna Rivers and probably in other major Chesapeake Bay tributaries, although historical records apparently were based on few verified records (Dadswell et al. 1984). However, populations have been decimated by loss of critical spawning habitat primarily from damming of rivers and pollution (Murdy et al. 1997). There were few published records of shortnose sturgeon occurrence in the Bay before 1996. Baltimore Gas and Electric Company (BGE) researchers captured a shortnose sturgeon during trawl studies near the Calvert Cliffs site in 1979 (UniStar 2008b). No shortnose sturgeon occurred in the impingement samples collected at CCNPP Units 1 and 2 from 1975 to 1995 (Ringger 2000).

A reward program conducted by the State of Maryland for Atlantic sturgeon that were captured during commercial fishing for other species yielded 40 shortnose sturgeon, most from the upper Bay (Welsh et al. 2002). Many of these sturgeon were tagged and released. Three sturgeon tagged in Chesapeake Bay were found in the Chesapeake and Delaware Canal or in the Delaware River.

Small pieces of fins collected from many of the captured sturgeon were used for genetic analyses. Comparison of genetic data from sturgeons collected over several river systems showed that sturgeons from Chesapeake Bay and Delaware Bay were essentially indistinguishable (Wirgin et al. 2005; Wirgin et al. 2009). Shortnose sturgeons from the Potomac River were shown to be a genetic subset of sturgeons from the larger Chesapeake Bay and Delaware River systems. One possible explanation for this extreme similarity is shortnose sturgeon may no longer reproduce in Chesapeake Bay, and the individuals sampled there were seasonal migrants from the Delaware River (Wirgin et al. 2005; Wirgin et al. 2009). If shortnose sturgeon populations that existed in Chesapeake Bay before the 20th century were genetically distinct from those in the Delaware River, this distinction may have been affected by the major land barrier separating the two that was removed with the construction of the sea-level Chesapeake and Delaware Canal in the late 1920s.

Recent studies of the shortnose sturgeon in the Potomac River showed that a reproducing, resident population may eventually be re-established in the Bay. A study from 2004 to 2007 documented the movements of two female shortnose sturgeons in the Potomac River (Kynard et al. 2007). A third female was tagged after the completion of the study (FWS 2009). All three female sturgeons were egg-bearing. One female, which had late-stage eggs when first caught in 2005, had not spawned when recaptured in the spring 2006 at about river kilometer (rkm) 185 near Fletcher's Landing (Kynard et al. 2009). This female was captured again in the summer 2007 and had early-stage eggs. A second female bearing late-stage eggs was caught in early spring 2006 (Kynard et al. 2009). The female that was tracked from 2005 to 2007 spent the summer-winter period in a 14.9 mi (24 km) part of the Potomac downriver of Craney Island and undertook a possible spawning migration upriver in the spring 2006. The 2006 female used a larger summer-winter range (about 48.5 mi) that extended from the capture point at rkm 63 to near Craney Island (Kynard et al. 2009). The 2005 female was tracked again in April 2009, swimming along 93-mi stretch of the river from Coles Point, Virginia (rkm 35) to Fletcher's Landing (FWS 2009). The trip began in early April and took 11 days, during which the female reached a top speed of 2.6 km/hr. This female may live in the Potomac all year (FWS 2009).

Despite the capture of egg-bearing females in the Potomac, there is no evidence yet that reproduction has been successful in the river. No shortnose sturgeon early life stages have been caught in the Potomac River despite sampling efforts designed to capture them (Kynard et al. 2009; FWS 2009). No Chesapeake Bay tributaries are known to support reproducing populations (FWS 2009). The occurrence of egg-bearing female shortnose sturgeons in the Potomac River is significant because it confirms the presence of suitable habitat for the species and suggests that a breeding population eventually may be established in the river. Kynard et al. (2009) offered that the surgeons now inhabiting the river could represent a remnant population or could be colonizers from the Delaware River because of the genetic similarity between the two fish groups.

4.2 Sea Turtles

Four species of sea turtles may occur in Chesapeake Bay during part of a year (Musick 1988). The two most common species are the loggerhead turtle (*Caretta caretta*) and Kemp's ridley turtle (*Lepidochelys kempii*) (Mansfield 2006). The green turtle (*Chelonia mydas*) and the leatherback turtle (*Dermochelys coriacea*) also occur in the Bay (VIMS 2000). Both occur primarily in the lower Bay. Most occurrences in the Bay are larger juveniles that use estuaries as feeding habitat (Mansfield 2006). Turtles visit Chesapeake Bay primarily in the spring and summer (VIMS 2000). Abundances of sea turtles are commonly estimated by counting the number of nesting females or directly counting the number of nests in which eggs have been deposited (Broderick et al. 2006). Abundances of males are often unknown. Recent estimates of turtle occurrence in lower Chesapeake Bay have been made by using aerial surveys (Mansfield 2006). Abundances of turtles within the Bay have decreased substantially since the 1980s. Spring and summer turtle abundances have declined by about 63 percent and 75 percent, respectively (Mansfield 2006). Mansfield (2006) suggested that these decreases in the Bay could be occurring because of reductions in the forage base, such as blue crabs.

Mansfield (2006) also studied turtles captured in pound nets located in Virginia waters at the mouth of the Potomac River, which provides a general indication of the relative commonness of the four species in the central Chesapeake Bay, closer to the Calvert Cliffs area. Loggerhead turtles, representing about 88 percent of the 436 turtles collected during the 22-year period from 1980 to 2002, were the most common. Kemp’s ridley turtles accounted for about 12 percent of the turtles caught. Only one green turtle was caught, and no leatherback turtles were caught. Most of the turtles were caught between May and October. An unidentified species of sea turtle was impinged on the trash racks at the existing CCNPP facility in June 2001 (NRC 2001).

Sea turtles generally show natal homing behavior in which females return to the areas of their birth to lay eggs (Bowen and Karl 2007), although the precision of the homing varies according to species life style. Genetic studies indicated species that travel great distances to forage, such as leatherback turtles, are less precise in returning to natal beaches than those that do not travel long distances, such as loggerhead turtles (Bowen and Karl 2007).

All four sea turtle species face similar threats, with the primary threat being the unintentional capture by many types of fishing gear, including pound nets in Chesapeake Bay (NOAA 2008a, 2008b). Additional threats include harvesting of eggs, juveniles, and adults and disturbance of nesting sites. Predators, other than humans, may also significantly affect sea turtles. The primary predators on turtle adults include several large shark species, particularly tiger sharks (*Galeocerdo cuvier*) (Heithaus et al. 2008).

4.2.1 Loggerhead Turtle (*Caretta caretta*)

The loggerhead turtle is a Federally and State threatened species (MDNR 2007; NOAA 2008a) that is found in temperate and tropical seas around the around the world (NOAA 2008a). In the Atlantic Ocean, loggerheads range from Argentina to Newfoundland. Loggerheads in the Northwest Atlantic nest primarily on beaches from Alabama to southern Virginia (Conant et al. 2009). Eggs are laid between April and early September with hatching occurring about 2 months after laying (NOAA 2008a). Hatchlings emerge from the nest, crawl to the surf, and swim away from shore for several days. Those from Northwest Atlantic rookeries eventually are caught by the Gulf Stream (McClellan and Read 2007). Juveniles eventually get transported to oceanic zones where they remain for 7 to 12 years (NOAA 2008a). These oceanic juveniles migrate to nearshore waters with estuaries, such as Chesapeake Bay, providing important habitat (NMFS and FWS 2007a). However, this migration to nearshore waters is often reversed with individuals moving back and forth between coastal and oceanic waters for several years (McClellan and Read 2007). Juveniles show a certain degree of homing, returning from the oceanic regions to areas often relatively close to their birth rookeries (Bowen et al. 2004). Loggerheads in the southeastern U.S. may reach a length of 36 in. and weigh as much as 250 lb (NOAA 2008a).

The Chesapeake Bay is used primarily by juveniles, but it is also frequented by adults in the summer. Loggerheads enter the Bay in April and May and leave with the arrival of cool waters in early to mid fall. Mitochondrial DNA analyses showed that about 64 percent of the loggerheads in the Bay were from rookeries in Florida, and the remainder were from rookeries in Georgia and South Carolina (Norrgard and Graves 1996). The Georgia and South Carolina rookeries account for only about 10 percent of the active loggerhead nesting in the southeastern U.S., and their relatively high contribution to the Chesapeake Bay's loggerhead population suggests that the Bay is an important foraging area for juveniles (Norrgard and Graves 1996). The pound net entrapment study recorded the carapace lengths of trapped loggerhead turtles as ranging from about 18 to 45 in. (Mansfield 2006), which provides some indication of the size of loggerheads found in the Bay.

Loggerheads have large heads and strong jaws that enable them to feed on hard-shelled prey. In the lower Chesapeake Bay area and coastal Virginia, loggerhead diet has shifted from invertebrates to fish since the 1980s (Seney and Musick 2007). Horseshoe crabs were a prominent prey in the 1980s, with blue crabs becoming predominant in the late 1980s and early 1990s. After the mid-1990s, Atlantic menhaden (*Brevoortia tyrannus*) and Atlantic croaker (*Micropogonias undulatus*) became important prey. The changes probably resulted from declines in the invertebrate populations that forced the turtles to feed on discards or trapped fish.

Concern over declining loggerhead populations had been ongoing for at least 30 years when the loggerhead was listed as Federally threatened (NMFS and FWS 1991a). Turtle abundance data away from nests are scarce, and it is generally accepted that estimates of nesting females or counting nests are reasonable guides to overall population size (NMFS and FWS 2007a). The most recent trends show significant declines in nesting females in many parts of the world, particularly in the South Florida Nesting Subpopulation, which has declined 39.5 percent since 1998 (NMFS and FWS 2007a). Recent conservation activities include revision of the 1991 recovery plan to address recovery of the Northwest Atlantic loggerhead population (NMFS and FWS 2008) and the completion of a status review to determine whether the western North Atlantic loggerhead population, or those in other areas, represent DPS (Conant et al. 2009). The revised recovery plan describes five recovery units that are defined by geography or political boundaries. Loggerhead turtles that occupy Chesapeake Bay originate from either of two recovery units. The Northern Recovery Unit includes breeding beaches from Georgia to Virginia, and the Peninsular Florida Recovery Unit encompasses beaches from the Georgia border to Pinellas County on Florida's west coast. The two Recovery Units have averaged a total of about 70,000 nests per year since 1989, which accounted for about 99 percent of the Northwest Atlantic population nests. The number of nests in each Unit has decreased about 1.3 percent to 1.6 percent per year since the 1980s.

Conant et al. (2009) determined that the global loggerhead turtle population can be differentiated into nine DPS. Each DPS is discrete from all other segments and is significant to the species. One DPS, the Northwest Atlantic DPS, includes all turtles that frequent Chesapeake Bay. Conant et al (2009) concluded that the Northwest Atlantic DPS was at risk for extinction primarily because of juvenile and adult mortality as bycatch from recreational and commercial fishing. Habitat destruction, such as that from pollution, channel dredging, or climate change, may also contribute to population declines.

4.2.2 Kemp's Ridley Turtle (*Lepidochelys kempii*)

The Kemp's ridley turtle is a Federally and State-endangered species (MDNR 2007; NOAA 2008b) that occurs along the Atlantic coast from Florida to New England and throughout the Gulf of Mexico (NOAA 2008b). About 95 percent of Kemp's ridley turtles nest in Tamaulipas State, Mexico, although some nesting has occurred in within the United States in the Carolinas and Florida. Nesting occurs from May to July, with females laying two to three clutches. Eggs hatch within about two months, and young turtles move to offshore waters. Juveniles drift in association with the seaweed *Sargassum* sp. for about 2 years and return to near coastal areas as subadults. Juveniles and adults typically remain fairly close to shore during migrations, usually in waters less than 60 ft deep (Renaud and Williams 2005). Kemp's ridley turtles are the smallest marine turtles, reaching a length of about 28 in. and a weight of 100 lbs (NOAA 2008b). Although Kemp's ridley turtles are opportunistic feeders that typically consume prey that are locally abundant (Witzell and Schmid 2005), most probably feed on swimming crabs, supplemented with jellyfish, mollusks, other types of crabs, and fish. Juvenile turtles in Florida fed on tunicates (*Molgula occidentalis*) that were abundant on hard bottoms (Witzell and Schmid 2005). Blue crabs and spider crabs (*Libinia* spp.) are the most important prey in Chesapeake Bay (Seney 2003). Abundance estimates are based on the number of nesting females. Kemp's ridley turtles experienced severe population declines from the 1940s to the 1980s, and a recovery plan for the species was developed in 1992 (NMFS and FWS 1992a). Populations started to increase in the 1990s (NMFS and FWS 2007b). Numbers of nesting females have continued to increase in the 2000s. In 2006, about 100 nests were found in the U.S. The primary historical threat to Kemp's ridley turtles was egg collection, but it has not been a significant issue since nesting beaches were protected in 1966 (NOAA 2008b).

Kemp's ridley turtles enter the Chesapeake Bay in spring and remain until the water cools in the fall (Musick 1988). After leaving the Bay, the turtles move offshore to the south, most likely overwintering between North Carolina and central Florida (Morreale and Standora 2005). While in the Bay, these turtles typically frequent shallower waters than loggerheads. Sizes of Kemp's ridley turtles in the Chesapeake Bay range from about 6 to 25 in., in curved carapace length (Keinath et al. 1994), the largest size is about that of an adult. Keinath et al. (1994) estimated that about 200 to 1100 Kemp's ridley turtles inhabit the lower Bay during the summer. There is a historical record of Kemp's ridley turtle near the Calvert Cliffs site (Hardy 1962). The record is based on the identification of a beak from a dead turtle. Many young Kemp's ridley turtles inhabit the Chesapeake Bay during the summer, but most of these live in the lower Bay (UniStar 2008a).

4.2.3 Leatherback Turtle (*Dermochelys coriacea*)

The leatherback turtle is a Federally and State endangered species (MDNR 2007; NOAA 2008c) that is found worldwide in many ocean habitats. In the western Atlantic, it ranges from the Gulf of Maine to the Caribbean and is found in the Gulf of Mexico (NOAA 2008c). The leatherback turtles in the Atlantic are tentatively considered to belong to seven stocks, largely based on primary nesting sites (TEWG 2007). The primary nesting areas are in South America and West Africa, with minor sites in the Caribbean Sea and Florida. Most of the nesting in Florida occurs along the Atlantic coast from Brevard County to Palm Beach County (TEWG 2007). Females may nest several times during the season. Eggs hatch about 2 months after being laid. Young turtles, about 2 in., in carapace length, quickly move offshore to pelagic habitats. Little is known about the distribution of juveniles, although they seem to occur in warmer waters (NOAA 2008c). After dispersing offshore, turtles are not usually seen again until they reach a large juvenile size of at least 59 in. carapace length and move into adult foraging areas (TEWG 2007). Adults return to nesting areas to reproduce. Leatherback turtles are the largest living reptiles with adults reaching lengths of about 6 ft and weighing as much as 1984 lb. Soft-bodied animals, such as jellyfish and salps, are the primary prey consumed by leatherback turtles (NOAA 2008c). Leatherbacks undertake long distance foraging treks across the Atlantic Ocean (Ferraroli et al. 2004; Hays et al. 2006). Leatherbacks often associate with large aggregations of jellyfish (Houghton et al. 2006). Population trends are not clear. The Atlantic has a larger population than the Pacific (NOAA 2008c). There is some indication that nesting in the Caribbean and Florida has been increasing. Nesting in Florida increased about tenfold from the late 1980s to the early 2000s, with about 800 to 900 nests found recently (NMFS and FWS 2007c; TEWG 2007). A recovery plan for the Atlantic and Caribbean populations of the leatherback turtle was developed in 1992 (NMFS and FWS 1992b).

4.2.4 Green Turtle (*Chelonia mydas*)

The green turtle population occurring in the Chesapeake Bay is Federally and State-threatened (MDNR 2007; NOAA 2008d). The Florida breeding population is Federally endangered. On the U.S. Atlantic coast, the green turtle ranges from southern Florida to Massachusetts. In the United States, the major nesting area is in Florida, where nesting typically occurs from June to September with most occurring in June and July (NOAA 2008d). Females nest about every 2 weeks and typically lay five clutches during the season (NOAA 2008d). The eggs hatch after about 2 months, and the young move to offshore areas where they spend several years. Older juveniles migrate to inshore areas where they mature. Adults may reach lengths of 3 ft, weigh 300 to 350 lb, and are the largest of the hard-shelled sea turtles (NOAA 2008d). Adult green turtles feed primarily on plants, such as seagrasses and algae, but may also consume soft-bodied invertebrates, such as jellyfish, sponges, and sea pens (NMFS and FWS 2007d). As with loggerhead turtles, green turtle abundance is estimated by the number of nesting females or nests with deposited eggs. Estimates have shown that green turtle populations worldwide have been declining for at least 100 years (NOAA 2008d), although six of eight nesting populations in the Atlantic Ocean, including the Florida population, have shown increases in the last few years (Broderick et al. 2006; NMFS and FWS 2007d). The numbers of green turtles nesting on Ascension Island in the South Atlantic may be about 285 percent larger than they were about 30 years ago (Broderick et al. 2006). Some green turtle populations may be affected by a disease, fibropapillomatosis. In Costa Rica, jaguars (*Panthera onca*) prey on turtles, but at a fairly low rate (Heithaus et al. 2008). A recovery plan for the Atlantic green turtle population was prepared in 1991 (NMFS and FWS 1991b).

5.0 Potential Environmental Effects of the Proposed Actions

This section describes the potential impacts from construction and operation of the proposed Unit 3 to Federally protected species in Chesapeake Bay.

5.1 General Construction Impacts

Impacts to the Federally protected species in Chesapeake Bay from construction of proposed Unit 3 would be associated mainly with the construction of new water intake and discharge systems; construction of a new fish-return system; and the refurbishing of the existing barge dock area, including dredging in Chesapeake Bay. These activities would result in temporary and permanent loss or conversion of aquatic habitat in the Chesapeake Bay.

The major construction events associated with building proposed Unit 3 that would affect aquatic resources in Chesapeake Bay share certain construction activities, such as dredging, pile driving, and armoring. All work would be conducted in accordance with Federal, State, and local permits. The Federally protected species in Chesapeake Bay likely would not be adversely affected by the installation of new onsite transmission facilities for the proposed Unit 3 because the facilities would be built on the uplands part of the Calvert Cliffs site.

The total proposed project would permanently affect about 248,000 ft^2 (5.7 ac) of tidal open waters. About 138,500 ft^2 (3.2 ac) of the tidal open water impacts would be from maintenance dredging, and about 109,000 ft^2 (2.5 ac) of impacts would be from new dredging. About 52,500 ft^2 (1.2 ac) of the new dredging would be backfilled.

5.1.1 Dredging and Pipeline Trenching

Dredging of the Bay bottom would be done by using shore-based or barge-mounted clamshell dredges to reestablish the channel on the south side of the existing CCNPP Units 1 and 2 barge dock and to create the trench for the cooling water discharge and the fish-return outfall pipelines. Dredging or pipeline trenching constitutes a major, localized impact to the benthos. Additional Bay bottom next to the pipeline trench would be disturbed by the placement of the dredged material for later use in the backfilling of the trench. Effects of dredging for the installation of the Unit 3 intake pipes would be minimized by construction of a sheet-pile cofferdam and dewatering system.

In addition to the physical removal of Bay bottom, dredging and pipeline trenching and backfilling increase the suspended sediment load in the water column. However, the surficial sediments in the area that would be dredged are primarily sandy (Section 2.0 of this BA) and likely would settle out of the water column relatively quickly. Some dredged material and water can be lost from the clam dredge as it is raised and deposited into the barge. The amount of material re-entering the water column as it is transferred from the barge to trucks would be small. The potential re-suspension of contaminants would not be a concern for the proposed dredging or trenching because the contaminant loads in the sediments in the barge dock area recently were shown to be very low (EA Engineering 2007).

5.1.2 Pile Driving

Pile driving would be used in three project areas, all involving the installation of the sheet-pile walls. The installation process involves using a vibratory hammer to install the sheet piling and a conventional pile-driving hammer to install the 30-in. soldier piles that are placed on 10-ft centers to support the sheet piling. The principal impact from this process is the generation of noise at levels that may be harmful to fish and turtles.

Pile driving noise may affect fish and turtles by causing temporary hearing loss, auditory tissue damage (generally sensory hair cells of the ear), and non-auditory tissue damage (UniStar 2008b). Two criteria, both measured at a standard distance of 10 m (32.8 ft) from the pile-driving activity, are used to estimate the sound and vibration levels from pile driving that would injure fish. The peak sound-pressure level (peak pressure or peak), measured as decibels (dB) relative to reference level of one micro Pascal (dB re 1 μPa_{peak}), is the maximum excursion of pressure associated with the sound (Popper et al. 2006). Peak pressure determines the likelihood that the swim bladder and ear would be exposed to extreme mechanical stress (Popper et al. 2006). The sound exposure level (SEL), measured as dB re 1 μPa2•s, is the constant sound level of 1-second duration that would contain the same acoustic energy as the original sound.

The interim criteria (Popper et al. 2006) specified a peak level of 206 dB and a cumulative SEL level of 187 dB for fish weighing 2 gm and heavier, or a cumulative SEL of 183 dB for fish lighter than 2 gm. The noise levels for the pile driving conducted during the proposed Unit 3 construction were estimated by applying compilations of measurements of noise and vibration impacts associated with various methods of pile driving, types of materials, and water depth. The estimated peak and cumulative SEL values for driving 24- to 36-in. steel piles with a conventional pile-driving hammer in about 5-m (16.4-ft) water depth are about 203 to 208 dB and 177 to 180 dB, respectively. These values suggest that driving 30-in. steel piles with conventional hammers at the Calvert Cliffs site may produce sound impacts that approach or exceed the peak pressure guidance criterion of 206 dB, but would not likely exceed the minimum SEL criterion of 183 dB for fish lighter than 2 gm. Sheet-pile driving produces peak pressures ranging from 175 dB to 180 dB and cumulative SEL values ranging from 160 dB to 165 dB, which are below the respective interim criteria values (UniStar 2008b).

Sounds from pile driving also could affect sea turtles, but the effects are difficult to estimate. There has been little work done to determine the hearing sensitivity of sea turtles at various sound frequencies (Viada et al. 2008), and most of the inference about the potential for sound-related injury is based on studies of turtle anatomy. There is some evidence that sea turtles initially might avoid sounds ranging from about 170 dB to 179 dB, but eventually may become habituated to the noise (Bartol and Musick 2002).

5.1.3 Armoring

The benthic substrate near key underwater structures in the project area would be armored by importing rocks. The largest area, about 4652 ft^2 (0.11 ac), that would receive rock armor is next to the new sheet-pile wall that would be installed to create the intake area for Unit 3. Armoring next to the baffle wall would be added to the Bay bottom as a series of four overlying layers, ranging from washed gravel on the bottom to large quarry rock (average about 2 tons each rock) on the top (UniStar 2009d). The overall thickness of the armoring would vary according to the water depth. Armor would also be placed at the end of the fish-return system, the cooling water discharge diffuser, and the nearshore area of the barge dock. The major effect would be the conversion of the benthic habitat from a soft-bottom infaunal community to a hard-bottom epifaunal community, which eventually should colonize the rocks (Abbe 1987). The loss of soft-bottom habitat may reduce the potential forage area for benthic-feeding fish species and blue crabs. However, the area is not one of high benthic productivity, and the area that would be lost is relatively small.

5.1.4 Vessel Movements

Vessel use during the dredging or the installation of the in-water structures for proposed Unit 3 would affect the aquatic resources of the area, particularly the benthos. The main effects from using vessels would include turbulence from propellers (prop wash), anchor cable scraping across the Bay bottom, and accidental spill of materials overboard. Vessels would be used during the installation of the cooling water discharge pipeline, during the offloading of materials from barges, and probably during the installation of the sheet-pile wall at the new intake area. The primary occurrence of vessels would be during the operation of the barge dock, which is expected to last about five years. The proposed barge docking procedures would minimize the potential impacts from prop wash (UniStar 2008b). Moving vessels could strike sea turtles. Vessel operations during construction are expected to cause short-term, localized impacts to the aquatic resources at the Calvert Cliffs site. These impacts are not expected to affect the protected species in the area of the site or the region along this coast of the Chesapeake Bay.

5.2 General Operational Impacts

For protected species in Chesapeake Bay, the primary concerns related to water intake and consumption are the impacts related to the relative amount of water drawn from the cooling water source, in this case the Chesapeake Bay, and the potential for organisms to be (1) entrapped within the wedge-shaped pool or common forebay; (2) impinged on the trash racks at the intake pipe openings, CWS intake, and UHS intake; (3) impinged on the travelling screens at the CWS and UHS intakes; and (4) entrainment into the cooling systems via CWS and/or UHS intakes. The intake system design for Unit 3 includes a fish-return system located at the CWS intake's travelling screens in the common forebay but not at the UHS intake or at the intake pipe openings in the wedge-shaped pool.

UniStar stated that a closed-cycle, recirculating, wet cooling system with a cooling tower would be used for Unit 3 (UniStar 2009a). The intake system for Unit 3 would incorporate protection measures that may reduce entrainment and impingement. The estimated maximum intake volume of 47,383 gpm for Unit 3 would not exceed the EPA 1-percent water column criterion (UniStar 2009a). Unit 3 would have a fish-return system similar to that used at existing CCNPP Units 1 and 2. Moreover, the through-screen flow velocity would be less than 0.5 ft/sec (0.15 m/sec) under the worst case scenario of minimum Chesapeake Bay level with highest makeup demand flow (UniStar 2009a).

5.2.1 Entrainment

The entrainment of organisms within the cooling water system at CCNPP Units 1 and 2 was studied from 1974 through 1980 (UniStar 2008a) and from March 2006 to September 2007 (UniStar 2008c). The latter study included day and night sampling. Additional ichthyoplankton samples were collected just outside the existing baffle wall separating the intake area from the open waters of the Bay from April to December 2006, which allowed comparison of entrained organisms with natural populations in the Bay.

No shortnose sturgeon life stages were entrained during either study nor were any caught in the samples collected outside the baffle wall in the 2006–2007 study. Because sturgeon eggs and larvae do not move from rivers into estuaries, no shortnose sturgeon life stages near the Calvert Cliffs site are small enough to be entrained by the proposed new unit. Likewise, no turtle life stage is small enough to be subject to entrainment at the proposed new unit.

5.2.2 Impingement and Entrapment

Impingement sampling was conducted at CCNPP Units 1 and 2 from 1975 through 1995 (Ringger 2000). Ringger (2000) did not report any shortnose sturgeon or sea turtle impingement. An unidentified species of sea turtle was impinged at the trash racks at the existing CCNPP facility in June 2001 (NRC 2001). However, blue crabs (*Callinectes sapidus*), prey for some sea turtles, were impinged, with the greatest occurrence generally in spring, summer, or fall. Blue crab impingement generally was lower after the mid 1980s than before. The apparent difference in impingement rates before and after the mid 1980s may be related to several operational and structural modifications to the intake and fish-return systems that were made from about 1984 to 1986, partly in response to severe impingement events that occurred in 1983 (Ringger 2000).

The numbers of organisms impinged were normalized to intake cooling water withdrawal flow at CCNPP Units 1 and 2 and scaled to Unit 3 flow. The combined flow of CCNPP Units 1 and 2 is about 5332 cfs, whereas the projected intake flow for proposed Unit 3 is about 96.8 cfs. Because the projected intake flow volume for Unit 3 is about 1.82 percent of that at CCNPP Units 1 and 2 and assuming that the relationship between flows is linear, the projected impingement and mortality rates at Unit 3 are correspondingly small. The average annual blue crab impingement rate predicted for Unit 3 is 11,403 crabs. However, because of the high survival rate (99.5 percent) following impingement (Ringger 2000), the estimated average annual impingement mortality rate at Unit 3 is 62 crabs. The impingement mortality estimates for blue crabs probably are somewhat conservative because the entire 21-year data set was used for the calculations regardless of apparently reduced impingement after modifications made in the mid-1980s. Also, the Unit 3 intake approach velocities within the forebay would be less than 0.5 ft/sec (0.15 m/sec), which would allow more crabs to avoid impingement. Unit 3 would incorporate a fish-return system in the common CWS/UHS forebay that may help increase survival following impingement by returning crabs beneath the surface of the Bay.

Water enters the wedge-shaped pool from the intake embayment for Units 1 and 2 by passing under a sheet-pile wall. Some protected species, particularly turtles, could enter the wedge-shaped pool and become trapped there. Water from the wedge-shaped pool passes through fixed trash racks into the two intake pipes that carry water to a common forebay that would supply water to the CWS and UHS (Section 3.1 of this BA). Protected species could become impinged on the trash racks and would require rescue because there is no method for removing organisms from the racks. Because traveling screens and the fish-return system would be located off the common forebay, organisms able to pass through the trash racks covering the intake pipe openings would enter the common forebay and could become trapped there. There would be no mechanism to remove entrapped organisms from the common forebay other than the fish-return system associated with the CWS pumps (UniStar 2009c). Some blue crabs could become entrapped, but the number is not possible to estimate confidently. It is unlikely that any of the protected species that could occur near Calvert Cliffs would be small enough to fit through the trash racks. Therefore, entrapment in the common forebay is not expected to be a dominant concern for shortnose sturgeon and sea turtles.

5.2.3 Aquatic Thermal Impacts

The effluent discharge from Unit 3 would be directly into the Chesapeake Bay. CORMIX modeling showed that the expected discharge plume from proposed Unit 3 would be small and would not interact with the plume from Units 1 and 2. Abbe (1987) evaluated the potential effects of the thermal discharge from CCNPP Units 1 and 2 and concluded that the thermal discharge from CCNPP Units 1 and 2 had no important adverse impacts on fish or key invertebrate species, such as blue crabs. The Maryland Power Plant Research Program (PPRP) concluded that the effects of thermal discharges from the power plants into Chesapeake Bay habitats were localized and not considered significant (MDNR PPRP 2008). The waste heat from the Unit 3 discharge would dissipate quickly because of the small size of the thermal plume and would not affect protected species.

Cold shock occurs when aquatic organisms that have been acclimated to warm water, such as fish in a power plant's discharge canal, are exposed to a sudden temperature decrease. This sometimes occurs when power plants shut down suddenly in winter. Abbe (1987) concluded that the potential for cold shock associated with the discharge plume from CCNPP Units 1 and 2 probably was not significant because the relatively small area of warmer water did not attract many fish during the winter. Cold shock is also unlikely to affect shortnose sturgeons at the Unit 3 site because the discharge volume is small in comparison to the volume of the Bay (UniStar 2009a). Sea turtles would not be exposed to cold shock because they do not live in the Bay during the winter.

5.2.4 Chemical Impacts

The UniStar application indicates that chemicals, such as anti-scaling compounds, corrosion inhibitors, and biocides, would be added to the CWS and the essential service water system (ESWS) (UniStar 2009a). Biofouling in the CWS would be controlled by the limited application of chlorine or bromine (UniStar 2009a). The CWS would provide about 90 percent of the effluent discharged to the Chesapeake Bay, with the desalinization plant contributing another 9 percent (UniStar 2008a). UniStar provided estimated concentrations of various constituents in the waste stream based on design data. To illustrate the expected low concentrations of these constituents, UniStar compared expected concentrations of five metal contaminants (arsenic, chromium, copper, nickel, and zinc) to aquatic life chronic salt water limits specified by the State of Maryland (COMAR 2008). Predicted concentrations within the discharge from proposed Unit 3 would be substantially less than the State aquatic life limits (UniStar 2008a). UniStar would calculate more precise estimates of constituent concentrations in the effluent as part of the NPDES permitting process for Unit 3. The NRC determined that the effluent discharge from CCNPP Units 1 and 2 would not significantly change the salinity gradients near the Calvert Cliffs site (NRC 2000). The addition of the relatively small discharge volume from Unit 3 would not be expected to alter this determination.

UniStar expects that the NPDES permit for Unit 3 would require bioassay testing, as does the permit for CCNPP Units 1 and 2, to assess the potential toxicity of the discharge and provide for corrective action if necessary. To date, the bioassay testing performed for CCNPP Units 1 and 2 has not indicated any toxicity to test organisms (UniStar 2009a). Therefore, the plume from proposed Unit 3 is not likely to be toxic to sturgeons or sea turtles.

5.2.5 Physical Impacts from Discharge

The NRC determined that the effluent discharge from CCNPP Units 1 and 2 would not significantly change the current patterns near the Calvert Cliffs site (NRC 2000). The addition of the relatively small discharge volume from Unit 3 would not be expected to alter this determination. The primary physical and ecological impacts from the CCNPP Units 1 and 2 cooling water discharge are from sediment scour near the high-velocity discharge ports. The bottom scour associated with the discharge from CCNPP Units 1 and 2 was about 42 ac (UniStar 2008a). The sand substrate present prior to the operation of CCNPP Units 1 and 2 was scoured by the discharge, leaving a hard clay substrate. The benthic community changed from one characterized by burrowing soft-bottom organisms to one dominated by fouling organisms (Abbe 1987; UniStar 2008a).

The physical impacts associated with Unit 3 cooling water discharge would be limited to sediment scour of a small area. The area of Bay bottom that may be scoured would be minimized by the placement of riprap for about 10 ft on either side of the diffuser (UniStar 2008b). The potential scour area was estimated to be 13,256 ft^2 (0.3 ac) (UniStar 2008a). If the sediment becomes scoured near the discharge for Unit 3, a change in benthic habitat that would be similar to, but much less extensive than, that observed at the discharge for Units 1 and 2 would occur. This scouring of the bottom would not adversely affect the protected species in the area.

5.3 Effects of the Proposed Actions on Federally Protected Species

This section describes the potential impacts to Federally proposed, threatened, or endangered aquatic species resulting from the construction and operation of the new unit at the Calvert Cliffs site.

5.3.1 Shortnose Sturgeon

The primary activities associated with the construction of a new unit at the Calvert Cliffs site that could affect the shortnose sturgeon are the installation of the intake and discharge systems. Construction of the intake would include installation of a sheet-pile baffle wall that would generate short-term noise levels sufficient to affect many fish, although the sensitivity of shortnose sturgeon to noise is not known. Baffle wall installation would occur over a relatively short time period, and sturgeons would be expected to avoid the area.

Dredging to refurbish the barge dock area or to install the discharge pipeline and fish-return system could affect sturgeons by increasing the sediment loads in the water column. UniStar would use methods, such as turbidity curtains, to minimize this sedimentation. Because the area near the construction activities is not highly productive, disruption of the benthic habitats would not indirectly affect shortnose sturgeons by altering a food resource.

The operational factor that poses the most risk to shortnose sturgeon is the potential for impingement on the trash racks that guard the intake pipelines. Despite the occurrence of many fish species in the impingement samples collected at CCNPP Units 1 and 2 from 1975 to 1995, no shortnose sturgeon were found (Ringger 2000). The benthic prey of juvenile and adult shortnose sturgeons likely would not be impinged. The small numbers of shortnose sturgeon in the Chesapeake Bay and their occurrence primarily in the upper Bay, coupled with the low intake velocity proposed for the new unit at Calvert Cliffs site, substantially lower the likelihood that impingement would occur. It is not likely that benthic-dwelling sturgeons would become entrapped for extended time periods within the wedge-shaped intake area for Unit 3 because the low current velocities through the intake embayment would not prevent sturgeons from swimming out of the area. Sturgeon eggs and larvae do not occur near the Calvert Cliffs site, and sturgeons that may occur there would be too large to pass through the trash racks and enter the common forebay. Therefore, shortnose sturgeons would not be entrained into the CWS or entrapped within the common forebay.

5.3.2 Sea Turtles

The construction and operation of a new unit at the Calvert Cliffs site would be most likely to affect the loggerhead and Kemp’s Ridley turtles. The green and leatherback turtles are relatively rare in the Bay, typically occurring in the lower Bay, and the likelihood that populations or individuals of either species would be significantly affected by the new unit is highly unlikely.

The primary construction activities that would affect sea turtles entering the Bay are similar to those that would affect shortnose sturgeons. Increased vessel activity could affect sea turtles in the area, but this could be minimized by careful vessel operations. The potential effects of pile driving noise during the installation of the baffle wall on turtles are difficult to evaluate. There are indications that turtles would initially avoid the noise, but eventually could become habituated to it. The relatively short duration proposed for this activity would help reduce the potential that turtles would become habituated. Increased sedimentation during dredging could affect turtles, but UniStar proposes to uses methods to reduce the spread of water column sediment.

As with shortnose sturgeon, the principal causes of adverse impact to sea turtles are impingement on the intake pipe trash racks and entrapment in the wedge-shaped pool. Smaller turtles could become trapped by the trash racks because their heads likely would fit between the trash rack bars. Because of the relative rarity of sea turtles in the part of the Bay near the Calvert Cliffs site, and the proposed low velocities at the intake system, the likelihood of sea turtle impingement is low. A search of the event logs maintained by the NRC revealed the occurrence of sea turtle impingement at the existing trash racks for operating Units 1 and 2 (NRC 2001). The impinged species was not identified. Impingement could indirectly affect Kemp's ridley turtles. Historical records showed large numbers of blue crabs, one of the major food items of Kemp's ridley turtles, as being impinged by CCNPP Units 1 and 2 (Section 5.2.2), but the new Unit 3 would not add significantly to that total because of the small volume of water required for the cooling system. The potential effect on the turtles is lessened by the high rate at which the crabs survive impingement. Sea turtles could become entrapped within the wedge-shaped pool by swimming under the sheet-pile wall separating the embayment for CCNPP Units 1 and 2 from the Unit 3 wedge-shaped pool where turtles could surface and be unable to find the path back under the wall to the embayment for Units 1 and 2 and then also back to the Bay. No information could be found about such occurrences of turtle entrapment by the similarly designed baffle wall for CCNPP Units 1 and 2. Turtles would likely be too large to pass through the trash racks at the intake pipe openings and enter the common forebay. Therefore, impingement on the trash racks at the CWS and UHS intake structures would not be likely.

6.0 Cumulative Effects on Federally Protected Species

The NRC and the Corps review team considered potential cumulative effects on Federally protected species in conjunction with building and operating a new nuclear unit at the Calvert Cliffs site. For this analysis, past and present actions create the existing baseline conditions, and cumulative effects include the effects of future State, tribal, local, and private actions that are reasonably certain to occur in the action area considered in this biological assessment. Future Federal actions that are not related to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the ESA (FWS and NMFS 1998). The future is defined as the start of construction of the proposed Unit 3 until the conclusion of decommissioning. The action area for this evaluation is the Calvert Cliffs site and the mesohaline (salinity ranges from about 5 to 19 parts per thousand) western portion of the Chesapeake Bay. The extent of the mesohaline zone in the Chesapeake Bay varies seasonally, but, at its maximum, includes the western Bay shore from near the mouth of the Rappahannock River to Baltimore (MDNR PPRP 2008; CBP 2009).

Two future non-Federal projects were identified within the action area. Reinforcing an existing pier at the Cove Point Liquefied Natural Gas (LNG) terminal, about 3.5 mi southeast of the Calvert Cliffs site, would involve the installing 108-in.-diameter tubular steel monopile mooring dolphins, reinforcing existing and installing new breasting dolphins, installing walkways, and dredging about 30 ac of Bay bottom around the pier to a depth of about −45.0 ft mean low water (USCG and USACE 2009). Suitable dredged material would be placed in a stone-reinforced area along 2513 ft of shoreline and extending an average of 225 ft channelward to create a tidal marsh. The construction and operation of the proposed Unit 3 at the Calvert Cliffs site would not interact with reinforcing the pier at the Cove Point terminal because the effects of both projects would be relatively localized. Both are in areas of the Bay that could be avoided by protected species. Operation of the terminal would not be likely to adversely affect protected species (USCG and USACE 2009).

Building and operating a new nuclear reactor on the Calvert Cliffs site could interact with a part of the proposed Mid-Atlantic Power Pathway (MAPP) project, which proposes to build a 500-kV transmission line from Possum Point, Virginia, to Salem, New Jersey (MAPP 2009a). The second part of the MAPP project would involve building an underwater crossing through the Chesapeake Bay extending from Calvert Cliffs to the Maryland eastern shore. The route could include broadband fiber optic cables (PHI 2009). Details of this part of the project are not yet available, but the installation of underwater cables could involve horizontal directional drilling from the shore into the Bay and some type of trenching to install the cable within the Bay. The schedule suggests that the crossing under the Bay is expected to be completed in 2014 (MAPP 2009b). Both projects could affect benthic habitats in the same nearshore area off the Calvert Cliffs site but would not significantly affect protected species occurring in the area.

CCNPP Units 1 and 2 will continue to operate during the construction and operation of proposed Unit 3. The two units have requested power uprates that will increase the generating capacity of each unit by about 1.38 percent (NRC 2009). The uprate was approved in December 2009 for Unit 2 and a decision is expected by the end of summer 2010 for Unit 1 (NRC 2009). The uprates would likely result in a small increase in water withdrawn from the Bay and a small increase in the temperature of water discharged to the Bay. Neither increase would be expected to significantly add to the present effects of Units 1 and 2 on the Bay, nor the combined effects of Units 1, 2, and 3.

The Calvert Cliffs site operations, other anthropogenic stressors, and climatic events could combine to adversely affect the aquatic populations of the Chesapeake Bay. Commercial and recreational fishing pressure has significantly affected aquatic resources in the Bay causing population declines for several species (Greiner and Vogt 2009). Shortnose sturgeon populations declined because of direct fishing and because the species was often bycatch for other fisheries. Sea turtles in Chesapeake Bay have been affected by entrapment within pound nets. The operation of proposed Unit 3 at the Calvert Cliffs site could also contribute to population declines by impinging or entrapping protected species, but such events are anticipated to occur rarely, if at all. Sturgeons have not been impinged at CCNPP Units 1 and 2, and there is only one documented record of turtle (unidentified) impingement.

A significant issue facing the Chesapeake Bay is global climate change. The buildup of greenhouse gas emissions that occurred in the 20th century has assured that some climate change will occur within the 21st century, even without increasing the current rates of emissions (Teng et al. 2006). The projected climate changes are predicted to affect the Chesapeake Bay primarily through increasing sea level, air and water temperatures, and changes in precipitation (Jasinski and Claggett 2009). Increased water acidity, which is a looming issue in some ocean habitats (Doney et al. 2009), is considered a less important factor for the Chesapeake Bay at present (Jasinski and Claggett 2009). Wu et al. (2009) projected that the sea level at Solomons Island, about 7.5 mi south of CCNPP, is expected to rise by about 22 to 24 in. by the end of the 21st century. However, the estimate did not consider that the melting of the West Antarctic Ice Sheet could cause regional differences in sea level rise, which implies that the projection may have underestimated the rise in sea level in the Chesapeake Bay area by as much as one-third (Mitrovica et al. 2009). Najjar et al. (2009) projected that air temperatures in the Chesapeake Bay region could rise by about 5°F to 12°F by the year 2100. Because surface-water temperature is roughly related to air temperature, a similar increase in water temperature could be expected (Wood et al. 2002). Changes in rainfall are difficult to predict and model results often disagree. Most models predict, with considerable variability, that precipitation in winter and spring in the latter part of the 21st century could change an average of 3 percent over current levels (Najjar et al. 2009). One of the effects of increased precipitation is a reduction in salinity, particularly in the winter and spring (Jasinski and Claggett 2009).

The interaction of the operation of the proposed Unit 3 and the predicted rise in Bay water level is difficult to assess, but it is not likely that the plant's operations would add significantly to the potential impacts of sea-level rise (e.g., increased shoreline erosion). Similarly, the small sizes of the discharge plumes from Units 1 and 2 and proposed Unit 3 compared to the volume of water in the Chesapeake Bay suggests that the thermal discharges from all three units would not add importantly to the thermal regime in the Bay. Salinity in the Bay is predominantly related to flow from the Susquehanna River (Gibson and Najjar 2000), and the comparatively small discharges from all three units would not contribute to significant salinity changes in the Bay.

The review team concludes that the construction and operation of Unit 3 on the Calvert Cliffs site would not significantly add to the cumulative effects of the identified future projects or to the existing or future anthropogenic stresses on the protected aquatic resources in the Chesapeake Bay.

7.0 Conclusions

This BA has evaluated the potential impacts of the construction and operation of the proposed Unit 3 at the Calvert Cliffs site on shortnose sturgeon and sea turtles near the site. The known distributions and records of those species and the potential ecological impacts of the construction and operation to the species, their habitat, and their prey have been considered.

Based on this review, the NRC and the Corps conclude that the overall effects of the construction and operation of the proposed new unit at the Calvert Cliffs site would not likely adversely affect or jeopardize the continued existence of the shortnose sturgeon or loggerhead, Kemp's ridley, green, or leatherback turtles.

8.0 References

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Essential Fish Habitat Assessment

National Marine Fisheries Service

Calvert Cliffs Nuclear Power Plant Unit 3
Calvert County, Maryland

U.S. Nuclear Regulatory Commission Combined License Application
Docket No. 52-016

U.S. Army Corps of Engineers Permit Application
Permit Application No. NAB-2007-08123-M05 (Calvert Cliffs 3 Nuclear Project, LLC/UniStar Nuclear Operating Services, LLC)

April 2010

U.S. Nuclear Regulatory Commission
Rockville, Maryland

U.S. Army Corps of Engineers
Baltimore District

1.0 Introduction

The Magnuson-Stevens Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801 et seq.), as amended (MSFCMA), recognizes that habitat is important for the protection of healthy fisheries and established procedures to identify, conserve, and enhance essential fish habitat (EFH) for Federally managed fish and shellfish species (NEFMC 1998). EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1801 *et seq*.; NMFS 2004). Federal agencies must consult with the Secretary of Commerce on all actions, or proposed actions, authorized, funded, or undertaken by the agency that may adversely affect EFH (NMFS 2004).

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application from Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC (applicant or UniStar) for a combined license (COL) to construct and operate a new nuclear reactor with a design-rated gross electrical output of approximately 1710 megawatts-electric (MW(e)) on the Calvert Cliffs site. The U.S. Army Corps of Engineers (USACE or Corps) is reviewing an application from UniStar for a Department of the Army (DA) Individual Permit pursuant to Section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 U.S.C. 403 *et seq.*) (Rivers and Harbor Act) and Section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*) to perform site preparation and construction activities for the proposed new unit at the Calvert Cliffs site. Currently, there are two operating nuclear reactors on the site, Calvert Cliffs Nuclear Power Plant (CCNPP) Units 1 and 2. The proposed project is to construct and operate a new unit, Unit 3, which would be located adjacent to CCNPP Units 1 and 2, to provide for additional baseload electrical generating capacity to meet the growing demand for electricity in the State of Maryland. The site is located about 60 mi south of Baltimore and 40 mi southeast of Washington, D.C. (Figure 1). It is about 10.5 mi southeast of Prince Frederick, Maryland, and 7.5 mi north of Solomons, Maryland.

Pursuant to National Environmental Policy Act of 1969, as amended (NEPA), the NRC and the Corps are cooperating agencies with the NRC being the lead agency, and they are preparing an environmental impact statement (EIS) as part of the agencies' review of the COL and DA permit applications. The Corps is cooperating with the NRC to ensure that the information presented in the EIS is adequate to fulfill the requirements of Corps regulations; the Clean Water Act Section 404(b)(1) Guidelines, which contain the substantive environmental criteria used by the Corps in evaluating discharges of dredged or fill material into waters of the United States; and the Corps' public interest review process. As required by Title 10 of the Code of Federal Regulations (CFR) Part 51.26, the NRC has published in the *Federal Register* a Notice of Intent (73 FR 8719) to prepare an EIS and to conduct scoping. The final EIS will be issued after considering public comments on the draft EIS. The impact analysis in the EIS includes an assessment of the potential environmental impacts of the construction and operation of a new nuclear power unit at the Calvert Cliffs site and along the associated transmission line corridors, including potential impacts to the threatened and endangered species. If issued, the COL would authorize UniStar to construct and operate the new unit. The Corps will finalize its Record of Decision after issuance of the final EIS.

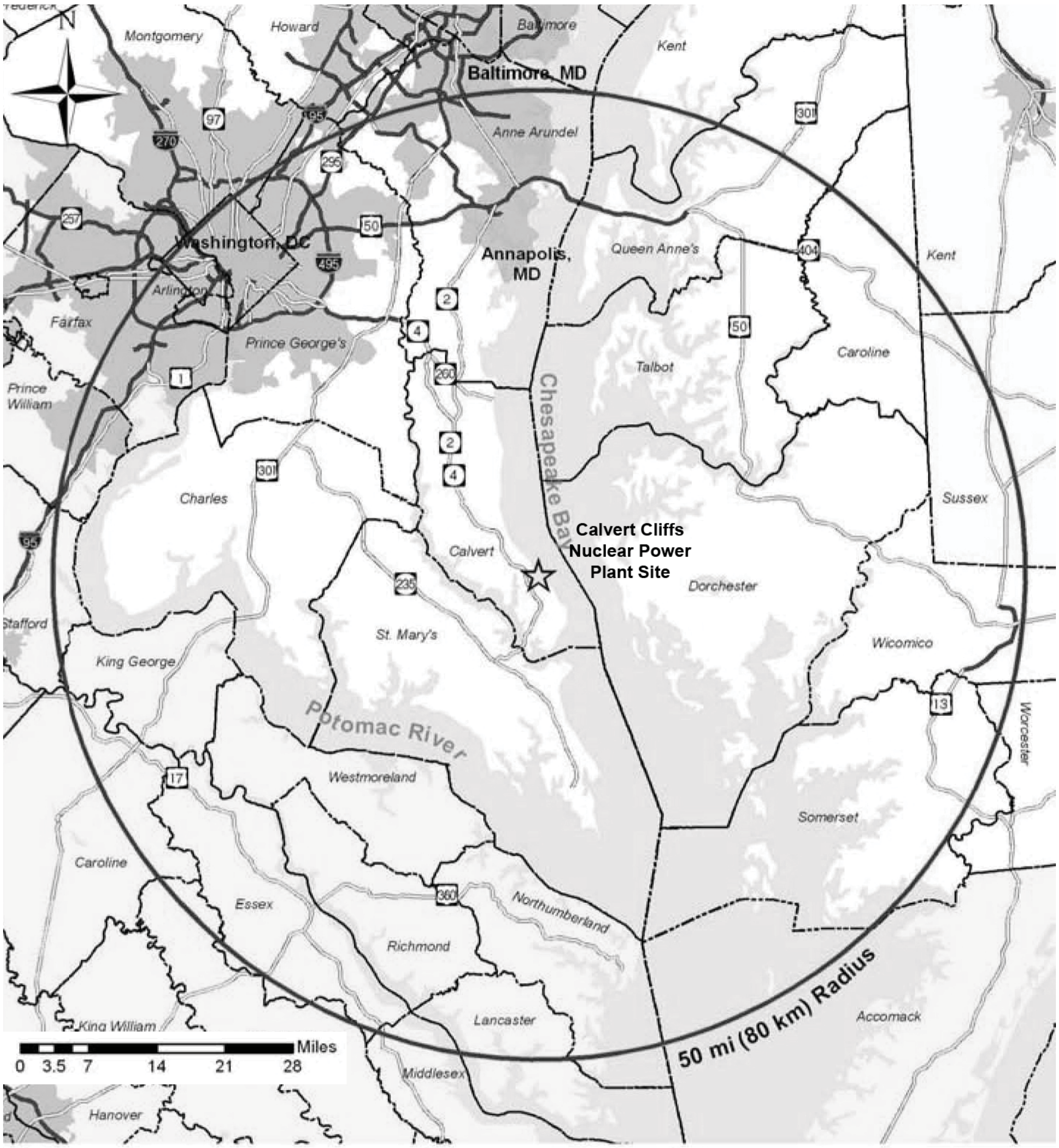

Figure 1. Location of the Calvert Cliffs Site, 50-mi Region (UniStar 2009a)

The NRC and the Corps have prepared this EFH assessment to support their joint consultation with the National Marine Fisheries Service (NMFS) in accordance with the MSFCMA. The proposed action may adversely affect EFH in the project area. The proposed project has the potential to cause temporary and permanent adverse impacts to spawning, nursery, forage, and shelter activities and habitats. The NRC and Corps review team considered the designated EFH in the Chesapeake Bay, and this EFH assessment examines the potential impacts of the proposed actions on nine species: black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), butterfish (*Peprilus triacanthus*), clearnose skate (*Raja eglanteria*), little skate

(*Leucoraja erinacea*), red drum (*Sciaenops ocellatus*), summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scophthalmus aquosus*), and winter skate (*Leucoraja ocellata*). These species are described further in Section 4.0, and the impacts to them and their EFH, including their prey, are discussed in Section 5.0 of this EFH assessment.

2.0 Calvert Cliffs Site Description

The Calvert Cliffs site is located on the Chesapeake Bay about 60 mi south of Baltimore; 40 mi southeast of Washington, D.C.; 10.5 mi southeast of Prince Frederick, Maryland; and 7.5 mi north of Solomons, Maryland (Figure 1). The site comprises about 2070 ac adjacent to Chesapeake Bay in an unincorporated area of Calvert County, Maryland. The NRC has licensed two existing nuclear generating units at the Calvert Cliffs site, CCNPP Units 1 and 2, which have a combined net electric generating capacity of approximately 1700-1780 MW(e). Units 1 and 2 use once-through cooling systems and obtain water from the Chesapeake Bay. The combined flow of CCNPP Units 1 and 2 intakes is about 5332 cubic feet per second (cfs). There are two shoreline water intake structures for the existing units that share a common forebay, and each unit has its own fish-return system. The two existing units also share a discharge pipe that enters the Chesapeake Bay north of the intake structure. South of the intake structure is a barge slip for offloading heavy replacement components. The barge slip has been used several times since 2001 to receive replacement steam generators, transformers, and vessel reactor heads, and it is likely that there would be occasional use of the facility in the future for continued operation of CCNPP Units 1 and 2, which could require future maintenance dredging (UniStar 2009b). Both existing units would remain and continue to operate and would not be affected by the proposed action.

There is no submerged aquatic vegetation (SAV) within the proposed project area or near the Calvert Cliffs site (EA Engineering 2007b), and there are no habitat areas of particular concern (HAPC) within the proposed project area or near the Calvert Cliffs site. The project site is a high-energy wave area with about a 6-mi fetch across the Chesapeake Bay. The project area waterway is used throughout the year for recreational and commercial boating, fishing activities, and commercial shipping. The shoreline at the proposed project site is protected by stone revetment and bulkheads and includes some natural beach shoreline along eroding 70-ft-high cliffs.

2.1 Chesapeake Bay Conditions

The Chesapeake Bay is one of the largest estuary systems in the world and currently supplies cooling water for CCNPP Units 1 and 2. The Bay is very productive and is an important part of the cultural and economic fabric of the area. Much of the Chesapeake Bay, including the reach that encompasses Calvert County, is considered impaired, primarily because of low dissolved oxygen (DO) and increased nutrients and sedimentation from human activities. The Chesapeake Bay Program (CBP) oversees monitoring at selected locations throughout the Bay and has developed average seasonal conditions from 1985 to 2008. One station, known as CB4.4, is in the middle of the Bay, east of the Calvert Cliffs site. The average monthly surface water temperature at this location has ranged from about 38°F (February) to about 81°F (July, August) (MDNR 2009a). The average monthly surface water salinity at station CB4.4 is typically lowest in late spring, ranging from about 10 to 11 ppt (April through June), and highest in late fall, ranging from about 15 to 16 ppt (September through November) (MDNR 2009b). Average monthly DO concentrations at station CB4.4 have ranged from about 0.3–0.4 mg/L (July; August) to 9.0–10.0 mg/L (January through March) (MDNR 2009c). Average June through September DO concentrations have been hypoxic (less than 2.0 mg/L) (Wicks et al. 2007). The minimum DO concentrations during those months occasionally may be anoxic (less than 0.2 mg/L).

Water depths near the Calvert Cliffs site are generally less than 30 ft (EA Engineering 2007a). Sediments near the CCNPP barge dock area primarily are composed of sand (94 to 96 percent) and gravel (2 to 5 percent) with a small percentage of clay (EA Engineering 2007a). Total organic carbon (TOC) in the sediments ranged from about 2.4 to 3.1 percent. The sediment type sampled near the barge area was typical for the general region. The two stations located just north of the Calvert Cliffs site that have been sampled under the Maryland Department of Natural Resources (Maryland DNR) water quality monitoring program are also very sandy with a very small silt/clay fraction (Llansó et al. 2007). However, the TOC content of the CCNPP sediments was much higher than that of the two Maryland DNR stations (<1 percent each). Most organic compounds analyzed in the CCNPP sediments were reported as not detected (EA Engineering 2007a). The few organic compounds that were detected in the sediments occurred at concentrations less than the respective method detection limits. Of the seven metal compounds analyzed, six occurred at levels greater than the method detection limits, but all were substantially less than their respective threshold effects levels (the concentration below which effects are expected to be rare) (Buchman 2008).

The benthic infaunal community found near the barge dock was generally sparse and composed of relatively few taxa. Infaunal abundance varied from 32 to 85 individuals per 0.05 m^2 samples (about 640 to 1700 individuals per m^2) (EA Engineering 2007a). These samples contained from 9 to 13 species. The abundances of infauna inhabiting the CCNPP sediments were generally similar to those reported for the two Maryland DNR stations sampled in summer 2006 (Llansó et al. 2007). However, species numbers at the CCNPP stations were slightly greater than those for the Maryland DNR stations. The infaunal community at the two CCNPP stations near the site of the proposed cooling water discharge pipe primarily was composed of the small clam *Gemma gemma* and polychaete worms, such as *Streblospio benedicti* and *Glycinde solitaria*. The small clam was not found at the station south of the barge dock near the area proposed to be dredged. The infaunal community there consisted predominantly of polychaete worms, such as *S. benedicti*. The general infaunal community composition at the CCNPP stations was similar to those at the two Maryland DNR stations. *Gemma gemma* was predominant at both Maryland DNR stations in summer 2006. Polychaete worms, such as *S. benedicti*, were common. Another small clam, *Mulinia lateralis*, was common at the Maryland DNR stations, but was not common at the CCNPP stations.

3.0 Proposed Federal Actions

The proposed Federal actions are (1) issuance of a COL for the construction and operation of a new nuclear reactor at the Calvert Cliffs site pursuant to 10 CFR 52.97 and (2) a decision regarding a DA Individual Permit pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

The NRC, in a final rule dated October 9, 2007 (72 FR 57416), limited the definition of “construction” to those activities that fall within its regulatory authority, as written in 10 CFR 51.4. Many of the activities required to construct a nuclear power plant are not part of the NRC action to license the plant. Activities associated with building the plant that are not within the purview of the NRC action are grouped under the term “preconstruction.” Preconstruction activities include clearing and grading, excavating, erection of support buildings and transmission lines, and other associated activities. These preconstruction activities may take place before the application for a COL is submitted, during the staff’s review of a COL application, or after a COL is granted. Although preconstruction activities are outside the NRC’s regulatory authority, many of them are within the regulatory authority of local, State, or other Federal agencies. This EFH assessment does not differentiate between construction and preconstruction, and they are being discussed together as construction activities.

The Corps action is the decision whether to issue a permit pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for proposed structures in and under navigable waters and the discharge of dredged, excavated, and/or fill material into waters of the United States, including jurisdictional wetlands.

Prerequisites to construction activities include, but are not limited to, documentation of existing site conditions within the Calvert Cliffs site and acquisition of the necessary permits (e.g., COL, local building permits, a National Pollutant Discharge Elimination System permit, a Clean Water Act Section 404 permit, a General Stormwater permit, and other State and local permits). After these prerequisites are completed, planned construction activities could proceed and would include all or some of all the activities pursuant to 10 CFR 50.10(a)(1), although no separate operating license would be required. Briefly, the construction and operation activities that could affect Federally managed estuarine and marine species based on habitat affinities and life-history characteristics and the nature and spatial and temporal considerations of the activity are:

Construction

- Dredging and modification of the existing barge slip, including a sheet-pile wall and a stone apron, on the Chesapeake Bay shoreline
- Installation of the cooling water intake system including new sheet pile, armor removal, armor installation, dredging, and the fish-return system
- Installation of the cooling water discharge system
- Increased vessel traffic associated with the construction activities.

Operation

- Impingement, entrainment, and entrapment associated with the cooling water intake system
- Discharge plume from the cooling water system (thermal, chemical, and physical effects)
- Maintenance dredging of barge slip.

The construction footprint for the proposed Unit 3 would cover about 460 ac, including about 175 ac of previously disturbed ground. UniStar has proposed to build and operate an AREVA NP, Inc., U.S. EPR design pressurized water reactor steam electric system, which is rated at 4590 MW(t) with a net electrical output of 1562 MW(e). Unit 3 would require cooling water intake and fish-return facilities that are separate from CCNPP Units 1 and 2 and would also have a separate plant access road and protected area. The proposed circulating water supply system (CWS) would be closed-cycle using a mechanical-draft cooling tower with plume abatement (UniStar 2009a). The proposed project would affect about 5.7 ac (248,000 ft^2) of tidal open waters and would affect intertidal, subtidal, and water-column zones within the proposed project area. The existing waterway depths within the proposed work area range from about 0.0 to −16.0 ft mean low water.

The existing transmission system for CCNPP Units 1 and 2, which consists of two circuits, would also be used to service the proposed Unit 3. No new transmission corridors would be constructed outside the construction footprint. Operation of the transmission system is not expected to affect Federally managed estuarine or marine species in the Chesapeake Bay.

3.1 Cooling Water Intake System

A 180-ft-long sheet-pile wall, embedded 15 ft into the Bay bottom, would be built to extend from the existing baffle wall for CCNPP Units 1 and 2 to the shoreline south of the present intake forebay to create a 9000-ft^2 (0.21-ac) wedge-shaped pool that would be the intake embayment for the new unit (Figure 2). The wall would be built of steel sheet piling supported by 30-in.-diameter soldier piles placed on 10-ft centers. The new baffle wall would not have an opening that would allow the new wedge-shaped pool to communicate directly with the Bay. Therefore, Unit 3 would share the embayment now used by CCNPP Units 1 and 2. A 50-ft section of shoreline armoring would be removed prior to the wall installation. The construction of the sheet-pile wall would take about 2 months. Once the wall is in place, about 60 ft of shoreline armor within the wedge-shaped pool would be removed, and a temporary sheet-pile wall would be installed upland along the intake water pipe route. The upland sheet-pile wall would extend about 30 ft into the wedge-shaped pool to create a small area that would be dewatered to facilitate dredging of a 30-ft by 30-ft area to a depth of 25 ft. This excavation would house two 60-in.-diameter intake pipes that would extend about 20 ft channelward. The pipes would have trash racks but no screens at their openings. The trash bar spacing is expected to be 3.5 in. from center to center. Debris collected by the trash racks would be collected in a debris basin for cleanout and disposal as solid waste. The expected flow into the Unit 3 intake pipes is

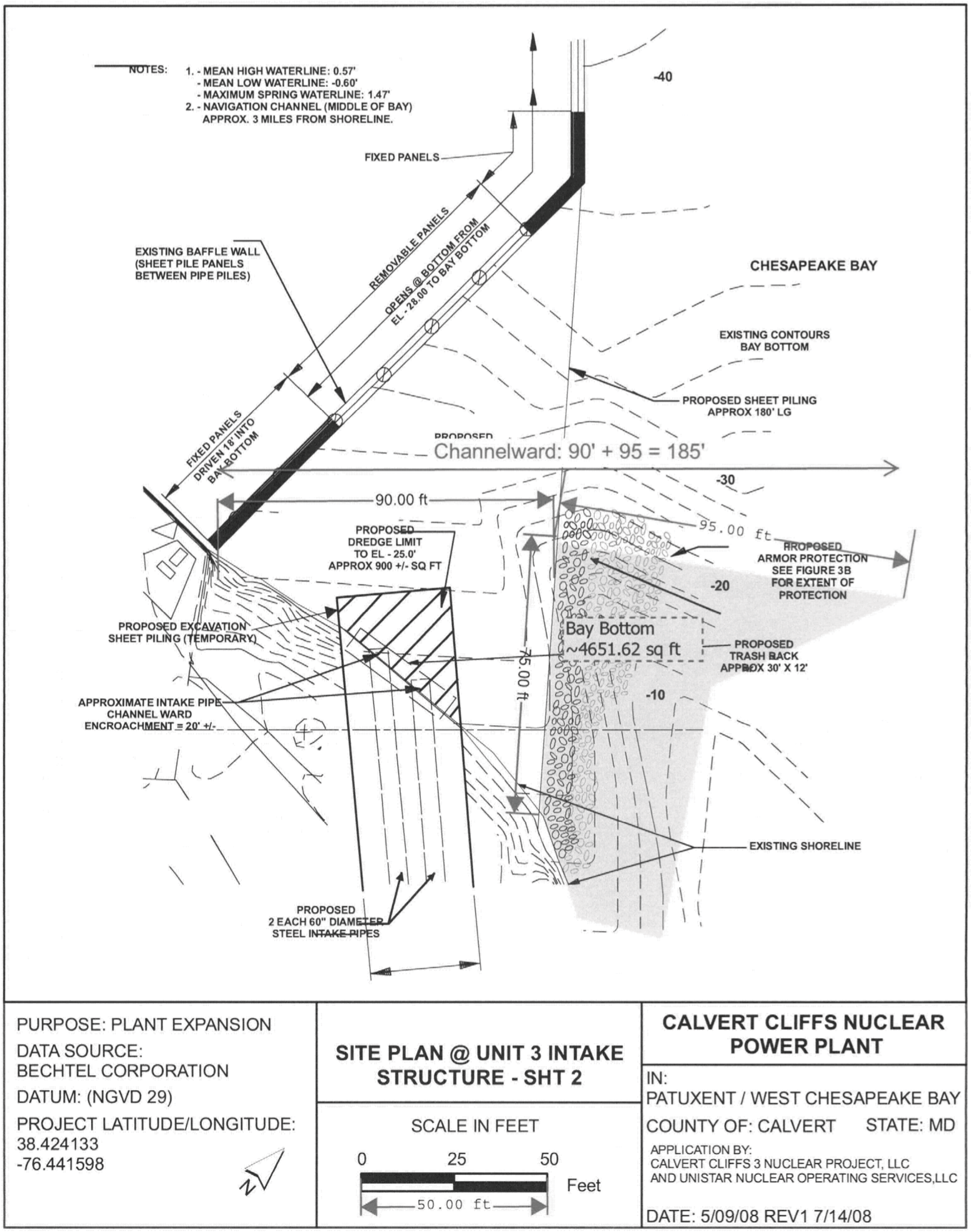

Figure 2. Site Plan at the Unit 3 Intake Structure (UniStar 2009d)

less than 0.5 fps. About 80 ft of the shoreline within the pool would be armored, with the armoring extending about 10 ft from shore. The new sheet-pile wall would be armored by placing riprap on the Bay bottom, extending about 75 ft from the shoreline and about 25 to 95 ft toward the channel (UniStar 2009d). The armoring would be added to the Bay bottom as a series of four overlying layers, ranging from washed gravel on the bottom to large quarry rock (average about 2 tons each rock) on the top (UniStar 2009d). The overall thickness of the armoring would vary according to the water depth. About 4652 ft^2 (0.11 ac) of the Bay bottom would be armored (Figure 2). The temporary sheet-pile wall within the wedge-shaped pool would be removed. The construction of the intake system would take about 4 months.

The two intake pipes would be placed in trenches dug on land and would extend about 500 ft south to the location of common forebay for the Unit 3 CWS and ultimate heat sink (UHS) makeup water intake structures (UniStar 2009a). The common forebay would be 100 ft long by 80 ft wide and would be about 12 ft deep (UniStar 2009a). The Unit 3 CWS makeup water intake structure would be a concrete structure about 78 ft long and 55 ft wide with individual pump bays. Three 50-percent capacity, vertical, wet-pit CWS makeup pumps would provide up to 44,000 gpm of makeup water. The Unit 3 UHS makeup water intake structure would be a concrete structure about 75 ft long and 60 ft wide with individual pump bays. Four 100-percent capacity, vertical, wet-pit UHS water makeup pumps would provide up to 3000 gpm of makeup water. Flow velocities at the CWS and UHS makeup structures would be less than 0.3 fps and less than 0.1 fps, respectively.

For the CWS makeup water intake structure, water would flow from the common forebay through trash racks and two traveling screens and trash racks into a smaller forebay that feeds the three CWS makeup pumps. The traveling screens for each system would be dual-flow screens with a double-entry/center-exit flow pattern. The screen panels would be metallic or plastic mesh with a mesh size of 3/8 in. or smaller (UniStar 2009b). The screens would be mechanically rotated above the water for cleaning with a pressurized water spray. Screen wash water would be supplied by two screen wash pumps. Through-screen flow velocities would be less than 0.5 fps. For the UHS makeup intake structure, water flows from the common forebay directly to each makeup pump after passing through trash racks and a dual-flow screen. The screens for the UHS pumps would not be equipped with a fish-return system (UniStar 2009c).

3.2 Fish-Return System

A fish-return system similar to those for CCNPP Units 1 and 2 would be built (UniStar 2009a) for the CWS pumps. The final design details have not been determined. Organisms would enter the return system at the intake screens for the CWS intake structure located at the common forebay after the organisms traveled through the pipe originating at the shoreline intake about 500 ft north of the forebay. The UHS pumps would not be connected to the fish-return system because the UHS makeup system only operates periodically or in the case of a design-based accident (DBA) (UniStar 2009c). The return system would be located on the east (Bay) side of the Unit 3 intake forebay about midway between the CCNPP Units 1 and 2 intake embayment and the existing barge dock. The proposed 18-in.-diameter high-density polyethylene fish-return outfall pipe would extend about 40 ft into the Bay with end of the pipe emerging from the Bay floor, but remaining below mean lower low tide level (UniStar 2009a). This design was chosen to minimize any drop at the exit point to facilitate the returning of the fish to the Chesapeake Bay (UniStar 2009a). Any bends in the pipes would be greater than 90 degrees to facilitate fish passage. The pipes would be smooth-walled and smooth-jointed to reduce potential fish abrasion (UniStar 2009b). About 40 linear ft of shoreline armoring would be removed to allow installation of the return pipe. A 6-ft-deep trench extending 40 ft from shore would be dredged to house the return pipe. The trench would be about 5 ft wide at the bottom and about 65 ft wide at the level of the Bay floor (Figure 3). An area of about 2600 ft^2 would be directly disturbed by the dredging. After the return pipe is placed in the trench, the trench would be backfilled with the dredged sand and stone material. A 10-ft by 10-ft section of the Bay bottom would be covered to a depth of 2 ft by a riprap apron. The shoreline armoring would be replaced. The existing fish-return system for CCNPP Units 1 and 2 would not be modified.

3.3 Cooling Water Discharge Structure

The 30-in.-diameter high-density polyethylene cooling water discharge pipe would be placed in a 550-ft-long trench dredged in a trapezoidal form at a 5:1 side slope to prevent sloughing of the trench sides (UniStar 2008b). The trench bottom would range from 3 to 6 ft wide, and the maximum width of the trench at the level of the Bay bottom would be about 70 ft. UniStar proposes to use a three-port diffuser, which, at 550 ft from the shoreline, would rise 3 ft above the bed of the Chesapeake Bay. Each diffuser port would direct water out of the pipe at an angle of 22.5 degrees above horizontal (Figure 4). A minimum area of about 38,500 ft^2 (0.88 ac) of Bay bottom would be directly disturbed by the pipeline installation. About 7000 yd^3 of material would be dredged for the pipe installation. About 5800 yd^3 of this material would be reused as trench fill with the remainder (about 1200 yd^3) being deposited at an existing upland (non-wetland), environmentally controlled disposal area at the Lake Davies laydown area on the site. Riprap with a median diameter of 12 in. and filter fabric would be placed on top of the backfilled material to provide a minimum 4 ft cover over the pipe. The riprap would be placed within discharge pipe trench to the top of the trench at the original grade of the Bay bottom, but would not extend above the existing Bay bottom. A 2-ft-deep riprap area would be placed to extend approximately 10 ft on each side of the 40-ft-long multiport diffuser. The area of Bay bottom covered by this riprap is about 800 ft^2.

3.4 Barge Dock Improvements

The existing barge slip for CCNPP Units 1 and 2 would be restored and extended to reestablish use during the construction of Unit 3. An area about 1500 ft long by 130 ft wide (average width), covering about 195,000 ft^2 (4.5 ac) of Bay bottom would be dredged to a bottom depth of −16 ft mean low water (UniStar 2008b). This would require the mechanical dredging of about 50,000 yd^3 of bottom substrates. UniStar considers the removal of sediment from about 1065 ft of the total length (about 45,000 yd^3) as maintenance dredging, with the removal of material from the remaining 435 ft (about 5000 yd^3) as new dredging beyond the original dredging limits of −16 ft mean low water. This extension is necessary to extend the proposed channel to tie into the same depth as the existing natural depth contour. Prior to dredging, two existing crane piles and one mooring bollard may be removed from the channel area (UniStar 2008b) (Figure 5 and Figure 6). Additional maintenance dredging would remove silt that has accumulated in the

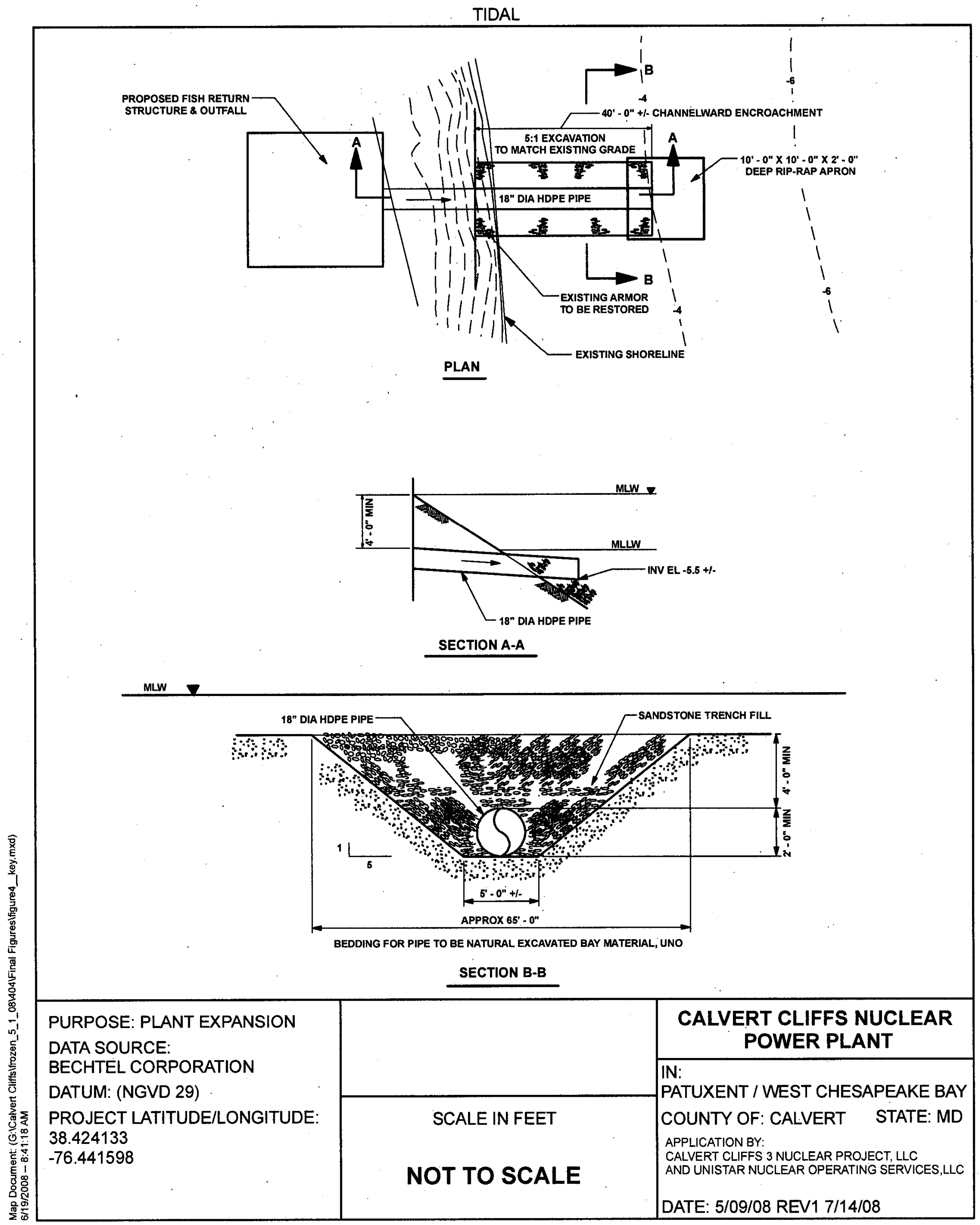

Figure 3. Fish-return System Discharge Piping for the Unit 3 Intake Structure (UniStar 2008c)

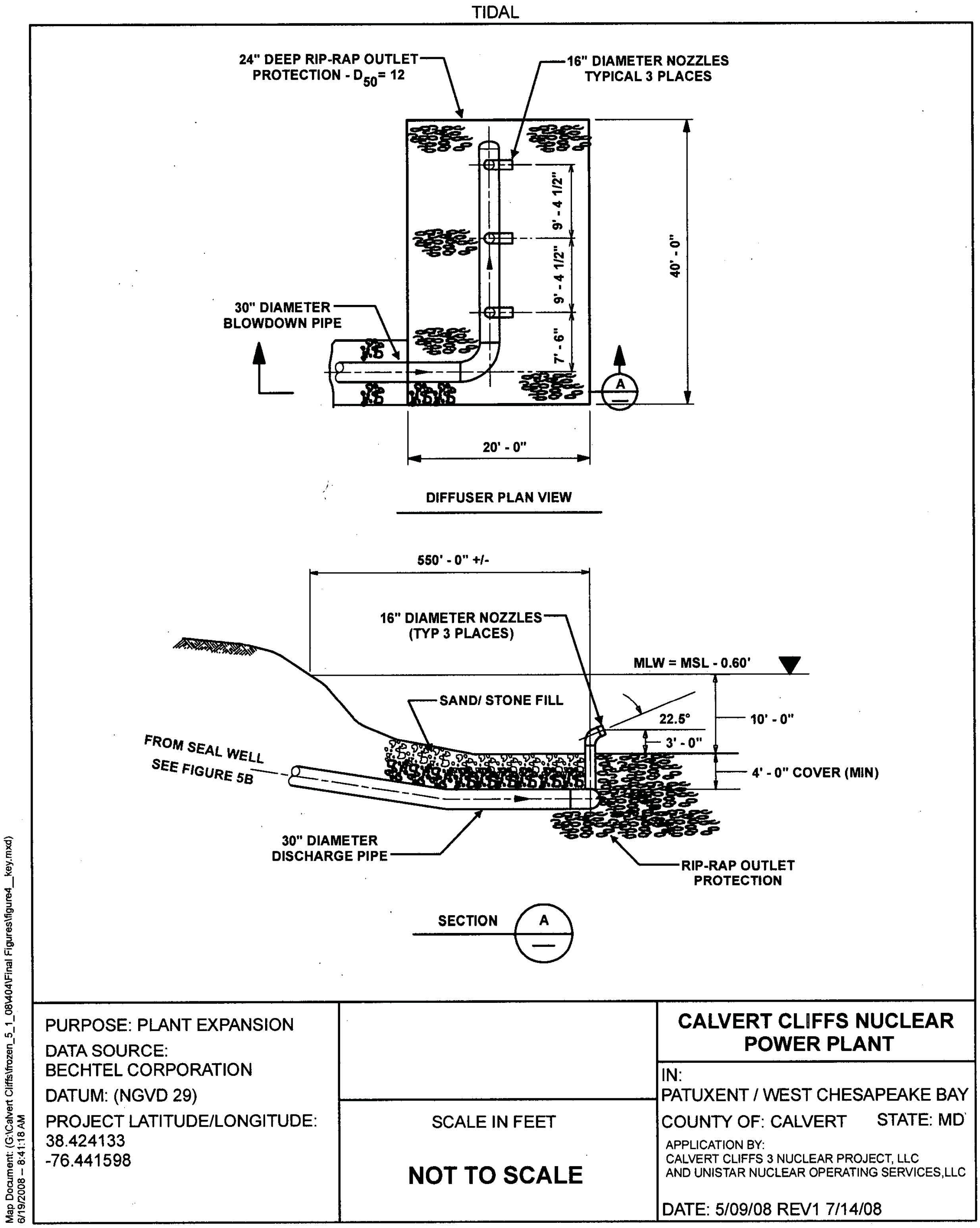

Figure 4. Details of the Unit 3 Cooling Water Discharge Outfall (UniStar 2008c)

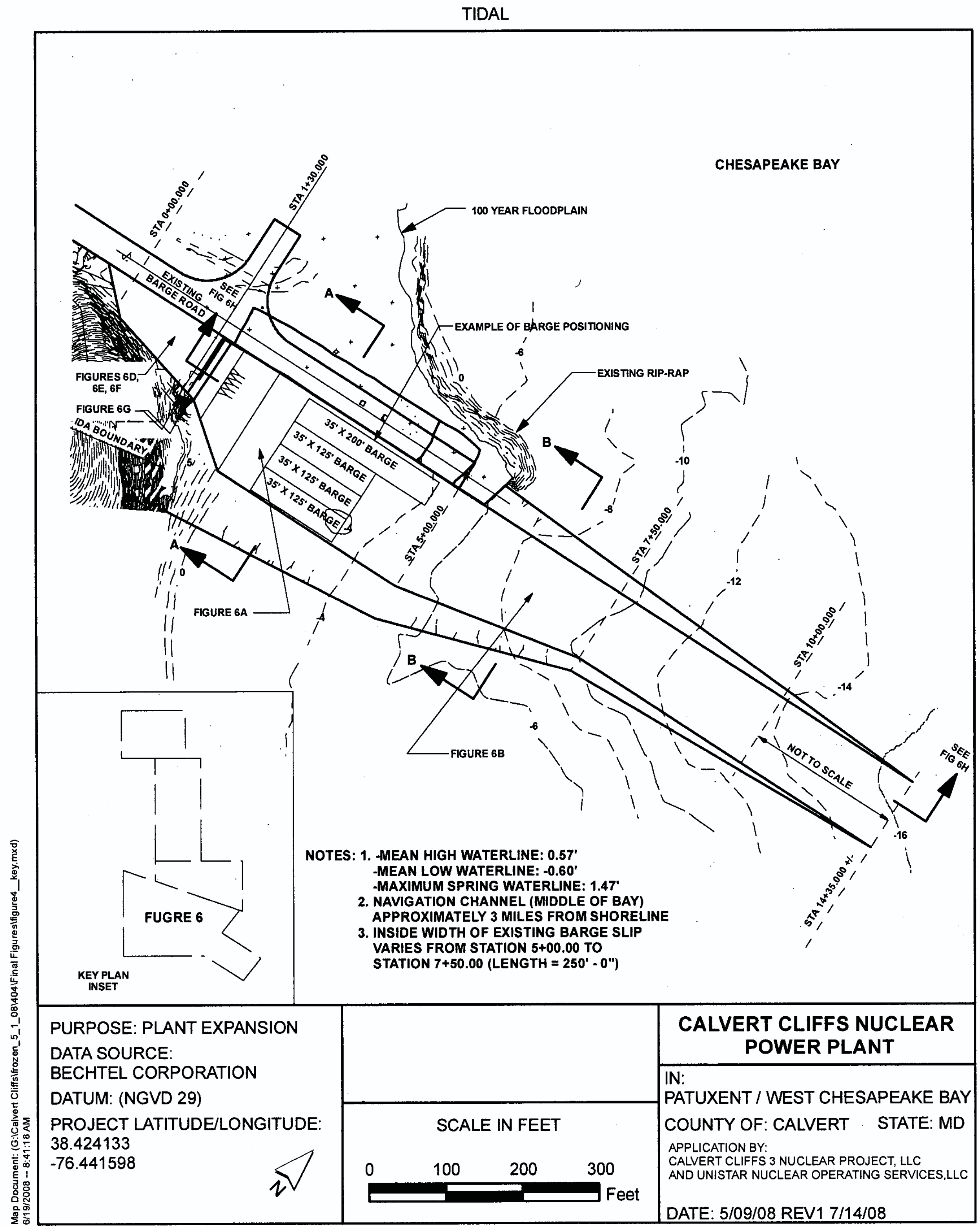

Figure 5. Proposed Restoration of Barge Slip (with existing contours) for the Construction of Unit 3 (UniStar 2008b)

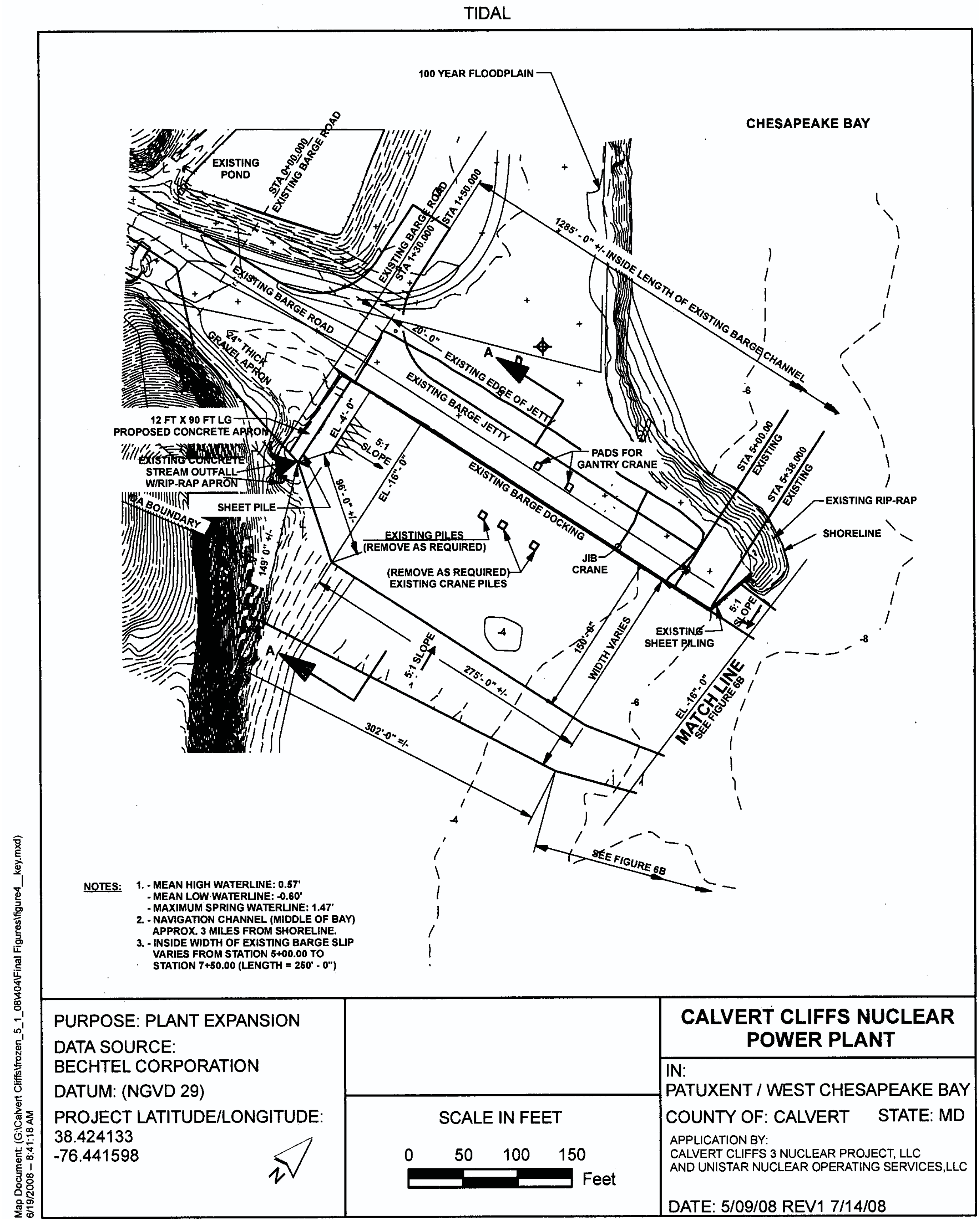

Figure 6. Proposed Modifications at the Existing Barge Unloading Facility for the Construction of Unit 3 (UniStar 2008b)

shoreward portion of the barge dock area during the past 30 years, altering the normal flow pattern from an existing culvert outfall. The area would be restored by installing a 12 ft by 90 ft concrete apron and a 90-ft-wide sheet-pile wall at the beach end of the area and building a 40-ft long by 40-ft wide by 2-ft deep riprap apron that would extend about 40 ft into the Bay covering about 1600 ft^2 (0.04 ac). The sheet-pile wall would be constructed of steel sheet piling supported by 30-in.-diameter soldier piles. The restoration would allow the discharge from the culvert outfall to flow directly in the Bay. The restoration is expected to take about 2 weeks.

Once the barge dock area has been refurbished, it would be used by barges that may be as large as 200 ft long and 50 ft wide. Typically, the barges used are about 35 ft wide. Barge drafts range from 2 ft to 11 ft, depending on the load. UniStar expects that the barge dock would be in use for about 5 years during the construction but stated that although there are no specific plans for maintenance dredging, eventual replacement of major components could require dredging in the future. UniStar has requested permission from the Corps to conduct maintenance dredging for 10 years (USACE 2008). The dredged material removed from the barge slip would be used during the plant construction as sand bedding for underground pipe installation or deposited at Lake Davies, an existing upland (non-wetland) environmentally controlled disposal area on site that was also used for previous dredge disposal. The dredged material would be characterized prior to use or disposal.

4.0 Essential Fish Habitat Species Descriptions

The proposed new unit at the Calvert Cliffs site is located in an area that is designated as EFH for species managed by the Mid-Atlantic Fishery Management Council. The NRC and the Corps conducted an evaluation by identifying and considering all designated EFH that occurs near the Calvert Cliffs site. The Maryland portion of the Chesapeake Bay was selected as the primary basis for the evaluation. The area of evaluation was further narrowed to the Chesapeake mainstem, the area most likely applicable to the Calvert Cliffs site (NMFS 2008a). The Patuxent River section of the Chesapeake Bay was also checked but did not add species to the list of those to be evaluated (NMFS 2008b). Only species having EFH within the mixing water/brackish salinity zone (0.5 to 25 parts per thousand) of the Bay or the Patuxent River were included in the final assessment. A separate list of skate habitats was checked for species with EFH in the Chesapeake Bay (NMFS 2009a).

The original list of candidates for EFH evaluation included 12 species (Table 1). However, the NMFS informed UniStar that the EFH designations for cobia, king mackerel, and Spanish mackerel were very broad and those species did not need to be considered further (UniStar 2008b). Therefore, final EFH evaluation list includes nine species.

Table 1. Species List of EFH Designations by Lifestage near Proposed CCNPP Unit 3

Species	Eggs	Larvae	Juveniles	Adults
black sea bass (*Centropristis striata*)			X	X
bluefish (*Pomatomus saltatrix*)			X	X
butterfish (*Peprilus triacanthus*)	X	X	X	X
clearnose skate (*Raja eglanteria*)			X	X
little skate (*Leucoraja erinacea*)			X	X
red drum (*Sciaenops ocellatus*)	X	X	X	X
summer flounder (*Paralichthys dentatus*)		X	X	X
windowpane flounder (*Scophthalmus aquosus*)			X	X
winter skate (*Leucoraja ocellata*)			X	X
cobia (*Rachycentron canadum*)[(a)]	X	X	X	X
king mackerel (*Scomberomorus cavalla*)[(a)]	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)[(a)]	X	X	X	X

Sources: NMFS 2008a, NMFS 2008b, NMFS 2009a, b, c, d, e, f and UniStar 2008b.
(a) Not considered further because of very broad EFH designations.

4.1 Black Sea Bass (Centropristis striata)

The black sea bass range along the east coast of North America from Nova Scotia to Florida (Drohan et al. 2007). The species occurs in the Chesapeake Bay from spring to late fall and is common in the mid and lower Bay (Murdy et al. 1997). Black sea bass migrate offshore in winter. Adults are typically found near structured habitats, such as shipwrecks, pilings, rocky areas and jetties, and shellfish beds (Murdy et al. 1997; Drohan et al. 2007). Some juveniles may overwinter in deeper waters in the Bay during mild years (Drohan et al. 2007). Juveniles in the Chesapeake Bay are closely associated with vegetated areas. Black sea bass are visual predators that feed during the day. Juveniles feed primarily on shrimp and small crustaceans, whereas adults eat mainly crabs, clams, and fish. Black sea bass are hermaphroditic with individuals maturing first as females. Most fish smaller than 7.5 in. long are females; larger fish are males (Drohan et al. 2007). Black sea bass may live as long as 20 years and reach a length of about 24 in. (Murdy et al. 1997). Spawning occurs in late spring to early fall over nearshore continental shelf habitats near large estuaries (Drohan et al. 2007). Development from egg through larval stages occurs in offshore water with juveniles (1.2 to 2.4 in. in length) migrating into estuaries during summer. There is a small commercial fishery for black sea bass in the Chesapeake Bay, and there is a popular sport fishery for the species (Murdy et al. 2007). Three stocks of black sea bass are used to manage the fishery. The mid-Atlantic stock includes the Chesapeake Bay. Recent year classes within this stock have shown strong growth in contrast to that for the south Atlantic stock (Drohan et al. 2007). The black sea bass recreational fishery has declined recently, although this may have resulted from increased minimum size limits (Kerns 2006).

EFH that includes Chesapeake Bay has been designated for black sea bass juveniles and adults. Inshore EFH for juveniles includes estuaries where black sea bass are identified as being common, abundant, or highly abundant for the mixing (0.5 to 25.0 ppt) and seawater (greater than 25 ppt) salinity zones. In general, juvenile black sea bass are found in waters warmer than 43°F with salinities greater than 18 ppt. Inshore EFH for adult black sea bass is similar to that designated for juveniles (NMFS 2009b).

4.2 Bluefish (Pomatomus saltatrix)

Bluefish are found on the western Atlantic coast from Nova Scotia to Brazil, but are rare in the Caribbean (Murdy et al. 1997). Bluefish of similar sizes form schools and migrate along the Atlantic coast moving up the Middle Atlantic Bight in spring from wintering grounds off Florida, then returning south in fall (Shepherd and Packer 2006). Schools can be large, often covering tens of square miles (Murdy et al. 1997). Bluefish visit the Chesapeake Bay from spring to autumn (Murdy et al. 1997). Spawning occurs in offshore waters during the northward migration with peak spawning off Chesapeake Bay occurring in July (Murdy et al. 1997; ASMFC 2006a). After spawning, smaller fish enter nearshore bays, such as Chesapeake Bay and Delaware Bay, while larger fish swim northward. Juveniles (1.8 to 2.4 in. long) move into estuaries and nearshore environments that serve as nursery grounds in late summer and eventually migrate out of the Bay in the autumn (Harding and Mann 2001; Shepherd and Packer 2006). In Chesapeake Bay, bluefish are abundant near the mouth of the Bay and common in the upper Bay in some years, but rarely occur north of Baltimore (Murdy et al. 1997). Bluefish reach a maximum length of about 45 in. and a weight of about 15 lbs (Shepherd and Packer 2006). Bluefish are voracious top-level predators. Bluefish larvae feed on planktonic copepods and transition to a fish diet at length of about 1.1 in., after which juveniles move into estuaries (Shepherd and Packer 2006). Bluefish feed opportunistically on whatever fish species are abundant (Shepherd and Packer 2006) and also eat invertebrates, such as blue crabs (*Callinectes sapidus*) (Buckel et al. 1999). In Chesapeake Bay, bluefish diet varies with location as fish feeding near oyster reefs eat more invertebrates than fish in the middle Chesapeake Bay (Harding and Mann 2001). This species is one of the most important recreational and commercial species in Chesapeake Bay with the recreational catch exceeding the commercial catch by an estimated five to six times (Murdy et al. 1997; ASMFC 2006a; Harding and Mann 2001). Bluefish are managed as a single stock, and the most recent review concluded that the species was not being overfished (Nygard 2005). Recreational and commercial catches in Maryland have decreased substantially since peak values in the late 1980s but have remained relatively stable since the mid 1990s (MDNR 2008). Despite reduced catches, the bluefish population estimates reflect a substantial increase in biomass from 1997 to 2004 (NOAA 2005).

EFH that includes Chesapeake Bay has been designated for bluefish juveniles and adults. Inshore EFH for juvenile and adult bluefish includes all major estuaries between Penobscot Bay, Maine and the St. Johns River, Florida (NMFS 2009c). Bluefish adults are highly migratory and distribution varies seasonally and according to the size of the individuals composing the schools. Bluefish generally are found where salinities exceed 25 ppt.

4.3 Butterfish (Peprilus triacanthus)

Butterfish range from Nova Scotia to Florida into the Gulf of Mexico (Murdy et al. 1997), but are most abundant between Cape Hatteras and the Gulf of Maine (Cross et al. 1999). Butterfish move into Chesapeake Bay about March and remain until about November. They are most abundant in the lower Bay, but occasionally may be common in the upper Bay as far north as the Patapsco River (Murdy et al. 1997). They overwinter in deep offshore waters. Butterfish are pelagic and form large, loosely structured schools. The short-lived species spawns offshore from May to July in the mid-Atlantic area with eggs remaining offshore during the 48-hr incubation period (Cross et al. 1999). Larvae eventually congregate around floating items, such as jellyfish, seaweed, and other debris. Juveniles, which range from 0.6 to 4.7 in. long (Cross et al. 1999), move into nearshore waters, including estuaries (Murdy et al. 1997) and still may be associated with jellyfish. Adults may reach a length of about 12 in. and, in the Chesapeake Bay, mature by their third summer (Cross et al. 1999). Juvenile butterfish feed on smaller plankton, whereas adults feed more broadly on pelagic tunicates, jellyfish, crustaceans, and small fish. Many predatory fish, including weakfish and bluefish, feed on butterfish. Commercial catches of butterfish peaked about 1973 along the Atlantic coast and have declined fairly steadily since, with the lowest landings occurring in 2005 (Overholtz 2006). Butterfish were of minor commercial importance in the Chesapeake Bay in the late 1990s, with most of the catch coming from Virginia waters (Murdy et al. 1997). There is little recreational fishing for butterfish.

EFH that includes Chesapeake Bay has been designated for butterfish eggs, larvae, juveniles, and adults. Inshore EFH for all butterfish life stages includes the mixing and/or seawater portions of all the estuaries where butterfish eggs are common, abundant, or highly abundant on the Atlantic coast, from Passamaquoddy Bay, Maine to James River, Virginia (NMFS 2009d). Butterfish eggs usually are found from shore to 6000 ft. Butterfish larvae typically are found at water depths between 33 ft and 6000 ft. Juveniles and adults usually are found in depths between 33 ft and 1200 ft. The only portion of the Bay near the Calvert Cliffs site deeper than 33 ft is in the channel that was dredged for the intake system of Units 1 and 2 (EA Engineering 2007a).

4.4 Clearnose Skate (Raja eglanteria)

Clearnose skates are broadly distributed in coastal waters from Massachusetts to Texas, although they are rare in the northern parts of the range (Murdy et al. 1997; Packer et al. 2003a). Clearnose skates are primarily summer-to-fall residents of the Chesapeake Bay and are most abundant in the lower Bay (Murdy et al. 1997). These skates move out of the Bay to shallow offshore waters in the fall. Clearnose skates generally occur in waters with salinities greater than 22 ppt, particularly in the Chesapeake Bay (Packer et al. 2003a). Reproduction in waters north of Cape Hatteras occurs in spring and summer with each fertilized egg enclosed in a rectangular egg case that is deposited on the sea bottom (Packer et al. 2003a). Juveniles hatch from the egg cases after about 3 months and may eventually reach a length of about 30 in. at an age of more than 6 years. Clearnose skates are nocturnal feeders on many types of benthic invertebrates and small fish. Sharks are the main predators of clearnose skates. Clearnose skate eggs may be attacked by snails capable of boring into the capsules (Cox and Koob 1993). A relatively small fishery exists for skates with smaller skates primarily caught for lobster bait (Packer et al. 2003a; Sosebee 2006). Clearnose skates do not contribute much to the total skate catch and are not being overfished (Sosebee 2006). In the Chesapeake Bay, clearnose skates are considered a nuisance catch (Murdy et al. 1997).

EFH that includes Chesapeake Bay has been designated for clearnose skate juveniles and adults. EFH for juveniles includes soft-bottom substrates along the continental shelf and rocky or gravelly bottom, ranging from the Gulf of Maine south along the continental shelf to Cape Hatteras, North Carolina (NMFS 2009a). Clearnose skate juveniles and adults are most abundant from nearshore to waters less than 360 ft deep.

4.5 Little Skate (Leucoraja erinacea)

Little skates occur from Nova Scotia to Cape Hatteras and are most abundant between Georges Back and Delaware Bay (Murdy et al. 1997; Packer et al. 2003b). Little skates occasionally occur in the lower Chesapeake Bay in the winter and spring (Murdy et al. 1997). Although little skates tolerate relatively low salinities (about 20 ppt), they are most commonly found where salinities are about 30 ppt (Packer et al. 2003b). Like clearnose skates, little skates enclose a single fertilized egg within a capsule that is deposited on the sea floor. Reproduction may occur throughout the year. Development time varies depending on the season in which the capsule is deposited, but typically extends at least 6 months (Packer et al. 2003b). Juveniles are about 4 in. long at hatching. Adults may reach a total length of about 24 in. Little skates feed primarily on benthic invertebrates, particularly crabs and polychaete worms, but also may feed on fish. Little skates are eaten by sharks, other skates, and several boney fish species (Packer et al. 2003b). Little skate eggs may be attacked by snails capable of boring into the capsules (Cox and Koob 1993). Little skates are fished primarily for use as lobster bait and account for most of the bait fishery. They are not presently being overfished (Sosebee 2006). In the Chesapeake Bay, little skates are occasionally caught as bycatch in trawls and by hook and line (Murdy et al. 1997).

EFH that includes Chesapeake Bay has been designated for little skate juveniles and adults. EFH for juvenile and adult little skates includes muddy, sandy, or gravelly bottom habitats from Georges Bank to Cape Hatteras, North Carolina (NMFS 2009a). Both life stages are found in shallow nearshore waters, but generally are most abundant in waters from 240 to 299 ft deep.

4.6 Red Drum (Sciaenops ocellatus)

Although red drum are found from the Gulf of Maine to the northern coast of Mexico, they are less abundant along the Atlantic coast than in the Gulf of Mexico (Murdy et al. 1997). Adults occur in Chesapeake Bay from May to November, with the highest numbers near the mouth in spring and fall with salinities at greater than 15 ppt (Murdy et al. 1997). Red drum may occur as far up the Bay as the Patuxent River. Spawning occurs at night in nearshore coastal waters from late summer through autumn, and tidal currents carry larvae to nursery habitats in estuaries where they stay through the juvenile stage (Murdy et al. 1997; ASMFC 2006b; Rooker et al. 1999). Adult red drum may reach a maximum size of 5 ft and weigh up to 92 lb. Red drum are predators feeding primarily on crustaceans, such as blue crabs, and fish, such as bay anchovy (*Anchoa mitchilli*) and menhaden (*Brevoortia tyrannus*) (Scharf and Schlicht 2000). There is a small red drum fishery in Chesapeake Bay with a small catch in Maryland waters in 2006; an important red drum fishery throughout the Gulf of Mexico; and, to some extent, on the south Atlantic coast (Murdy et al. 1997).

EFH has been designated for red drum eggs, larvae, juveniles, and adults and includes tidal freshwater, emergent vegetated wetlands in estuaries, mangrove fringe in estuaries, submerged rooted vascular plants, oyster reefs and shell banks, soft-bottom sediments, ocean surf zones, and artificial reefs (NMFS 2009e). Many of these habitats, especially submerged vegetation and oyster reefs, occur in Chesapeake Bay. There is an oyster reef but no SAV near the Calvert Cliffs site. EFH for red drum is also included within the Patuxent River (NMFS 2008b).

4.7 Summer Flounder (Paralichthys dentatus)

Summer flounder range from Nova Scotia to South Florida, and most only visit Chesapeake Bay from spring to autumn, although some have been known to overwinter in the Bay (Murdy et al. 1997). Summer flounder migrate out of estuaries in late summer to early fall, but some may leave as late as early winter (Sackett et al. 2007). Tagging studies showed that many individuals return to the same estuary from which they emigrated (Sackett et al. 2007). Summer flounder are more common in the lower Chesapeake Bay than in the upper Bay. Spawning occurs during the migration offshore in the autumn with larvae typically most abundant about 15 to 50 mi from shore (NMFS 2009f). Recently settled juveniles enter Virginia waters in the lower Bay between October and May (Norcross and Wyanski 1994). They remain in inshore areas for the first year of life (Murdy et al. 1997; ASMFC 2007). The maximum adult size is about 37 in. Young-of-the-year (about 1 in. long) may reach the Calvert Cliffs site area sometime in spring (Nichols 2008). Juveniles (about 3 to 10 in. long) may occur in the area from spring through fall (Nichols 2008). Summer flounder are ambush predators that feed on many fish and invertebrate species, although bay anchovy and mysid shrimp (*Neomysis* spp.) make up about half their diet (Latour et al. 2008).

The summer flounder constitutes major commercial and recreational fisheries and is a highly sought food fish (Murdy et al. 1997; ASMFC 2007). The commercial fishery is primarily offshore, whereas the recreational fishery is in estuaries and bays (Latour et al. 2008). Though the summer flounder recreational catch has varied over the years, it approaches the commercial catch because of its popularity with anglers (Murdy et al. 1997; ASMFC 2007). Summer flounder are not yet overfished, but overfishing is occurring (Terceiro 2006). The estimated stock biomass increased substantially during the 1990s and through 2005, but it decreased slightly in 2006.

EFH that includes Chesapeake Bay has been designated for summer flounder larvae, juveniles, and adults (NMFS 2009f). Inshore EFH for summer flounder larvae, juveniles, and adults includes all the estuaries where summer flounder were identified as being present in the mixing and seawater salinity zones. HAPCs that include all native species of SAV, such as macroalgae, seagrasses, and freshwater and tidal macrophytes in beds of any size or in loose aggregations within juvenile and adult summer flounder EFH, have been designated (NMFS 2009f). SAV was not found during recent surveys conducted in the area of the Calvert Cliffs site (EA Engineering 2007b).

4.8 Windowpane Flounder (Scophthalmus aquosus)

Windowpane flounder (or windowpane) range from the Gulf of St. Lawrence to Florida (Murdy et al. 1997) and are most common around Georges Bank (Chang et al. 1999). Windowpane live year round in Chesapeake Bay and may be common as far north as the Choptank River (Murdy et al. 1997). The species can be abundant in the lower Bay. Windowpane spawn from spring to autumn, but they may not spawn during the middle of summer (Murdy et al. 1997; Chang et al. 1999). Eggs float and are about 0.06 in. in diameter. Larvae range in length from about 0.08 to 0.8 in., and juveniles reach lengths of up to about 8 in. (Morse and Able 1995). Adult windowpane can reach a total length of about 18 in. Juveniles and adults have broad diets, but they feed primarily on small crustaceans and worms, with small fish secondarily important (Chang et al. 1999; Link et al. 2002). The main predators of windowpane are spiny dogfish (*Squalus acanthias*), thorny skates (*Amblyraja radiata*), and other fish species (Chang et al. 1999). Windowpane in the mid-Atlantic region are managed as the Southern New England/Middle Atlantic (SNE-MA) stock (Hendrickson 2006). Windowpane catches are not typically targeted but are primarily bycatch for other fisheries probably because of the thinness of the fish. There is no commercial or recreational windowpane fishery in Chesapeake Bay (Murdy et al. 1997). Landings of the SNE-MA windowpane stock increased from the 1970s through 1985 but have since declined to a record low value in 2005 (Hendrickson 2006). Because there is no targeted fishery, the main cause of fishery mortality is probably as discarded bycatch from other targeted fishing. The most recent evaluation showed the stock was overfished, although overfishing was not occurring (Hendrickson 2006).

EFH that includes Chesapeake Bay has been designated for windowpane juveniles and adults. EFH for juveniles and adults includes muddy or fine-grained sandy bottom habitats (NEFMC 1998). Both life stages typically occur where waters are cooler than about 84°F, and salinities range between 5.5 and 36 ppt (NEFMC 1998).

4.9 Winter Skate (Leucoraja ocellata)

Winter skates range from the Gulf of St. Lawrence to Cape Hatteras and are most abundant on Georges Bank and in the northern Mid-Atlantic Bight (Packer et al. 2003c). In the lower Chesapeake Bay, winter skates are occasional residents from winter to spring (Murdy et al. 1997). Winter skates may reproduce all year, although there seems to be peak reproductive activity in summer and fall (Packer et al. 2003c). Fully developed juveniles hatch from egg capsules at about 4 to 5 in. in total length. Adults are relatively large, reaching lengths of about 3 to 4 ft. Winter skates have a diverse diet of invertebrates and fish, the latter being particularly important food for larger skates (Packer et al. 2003c). Sharks, other skates, and gray seals are the main predators of winter skates. Winter skates are fished as part of the export market for skate wings. The biomass of large skates, including winter skates, has decreased since the 1980s, and winter skates are considered as being overfished throughout most of the northwest Atlantic (Sosebee 2006). However, there are no commercial or recreational winter skate fisheries in the Chesapeake Bay (Murdy et al. 1997).

EFH that includes Chesapeake Bay has been designated for winter skate juveniles and adults. EFH for juvenile and adult winter skates includes muddy, sandy, or gravelly bottom habitats in Cape Cod Bay, on Georges Bank, the southern New England shelf, and through the Mid-Atlantic Bight to North Carolina (NMFS 2009a). Winter skate juveniles and adults frequent nearshore waters and are most abundant at depths less than 364 ft.

5.0 Potential Environmental Effects of the Proposed Federal Actions

This section describes the potential impacts from the construction and operation of the proposed Unit 3 at the Calvert Cliffs site to Federally managed estuarine and marine species and their habitats in Chesapeake Bay.

5.1 General Construction Impacts

Impacts to the EFH in Chesapeake Bay from construction of Unit 3 would be associated mainly with the construction of new water intake and discharge systems; construction of a new fish-return system; and the refurbishing of the existing barge dock area, including dredging in Chesapeake Bay. These activities would result in temporary and permanent loss or conversion of aquatic habitat in the Chesapeake Bay.

The major construction events associated with building Unit 3 that would affect EFH in the Chesapeake Bay share certain construction activities, such as dredging, pile driving, and armoring. All work would be conducted in accordance with Federal, State, and local permits that would be obtained by the applicant. EFH in Chesapeake Bay likely would not be adversely affected by the installation of new transmission facilities for Unit 3 because the facilities would be built on the uplands part of the Calvert Cliffs site.

The total proposed project dredging would permanently affect about 248,000 ft^2 (5.7 ac) of tidal open waters. About 52,500 ft^2 (1.2 ac) of the dredging would be backfilled.

5.1.1 Dredging and Pipeline Trenching

Dredging of the Bay bottom would be done by using shore-based or barge-mounted clamshell dredges to reestablish the channel on the south side of the existing CCNPP Units 1 and 2 barge dock and to create the trenches for the fish-return and the cooling water discharge pipelines. Dredging or pipeline trenching constitutes a major, localized impact to the benthos. Additional Bay bottom next to the pipeline trenches would be disturbed by the placement of the dredged material for later use in the backfilling the trenches. Effects of dredging for the installation of the Unit 3 intake pipes would be minimized by construction of a sheet-pile cofferdam and dewatering system. The benthic infauna community in the areas proposed for dredging or trenching for the construction of Unit 3 is similar to the community elsewhere in the region and also to the community type that has been in the area for many years. The community is moderately degraded to degraded (EA Engineering 2007a). Although this community probably provides some forage for fish, the area is not one of high benthic productivity.

In addition to the physical removal of Bay bottom, dredging, pipeline trenching, and backfilling increase the suspended sediment load in the water column. Suspended sediment may affect fish by clogging the gills and altering the feeding behavior of visual predators. It also may affect filter-feeding invertebrates and fish. However, the surficial sediments in the area that would be dredged are primarily sandy (refer to Section 2.1 of this EFH assessment) and likely would settle out of the water column relatively quickly. Some dredged material and water can be lost from the clam dredge as it is raised and deposited into the barge or as material is transferred from the barge to trucks. The potential resuspension of contaminants would not be a concern for the proposed dredging or trenching because the contaminant loads in the sediments in the barge dock area were shown to be very low (EA Engineering 2007a).

5.1.2 Pile Driving

Pile driving would be used in three project areas, all involving the installation of the sheet-pile walls. A vibratory hammer would be used to install the sheet piling and a conventional pile-driving hammer to install the 30-in.-diameter steel soldier piles that would be placed on 10-ft centers to support the sheet piling. The principal impact would be the generation of noise at levels that may be harmful to fish.

Pile driving noise may affect fish by causing temporary hearing loss, auditory tissue damage, and damage to non-auditory tissue, such as the swim bladder (Popper et al. 2006). Two criteria, both measured at a standard distance of 10 m (32.8 ft) from the pile-driving activity, are used to estimate the sound and vibration levels from pile driving that would injure fish. The peak sound-pressure level (peak pressure or peak), measured as decibels (dB) relative to reference level of one micro Pascal (dB re 1 μPa_{peak}), is maximum excursion of pressure associated with the sound (Popper et al. 2006). Peak pressure determines the likelihood that the swim bladder and ear would be exposed to extreme mechanical stress (Popper et al. 2006). The sound exposure level (SEL), measured as dB re 1 µPa2•s, is the constant sound level of 1-second duration that would contain the same acoustic energy as the originally produced sound.

The interim criteria (Popper et al. 2006) specified a peak level of 206 dB and a cumulative SEL level of 187 dB for fish weighing 2 gm and heavier or a cumulative SEL of 183 dB for fish lighter than 2 gm. The noise levels for the pile driving proposed for Unit 3 construction were estimated by applying compilations of measurements of noise and vibration impacts associated with various methods of pile driving, types of materials, and water depth. The estimated peak and cumulative SEL values for driving 24- to 36-in.-diameter steel piles with a conventional pile-driving hammer in about 5-m water depth are about 203 to 208 dB and 177 to 180 dB, respectively. These values suggest that driving 30-in.-diameter steel piles with conventional hammers at the Calvert Cliffs site may produce sound impacts that approach or exceed the peak pressure guidance criterion of 206 dB, but would not likely exceed the minimum SEL criterion of 183 dB for fish lighter than 2 gm. Sheet-pile driving produces peak pressures ranging from 175 dB to 180 dB and cumulative SEL values ranging from 160 dB to 165 dB, which are below the respective interim criteria values (UniStar 2008b). Noise from pile driving would most likely affect small EFH species or those with small lifestages (e.g., butterfish; black sea bass) in the area. Prey of some species also could be affected (e.g., bluefish; red drum).

5.1.3 Armoring

Key underwater structures in the project area would be armored with imported rocks, permanently converting the benthic substrate to rocky bottom. The largest area, about 4652 ft^2

(0.11 ac), that would receive rock armor is next to the new sheet-pile wall that would be installed to create the wedge-shaped pool for Unit 3. The armoring in the area next to the baffle wall would be added to the Bay bottom as a series of four overlying layers, ranging from washed gravel on the bottom to large quarry rock (average about 2 tons each rock) on the top (UniStar 2009d). The overall thickness of the armoring would vary according to the water depth. Armor would also be added to the Bay bottom at the end of the fish-return system, the cooling water discharge diffuser, and the nearshore area of the barge dock. Although some sediment suspension would occur during installation of the rock armor, the major effect would be the conversion of the benthic habitat from a soft-bottom infaunal community to a hard-bottom epifaunal community, which eventually is expected to colonize the rocks. The epifaunal community probably would include oysters, barnacles, mussels, and sea anemones, all of which colonized new hard-bottom habitat near the CCNPP Units 1 and 2 discharge pipe (Abbe 1987). The loss of soft-bottom habitat would likely reduce the potential forage area for some benthic-feeding EFH fish species (e.g., summer flounder, winter flounder, and skates). However, the area is not one of high benthic productivity, and the area that would be lost is relatively small.

5.1.4 Vessel Movements

Vessel use during the dredging or the installation of the in-water structures for Unit 3 would affect the aquatic resources of the area, particularly the benthos. The main effects from using vessels would include turbulence from propellers (prop wash), anchor cable scraping across the Bay bottom, and accidental spills of materials overboard. Vessels would be used during the installation of the cooling water discharge pipeline; during the offloading of materials from barges; and, probably, during the installation of the sheet-pile wall at the new intake area and the fish-return system outfall. The primary occurrence of vessels would be during the operation of the barge dock, which is expected to last about 5 years during construction of the proposed Unit 3. The proposed barge docking procedures would minimize the potential impacts from prop wash (UniStar 2008b). Vessel operation during construction would cause short-term, localized impacts to EFH near the Calvert Cliffs site. These impacts are not expected to affect the general resources in the area of the site or the region along this coast of the Chesapeake Bay.

5.2 General Operational Impacts

For EFH in Chesapeake Bay, the primary concerns related to water intake and consumption are those related to the relative amount of cooling water drawn from the Chesapeake Bay and the potential for organisms to be entrained into the cooling water system, impinged on the trash racks or intake screens, or entrapped in the wedge-shaped pool or common forebay. Entrainment and impingement have the potential to affect EFH species indirectly by reducing key prey species or directly by entrainment or impingement of the EFH species themselves. Entrapment in the wedge-shaped pool is possible but unlikely because fish may be able to swim back out to the Bay following the same route of entry. Entrapment in the common forebay for Unit 3 would not have an escape route with the exception of the fish-return system for organisms impinged on the CWS intake screens.

The intake system design for Unit 3 includes a fish-return system located at the CWS intake screens in the common forebay. There is no fish-return mechanism at the intake pipe openings in the wedge-shaped pool or at the UHS intake screens in the common forebay. The fish-return system may help increase survival following impingement by returning fish and crabs beneath the surface of the Bay.

UniStar stated that a closed-cycle, recirculating, wet cooling system with a cooling tower would be used for Unit 3 (UniStar 2009a). The intake system for Unit 3 would incorporate fish and invertebrate protection measures that may reduce entrainment and impingement. The estimated maximum intake volume of 47,383 gpm for Unit 3 would not exceed the EPA 1-percent water column criterion (UniStar 2009a). Unit 3 would have a fish-return system similar to the one used at existing CCNPP Units 1 and 2. Moreover, the through-screen flow velocity would be less than 0.5 ft/sec (0.15 m/sec) under the worst-case scenario of minimum Chesapeake Bay level with highest makeup demand flow (UniStar 2009a). The projected intake flow for Unit 3 is about 96.8 cfs, which is considerably less than the CCNPP Units 1 and 2 combined flow of 5332 cfs. Because the projected intake flow volume for Unit 3 is about 1.82 percent of that at CCNPP Units 1 and 2 and assuming that the relationship between flows is linear, the projected entrainment and impingement rates at Unit 3 would be correspondingly small.

5.2.1 Entrainment

The EFH species listed do not feed directly on plankton, but some are predators that consume planktivorous fish. The potential impact of Unit 3 from the entrainment of organisms into the cooling water system was evaluated by using historical (1974–1980) data collected at CCNPP Units 1 and 2. Sellner and Kachur (1987) determined that phytoplankton density in the discharge stream for Units 1 and 2 was significantly reduced compared to that in the intake stream. Phytoplankton photosynthesis metabolism was changed during passage through the plant such that carbon fixation was reduced. Importantly, however, Sellner and Kachur (1987) determined that these changes had no discernable effect on the phytoplankton densities or metabolism in the Chesapeake Bay waters near the Calvert Cliffs site. Olson (1987) found that zooplankton densities were less at the discharge point than they were at the intake point, which suggests that entrainment causes some zooplankton cropping. Olson also indicated survival after entrainment is typically very high and that no important changes in the zooplankton community could be detected. However, for this entrainment analysis, the review team used the conservative assumption of 100 percent mortality for entrained organisms.

The potential for direct effects on EFH species can be evaluated by considering information from the ichthyoplankton entrainment sampling that was conducted at the intake system of CCNPP Units 1 and 2 from March 2006 through September 2007 (UniStar 2008c). Additional ichthyoplankton samples were collected just outside the existing baffle wall separating the intake area from the open waters of the Bay from April to December 2006.

The total ichthyoplankton entrainment from March 2006 to September 2007, estimated at the maximum design flow for the intake systems of CCNPP Units 1 and 2, was at least 11.9 billion organisms, including fish eggs, larvae, juveniles, and adults (UniStar 2008c). This value is a minimum estimate of the total potential entrainment because daytime samples were not collected in March 2006, October through December 2006, and January through March 2007.

Most of the entrainment during the study occurred from May to September. The bay anchovy (all life stages), a key prey item for some EFH species, was the predominant taxon entrained, accounting for about 75 percent and 69 percent of the total organisms estimated as entrained during 2006 and 2007, respectively. About 5.7 million adult and 9.2 billion eggs, larvae, and juvenile bay anchovies were estimated to be entrained at the maximum design flow rate for CCNPP Units 1 and 2 during the 19-month study. In 2006, Sciaenid eggs, Atlantic menhaden eggs and larvae (another prey species for some EFH taxa), and naked goby larvae and juveniles (*Gobiosoma bosc*) accounted for about 18.5 percent, 3.3 percent, and 1.5 percent of the entrained organisms, respectively. Hogchoker eggs (*Trinectes maculatus*), sciaenid eggs, and Atlantic menhaden eggs and larvae accounted for about 14.1 percent, 6.0 percent, and 4.9 percent of the organisms, respectively, estimated entrained in 2007. Bay anchovy (all life stages), sciaenid eggs, Atlantic menhaden eggs and larvae, and naked goby larvae and juveniles were the predominant organisms collected just outside the intake system baffle wall, although the proportional contribution of each varied somewhat (UniStar 2008c). Comparisons of the intake and baffle-wall samples showed that most taxa entrained at rates relative to their occurrence in the Bay waters. However, juvenile bay anchovies, American eel (*Anguilla rostrata*) juveniles, Atlantic menhaden eggs and larvae, and sciaenid eggs were more abundant at the intake than they were at the baffle wall.

The April through September Units 1 and 2 entrainment data for each year were used to estimate the potential total entrainment by the Unit 3 intake system because only those months had samples collected during the day and night. The April through September time period was the main period of entrainment captured by the study. Entrainment of most species and lifestages, except Atlantic croaker (*Micropogonias undulatus*) juveniles, was nonexistent or very reduced between October and March. Total estimated entrainment by Units 1 and 2 during April to September varied considerably between the 2 years, with 7.3 billion organisms entrained in 2006 and 759 million entrained in 2007. The estimate also considered that the projected intake flow volume for Unit 3 would be about 1.82 percent of that at CCNPP Units 1 and 2 and assumed that the relationship between flows is linear. The projected April through September ichthyoplankton entrainment by the Unit 3 intake system would range from about 83 million to about 132 million organisms. These values are much less than the variability in entrainment by the two existing units. The projected annual entrainment by Unit 3 would not be much greater than the April to September estimates, with the possible exception of Atlantic croaker juveniles, because entrainment at Units 1 and 2 from April through September is much greater than it is during the rest of the year. The projected combined April through September ichthyoplankton entrainment for all three units during those months would range from about 4.6 billion to 7.4 billion organisms.

5.2.2 Impingement and Entrapment

Impingement sampling was conducted at CCNPP Units 1 and 2 from 1975 through 1995 (Ringger 2000). Peak fish impingement occurred during the spring and summer. Blue crab, a potential prey species for some EFH species, impingement was greatest in spring, summer, or fall. There did not to appear to be annual trends, except that impingement generally appeared to be less after 1986 than it was before. The apparent difference in impingement rates before and after the mid-1980s may be related to several operational and structural modifications to the intake and fish-return systems that were made from about 1984 to 1986, partly in response to severe impingement events that occurred in 1983 (Ringger 2000). The most commonly impinged fish during the 21-year period were bay anchovy, hogchoker, spot (*Leiostomus xanthurus*), and Atlantic menhaden. Blue crab impingement, as that for fish, generally was lower after the mid 1980s than before.

The average annual fish and blue crab impingement rates predicted for Unit 3 are 23,683 fish and 11,403 crabs. These resulted in estimated average annual impingement mortality rates at Unit 3 of 6327 fish and 62 crabs. The impingement mortality estimate for fish and crabs probably is somewhat conservative because the entire 21-year data set was used for the calculations regardless of apparently reduced impingement after modifications made in the mid 1980s. Also, the Unit 3 intake approach velocities within the forebay would be less than 0.5 ft/sec (0.15 m/sec), which would allow more crabs to avoid impingement.

Special Condition N of the NPDES permit for CCNPP Units 1 and 2 requires notification within 24 hours of any impingement on the water intake apparatus of aquatic organisms substantial enough to cause modification to plant operations (UniStar 2009a). Significant fish kills involving cownose rays (*Rhinoptera bonasus*) that were impinged on the trash racks of Units 1 and 2 were reported in summer 2005 (80 to 100 rays) and 2006 (50 to 200 rays) (NRC 2005, NRC 2006a, b).

Water from the wedge-shaped pool would enter the common forebay that would supply water to the CWS and UHS intakes (Section 3.1 of this EFH assessment). Organisms impinged on the trash racks at the intake pipe openings would likely die because there is no rake or return system at that interface with the Bay. Such organisms would likely be larger than 3.5-in., which is the spacing between the trash bars. Because traveling screens and the fish-return system would be located at the CWS intake, smaller organisms would enter the common forebay. Organisms pulled toward the CWS pumps would be entrained as already discussed, impinged at the CWS trash rack, or impinged at the CWS traveling screens then delivered to the fish-return system for passage to the Bay. Organisms pulled toward the UHS pumps during its periodic operation would be lost to impingement at the UHS trash racks or traveling screens because that system would not be connected to a fish-return system. The common forebay would hold a large volume of water, and it is likely that some organisms entering the forebay could become trapped within it without necessarily being entrained or impinged at CWS or UHS intakes. All approach velocities would be small, and all organisms would not be pulled into the pump system. There would be no mechanism to remove entrapped organisms from the common forebay other than the fish-return system associated with the CWS traveling screens (UniStar 2009c). It is not possible to accurately estimate the numbers of the individuals that would be entrapped. The species most likely to become entrapped would be those that were represented in results of entrainment and impingement studies conducted at Units 1 and 2 (Section 5.2.1). Some species may thrive in the common forebay, while others may not. Regardless, all organisms entrapped in the forebay would be effectively removed from the Bay ecosystem.

5.2.3 Aquatic Thermal Impacts

The effluent discharge from Unit 3 would be directly into the Chesapeake Bay and would include blowdown from the CWS cooling tower, the essential service water system (ESWS) cooling towers, the desalination plant, liquid radiological effluent, and site waste streams. CORMIX modeling showed that the expected discharge plume from Unit 3 would be small and would not interact with the plume from Units 1 and 2. Abbe (1987) evaluated the potential effects of the thermal discharge from CCNPP Units 1 and 2, which is almost 1 mi north of the Unit 3 discharge location, and concluded that the thermal discharge from CCNPP Units 1 and 2 had no important adverse impacts on fish or key invertebrate species, such as eastern oysters (*Crassostrea virginica*) and blue crabs. The Maryland Power Plant Research Program (PPRP) concluded that the effects of thermal discharges from the power plants into Chesapeake Bay habitats were localized and not considered significant (MDNR PPRP 2008a). The waste heat from the Unit 3 discharge would dissipate quickly because of the small size of the thermal plume and would not likely affect EFH taxa or habitat significantly.

Cold shock occurs when aquatic organisms that have been acclimated to warm water, such as fish in a power plant's discharge canal, are exposed to a sudden temperature decrease. This sometimes occurs when power plants shut down suddenly in winter. Abbe (1987) concluded the potential for cold shock associated with the discharge plume from CCNPP Units 1 and 2 probably was not significant because the relatively small area of warmer water did not attract many fish during the winter. The volume of effluent discharge from Unit 3 would be much smaller than that from Units 1 and 2 and small in comparison to the volume of the Bay (UniStar 2009a). Therefore, the warmer effluent water would mix quickly with the cooler ambient water given normal Bay flow patterns so that the thermal discharge would not attract many organisms. Cold shock is unlikely to be a factor for EFH species at the Unit 3 site.

5.2.4 Chemical Impacts

UniStar indicates that chemicals, such as anti-scaling compounds, corrosion inhibitors, and biocides, would be added to the CWS and the ESWS (UniStar 2009a). Biofouling normally would be controlled by injecting chlorine or bromine into the Chesapeake Bay influent water during the spring through fall (UniStar 2009a). The CWS would provide about 90 percent of the effluent discharged into the Chesapeake Bay, with the desalinization plant contributing another 9 percent (UniStar 2008a). UniStar provided estimated concentrations of various constituents in the waste stream, which would include a small radioactive effluent (with a dose low enough not to affect biota), based on design data. To illustrate the expected low concentrations of these constituents, UniStar compared expected concentrations of five metal contaminants (arsenic, chromium, copper, nickel, and zinc) to aquatic life chronic salt water limits specified by the State of Maryland (COMAR 2008). Predicted concentrations within the discharge from Unit 3 would be substantially less than the State aquatic life limits (UniStar 2008a). UniStar would calculate more precise estimates of constituent concentrations in the effluent as part of the permitting process for Unit 3. The NRC determined that the effluent discharge from Units 1 and 2 would not significantly change the salinity gradients near the CCNPP site (NRC 2000). The addition of the relatively small discharge volume from Unit 3 would not be expected to alter this determination.

UniStar expects that the NPDES permit for Unit 3 would require bioassay testing, as does the permit for Units 1 and 2, to assess the potential toxicity of the discharge and provide for corrective action if necessary. To date, the bioassay testing performed for CCNPP Units 1 and 2 has not indicated any toxicity to test organisms (UniStar 2009a).

5.2.5 Physical Impacts from Discharge

The NRC determined that the effluent discharge from Units 1 and 2 would not significantly change the current patterns near the Calvert Cliffs site (NRC 2000). The addition of the relatively small discharge volume from Unit 3 would not be expected to alter this determination. The primary physical and ecological impacts from the CCNPP Units 1 and 2 cooling water discharge are sediment scour near the high-velocity discharge ports. The bottom scour associated with the discharge from CCNPP Units 1 and 2 was about 42 ac (UniStar 2008a). The sand substrate present prior to the operation of CCNPP Units 1 and 2 was scoured by the discharge, leaving a hard clay substrate. The benthic community changed from one characterized by burrowing soft-bottom organisms to one dominated by fouling organisms (UniStar 2008a).

The area of Bay bottom that may be scoured would be minimized by the placement of riprap for about 10 ft on either side of the diffuser (UniStar 2008b). The potential scour area was estimated by comparing the sediment type to expected discharge flow velocities. Sediments in the area are primarily sandy (see Section 2.1 of this EFH assessment), and UniStar calculated that a water velocity of about 1 ft/sec would be required to move sand particles of a size between 0.210 mm and 0.177 mm (0.008 and 0.007 in.) (UniStar 2008a). The distance beyond which water velocities are expected to drop below the 1 ft/sec threshold was estimated to be about 92 ft, which resulted in an estimated potential scour area of 13,256 ft^2 (0.3 ac). Therefore, the physical impacts associated with Unit 3 cooling water discharge would be limited to sediment scour of a small area.

The infaunal community inhabiting the area near the discharge point, which was characterized during 2006 and 2007 (EA Engineering 2007a), was moderately degraded to degraded (Section 2.1 of this EFH assessment). The community had low organism abundance and few species. The predominant taxa were polychaete worms (*Streblospio benedicti*; *Glycinde solitaria*) and a small clam species (*Gemma gemma*). A historical study of benthic fish feeding at a location north of the Calvert Cliffs site (Kenwood Beach) found that nematode worms and polychaetes were among the predominant prey (UniStar 2008a).

The bottom scouring near the discharge from CCNPP Units 1 and 2 caused the habitat to change from sandy sediment to hard clay and also caused a change from a sand-inhabiting infaunal community to an epifaunal community consisting of oysters, mussels, barnacles, and sea anemones (Abbe 1987). A similar, but much less extensive, change is likely if the sediment becomes scoured near the discharge for Unit 3. The small predicted size of the potential scour area and relative impoverishment of the infaunal community that would be replaced would not have much effect on the regional infaunal populations or their predators.

5.3 Potential Effects of the Proposed Federal Actions on EFH Species

5.3.1 Black Sea Bass

The construction activities with the greatest potential to affect black sea bass EFH would be the pile driving associated with the installation of the sheet-pile wall at the proposed wedge-shaped pool and the dredging for the refurbishment of the barge dock, installation of the fish-return pipeline, and installation of the cooling water discharge and fish-return pipelines. The noises from pile driving likely would be loud enough to affect small black sea bass juveniles as described in Section 5.1.2. Increased water column sediment loads from dredging could affect juveniles and adults, which are visual predators. The overall effects of these would be reduced by the relatively short time over which pile driving would occur and the use of turbidity curtains during dredging and pipeline installation. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser could provide habitat for black sea bass.

Direct operational impacts to black sea bass EFH would most likely be from impingement and possibly entrapment. Black sea bass occurred in 6 of the 21 yearly impingement samples collected from CCNPP Units 1 and 2 between 1975 and 1995 (Ringger 2000). However, the species only occurred in 1 year from 1984 to 1995, which could indicate a reduced likelihood of impingement and entrapment. Black sea bass eggs and larvae do not occur near Calvert Cliffs (Drohan et al. 2007). Therefore, entrainment or entrapment of early life stages is not expected. Black sea bass eggs, larvae, and juveniles were not found in the entrainment samples collected in the CCNPP Units 1 and 2 intake system or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Some juvenile and adult black sea bass prey, such as bay anchovy and scup (*Stenotomus chrysops*), likely would be entrained, impinged, and/or entrapped by the Unit 3 cooling water system. However, black sea bass diets are diverse (Drohan et al. 2007), and the overall effects likely would not be important. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for black sea bass.

5.3.2 Bluefish

The construction activities with the greatest potential to affect bluefish EFH would be the pile driving associated with the installation of the sheet-pile wall at the new intake location and the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. The noises from pile driving likely would be loud enough to affect small bluefish juveniles as described in Section 5.1.2. Increased water column sediment loads from dredging could affect juveniles and adults, which are visual predators. The overall effects of these would be reduced by the relatively short time over which pile driving would occur and the use of turbidity curtains during dredging and pipeline installation.

Direct operational impacts to bluefish EFH would most likely be from impingement and possibly entrapment. Bluefish occurred in the impingement samples collected from the CCNPP Units 1 and 2 intake system in 9 of the 21 years from 1975 to 1995 (Ringger 2000), although they occurred in only 1 year after 1984, which could indicate a reduced likelihood of impingement and entrapment. Bluefish were not found in the entrainment samples collected in the CCNPP Units 1 and 2 intake system or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Impingement, entrainment, and entrapment could indirectly affect bluefish EFH because some of the key bluefish prey species, Atlantic menhaden and bay anchovy (Hartman and Brandt 1995), are captured by the intake system for CCNPP Units 1 and 2 and, therefore, would likely be affected by CCNPP Unit 3. However, bluefish feed opportunistically on abundant species and likely would feed on prey other than menhaden and bay anchovy if necessary (Shepherd and Packer 2006). Also, the intake system for Unit 3 would draw much less water than that for Units 1 and 2 and would not be expected to add significantly to the numbers of these prey species impinged, entrained, or entrapped. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for bluefish.

5.3.3 Butterfish

The construction activities with the greatest potential to affect butterfish EFH would be the pile driving associated with the installation of the sheet-pile wall at the new intake location and the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. The noises from pile driving likely would be loud enough to affect butterfish larvae and juveniles as described in Section 5.1.2. Increased water column sediment loads from dredging could affect larvae, juveniles, and adults as described in Section 5.1.1. However, these life stages typically occur in waters deeper than where pile driving or dredging would occur. The overall effects of these would be reduced further by the relatively short time over which pile driving would occur and the use of turbidity curtains during dredging and pipeline installation.

Direct operational impacts to butterfish EFH would most likely be from impingement and possibly entrapment. Butterfish occurred in 15 of the 21 yearly impingement samples collected from CCNPP Units 1 and 2 between 1975 and 1995 (Ringger 2000). However, the species only occurred in 5 years from 1984 to 1995, which could indicate a reduced likelihood of impingement and entrapment. The intake system for Unit 3 would draw much less water than that for Units 1 and 2 and would not be expected to add significantly to the numbers of butterfish impinged. Butterfish were not caught in entrainment samples collected from the intake for Units 1 and 2 or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. The planktonic prey of butterfish may be entrained or entrapped by the Unit 3 cooling water system. Entrainment studies conducted at CCNPP Units 1 and 2 showed no significant effects on plankton communities in the area (Section 5.2). The small water volume withdrawn by the Unit 3 intake system reduces the potential for important effects on butterfish prey. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the butterfish.

5.3.4 Clearnose Skate

The construction activities with the greatest potential to affect clearnose skate EFH would be the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. Increased water column sediment loads from dredging could affect larvae, juveniles, and adults as described in Section 5.1.1. The overall effects of dredging would be reduced by the use of turbidity curtains during dredging and pipeline installation. Noise from pile-driving activities is not expected to adversely affect clearnose skates because the individuals most likely in the area would be relatively large and not as susceptible as smaller fish. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser would make the habitat less suitable for clearnose skates. Disturbances to the benthos, including armoring, could affect benthic prey resources for clearnose skates. However, the benthic habitat near the Calvert Cliffs site is not highly productive and constitutes only a relatively small portion of the available benthic habitat in the Bay.

Direct operational impacts to clearnose skate EFH would most likely be from impingement on the trash racks. Clearnose skates were not listed in the yearly impingement samples collected from the CCNPP Units 1 and 2 traveling screens between 1975 and 1995 (Ringger 2000). However, other large elasmobranchs (cownose ray) occasionally have impinged in large numbers on the trash racks at the existing CCNPP Units 1 and 2, probably as a result of low oxygen levels during the summer (NRC 2005, NRC 2006a, b). Clearnose skates were not caught in entrainment samples collected from the intake for Units 1 and 2 or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Clearnose skates are benthic feeders whose diets would not be adversely affected by the potential entrainment, impingement, and entrapment of prey by the Unit 3 cooling water intake system. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the clearnose skate.

5.3.5 Little Skate

The construction activities with the greatest potential to affect little skate EFH would be the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. Increased water column sediment loads from dredging could affect larvae, juveniles, and adults as described in Section 5.1.1. The overall effects of dredging would be reduced by the use of turbidity curtains during dredging and pipeline installation. Noise from pile-driving activities is not expected to adversely affect little skates because the individuals most likely in the area would be relatively large and not as susceptible as smaller fish. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser would make the habitat less suitable for little skates. Disturbances to the benthos, including armoring, could affect benthic prey resources for little skates. However, the benthic habitat near the CCNPP site is not highly productive and constitutes only a relatively small portion of the available benthic habitat in the Bay.

Direct operational impacts to little skate EFH would most likely be from impingement on the trash racks. Little skates were not listed in the yearly impingement samples collected from the

CCNPP Units 1 and 2 traveling screens between 1975 and 1995 (Ringger 2000). However, other large elasmobranchs (cownose ray) occasionally have impinged in large numbers on the trash racks at the existing CCNPP Units 1 and 2, probably as a result of low oxygen levels during the summer (NRC 2005, NRC 2006a, b). Little skates were not caught in entrainment samples collected from the intake for Units 1 and 2 or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Little skates are benthic feeders whose diets would not be adversely affected by the potential entrainment, impingement, and entrapment of prey by the Unit 3 cooling water intake system. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the little skate.

5.3.6 Red Drum

The construction activities with the greatest potential to affect red drum EFH would be the pile driving associated with the installation of the sheet-pile wall at the new intake location and the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. The noises from pile driving likely would be loud enough to affect red drum larvae and juveniles as described in Section 5.1.2. Increased water column sediment loads from dredging could affect larvae, juveniles, and adults as described in Section 5.1.1. The overall effects of these would be reduced further by the relatively short time over which pile driving would occur and the use of turbidity curtains during dredging and pipeline installation. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser would make the habitat less suitable for red drum.

Direct operational impacts to red drum EFH would most likely be from impingement and entrapment. Red drum occurred in the impingement samples collected from CCNPP Units 1 and 2 only in 1983 (Ringger 2000), which could indicate a low likelihood of impingement and entrapment. Red drum were not specifically identified in the entrainment samples collected in the CCNPP Units 1 and 2 intake system or from the baffle wall in 2006 and 2007 (UniStar 2008c). However, sciaenid eggs, which were not identified further, were the second most common organism entrained. These were not likely red drum eggs because red drum spawn primarily in nearshore coastal waters. Impingement, entrainment, and entrapment could indirectly affect red drum EFH because some of the potential prey species in the Chesapeake Bay, such as Atlantic menhaden and bay anchovy, are captured by the intake system for CCNPP Units 1 and 2. However, the intake system for Unit 3 would draw much less water than that for Units 1 and 2 and would not be expected to add significantly to the numbers of these prey species impinged, entrained, or entrapped. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the red drum.

5.3.7 Summer Flounder

The construction activities with the greatest potential to affect summer flounder EFH would be the pile driving associated with the installation of the sheet-pile wall at the new intake location and the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. The noises from pile driving likely would be loud enough to affect summer flounder juveniles of the size potentially found near the site as described in Section 5.1.2. Increased water column sediment loads from dredging could affect larvae, juveniles, and adults as described in Section 5.1.1. The overall effects of these would be reduced further by the relatively short time over which pile driving would occur and the use of turbidity curtains during dredging and pipeline installation. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser would make the habitat less suitable for summer flounder. Disturbances to the benthos, including armoring, could affect benthic prey resources for summer flounder. However, the benthic habitat near the Calvert Cliffs site is not highly productive and constitutes only a relatively small portion of the available benthic habitat in the Bay.

Direct operational impacts to summer flounder EFH would most likely be from impingement and entrapment. Summer flounder occurred in impingement samples collected from the CCNPP Units 1 and 2 intake system in 18 of the 21 years from 1975 to 1995 and was the fifth most-impinged species in 1984 (Ringger 2000). About 90 percent of impinged summer flounder survive. Despite the possible occurrence of smaller individuals at the Calvert Cliffs site, summer flounder were not caught in entrainment samples collected from the intake for Units 1 and 2 or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Impingement, entrainment, and entrapment could indirectly affect summer flounder EFH because one of the key prey species, bay anchovy (Latour et al. 2008), is captured by the intake system for CCNPP Units 1 and 2. However, the intake system for Unit 3 would draw much less water than that for Units 1 and 2 and would not be expected to add significantly to the numbers of these prey species impinged, entrained, or entrapped. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the summer flounder.

5.3.8 Windowpane Flounder

The construction activities with the greatest potential to affect windowpane flounder EFH would be the pile driving associated with the installation of the sheet-pile wall at the new intake location and the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. The noises from pile driving likely would be loud enough to affect windowpane flounder juveniles as described in Section 5.1.2. Increased water column sediment loads from dredging could affect juveniles and adults as described in Section 5.1.1. The overall effects of these would be reduced further by the relatively short time over which pile driving would occur and the use of turbidity curtains during dredging and pipeline installation. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser would make the habitat less suitable for windowpane flounder. Disturbances to the benthos, including armoring, could affect benthic prey resources for windowpane flounder. However, the benthic habitat near the Calvert Cliffs site is not highly productive and constitutes only a relatively small portion of the available benthic habitat in the Bay.

Direct operational impacts to windowpane flounder EFH would most likely be from impingement and entrapment. Windowpane flounder occurred in 5 of the 21 yearly impingement samples collected from CCNPP Units 1 and 2 between 1975 and 1995 (Ringger 2000). However, the species only occurred in 1 year from 1981 to 1995, which could indicate a reduced likelihood of impingement and entrapment. Windowpane flounder were not caught in entrainment samples collected from the intake for Units 1 and 2 or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Windowpane flounder are benthic feeders whose diets would not be adversely affected by the potential entrainment, impingement, or entrapment of prey by the Unit 3 cooling water intake system. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the windowpane flounder.

5.3.9 Winter Skate

The construction activities with the greatest potential to affect winter skate EFH would be the dredging for the refurbishment of the barge dock and installation of the cooling water discharge and fish-return pipelines. Increased water column sediment loads from dredging could affect larvae, juveniles, and adults as described in Section 5.1.1. The overall effects of dredging would be reduced by the use of turbidity curtains during dredging and pipeline installation. Noise from pile-driving activities is not expected to adversely affect winter skates because the individuals most likely in the area would be relatively large and not as susceptible as smaller fish. Armoring near the new baffle wall, the fish-return discharge point, and the cooling water discharge diffuser would make the habitat less suitable for winter skates. Disturbances to the benthos, including armoring, could affect benthic prey resources for winter skates. However, the benthic habitat near the Calvert Cliffs site is not highly productive and constitutes only a relatively small portion of the available benthic habitat in the Bay.

Direct operational impacts to winter skate EFH would most likely be from impingement on the trash racks. Winter skates were not listed in the yearly impingement samples collected from the CCNPP Units 1 and 2 traveling screens between 1975 and 1995 (Ringger 2000). However, other large elasmobranchs (cownose ray) occasionally have been impinged in large numbers on the trash racks at the existing CCNPP Units 1 and 2, probably as a result of low oxygen levels during summer (NRC 2005, NRC 2006a, b). Winter skates were not caught in entrainment samples collected from the intake for Units 1 and 2 intake system or at the baffle wall in 2006 and 2007 (UniStar 2008c), which indicates that there is a low likelihood of entrainment by the Unit 3 CWS. Winter skates are benthic feeders whose diets would not be adversely affected by the potential entrainment and impingement of prey by the Unit 3 cooling water intake system. Therefore, the construction and operation of the proposed new Unit 3 at the Calvert Cliffs site are likely to have a more than minimal, although not substantial, adverse effect on EFH for the winter skates.

6.0 Cumulative Effects

The NRC and the Corps review team considered potential cumulative effects on EFH and Federally managed fish and shellfish species in conjunction with building and operating a new nuclear unit at the Calvert Cliffs site. For this analysis, past and present actions create the existing baseline conditions, and cumulative effects include the effects of future State, Tribal, local, and private actions that are reasonably certain to occur in the action area considered in this assessment. The future is defined as the start of construction of the proposed Unit 3 until the conclusion of decommissioning. The action area for this evaluation is the Calvert Cliffs site and the mesohaline (salinity ranges from about 5 to 19 ppt) western portion of the Chesapeake Bay. The extent of the mesohaline zone in the Chesapeake Bay varies seasonally, but at its maximum, includes the western Bay shore from near the mouth of the Rappahannock River to Baltimore (MDNR PPRP 2008a; CBP 2009).

Two future non-Federal projects were identified within the action area. Reinforcing an existing pier at the Cove Point liquefied natural gas (LNG) terminal, about 3.5 mi southeast of the Calvert Cliffs site, would involve installing 108-in.-diameter tubular steel monopile mooring dolphins, reinforcing existing and installing new breasting dolphins, installing walkways, and dredging about 30 ac of Bay bottom around the pier to a depth of about −45.0 ft mean low water (USACE 2009). Suitable dredged material would be placed in a stone-reinforced area along 2513 ft of shoreline and extending an average of 225 ft channelward to create a tidal marsh. The effects of this project on EFH would be similar to the effects from construction of the in-water components described for the proposed Unit 3. Because the Cove Point LNG terminal is close to the Calvert Cliffs site, it is likely that similar species and habitats would exist and experience similar localized effects. In additionally, ongoing operation of the terminal could affect EFH as a result of vessel operation, most notably through the use of Chesapeake Bay water for ballast. The addition of ballast water to a vessel would likely remove certain life stages of certain species from the immediate area. Such removal could have similar effects on the populations as impingement, entrapment, and entrainment from operation of the proposed CCNPP Unit 3.

Building and operating a new nuclear reactor on the Calvert Cliffs site could interact with a part of the proposed Mid-Atlantic Power Pathway (MAPP) project, which proposes to build a 500-kV transmission line from Possum Point, Virginia to Salem, New Jersey (MAPP 2009a). The second part of the MAPP project would involve building an underwater crossing through the Chesapeake Bay, extending from Calvert Cliffs to the Maryland eastern shore. The route could include broadband fiber optic cables (PHI 2009). Details of this part of the project are not yet available, but the installation of underwater cables could involve horizontal directional drilling from the shore into the Bay and some type of trenching to install the cable within the Bay. The schedule suggests that the crossing under the Bay is expected to be completed in 2014 (MAPP 2009b). The MAPP project could affect benthic habitats and noise-sensitive species in the same nearshore area off the Calvert Cliffs site, but such impacts are expected to be temporary as benthic organisms would recolonize the area, and mobile organisms would avoid noisy construction areas.

CCNPP Units 1 and 2 will continue to operate during the construction and operation of proposed Unit 3. Calvert Cliffs Nuclear Power Plant, Inc. requested power uprates for the two units that will increase the generating capacity of each unit by about 1.38 percent. The uprate was completed in December 2009 for Unit 2, and a decision is expected by the end of summer 2010 for Unit 1 (NRC 2009). The uprates would likely result in a small increase in water withdrawn from the Bay and a small increase in the temperature of water discharged to the Bay. Neither increase would be expected to add significantly to the present effects of Units 1 and 2 on the Bay, nor the combined effects of Units 1, 2, and 3.

The Calvert Cliffs site operations, other anthropogenic stressors, and climatic events could combine to adversely affect EFH and Federally managed fish and shellfish species of the Chesapeake Bay. Commercial and recreational fishing pressure, the most noticeable anthropogenic stressor, has significantly affected aquatic resources in the Bay, causing population declines for several species (Greiner and Vogt 2009). Heavy fishing pressure, in conjunction with habitat loss and pollution, has caused serious reductions in the populations of many species inhabiting the Bay. Notable among these are the eastern oyster (*Crassostrea virginica*), blue crab (*Callinectes sapidus*), striped bass (*Morone saxatilis*), and several species of forage fish (CBP 2007). Other species, including weakfish (*Cynoscion regalis*), summer flounder (*Paralichthys dentatus*), and Atlantic croaker (*Micropogonias undulatus*), have been affected primarily by overfishing (McBride 2006). Steps to reduce fishing pressure, such as catch limits and moratoria, have contributed to population increases of some of these species (McBride 2006). The operation of proposed Unit 3 at the Calvert Cliffs site could also contribute to population declines by impinging, entrapping, or entraining species, but the effects would be minor relative to the existing Units 1 and 2, which operate using once-through cooling systems.

A significant issue facing the Chesapeake Bay is global climate change. The buildup of greenhouse gas emissions that occurred in the 20th century has assured that some climate change will occur within the 21st century, even without increasing the current rates of emissions (Teng et al. 2006). The projected climate changes are predicted to affect the Chesapeake Bay primarily through increasing sea level, air and water temperatures, and changes in precipitation (Jasinski and Claggett 2009). Increased water acidity, which is a looming issue in some ocean habitats (Doney et al. 2009), is considered a less important factor for the Chesapeake Bay at present (Jasinski and Claggett 2009). Wu et al. (2009) projected that the sea level at Solomons Island, about 7.5 mi south of CCNPP, is expected to rise by about 22 to 24 in. by the end of the 21st century. However, the estimate did not consider that the melting of the West Antarctic Ice Sheet could cause regional differences in sea level rise, which implies that the projection may have underestimated the rise in sea level in the Chesapeake Bay area by as much as one-third (Mitrovica et al. 2009). Najjar et al. (2009) projected that air temperatures in the Chesapeake Bay region could rise by about 5°F to 12°F by the year 2100. Because surface-water temperature is roughly related to air temperature, a similar increase in water temperature could be expected (Wood et al. 2002). Changes in rainfall are difficult to predict and model results often disagree. Most models predict, with considerable variability, that precipitation in winter and spring in the latter part of the 21st century could change an average of 3 percent over current levels (Najjar et al. 2009). One of the effects of increased precipitation is a reduction in salinity, particularly in the winter and spring (Jasinski and Claggett 2009).

The interaction of the operation of the proposed Unit 3 and the predicted rise in Bay water level is difficult to assess, but it is not likely that the plant's operations would add significantly to the potential impacts of sea-level rise (e.g., increased shoreline erosion). Similarly, the small sizes of the discharge plumes from Units 1 and 2 and proposed Unit 3 compared to the volume of water in the Chesapeake Bay suggests that the thermal discharges from all three units would not add importantly to the thermal regime in the Bay. Salinity in the Bay is predominantly related to flow from the Susquehanna River (Gibson and Najjar 2000), and the comparatively small discharges from all three units would not contribute to significant salinity changes in the Bay.

The review team concludes that the incremental contribution of construction and operation of Unit 3 on the Calvert Cliffs site to the cumulative effects on EFH and Federally managed fish and shellfish species in the Chesapeake Bay would be unlikely to noticeably alter populations.

7.0 Mitigation Measures

The primary factors that could affect EFH in the CCNPP Unit 3 project area would be construction activities, such as dredging for the barge dock restoration or pipeline installation and pile driving for the wedge-shaped pool and barge dock renovation. Increased water column turbidity is a primary effect from dredging. UniStar proposes to use methods such as turbidity curtains to reduce the potential turbidity impacts to aquatic resources in Chesapeake Bay (UniStar 2008d). This would include the use of turbidity curtains around dredges or active dredge areas. The State of Maryland, as a condition on granting a Certificate of Public Convenience and Necessity (CPCN), stipulated that UniStar conduct dredging at times of the year that are appropriate to avoid impacts to Natural Oyster Bar (NOB) 19-2, part of which is within the dredging area (MDNR PPRP 2008b).

Pile driving would be a relatively short-term activity with unavoidable adverse impacts. However, the extent of the adverse impacts is mitigable to some degree. UniStar has acknowledged that the effects of noise and vibrations could be reduced by various means, but has not committed to any for the proposed project at this time (UniStar 2008d). These could include placing bubble curtains around large piles and switching to hammers that produce less sound. Turbidity curtains would be used around pile driving areas to reduce the potential for increased water column sediment (UniStar 2008d). Buffered sound and less extensive sediment suspension would result in fewer adverse impacts on designated EFH and on Federally managed fish and shellfish species in the Chesapeake Bay.

There are also potential mitigation measures for operation of the proposed Unit 3 that may reduce adverse effects on designated EFH and on Federally managed fish and shellfish species in the Chesapeake Bay. Although the proposed new unit would include a fish-return system at the CWS intake, there is no proposed fish-return system at the UHS intake or at the entrance to the intake pipelines at the wedge-shaped pool. The UHS intake would not be operated often, so there would not be as great a need for a fish-return system at that location. However, the openings of the intake pipelines are the point of no return for many organisms as they are delivered into the common forebay. The trash racks at the pipe openings would prevent large organisms from being delivered to the common forebay. However, large organisms could be impinged on those trash racks. Any organisms smaller than the trash rack spacing (3.5 in.) likely would be drawn into the common forebay, where they would be subjected to entrainment, impingement, and/or entrapment. Installation of travelling screens and a fish-return system at the pipe openings in the wedge-shaped pool would reduce impingement and entrapment in the common forebay. In addition, to reduce effects of entrapment in the wedge-shaped pool and in the common forebay, a monitoring and rescuing program could be implemented to transfer such organisms back to the Bay. Such a program could include visual inspection, collection with nets or other devices, and delivery by a fish-return pipe or by direct transfer to the Bay in a location less likely to be affected by the intake area for Units 1, 2, and 3.

Although the NRC lacks the statutory authority to require any of the above potential mitigation measures, the staff recognizes that such potential mitigation could further reduce adverse impacts on designated EFH and on Federally managed fish and shellfish species in the Chesapeake Bay. The Corps permit, if issued, could include special conditions such as time-of-year restrictions or specific methods of work to ameliorate potential impacts to EFH for the authorized construction and maintenance dredging activities. EFH Conservation Recommendations necessary to protect EFH may also be included in the Corps DA permit. Mitigation may only be employed after all appropriate and practical steps to avoid and minimize adverse impacts to aquatic resources have been taken. All remaining unavoidable impacts must be compensated to the extent appropriate and practicable.

8.0 Conclusions

The potential impacts of the construction and operation of the proposed Unit 3 at the Calvert Cliffs site on Federally managed species and their designated EFH near the site have been evaluated. The known distributions and records of those species, the potential adverse impacts of the construction and operation to the species, their habitat, and their prey have been considered in this EFH assessment.

The disturbance created by the project, including sediment resuspension, would temporarily disturb EFH species in the area. Wave patterns and littoral drift patterns would be multi-directionally deflected and interrupted by the proposed structures and stone revetment. The proposed project would reduce the benefits and habitat that open water areas provide. However, motile species can move out of the project area during project construction and are expected to return following completion of the project. Benthic repopulation is expected to occur and benthic communities usually recover quickly from the impacts associated with similar projects, where depths dredged to bottom contours are not markedly different from pre-dredge depths. The overall effects of the dredging on the ecosystem and EFH are temporary, and the area proposed to be dredged would continue to be similar depth habitat. The proposed project area could either revert to current depths if maintenance dredging is not conducted through the years, or the waterway ecosystem would adjust to the depth change in the waterway and reach an equilibrium, providing habitat for those fish and wildlife communities that develop with the changes in the waterway.

Vessel traffic at the barge area is limited to the facility uses, and use of the channel may result in the discharge of small amounts of gas, oil, and grease from motors, as well as littering of the waterway with debris. It is expected that vessel traffic in the area and its associated pollution would increase due to improved access. The proposed depth increase would allow for larger vessels to navigate the waterway area, although access would be limited to vessels associated with the nuclear facility property. Increasing depths at the dredge site may reduce concentrations of dissolved oxygen available and reduce light penetration to the bottom, reducing photosynthesis opportunities. However, the proposed depths are similar to the existing waterway depths in the majority of the project area. Also, there is no SAV in the shallower depths closer to the shoreline.

Mechanical dredging uses a crane and bucket to excavate and transfer bottom sediments to a barge for transport to the disposal area. Some dredged material and water can be lost from the bucket as it is raised and deposited into the barge. The amount of material re-entering the water column as it is transferred from the barge to trucks is considered to be *de minimus*. The suspended sediment levels are also expected to return to normal when the off-loading activities are terminated. No toxic substances in toxic amounts are expected to be in the dredged material.

Water quality is expected to change. However, the alteration may not be considerably beneficial or detrimental. Dredging, structures, and stone revetment may not substantially improve water quality or offset other impacts to water quality. In general, the project and resultant uses may have impacts on water quality that may not be discernable from normal water quality fluctuations.

The primary effect of operation of the proposed Unit 3 on EFH would be the removal of water from the Bay and the associated entrainment, impingement, and entrapment of water-dwelling biota. Entrainment and impingement by the cooling water system of the proposed new unit would be much less than that generated by existing Units 1 and 2.

The NRC and the Corps have determined the construction and operation of the proposed Unit 3 at the Calvert Cliffs site would have more than minimal, although not substantial, adverse effect on EFH within the Chesapeake Bay by loss of spawning, nursery, forage, and/or shelter habitat for all of the nine species considered. The NRC lacks the statutory authority to require any mitigation measures that would minimize adverse effects on EFH. The Corps does not recommend any mitigative measures to minimize adverse effects on EFH at this time. This determination may be modified if additional information indicates otherwise and would change the preliminary determination.

9.0 References

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Appendix G

Supporting Documentation on Radiological Dose Assessment

Appendix G

Supporting Documentation on Radiological Dose Assessment

The U.S. Nuclear Regulatory Commission (NRC) staff performed an independent dose assessment of the radiological impacts resulting from normal operation of the new and existing nuclear units at and near the Calvert Cliffs Nuclear Power Plant (CCNPP). The results of this assessment are presented in this appendix and are compared to the results from UniStar found in Section 5.9 of this EIS, Radiological Impacts of Normal Operations. The appendix is divided into four sections: (1) dose estimates to the public from liquid effluents, (2) dose estimates to the public from gaseous effluents, (3) cumulative dose estimates, and (4) dose estimates to the biota from liquid and gaseous effluents.

G.1 Dose Estimates to the Public from Liquid Effluents

The staff used the dose assessment approach specified in Regulatory Guide 1.109 (NRC 1977) and the LADTAP II computer code (Strenge et al. 1986) to estimate doses to the maximally exposed individual (MEI) and population from the liquid effluent pathway of the proposed Unit 3. The staff used the annual radioactive effluent release reports for the years 2000 to 2006 to estimate doses to the MEI and population from liquid effluent releases from the existing CCNPP units (Constellation 2001, 2002, 2003, 2004, 2005, 2006, 2007).

G.1.1 Scope

Doses from the proposed Unit 3 to the MEI were calculated and compared to regulatory criteria for the following:

- Total Body – Dose was the total for all pathways (i.e., drinking water, fish and shellfish consumption, shoreline usage, swimming exposure, boating) with the highest value for either the adult, teen, child, or infant compared to the 0.03 mSv/yr (3 mrem/yr) per reactor dose design objective in Title 10 of the Code of Federal Regulations (CFR), Part 50, Appendix I.

- Organ – Dose was the total for each organ for all pathways (i.e., drinking water, fish and shellfish consumption, shoreline usage, swimming exposure, boating) with the highest value for either the adult, teen, child, or infant compared to the 0.1 mSv/yr (10 mrem/yr) per reactor dose design objective specified in 10 CFR Part 50, Appendix I.

The staff reviewed the exposure pathways and the input parameters and values used by UniStar (2009) for appropriateness, including references made to the AREVA NP, Inc. (AREVA) U.S. EPR design certification document (AREVA 2007). Default values from Regulatory Guide 1.109 (NRC 1977) were used when site-specific input parameters were not available from UniStar. The staff concluded that the assumed exposure pathways were conservative in that the Chesapeake Bay is not a source for irrigation or drinking water (except for ship borne desalination facilities).

G.1.2 Resources Used

To calculate doses to the public from liquid effluents, the staff used a personal computer version of the LADTAP II code entitled NRCDOSE, Version 2.3.10 (Chesapeake Nuclear Services, Inc. 2008) obtained through the Oak Ridge Radiation Safety Information Computational Center (RSICC).

G.1.3 Input Parameters

Table G-1 provides a listing of the major parameters used in calculating dose to the public from liquid effluent releases during normal operation.

G.1.4 Comparison of Results

Table G-2 presents a comparison of UniStar's results for a single new unit with those determined by the staff. Doses calculated for the MEI and population were similar to those developed by UniStar.

For calculating the population dose from liquid effluents, the population distribution used by UniStar was for year 2080, 10 years beyond the anticipated operating license. However, Environmental Standard Review Plan (ESRP) Section 5.4.1 (NRC 2000) instructs the NRC staff to use the "...projected population for 5 years from the time of the licensing action under consideration." Assuming the combined license (COL) licensing action occurs in year 2010 and adding 5 years yields year 2015, so the NRC staff considered using the population for 2015 in its analysis. Using the population projections from Environmental Report (ER) Table 2.5-10 (UniStar 2009) (summarized in Table G-3) yields a population estimate for the year 2015 of 3,676,123. This is significantly smaller than the 2080 projected population (8,124,000), so the doses calculated by UniStar are conservatively high. For comparability, the NRC staff also used 2080 population. Doses for the year 2015 would be a factor of 2.2 less than those reported below.

The staff concurs with the conclusion documented in the ER that the peak MEI and population doses from the existing unit liquid effluent pathway during the period 2002 to 2006 occurred in year 2002. The NRC staff reviewed the annual radioactive effluent release reports for the years 2002 to 2006 (Constellation 2003, 2004, 2005, 2006, 2007) to find the peak occurred in year 2002. The staff's review of the 2002 annual report (Constellation 2003) yielded results equivalent to those reported in Tables 4.5-2 and 5.4-14 of UniStar's ER (UniStar 2009).

Table G-1. Parameters Used in Calculating Dose to the Public from Liquid Effluent Releases

Parameter	Staff Value		Comments
New unit liquid effluent source term (Ci/yr)[a]	H-3	1.66×10^{3}	Values from AREVA U.S. EPR Design Control Document Table 11.2-4 for a single unit (AREVA 2007). These values are the same as those reported in ER Table 3.5-7 (UniStar 2009).
	Na-24	6.10×10^{-3}	
	Cr-51	1.00×10^{-3}	
	Mn-54	5.40×10^{-4}	
	Fe-55	4.10×10^{-4}	
	Fe-59	1.00×10^{-4}	
	Co-58	1.50×10^{-3}	
	Co-60	1.80×10^{-4}	
	Zn-65	1.70×10^{-4}	
	W-187	4.60×10^{-4}	
	Np-239	5.80×10^{-4}	
	Sr-89	5.00×10^{-5}	
	Sr-91	8.00×10^{-5}	
	Y-91m	5.00×10^{-5}	
	Y-93	3.60×10^{-4}	
	Zr-95	1.30×10^{-4}	
	Nb-95	1.00×10^{-4}	
	Mo-99	1.80×10^{-3}	
	Tc-99m	1.70×10^{-3}	
	Ru-103	2.50×10^{-3}	
	Ru-106	3.10×10^{-2}	
	Ag-110m	4.40×10^{-4}	
	Te-129m	6.00×10^{-5}	
	Te-129	4.00×10^{-5}	
	Te-131m	3.10×10^{-4}	
	Te-131	6.00×10^{-5}	
	I-131	3.40×10^{-2}	
	Te-132	4.80×10^{-4}	
	I-132	1.20×10^{-3}	
	I-133	3.50×10^{-2}	
	Cs-134	2.60×10^{-3}	
	I-135	1.50×10^{-2}	
	Cs-136	3.10×10^{-4}	
	Cs-137	3.50×10^{-3}	
	Ba-140	4.20×10^{-3}	
	La-140	7.60×10^{-3}	
	Ce-141	5.00×10^{-5}	
	Ce-143	6.10×10^{-4}	
	Ce-144	1.30×10^{-3}	
	Pr-144	1.30×10^{-3}	

Table G-1. (contd)

Parameter	Staff Value	Comments
Discharge flow rate (ft^3/s)	100	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Source term multiplier	1	Single-unit source term.
Site type	Saltwater	Discharge is to the saltwater Chesapeake Bay.
Reconcentration model	No impoundment	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Impoundment total volume (ft^3)	0	Set to zero for “no impoundment” model (Strenge et al. 1986).
Shore width factor	1.0	Suggested value for tidal basin (NRC 1977; Strenge et al. 1986; UniStar 2009).
Dilution factors for aquatic food and boating, shoreline and swimming, and drinking water	365	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Transit time (hr)	0	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Consumption and usage factors for adults, teens, children, and infants	Shoreline and Boating usage (hr/yr) 200 (adult) 200 (teen) 200 (child) 200 (infant) Swimming usage (hr/yr) 100 (adult) 100 (teen) 100 (child) 100 (infant)	Site-specific values from Table 5.4-2 of the ER (UniStar 2009) and LADTAP II code default values (NRC 1977; Strenge et al. 1986).
	Drinking water usage (L/yr) 730 (adult) 510 (teen) 510 (child) 330 (infant) Fish consumption (kg/yr) 21 (adult) 16 (teen) 6.9 (child) 0 (infant)	MEI drinking water assumes water is desalinated by shipborne water treatment facilities.
Total 50-mi population	8,124,000	Site-specific value from Table 11.2-9 of the FSAR (AREVA 2007).
Total 50-mi sport fishing harvest (kg/yr)	1,290,000	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).

Table G-1. (contd)

Parameter	Staff Value	Comments
Total 50-mi sport invertebrate harvest (kg/yr)	1,580,000	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Total 50-mi commercial fishing harvest (kg/yr)	152,200,000	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Total 50-mi commercial invertebrate harvest (kg/yr)	26,400,000	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Total 50-mi shoreline usage (person-hr/yr)	37,843,909	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Total 50-mi swimming usage (person-hr/yr)	30,133,372	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).
Total 50-mi boating usage (person-hr/yr)	44,285,377	Site-specific value from Table 5.4-1 of the ER (UniStar 2009).

(a) Only radionuclides included in Regulatory Guide 1.109 are considered (NRC 1977).

Table G-2. Comparison of Doses to the Public from Liquid Effluent Releases for a New Unit

Type of Dose[(a)]	UniStar ER (2009)[(a)]	Staff Calculation	Percent Difference
Total Body (mrem/yr)	0.0140 (adult)	0.0140 (adult)	0.0
Organ Dose (mrem/yr)	0.0902 (adult GI-LLI)	0.0902 (adult GI-LLI)	0.0
Thyroid (mrem/yr)	0.0787 (child)	0.0787 (child)	0.0
Population dose from liquid pathway (person-rem/yr)	0.186	0.186	0.0

(a) Results from UniStar ER Tables 5.4-7, 5.4-8 and 5.4-9 (UniStar 2009).

Table G-3. Population Projections from 2000 to 2080 within 50 mi of the Calvert Cliffs Site

	Population Projections within Radii/Distances mi							Annual Average Percent Change for the 10-Year Period
Year	**0 to 10 mi [(a)]**	**10 to 20 mi**	**20 to 30 mi**	**30 to 50 mi**	**30 to 40 mi**	**40 to 50 mi**	**0 to 50 mi [(d)]**	
2000[(b)]	48,755	112,841	162,006	2,886,668	618,907	2,267,761	3,210,270	NA
2010[(c)]	57,937	139,384	189,097	3,116,981	683,019	2,433,962	3,503,399	0.91%
2015[(c)]	63,441	155,687	204,844	3,252,151	719,341	2,532,810	3,676,123	NA
2020[(c)]	69,504	174,040	222,222	3,395,683	757,969	2,637,714	3,861,449	1.02%
2030[(c)]	83,129	216,740	263,498	3,729,663	845,378	2,884,285	4,293,030	1.12%
2040[(c)]	99,840	271,210	314,001	4,122,037	947,388	3,174,649	4,807,088	1.20%
2050[(c)]	120,508	340,666	376,926	4,586,827	1,062,906	3,523,921	5,424,927	1.29%
2060[(c)]	145,458	428,351	454,445	5,134,257	1,200,670	3,933,587	6,162,511	1.36%
2080[(e)]	215,332	683,900	672,100	6,553,000	1,550,000	5,003,000	8,124,000	1.39%

(a) Population estimates and projections include transient and residential population in the 0 to 10 mi range.
(b) Residential population in 2000, U.S. Census Bureau, Decennial Census.
(c) The populations for years 2010 through 2060 have been projected by calculating a growth rate using state population projections (by county) as the base.
(d) Transient population is only included in the 0 to 10 mi distribution.
(e) Population used in GASPAR II Population runs (UniStar 2009).

G.2 Dose Estimates to the Public from Gaseous Effluents

The staff used the dose assessment approach specified in Regulatory Guide 1.109 (NRC 1977) and the GASPAR II computer code (Strenge et al. 1987) to estimate doses to the MEI and to the population within a 50-mi radius of the proposed Unit 3 site from the gaseous effluent pathway for both the proposed and existing units.

G.2.1 Scope

The staff and UniStar calculated the maximum gamma air dose, beta air dose, total body dose, and skin dose from noble gases at the exclusion area boundary location 0.86 mi south of the proposed Unit 3 site. Dose to the MEI was calculated at 0.88 mi SE of the site for the following exposure pathways: plume immersion, direct shine from deposited radionuclides, inhalation, ingestion of local farm or garden vegetables, and ingestion of locally produced beef. The milk ingestion pathway is not considered because there are no known milk cows within 5 mi of the Unit 3 site (UniStar 2009).

The staff reviewed the input parameters and values used by UniStar (2009) for appropriateness, including references made to the AREVA U.S. EPR design control document (2007). Default values from Regulatory Guide 1.109 (NRC 1977) were used when input parameters were not available. The staff concluded that the assumed exposure pathways and input parameters and values used by UniStar were appropriate. These pathways and parameters were used by the staff in its independent calculations using GASPAR II.

Joint frequency distribution data of wind speed and wind direction by atmospheric stability class for the Unit 3 site provided in Table 2.7-42 of the ER (UniStar 2009) were used as input to the XOQDOQ code (Sagendorf et al. 1982) to calculate long-term average χ/Q and D/Q values for routine releases. The staff's independent results compare favorably to those reported in ER Tables 2.7-101 to 2.7-104 (UniStar 2009).

Population doses were calculated for all types of releases (e.g., noble gases, iodines and particulates, and H-3 and C-14) using the GASPAR II code for the following exposure pathways: plume immersion, direct shine from deposited radionuclides, ingestion of vegetables, and ingestion of milk and meat.

G.2.2 Resources Used

To calculate doses to the public from gaseous effluents, the staff used a personal computer version of the XOQDOQ and GASPAR II codes entitled NRCDOSE Version 2.3.10 (Chesapeake Nuclear Services, Inc. 2008) obtained through the Oak Ridge RSICC.

G.2.3 Input Parameters

Table G-4 provides a listing of the major parameters used in calculating dose to the public from gaseous effluent releases during normal operation.

Table G-4. Parameters Used in Calculating Dose to Public from Gaseous Effluent Releases

Parameter	Staff Value		Comments
New unit gaseous effluent source term (Ci/yr)[(a)]	Ar-41	3.4×10^{1}	Values from AREVA U.S. EPR Design Control Document Table 11.3--3 (AREVA 2007). Except for rounding differences, these values are the same as those reported in ER Table 3.5-8 (UniStar 2009).
	Kr-85m	1.5×10^{2}	
	Kr-85	3.4×10^{4}	
	Kr-87	5.3×10^{1}	
	Kr-88	1.8×10^{2}	
	Xe-131m	3.5×10^{3}	
	Xe-133m	1.8×10^{2}	
	Xe-133	8.6×10^{3}	
	Xe-135m	1.4×10^{1}	
	Xe-135	1.2×10^{3}	
	Xe-138	1.2×10^{1}	
	I-131	8.8×10^{-3}	
	I-133	3.2×10^{-2}	
	H-3	1.8×10^{2}	
	C-14	7.3×10^{0}	
	Cr-51	9.7×10^{-5}	
	Mn-54	5.7×10^{-5}	
	Co-57	8.2×10^{-6}	
	Co-58	4.8×10^{-4}	
	Co-60	1.1×10^{-4}	
	Fe-59	2.8×10^{-5}	
	Sr-89	1.6×10^{-4}	
	Sr-90	6.3×10^{-5}	
	Zr-95	1.0×10^{-5}	
	Nb-95	4.2×10^{-5}	
	Ru-103	1.7×10^{-5}	
	Ru-106	7.8×10^{-7}	
	Sb-125	6.1×10^{-7}	
	Cs-134	4.8×10^{-5}	
	Cs-136	3.3×10^{-5}	
	Cs-137	9.0×10^{-5}	
	Ba-140	4.2×10^{-6}	
	Ce-141	1.3×10^{-5}	

Table G-4. (contd)

Parameter	Staff Value		Comments
Existing Units 1 and 2 gaseous effluent source term (Ci/yr)[(a)]	H-3 Ar-41 Co-58 Co-60 Kr-85m Kr-85 Sr-89 Sr-90 Xe-131m Xe-133m Xe-133 Xe-135 I-133 I-131	$4.79 \times 10^{+0}$ 2.72×10^{-3} 8.99×10^{-6} 7.19×10^{-6} 8.60×10^{-2} $1.88 \times 10^{+2}$ 9.08×10^{-9} ND $1.51 \times 10^{+1}$ $6.49 \times 10^{+0}$ $2.58 \times 10^{+2}$ $2.67 \times 10^{+1}$ 2.32×10^{-2} 3.28×10^{-2}	Values from 2006 annual radioactive effluent release report Table 4.5-7 (UniStar 2009) and Table 1C (Constellation 2007).
Population distribution	Table 2.5-10 of the ER (UniStar 2009)		Population distribution used by UniStar and the NRC staff was for year 2080. Note that ESRP Section 5.4.1 requires use of "projected population for 5 years from the time of the licensing action under consideration." Assuming the ESP licensing action occurs in year 2010 and adding 5 years yields year 2015. See discussion of population dose in Section G.2.5.
Wind speed and direction distribution	Table 2.7-42 of the ER (UniStar 2009)		Site-specific data provided by UniStar for 5-year period from 2000 to 2005.
Atmospheric dispersion factors (s/m^3)	Tables 2.7-99 to 2.7-110 of the ER (UniStar 2009)		Site-specific data provided by UniStar for 5-year period from 2000 to 2005.
Ground deposition factors (m^{-2})	Tables 2.7-111 to 2.7-114 of the ER (UniStar 2009)		Site-specific data provided by UniStar for 5-year period from 2000 to 2005.
Milk production rate within a 50-mi radius of the Calvert Cliffs site (kg/yr)	$2.34 \times 10^{+8}$		Site-specific data provided by UniStar (2009).
Vegetable/fruit production rate within a 50-mi radius of the Calvert Cliffs site (kg/yr)	$5.62 \times 10^{+11}$		Site-specific data provided by UniStar (2009).

Table G-4. (contd)

Parameter	Staff Value	Comments
Meat production rate within a 50-mi radius of the Calvert Cliffs site (kg/yr)	$3.58 \times 10^{+7}$	Site-specific data provided by UniStar (2009).
Pathway receptor locations (direction, distance, and atmospheric dispersion factors) - nearest site boundary, vegetable garden, residence, meat animal	Table 5.4-6 and Tables 2.7-105 to 2.7-107 of the ER (UniStar 2009)	Site-specific data provided by UniStar (2009).
Consumption factors for milk, meat, leafy vegetables, and vegetables	Milk (L/yr) 310 (adult) 400 (teen) 330 (child) 330 (infant) Meat (kg/yr) 110 (adult) 65 (teen) 41 (child) 0 (infant) Leafy vegetables (kg/yr) 64 (adult) 42 (teen) 26 (child) 0 (infant) Vegetables (kg/yr) 520 (adult) 630 (teen) 520 (child) 0 (infant)	Table 5.4-5 of the ER (UniStar 2009) and Regulatory Guide 1.109 (NRC 1977).
Fraction of year leafy vegetables are grown	0.58	Site-specific value from Table 5.4-4 of the ER (UniStar 2009).
Fraction of year that milk cows are on pasture	0.58	Site-specific value from Table 5.4-4 of the ER (UniStar 2009).
Fraction of MEI vegetable intake from own garden	0.76	Default value of GASPAR II code (Strenge et al. 1987).
Fraction of milk-cow intake that is from pasture while on pasture	1	Default value of GASPAR II code (Strenge et al. 1987).

Table G-4. (contd)

Parameter	Staff Value	Comments
Average absolute humidity over the growing season (g/m^3)	8.4	Site-specific value from Table 5.4-4 of the ER (UniStar 2009).
Average temperature over the growing season (°F)	66.8	Site-specific value from Table 5.4-4 of the ER (UniStar 2009).
Fraction of year beef cattle are on pasture	0.58	Site-specific value from Table 5.4-4 of the ER (UniStar 2009).
Fraction of year beef cattle intake that is from pasture while on pasture	1	Default value of GASPAR II code (Strenge et al. 1987).

(a) To convert Ci/yr to Bq/yr, multiply the value by 3.7×10^{10}.

G.2.4 Comparison of Doses to the Public from Gaseous Effluent Releases

Table G-5 compares results documented in the ER (UniStar 2009) for doses from noble gases at the exclusion area boundary with the results calculated by the NRC staff. The doses provided by UniStar and those calculated by the NRC were similar.

Table G-6 presents doses to the MEI calculated by UniStar and the staff. Doses to the MEI were calculated at the nearest residence, nearest garden, and nearest beef cattle. The doses estimated by UniStar and those calculated by the NRC staff were similar.

Table G-5. Comparison of Doses to the Public from Noble Gas Releases for a New Unit

Type of Dose	UniStar ER (2008) [(a)]	Staff Calculation	Percent Difference
Gamma air dose at exclusion area boundary – noble gases only (mrad/yr)	0.34	0.35	2.9
Beta air dose at exclusion area boundary – noble gases only (mrad/yr)	2.8	2.9	3.6
Total body dose at exclusion area boundary – noble gases only (mrem/yr)	0.215	0.22	2.3
Skin dose at exclusion area boundary – noble gases only (mrem/yr)	2.05	2.1	2.4

(a) Results from UniStar ER Table 5.4-12 (UniStar 2009).

Table G-6. Comparison of Doses to the MEI from Gaseous Effluent Releases for a New Unit

Location	Pathway	Total Body Dose (mrem/yr)	Bone Dose (mrem/yr)	Skin Dose (mrem/yr)
Nearest residence, 0.88 mi southeast	Plume	0.214	0.214	2.05
Nearest residence, 0.88 mi Southeast	Ground	0.00149	0.00149	0.00174
Nearest residence, 0.88 mi southeast	Inhalation			
	Adult	0.00413	7.36×10^{-5}	0.00430
	Teen	0.00436	8.98×10^{-5}	0.00434
	Child	0.00385	1.10×10^{-4}	0.00383
	Infant	0.00222	5.76×10^{-5}	0.00220
Nearest garden, 1.33 mi south southeast	Vegetable			
	Adult	0.0234	0.107	0.0229
	Teen	0.0371	0.176	0.0362
	Child	0.0863	0.422	0.0853
Nearest meat animal, 0.88 mi southeast	Meat			
	Adult	0.0174	0.0818	0.0172
	Teen	0.0144	0.0691	0.0144
	Child	0.0267	0.130	0.0267

G.2.5 Comparison of Results – Population Doses

Table G-7 compares the UniStar population dose estimates taken from Table 5.4-13 of the ER (UniStar 2009) with the NRC staff estimates for the new unit. The staff's independent calculation for population dose yields results that are comparable to the UniStar ER estimates for the proposed Unit 3. Both UniStar and the NRC staff used the population estimate for the year 2080 which is a factor of 2.2 times higher than the population estimated for the year 2015 (5 years past the expected licensing action).

Table G-7. Comparison of Population Total Body Doses from Gaseous Effluent Releases for Proposed Unit 3

Pathway	UniStar ER (2008) (person-rem/yr)[(a)]	Staff Estimate Population (person-rem/yr)	Percent Difference
Noble gases	3.63	3.65	0.55
Iodines and particulates	NR[(b)]	0.0307	-
Tritium and C-14	NR[(b)]	1.23	-
Total	5.52	4.91	-11

(a) Results from UniStar ER Table 5.4-13 (UniStar 2009).
(b) Values not reported in ER (UniStar 2009).

G.3 Cumulative Dose Estimates

Table G-8 compares UniStar's results for cumulative dose estimates to the MEI with those calculated by the NRC staff. Cumulative dose estimates include doses from all pathways (i.e., direct radiation, liquid effluents, and gaseous effluents) for both the proposed Unit 3 and the existing Units 1 and 2 at the Calvert Cliffs site. These cumulative dose estimates were estimated for comparison to the dose standards of 40 CFR Part 190. Cumulative dose estimates calculated by UniStar (2009) and the NRC staff were similar but not identical. Differences in the cumulative dose were due to UniStar's selection of the highest dose between 2000 and 2005 for Units 1 and 2. Whereas the staff selected 2006 as a year indicative of the current trend in MEI doses from plant activity. UniStar's selection is bounding.

Table G-8. Comparison of Cumulative Doses to the Maximally Exposed Individual

Dose	UniStar ER (2009)[(a)(b)]	Staff Estimate[(c)]	Percent Difference	40 CFR Part 190 Dose Standards
Whole body (mrem/yr)	0.36	0.35	-2.8	25
Thyroid dose (mrem/yr)	0.62	0.64	3.2	75
Dose to other organ – (mrem/yr)[(d)]	1.2	.87	-27	25

(a) Doses from direct radiation were determined to be negligible (UniStar 2009).
(b) Sum of dose from liquid and gaseous effluent releases for the two existing units and the proposed unit are from Table 5.4-15 of the ER (UniStar 2009).
(c) The staff calculation included the sum of doses from liquid and gaseous effluent releases from the two existing units and the new proposed unit. Doses from liquid effluent for existing units were taken from the 2006 annual radiological effluent report (Constellation 2007). Doses from gaseous effluent for existing units were calculated.
(d) UniStar combined the critical organ for liquids (adult GI-LLI) and gaseous effluents (child – bone) to conservatively represent the maximum dose (UniStar 2009). Staff combined the maximum organ from all pathways as a conservative estimate of maximum organ dose.

G.4 Dose Estimates to the Biota from Liquid and Gaseous Effluents

To estimate doses to the biota from the liquid and gaseous effluent pathways, the staff used the LADTAP II code (Strenge et al. 1986), the GASPAR II code (Strenge et al. 1987), and input parameters supplied by UniStar (2009) in its ER.

G.4.1 Scope

The staff estimated the doses to biota other than humans using surrogate species; using the characteristics of surrogate species to represent a range of species is an accepted methodology. Fish, invertebrates, and algae are used as surrogate aquatic biota species. Muskrats, raccoons, herons, and ducks are used as surrogate terrestrial biota species. The staff recognizes the LADTAP II computer program as an appropriate method for calculating dose to the aquatic biota and for calculating the liquid-pathway contribution to terrestrial biota. The LADTAP II code calculates an internal dose component and an external dose component and sums them for a total body dose. The staff reviewed the input parameters used by UniStar for appropriateness. Default values from Regulatory Guide 1.109 (NRC 1977) were used when site-specific input parameters were not available. The staff concluded that all of the LADTAP II input parameters used by UniStar were appropriate. These parameters were used by the staff in its independent calculations using LADTAP II.

The LADTAP II code calculates biota dose only from the liquid effluent pathway. Terrestrial biota could also be exposed via the gaseous effluent pathway. The gaseous pathway doses would be the same as doses for the MEI calculated using the GASPAR II code. UniStar (2009) used the MEI doses at the exclusion area boundary (0.88 mi from the plant) to estimate these doses. However, because animals may live within the site boundary, closer than maximally exposed humans, the staff used a location 0.25 mi from the release point for estimating onsite biota exposures. The ratio of radionuclide concentrations in air at the biota location to the concentrations at the MEI location is used to adjust (or scale) the dose. Dose from exposure to atmospheric plumes is directly proportional to air concentration. To account for the greater proximity of the main body mass of animals to the ground compared to humans, the biota calculation assumed a ground deposition factor twice that used in the human MEI calculation. The gaseous pathway doses are summed and combined with the liquid pathway doses for a total dose for the representative biota species.

G.4.2 Resources Used

To calculate doses to the biota, the staff used a personal computer version of the LADTAP II and GASPAR II computer codes entitled NRCDOSE Version 2.3.10 (Chesapeake Nuclear Services, Inc. 2008). NRCDOSE was obtained through the Oak Ridge RSICC.

G.4.3 Input Parameters

The NRC staff used the input parameters for LADTAP II and GASPAR II specified in Sections G.2.3 and G.2.4 to calculate biota dose.

G.4.4 Comparison of Results

Table G-9 compares UniStar's biota dose estimates from liquid and gaseous effluents taken from Table 5.4-19 of the ER (UniStar 2009) with the NRC staff's estimates. Dose estimates were similar until staff added ingestion of vegetables and calculated the doses from gaseous releases at a location closer to the gaseous release point. Even though percent differences are large for gaseous doses, all of the estimated doses are well below NCRP and IAEA guidelines (as discussed in Section 5.9.5 of this EIS).

Table G-9. Comparison of Dose Estimates to Biota from Liquid and Gaseous Effluents, Unit 3

Biota	Pathway	UniStar ER (2009) (mrad/yr)	Staff Calculation (mrad/yr)	Percent Difference
Fish	Liquid	0.326	0.327	0
	Gaseous[(a)]	NA	NA	-
Muskrat	Liquid	1.28	0.975	-24
	Gaseous	0.22	32.9	14800
Raccoon	Liquid	0.0471	0.046	-2.3
	Gaseous	0.22	32.9	14800
Heron	Liquid	0.17	0.17	0
	Gaseous	0.22	32.9	14800
Duck	Liquid	1.31	1.02	-22
	Gaseous	0.22	32.9	14800
Algae	Liquid	5.13	5.97	+16
	Gaseous[(a)]	NA	NA	NA
Invertebrate	Liquid	2.62	2.67	+1.9
	Gaseous[(a)]	NA	NA	NA

(a) Fish, invertebrate species, and algae would not be exposed to gaseous effluents.

G.5 References

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

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

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Appendix H

Authorizations, Permits, and Certifications

Appendix H

Authorizations, Permits, and Certifications

This appendix contains a list of the environmental-related authorizations, permits, and certifications potentially required by Federal, State, regional, local, and affected Native American tribal agencies related to the combined license for the Calvert Cliffs Nuclear Power Plant, Unit 3. The table is adapted from Table 1.3-1 of the Environmental Report submitted to the U.S. Nuclear Regulatory Commission by UniStar.

Table H-1. Authorizations/Permits Required for Combined License

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
U.S. Nuclear Regulatory Commission (NRC)	10 Code of Federal Regulations (10 CFR) Part 40	Source Material License	Possession, use and transfer of source material.	Submitted March 2008
NRC	10 CFR Part 52, Subpart C	Combined License	Construction and Operation of a nuclear power plant.	Submitted Part 1 July 2007, Submitted March 2008
NRC	10 CFR Part 70	Special Nuclear Material License	Possession, delivery, receipt, use, transfer of fuel.	Submitted March 2008
NRC	10 CFR Part 30	By-product Material License	Production, transfer, receipt acquisition, ownership, possession of nuclear byproduct materials	Submitted March 2008
NRC	Clean Air Act Section 176 (42 U.S.C. 7506); 40 CFR Part 93 Subpart B	Air Conformity Analysis	Conformity with State Implementation Plan for criteria air pollutants in non-attainment zones	Prior to issuance of the combined license
Federal Aviation Administration	49 U.S.C. 44718; 14 CFR 77.13	Construction Notice	Construction of structures (>200 feet) affecting air navigation	Issued August 2009
USACE	Federal Water Pollution Control Act, Section 404; 33 CFR 322-323; Rivers and Harbors Act 33 U.S.C. 403 Section 10; 33 U.S.C. 1344	Individual Permit	Excavation, dredging, and/or disposal of dredged material in navigable waters; filling of waters of U.S.	Submitted May 2008

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
Maryland Department of the Environment (MDE)	Coastal Zone Management Act, 16 U.S.C. 1451 et seq., 15 CFR 930.57	CZMA Consistency Certification and Approval	Activities affecting the state's coastal zone resources.	Incorporated as part of USACE/MDE Joint Permit Application submitted May 2008
U.S. Fish and Wildlife Service (FWS)	Endangered Species Act (ESA) Section 7, 16 U.S.C. 1536	Consultation regarding potential to adversely impact protected species	Identification of protected species and critical habitat onsite and in the vicinity of site, assessment of construction and operation impacts.	Began Informal consultation January 2009
National Marine Fisheries Service (NMFS)	ESA Section 7, 16 U.S.C. 703 et seq.; 50 CFR 402	Consultation regarding potential to adversely impact protected species	Identification of protected species and critical habitat onsite and in the vicinity of site, assessment of construction and operation impacts.	Incorporated as part of USACE/MDE Joint Permit Application submitted May 2008
NMFS	Magnuson-Stevens Fishery Conservation Management Act Section 305(b); 16 U.S.C. 1801 et seq	Consultation regarding potential impacts to essential fish habitat (EFH)	Identification of EFH in the site vicinity, assessment of project operations impacts	Incorporated as part of USACE/MDE Joint Permit Application submitted May 2008
FWS	Bald and Golden Eagle Protection Act, 16 U.S.C. 668(a); Migratory Bird Permits, 50 CFR 21	Eagle Scientific Collecting Permit	Eagle management activities	Issued March 26, 2009

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
State Historic Preservation Office (SHPO) / MD Historic Trust	National Historic Preservation Act (NHPA) 16 U.S.C. 470 et seq; 36 CFR 800	Cultural Resources Review and Consultation	Identification, description and evaluation of cultural resources on and in the site vicinity with the potential to be impacted by construction and operation.	Phase I and II completed 2007 and 2008, respectively
Maryland Public Service Commission (PSC)	Annotate Code of MD 7-207 and 7-208; Code of Maryland Regulations 20.79	Certification of Public Convenience and Necessity (CPCN)	Site preparation for construction and operation of electric generating station	Issued June 26, 2009
PSC	Annotate Code of MD 7-207 and 7-208; Code of Maryland Regulations 20.79	CPCN	Construction or modification of transmission lines (Lines to be modified)	Issued June 26, 2009
MDE	Federal Water Pollution Control Act 33 U.S.C. 1341 et seq, Code of Maryland Regulations 26.08.02.10	Section 401 Water Quality Certification	Compliance with state water quality standards	Incorporated as part of USACE/MDE Joint Permit Application submitted May 2008
U.S. Environmental Protection Agency (EPA)	Federal Water Pollution Control Act Section 316(a), Code of Maryland Regulations 26.08.03.03	Water quality impact assessment	Demonstrate thermal discharges to water comply with thermal discharge criteria, and are protective of aquatic species	With NPDES permit application to be submitted December 2013
EPA/MDE	Federal Water Pollution Control Act Section 316(b), Code of Maryland Regulations 26.08.03.05	Best Technology Available demonstration	Demonstrate cooling water intake structure represents Best Technology Available in minimizing potential for entrainment/impingement of aquatic species.	With NPDES permit application to be submitted December 2013

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
MDE	Federal Water Pollution Control Act Section 402; 33 U.S.C. 1342; Code of Maryland Regulations 26.08.04	National Pollution Discharge Elimination System (NPDES) permit	Discharge of industrial wastewater and stormwater during operation	December 2013
Maryland Department of Natural Resources	Code of Maryland Regulations 08.03.08.03	Maryland listed threatened species	Removal of bald eagle nest within Limit of Disturbance	Issued September 2008
MDE	Code of Maryland Regulations 26.08.04.09	General NPDES permit for stormwater associated with construction activity	Discharge of stormwater during construction	Issued February 2008
PSC/ MDE	Code of Maryland Regulations 26.24 and 20.79.03.02.B(4)(g)	Maryland Tidal Wetlands License	Construction work in tidal wetlands	Submitted May 2008 under Joint Permit Application and included in CPCN application
PSC/ MDE	Code of Maryland Regulations 26.23 and 20.79.03.02.B(4)(g)	Maryland Non-Tidal Wetlands Permit	Construction work in non-tidal wetlands	Submitted May 2008 under Joint Permit Application
MDE	Code of Maryland Regulations 26.17.04	Waterway and 100-year floodplain permits	Any activity that changes the course, current, or cross-section of a non-tidal stream or body of water, including the 100-year floodplain	Submitted May 2008 under Joint Permit Application

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
MDE	Code of Maryland Regulations 26.17.01	Erosion and Sediment Control Plan	Land clearing, grading, or other earth disturbance (construction)	November 2009
MDE	Code of Maryland Regulations 26.17.02	Stormwater Management Plan	Land development activity (construction and operation)	November 2009
Chesapeake Bay Critical Area (CBCA) Commission	Code of Maryland Regulations 27.02	CBCA conformance	Construction and operation of an electric generating facility in the CBCA	Issued August 2008, Revised plan approval issued August 2009
PSC	Code of Maryland Regulations 26.17.06; 20.79.03.02.B(3)(e)	Water appropriation permit	Withdrawal of groundwater for construction and withdrawal of surface water during operation	Issued June 26, 2009
MDE	Code of Maryland Regulations 26.03.12	Major Water Facilities Permit	Construction of potable water supply system	January 2011
MDE	Code of Maryland Regulations 26.03.12	Major Sewerage System Permit	Construction of sanitary waste treatment system for operation	January 2011
MDE	Code of Maryland Regulations 26.04.06	Sewage Sludge Utilization Permit	Disposal of sludge from sewage treatment plant	January 2011
EPA / MDE	40 CFR 262.12, Code of Maryland Regulations 26.13.03	Hazardous Waste Generator Registration	Generation and storage of hazardous waste for ≤90 days	January 2010

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
MDE	Code of Maryland Regulations 26.12.01.01	State Radioactive Materials License	Possession, use, acquisition, ownership, transfer of radioactive materials not regulated by NRC	January 2015
MDE	Code of Maryland Regulations 26.10.01.07	Oil Operations Permit	Storage of oil in above ground storage tanks ≥10,000 gal and/or >1,000 gal of used oil	January 2015
PSC	Code of Maryland Regulations 26.11.02	State Air Permit to Construct – Construction Phase	Construction of construction-phase air pollutant emission sources	Issued June 26, 2009
PSC	40 CFR 52.21; Code of Maryland Regulations 26.11.01 and 26.11.02	Prevention of Significant Deterioration (PSD) – Construction Phase	Construction and operation of construction-phase major stationary sources of attainment pollutants	Issued June 26, 2009
PSC	Code of Maryland Regulations 26.11.01, 26.11.02, 26.11.17	New Source Review (NSR) – Construction Phase	Construction of construction-phase major stationary sources of nonattainment pollutants	Issued June 26, 2009
PSC	Code of Maryland Regulations 26.11.02; 20.79.03.02.B(2)(c)	State Air Permit to Construct – Operational Phase	Construction of operational-phase air pollutant emission sources	Issued June 26, 2009
PSC	40 CFR 52.21; Code of Maryland Regulations 26.11.01, 26.11.02 and 20.79.03.02.B(2)(c)	PSD- Operational Phase	Construction of major stationary sources of attainment pollutants for operational phase facilities	Issued June 26, 2009

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
PSC	Code of Maryland Regulations 26.11.01, 26.11.02, 26.11.17, and 20.79.03.02.B(2)(c)	NSR – Operational Phase	Construction of major stationary sources of attainment pollutants for operational phase facilities	Issued June 26, 2009
MDE	Code of Maryland Regulations 26.11.03; 20.79.03.02.B(2)(c)	Clean Air Act Title V Operating Permit State Operating Permit	Operation of existing facility with major stationary sources of air emissions	May 2010
Maryland State Highway Administration	Annotated Code of MD 8-625 and Code of Maryland Regulations 11.04.05	Highway Access Permit	Construction of new or modified entrances on state highways	Based on agency guidance
Calvert County Department of Planning and Zoning	Calvert County Code, Ordinances and Resolutions Chapter 18, Building Code of Calvert County	County Grading Permit	Clearing and grading of land	November 2009
Calvert County Department of Planning and Zoning	Calvert County Code, Ordinances and Resolutions Chapter 18, Building Code of Calvert County	County Building Permit, and Related Site Development Plan	Construction of buildings and other structures.	September 2010

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
Calvert County Department of Planning and Zoning; Inspections and Permits	Calvert County Zoning, Ordinance, Article 4	County Use and Occupancy Permit	Use and occupancy of buildings	Certificate of Occupancy issued as defined by Building Permit
Federal Energy Regulatory Commission	Section 205 of the Federal Power Act	Market Based Rate Authorization and related energy regulatory matters (e.g., Exempt Wholesale Generator filing)	Authority to sell power at market-based rates	Based on agency guidance
Calvert County Department of Planning and Zoning	Calvert County Code, Ordinances and Resolutions Chapter 18, Building Code of Calvert County	County Permit for Structure Demolition or Move	Demolish certain structures and move certain structures at Camp Canoy	Expected Spring 2010
EPA	40 CFR 82.162	Ozone-Depleting Substance (ODS) Compliance Certification	Recovery and recycling of ODS	2010

Table H-1. (contd)

Agency	Authority	Requirement	Activity Covered	Permit Issued or Authorization Obtained/Status
U.S. Department of Energy	Nuclear Waste Policy Act of 1982	Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste	Disposal of spent nuclear fuel and/or high-level radioactive waste	November 2008
U.S. Department of Transportation	49 CFR 107, Subpart G	Certificate of Registration	Transportation of hazardous materials	April 2011
Tennessee Department of Environment and Conservation-Division of Radiological Health	TN Department of Environment and Conservation Rule 1200-2-10.32	Tennessee Radioactive License for Delivery	Transportation of radioactive waste into the State of Tennessee (below regulatory limits materials)	November 2015
State of Utah Department of Environmental Quality – Division of Radiological Control	Utah Radiation Control Rules R313-26	General Site Access Permit	Transportation of radioactive waste into the State of Utah	November 2015

Appendix I

Severe Accident Mitigation Alternatives

Appendix I

Severe Accident Mitigation Alternatives

I.1 Introduction

UniStar has submitted an application to construct an AREVA NP Inc. (AREVA) U.S. EPR at the Calvert Cliffs site. Current policy developed after the Limerick decision (Limerick 1989) requires that the U.S. Nuclear Regulatory Commission (NRC) staff consider alternatives to mitigate the consequences of severe accidents in a site-specific environmental impact statement (EIS). The severe accident mitigation alternative (SAMA) review presented here considers both severe accident mitigation design alternatives (SAMDAs) and procedural alternatives.

In Title 10 of the Code of Federal Regulations (CFR), 10 CFR 52.79(a)(38), the NRC requires that an applicant for a combined license (COL) include "… a description and analysis of design features for the prevention and mitigation of severe accidents…" in the Final Safety Analysis Report (FSAR). The UniStar COL application provides this information in the FSAR (UniStar 2009a). The Environmental Report (ER) (UniStar 2009a) also includes information regarding the SAMA analysis.

In 10 CFR 52.47(a)(23), the NRC requires that applicants for design certification include "… a description and analysis of design features for the prevention and mitigation of severe accidents…" in the application for design certification. In 10 CFR 52.47(a)(27) the NRC requires a description of a "…plant-specific probabilistic risk assessment (PRA) and its results," and in 10 CFR 52.47(b)(2) the NRC requires an ER that contains the information required by 10 CFR 51.55. AREVA has submitted all of this information in documents that are part of the application for certification of the U.S. EPR design.

While the NRC staff has not completed its generic SAMDA review of the U.S. EPR for design certification, the staff has conducted a review of the UniStar SAMDA analysis specific to operation of a U.S. EPR at the Calvert Cliffs site (UniStar 2009b). The staff reviewed the input parameters and values used by UniStar (2009b) for appropriateness, including references made to the U.S. EPR design certification document (AREVA 2007a, b). The UniStar analysis is based on:

1. the PRA included as Section 19.1 of the U.S. EPR FSAR (AREVA 2007a) and the SAMDA analysis in the U.S. EPR ER (AREVA 2007b), and

2. results of the analysis of probability-weighted risks of the U.S. EPR design at the Calvert Cliffs site described in Section 5.11.2 of this EIS.

An analysis for a U.S. EPR at a generic site is presented first; then the analysis is extended to include consideration of Calvert Cliffs site-specific information. These analyses have been updated by the NRC staff based on Revision 1 to the U.S. EPR ER (AREVA 2009). The SAMDA analysis for the proposed U.S. EPR design certification will be finally resolved through the design certification rulemaking process.

I.2 U.S. EPR SAMDA Review – Generic Site

This section addresses the generic analysis of SAMDAs conducted by AREVA, the applicant for the design certification of the U.S. EPR design. The SAMA review in Section I.3 extends the generic SAMDA analysis to include Calvert Cliffs site-specific factors including meteorology, population, and land use. Section I.3 also addresses SAMAs that were not included in the generic analysis because they do not involve reactor system design.

I.2.1 U.S. EPR PRA Results

AREVA, the applicant for certification of the U.S. EPR design, conducted Level 1 and Level 2 PRAs to estimate the core damage frequencies (CDF) that might result from a large number of initiating events and accident sequences. Table I-1 lists these CDF estimates and estimates of the large release frequencies (LRF) of iodine, cesium, or tellurium. Releases associated with containment bypass, containment isolation failure, or containment failure at or before reactor vessel failure are considered to be large. Table I-1 also lists NRC staff goals related to CDFs and LRFs.

Table I-1. Comparison of U.S. EPR PRA Results with the Design Goals

	NRC Design Goal[(a)]		**U.S. EPR PRA Results[(b)]**	
	Core Damage Frequency (yr^{-1})	**Large Release Frequency (yr^{-1})**	**Core Damage Frequency (yr^{-1})**	**Large Release Frequency (yr^{-1})**
Internal At Power Events	1.0×10^{-4}	1.0×10^{-6}	2.8×10^{-7}	2.2×10^{-8}
Internal Flooding Events	1.0×10^{-4}	1.0×10^{-6}	6.1×10^{-8}	1.1×10^{-9}
Internal Fire Events	1.0×10^{-4}	1.0×10^{-6}	1.8×10^{-7}	3.6×10^{-9}
Low Power and Shutdown Events	1.0×10^{-4}	1.0×10^{-6}	5.8×10^{-8}	2.4×10^{-9}

(a) SECY-90-016 (NRC 1990)
(b) From Chapter 19 of the U.S. EPR FSAR (AREVA 2007a)

Although the U.S. EPR PRAs did not provide quantitative estimates of CDFs and LRFs for seismic and other external initiating events such as hurricanes and tornadoes, they are discussed in the FSAR. The Section 19.1.5.1 of the FSAR (AREVA 2007a) presents the results of a seismic margins analysis in which PRA methods are used to identify potential vulnerabilities in the design and so corrective measures can be taken to reduce risk. Similarly, FSAR Section 19.1.5.4 addresses risks associated with high winds, tornado missiles, external flooding, and external fires. Risks associated with these events are considered to be insignificant by AREVA.

I.2.2 Potential Design Improvements

In the ER submitted as part of the design certification application (AREVA 2009), AREVA identified 167 candidate alternatives based on a review of industry documents, including previous SAMDA reviews and NRC evaluations of those reviews, and consideration of plant-specific enhancements. The candidate alternatives were then screened to identify candidates for detailed evaluation. The categories used in screening were

- not applicable
- already implemented
- combined
- excessive implementation cost
- very low benefit
- not required for design certification
- consider for further evaluation.

The development of the U.S. EPR design has benefitted from insights gained in numerous PRAs. The low CDFs and LRFs in Table I-1 are attributable to the implementation of design improvements already incorporated into the U.S. EPR design. The following are examples of the 67 candidate alternatives already included in the design:

- increase direct current battery capacity
- improve direct current bus load shedding
- provide an additional diesel generator
- install self-actuating containment isolation valves
- replace steam generators with new designs
- install relief valves in the component cooling water system
- create a reactor coolant depressurization system

- add a motor-driven feedwater pump
- improve seismic ruggedness of plant components.

The screening process eliminated 21 candidate alternatives as being inapplicable for the U.S. EPR design; 4 candidate alternatives were combined with similar alternatives; and 51 candidate alternatives were procedural or administrative rather than design alternatives. Of the remaining 24 candidate alternatives, 1 was categorized as very low benefit because it would not significantly reduce risk, and 23 were categorized as having excessive implementation costs. No candidate alternatives were identified for further evaluation.

I.2.3 Cost-Benefit Comparison

AREVA used the cost-benefit methodology found in NUREG/BR-0184, *Regulatory Analysis Technical Evaluation Handbook* (NRC 1997), to calculate the maximum attainable benefit associated with completely eliminating all risk for the U.S. EPR.

This methodology involves determining the net value for a SAMDA 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 ($)
AOSC = present value of averted onsite costs ($); this includes cleanup, decontamination, and long-term replacement power costs
COE = cost of enhancement ($)

If the net value of a SAMDA is negative, the cost of implementing the SAMDA is larger than the benefit associated with the SAMDA and it is not considered to be cost beneficial.

To assess the risk reduction potential for SAMDAs, AREVA (AREVA 2009) assumed that each design alternative would work perfectly to completely eliminate all severe accident risk from the internal events. This assumption is conservative as it maximizes the benefit of each design alternative. AREVA estimated the public exposure benefits for the design alternative on the basis of the reduction of risk expressed in terms of whole body person-rem per year received by the total population within a 50-mi radius of the generic site hosting a U.S. EPR.

Table I-2 summarizes AREVA's estimates of each of the associated cost elements. The provided results are based on the approach, parameters, and data listed in NUREG/BR-0184. Baseline risks used in the analysis were 1.98×10^{-1} person-rem/yr population dose risk and $182 per year for cost risk for internal events during full-power operation (AREVA 2007b).

Table I-2. Summary of Estimated Maximum Averted Costs for a Generic Site

Quantitative Attributes		Averted Cost Estimate ($)[a]	
		7% discount	**3% discount**
Health	Public (APE)	5094	10,072
	Occupational (AOE)	264	847
Property	Offsite[b] (AOC)	2603	5147
	Onsite	NA[c]	NA[c]
Cleanup and Decontamination	Onsite (AOSC)[d]	8215	26,682
Replacement Power	(AOSC)[d]	36,888	180,452
Total[e]		53,063	164,179
Total with seismic risk		70,574	218,358

(a) From the design certification ER (AREVA 2009).
(b) Includes offsite cleanup and decontamination costs.
(c) Not Analyzed.
(d) AOSC includes onsite cleanup and decontamination costs and the cost of replacement power.
(e) Based on internal event, internal flooding, and internal fire risks.

The monetary present value estimate for each risk attribute does not represent the expected reduction in risk resulting from a single accident; rather, it is the present value of a stream of potential losses extending over the projected lifetime of the facility (in this case projected to be 60 years). Therefore, the averted cost estimates reflect the expected annual loss resulting from a single accident, the possibility that such an accident could occur at any time over the licensed life, and the effect of discounting these potential future losses to present value.

As indicated above, AREVA estimated the total present dollar value equivalent associated with complete elimination of severe accidents at a single U.S. EPR unit site to range between about $53,100 and about $164,200. The estimated cost of replacement power has the largest effect on the averted cost. To account for the seismic risks, AREVA increased these estimates by a factor 1.33. The resulting best estimate of maximum averted costs is about $70,600 with an upper bound estimate of about $218,400. For any SAMDA to be cost beneficial, the enhancement cost must be less than $218,400. Based on a cost estimate of $70,600, AREVA concluded that none of the SAMDA candidates are cost beneficial. Based on screening estimates, AREVA (2009) estimated that the minimum implementation cost for a SAMDA would be about $150,000. AREVA also noted that the costs estimates for public health impacts (APE) and offsite costs (AOC) could double without affecting the SAMDA analysis.

I.2.4 Staff Evaluation

In 10 CFR 52.47(a)(27), the NRC requires that an applicant for design certification perform a plant- or site-specific PRA. The aim of this PRA is to seek improvements in the reliability of core and containment heat removal systems that are significant and practical. The set of potential design improvements considered for the U.S. EPR include those from industry guidance, previous SAMDA review, and review of the U.S. EPR design. The U.S. EPR design already incorporates many design enhancements related to severe accident mitigation. Such design improvements have resulted in a CDF that are two orders of magnitude lower than the CDFs for the existing Calvert Cliffs Units 1 and 2.

AREVA's averted cost estimates are based on point-estimate values, without consideration of uncertainties in CDF or offsite consequences. Even though this approach is consistent with that used in previous design alternative evaluations, further consideration of these factors could lead to significantly higher risk reduction values, given the extremely small CDF and risk estimates in the baseline PRA. Uncertainties either in CDF or in offsite radiation exposures resulting from a core damage event are fairly large because key safety features of the U.S. EPR design are unique, and their reliability has been evaluated through analysis and testing programs rather than through operating experience.

Further, in evaluating the costs of SAMDA candidates, AREVA did not explicitly assess the capital costs associated with the various alternatives. Instead, AREVA used estimated costs of back fitting of similar SAMDAs provided by industry in license renewal applications. This approach has the potential to overestimate the actual costs of SAMDAs because the cost of implementing a modification to a reactor that has been built is always greater than implementing the modification in a design that is still evolving.

I.3 Calvert Cliffs Site-Specific SAMA Review

The discussion above evaluates SAMDAs for the U.S. EPR at a generic site. The discussion that follows updates that evaluation to include consideration of Calvert Cliffs site-specific factors including meteorological conditions, population distribution, and land use. It is based on the UniStar SAMDA analysis presented in the ER (UniStar 2009b) revised to account for changes in the U.S. EPR ER (AREVA 2009). The last part of this discussion deals with procedural and training SAMAs.

I.3.1 Risk Estimates

UniStar estimated severe accident risks for a U.S. EPR at the Calvert Cliffs site in Section 7.2 of its ER (UniStar 2009b). The NRC staff evaluated the information for the U.S. EPR design supplied by AREVA and UniStar (AREVA 2007a, b; UniStar 2009a) and Calvert Cliffs site-specific data (meteorology, demographics, and land use) provided by UniStar (UniStar 2008, 2009b). The results of these analyses are found in Table 5-16 in Chapter 5 of this EIS (Vol. 1).

Table 5-16, gives a CDF of 5.3×10^{-7} yr^{-1}, and population dose and cost risks of 4.1×10^{-1} person-rem yr^{-1} and \$369 yr^{-1}, respectively. These risks are based on internally initiated events, internal flooding events, and internal fire events that occur while the reactor is at power. The U.S. EPR FSAR (AREVA 2007a) states that the total CDF for events occurring while the reactor is at low power or shutdown is estimated to be about an order of magnitude less than the total at power CDF.

I.3.2 Cost-Benefit Comparison

In Section 7.3.2 of the ER (UniStar 2009b), UniStar estimates the averted costs associated with eliminating all severe accident risks associated for a U.S. EPR at the Calvert Cliffs site. The UniStar analysis is an update of the AREVA SAMDA analysis (AREVA 2007b) to include site-specific information. UniStar substituted population dose and offsite cost risks based on 2050 population projections for the Calvert Cliffs site for the population dose and offsite property costs in the AREVA analysis. Table I-3 shows both the AREVA generic averted cost estimates and the UniStar estimates, updated by the NRC staff to reflect the changes in the U.S. EPR ER (AREVA 2009).

Table I-3. Summary of Estimated Averted Costs for the Calvert Cliffs Site

Quantitative Attributes		Averted Cost Value Estimate ($)			
		AREVA Generic[a]		Calvert Cliffs Site[b]	
		7% discount	3% discount	7% discount	3% discount
Health	Public (APE)	5094	10,072	11,537	22,812
	Occupational (AOE)	264	847	264	847
Property	Offsite[c] (AOC)	2603	5,147	5192	10,266
	Onsite	NA[d]	NA[d]	NA[d]	NA[d]
Cleanup and Decontamination	Onsite (AOSC)[e]	8215	26,682	8215	26,682
Replacement Power	(AOSC)[e]	36,888	180,452	36,888	180,452
	Total	**53,063**	**164,179**	**65,095**	**241,059**
Total with seismic risk		**70,574**	**218,358**	**82,587**	**320,608**

(a) From design certification ER (AREVA 2009).
(b) UniStar estimates (UniStar 2009b) updated to reflect AREVA (2009).
(c) Includes cleanup and decontamination costs.
(d) Not Analyzed.
(e) AOSC includes onsite cleanup and decontamination cost and the cost of replacement power.

In assessing the risk reduction potential of design improvements for the U.S. EPR, the NRC staff evaluated the AREVA risk reduction estimates for the various design alternatives and assessed the potential impact of uncertainties on the results. The analyses in Table I-2 and Table I-3 present the value of reducing the severe accident risk to zero. These values are used in screening potential SAMDAs. Using the results in Table I-2, AREVA concluded that no candidate alternative from an initial list of 167 alternatives would be cost beneficial. The Calvert Cliffs site-specific values, although higher than those estimated for a generic site, are below the minimum estimated cost for a design change. Moreover, no SAMDA can reduce the risk to zero. Therefore, the staff concludes that it is highly unlikely that any SAMDA would be cost beneficial at the Calvert Cliffs site.

I.3.3 Procedural and Training SAMAs

The original list of 167 U.S. EPR SAMDAs included 51 candidate alternatives that were procedural or training in nature. These items were eliminated from consideration because they did not involve design changes. Examples of items screened out for this reason include

- develop procedures for replenishing diesel fuel oil
- emphasize steps in recovery of offsite power after a station blackout in training
- institute simulator training for severe accident sequences
- delay containment spray actuation after a large loss of coolant accident
- implement procedures to stagger high-pressure safety injection pump use after a loss of service water
- provide operator training on manually actuating the extra borating system.

These candidate alternatives fall within the scope of the SAMA review that the NRC staff conducts as part of its environmental review of applications. However, such SAMAs generally involve operational and training procedures that have not been developed and that are typically not developed until construction has been completed and the plant is approaching operation.

The staff reviewed the candidate alternatives that were previously screened out because they did not involve design changes. Because the maximum attainable benefit is so low, a SAMA based on procedures or training for a U.S. EPR at the Calvert Cliffs site would have to reduce the CDF or risk to near zero to become cost beneficial. Based on its evaluation, the staff concludes that it is unlikely that any of the SAMAs based on procedures or training would reduce the CDF or risk that much. Therefore, the staff further concludes it is unlikely that these SAMAs would be cost effective.

UniStar (2009b) has stated that "… the plant administrative processes, procedures, and training program will be developed to address appropriate maintenance and use of the U.S. EPR design features which have been credited with the reduction of risk associated with postulated severe accidents." Based on this statement, the staff expects that UniStar will consider risk insights and mitigation measures in the development of procedures and training; however, this expectation is not crucial to the staff's conclusions because the staff already concluded procedural and training SAMAs would be unlikely to be cost effective.

I.3.4 Conclusions

Based on its evaluation of the U.S. EPR PRA (AREVA 2007a) and SAMDA analysis (AREVA 2009), the Calvert Cliffs site-specific severe accident and SAMDA analyses (UniStar 2008, 2009b) and its own independent review, the staff concludes that that there are no U.S. EPR SAMDAs that would be cost beneficial at the Calvert Cliffs site. The staff expects that UniStar will consider risk insights and mitigation measures in the development of procedures and training; however, this expectation is not crucial to the staff's conclusions because the staff concludes procedural and training SAMAs would be unlikely to be cost effective.

I.4 References

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

10 CFR Part 52. Code of Federal Regulations, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

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Appendix J

UniStar's Least Environmentally Damaging Practicable Alternative (LEDPA) and Onsite Alternatives Analysis

Appendix J

UniStar Least Environmentally Damaging Practicable Alternative (LEDPA) and Onsite Alternatives Analysis

UniStar provided an alternative site analysis (UniStar 2009) that describes the offsite alternatives relative to wetland and stream impacts and a statement on the least environmentally damaging practicable alternatives (LEDPA). UniStar also provided an onsite alternative analysis that describes the onsite alternative layouts relative to wetland and stream impacts. These alternative site analyses are shown in the balance of this appendix.

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Appendix F—US Army Corps of Engineers (USACE) Information

This appendix contains: 1) Project Purpose, 2) the Least Environmentally Damaging Practicable Alternative (LEDPA) Analysis.

Section F1 - Purpose

The basic purpose for the project is to generate electricity for additional baseload capacity.

The overall purpose of the project is to construct a nuclear power plant facility to provide for additional baseload electrical generating capacity to meet the growing demand in the State of Maryland.

Section F2 – LEDPA Analysis

Table 9.3-12 of ER Chapter 9 of the Calvert Cliffs Unit 3 COLA presents the impacts of the EPR project at four sites; the proposed site and three alternative sites. The relevant information from the subject table needed for a 404(b)1 analysis and subsequent LEDPA determination by the USACE has been provided in the COLA ER Tables 9.3-12, 9.3-13, and 9.3-14 below.

Review of the tables identifies that relative to impacts to Waters of the U.S. *on the site itself,* EASTALCO would be the LEDPA site. However, further evaluation of associated off-site impacts required for water line and transmission line right-of-way (ROW) construction associated with the Alternative Sites, supports Calvert Cliffs Unit 3 as the LEDPA site.

A LEDPA analysis, by regulation, should help identify a site with the least impact to Waters of the U.S. *and with no significant adverse impacts to other environmental resources* as the Least Environmentally Damaging Practicable Alternative Accordingly, based upon a comprehensive evaluation, including 41 other environmental impact criteria used to evaluate the four sites, Calvert Cliffs Unit 3 Alternative Site Evaluation Report (ASER) and supporting materials clearly demonstrate that the Calvert Cliffs Unit 3 site has the smallest overall impact to environmental resources and therefore is the environmentally preferred location for construction of the EPR within the defined Region of Interest, Maryland.

The dredging for barge access is unique to Calvert Cliffs due to its location and existing nuclear facilities. The proposed tidal wetland impact is approximately 5.7 acres (4.5 acres due to the barge slip restoration and the balance of 1.2 acres is associated with the intake structure, discharge pipe, and fish return). The barge facility restoration work to access the pier and improve navigation would have eventually been necessary to service the existing facilities at Units 1 and 2. The tidal work does not impact the overall LEDPA conclusion, as Calvert Cliffs was selected based on a comprehensive evaluation as described below.

The Alternative Sites Bainbridge and EASTALCO share a similar navigable riverine environment where in-water Cooling Water Intake Structure (CWIS) components are proposed. Similar methods of in-water work and identical impacts below Ordinary High Water (OHW) or Mean High Water shoreline (MHW) were assumed. Certain assumptions were used in the calculations of impacts associated with in-water work, estimated at 0.23 acre (100'x100'). These assumptions are based on understanding of the physical environment, based on screening level data and experience of the UniStar Nuclear Energy team with similar projects. Primary factors included the following: an assumption that 0.23 acre would accommodate the cooling water intake system components and any necessary turbidity curtain array or coffer dam; work within the 0.23 acre disturbance footprint could accommodate dredging, blasting, drilling, or any other typical construction methods; the use of horizontal directional drilling (HDD) could be employed to avoid open cut or surface lay pipeline impacts; the pump house and support structures can be sited outside of any regulatory resource area.

The Thiokol Alternative Site is located along the Patuxent River. Because of the soft muddy substrate documented to be in the river at the location of the cooling water intake and discharge locations and a shallow shelf along the southern shoreline that must be spanned to reach suitable water depths, the following assumptions were included in the calculation of impacts presented here: 1) HDD will not be an effective technology, 2) dredging must be employed for the pipe trench and CWIS component locations, 3) the CWIS would need to be located 1000' or greater offshore. Under this scenario, work would be proposed to impact approximately 2.25 acres of waters below MHW, and require approximately 8,000 cubic yards of (in-place) sediment.

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Table 9.3-12 Comparison of Wetland and Waterway Impacts from Alternative Sites Evaluation (Reconnaissance Level Data)

	Proposed Site		Alternative Sites					
	Calvert Cliffs 3[16]		Bainbridge		EASTALCO		Thiokol[17]	
Property Acreage	2057.2		1068.6		1742.1		620.0	
Wetlands – Total Property[1] (ac)	173.2		4.6		22.0		49.8	
Wetlands – Site[2] (ac)	6.6		0.0		0.0		34.5	
Streams – Total Property[3] (LF)	21805		8654		32944		7055	
Streams – Site[4] (LF)	3604		1557		1311		3435	
Wetlands Affected – Site[5] (ac)	6.6		0.0		0.0		34.5	
Streams Affected – Site[6] (LF)	3604		1557		1311		3435	
Section 10 Waters: Tidal (ac)	5.7[7]		NA		NA		2.25[8]	
Navigable Riverine (ac)	N/A		0.23[9]		0.23[9]		NA	
Off-Site Wetlands/Waterways Affected –ROWs and Interconnects (ac/LF)[7]	Wetlands	Streams	Wetlands	Streams	Wetlands	Streams	Wetlands	Streams
CWIS (in-water components)(ac)[11]	0.23	0	0.23	0	0.23	0	0.23	0
CW Pump House (ac.)[12]	NA	NA	0	0	0	0	0	0
Water Line ROW (ac)[13]	NA	NA	1.3	0	3.2	865	0.4	0
Transmission Line ROW (ac)[14]	0	0	5.2	3517	0.2	1820	26.6	4051
RR Spur/Improvements (ac)	NA	NA	NA	NA	NA	NA	NA	NA
Access Roadways (ac)	NA	NA	NA	NA	NA	NA	NA	NA
Other Off-Site Uses (ac)[15]	NA	NA	NA	NA	NA	NA	NA	NA

[1] "*Total Property*" includes the entirety of the alternate site facility contiguous land holdings (black outline).
[2] "*Site*" includes the 420 parcel on the Total Property selected for EPR development (red outline).
[3] Describes the total length of all streams on the Total Property in linear feet. Includes both mapped perennial and intermittent waterways and obvious drainage ways observed during site inspections or interpreted from desktop mapping.
[4] Describes streams within the 420 EPR Site, calculated in the same manner as streams for "Total Property".
[5] An assumption has been made that any wetlands within the 420 acre Site would be affected.
[6] An assumption has been made that any streams within the 420 acre Site would be affected by construction.
[7] The actual, not estimated, proposed impacts to Sec. 10 regulated tidal waterways below ordinary high water (OHW) or mean high water shoreline (MHW) is approximately 5.7 acres.

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[8] The Thiokol site cooling water intake and discharge structures are located within the Patuxent River. Directional drilling would not be possible based on soft mud substrate, and suitable water depths are located 1000' feet into the river channel seaward of OHW or MHW. Accordingly, dredging of a 1000' x 45' pipe trench (4' deep) in addition to 0.5 acres for aquatic structures is proposed, totaling approximately 2.25 acres. Dredging volume (in place) is estimated to be approximately 8,000 cubic yards.

[9] For both the Bainbridge and EASTALCO Alternative Sites, 0.23 acre (100'x100') of wetland disturbance below OHW is assumed. This estimation of impact is based upon prior experience in similar environments, and assumes use of directional drilling to approach intake sites, and the ability to contain the intake and discharge structures within a coffer dam or turbidity curtain array with area 0.23 acres.

[10] An assumption has been made that any wetlands or streams within the ROWs or interconnects would be affected by construction. Impacts associated with ROW construction and some in-water construction activities are temporary in nature.

[11] An assumption has been made to allow a 100'x100' area of impact for in-water cooling water intake system (CWIS) components. No alternate sites are proposed to use shoreline intake structures; all intake/discharge structures are proposed to be sited at a depth of -20' MLW or greater. Horizontal directional drilling (HDD) is proposed to access off shore locations.

[12] A cooling water pump house would be located alongshore to the selected cooling water source, and would occupy 0.5 acre total area.

[13] For the purposes of this evaluation, it has been assumed that any water line ROW would require a 120' width for construction to allow installation of 2-60" pipes.

[14] For new transmission line construction or reconductoring of existing circuits to accommodate the EPR, a 300' wide cleared ROW is assumed to be required. The Transmission Corridor for the Thiokol site is different from the one in the March 2009 Requests for Additional Information Responses (UN#09-140)

[15] Other off-site uses include any required parking, laydown, staging requiring land alteration.

[16] ER Section 4.1.1.1 (Rev. 5) states the CCNPP3 and supporting facilities will be located on 2,070 acres; ER Section 4.3.1.3 (Rev. 5) states the construction of CCNPP3 will permanently fill approximately 8,350 LF of stream and 11.72 acres of delineated wetland areas. This table provides data primarily for the approximate 420-acre EPR Site (see Footnote 2) for consistent comparison with the alternative sites and, therefore, some data in this table will be different from quantities of affected acreage stated in the ER Rev. 5.

[17] ER Section 9.3.2.4.5 (UN#09-319) states that the Thiokol site has approximately 49.2 ac of non-tidal wetlands and 14,411 LF of stream within the 619 ac Thiokol site. This table provides data primarily for an approximate 420-acre EPR site within the overall property boundary. Therefore the data on affected wetlands and streams in this table will differ from the data presented in ER Section 9.3.2.4.5 (UN#09-319).

Sources: USFWS, 2008. National Wetlands Inventory, U.S. Fish and Wildlife Service, CONUS_wet_poly, Classification of Wetlands and Deepwater Habitats of the United States, Washington, DC, FWS/OBS-79/31, National Wetlands Metadata, website: http://www.fws.gov/wetlands/Data/DataDownloadState.html, accessed: June 17, 2009.
MDNR, 2002. Wetlands of Special State Concern Data, Geospatial Data from the Maryland Department of Natural Resources, Metadata, website: http://dnrweb.dnr.state.md.us/gis/data/data.asp, accessed June 27, 2009.

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Table 9.3-13 Summary of Wetlands on Alternate Sites

	Number of discrete wetlands or systems	Wetland types (NWI classification)	Description
Calvert Cliffs 3	5	1. Freshwater Forested/Shrub Wetland 2. Freshwater Pond 3. Freshwater Pond 4. Freshwater Forested/Shrub Wetland 5. Freshwater Pond	1. 4.7 ac of PFO[1] 2. 0.5 ac of PUB[2] 3. 0.02 ac of PUB 4. 0.5 ac of PFO 5. 0.9 ac of PUB
Bainbridge	5	1. Freshwater Forested/Shrub Wetland 2. Freshwater Pond 3. Riverine 4. Riverine 5. Freshwater Forested/Shrub	1. 3.7 ac 2. 0.9 ac 3. 1.3 ac 4. 3.2 ac 5. 0.7 ac
EASTALCO	10	1. Freshwater Emergent Wetland 2. Freshwater Emergent Wetland 3. Freshwater Forested/Shrub Wetland 4. Freshwater Forested/Shrub Wetland 5. Freshwater Forested/Shrub Wetland 6. Freshwater Emergent Wetland 7. Riverine 8. Freshwater Emergent Wetland 9. Freshwater Emergent Wetland 10. Freshwater Forested/Shrub Wetland	1. 0.2 ac 2. 0.4 ac 3. 0.1 ac 4. 0.3 ac 5. 0.9 ac 6. 0.03 ac 7. 1.3 ac 8. 0.2 ac 9. 0.3 ac 10. 0.7 ac

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Table 9.3-13 Summary of Wetlands on Alternate Sites

	Number of discrete wetlands or systems	Wetland types (NWI classification)	Description
Thiokol	14	1. Freshwater Forested/Shrub Wetland 2. Freshwater Forested/Shrub Wetland 3. Freshwater Forested/Shrub Wetland 4. Freshwater Forested/Shrub Wetland 5. Freshwater Forested/Shrub Wetland 6. Freshwater Forested/Shrub Wetland 7. Freshwater Forested/Shrub Wetland 8. Freshwater Pond 9. Freshwater Emergent Wetland 10. Freshwater Forested/Shrub Wetland 11. Freshwater Emergent Wetland 12. Estuarine and Marine Wetland 13. Estuarine and Marine Deepwater 14. Freshwater Emergent Wetland	1. 2.5 ac of PFO 2. 31.9 ac of PFO 3. 0.08 ac 4. 0.3 ac 5. 4.3 ac 6. 0.1 ac 7. 0.1 ac 8. 0.5 ac 9. 1.9 ac 10. 5.2 ac 11. 1.1 ac 12. 6.3 ac 13. 6.8 ac 14. 0.3 ac

[1] PFO is a palustrine forested wetland
[2] PUB is a palustrine unconsolidated bottom wetland

Sources: USFWS, 2008. National Wetlands Inventory, U.S. Fish and Wildlife Service, CONUS_wet_poly, Classification of Wetlands and Deepwater Habitats of the United States, Washington, DC, FWS/OBS-79/31, National Wetlands Metadata, website: http://www.fws.gov/wetlands/Data/DataDownloadState.html, accessed: June 17, 2009.

MDNR, 2002. Wetlands of Special State Concern Data, Geospatial Data from the Maryland Department of Natural Resources, Metadata, website: http://dnrweb.dnr.state.md.us/gis/data/data.asp, accessed June 27, 2009.

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Table 9.3-14 Summary of Waterways on Alternate Sites

	Number of/names of streams	Stream type	Description
Calvert Cliffs 3	A. Johns Creek	A. Perennial	A. 4661 LF
	B. Tributary to the Bay	B. Perennial	B. 2093 LF
	C. Tributary of Johns Creek	C. Perennial	C. 7400 LF
	D. Goldstein Branch	D. Perennial	D. 2051 LF
	E. Tributary of Perrin Branch	E. Intermittent	E. 4517 LF
	F. Tributary of Perrin Branch	F. Perennial	F. 1083 LF
Bainbridge	A. Tributary of Susquehanna River	A. Perennial	A. 2638 LF
	B. Happy Valley Branch	B. Perennial	B. 6016 LF
	C. Tributary of Susquehanna River	C. Perennial	C. 1279
	D. Tributary of Susquehanna River	D. Perennial	D. 312 LF
	E. Tributary of Susquehanna River	E. Perennial	E. 308 LF
	F. Octoraro Creek	F. Perennial	F. 1433 LF
	G. Tributary to Octoraro Creek	G. Perennial	G. 185 LF
EASTALCO	A. Tributary of Tuscarora Creek	A. Perennial	A.2693 LF
	B. Tuscarora Creek	B. Perennial	B. 12319 LF
	C. Tributary of Tuscarora Creek	C. Intermittent	C. 6001 LF
	D. Tributary of Tuscarora Creek	D. Perennial	D. 3399 LF
	E. Tributary of Tuscarora Creek	E. Intermittent	E. 4634 LF
	F. Horsehead Run	F. Intermittent	F. 3898 LF
	G. Tributary of Tuscarora Creek	G. Intermittent	G. 120 LF
	H. Tuscarora Creek	H. Perennial	H. 745 LF
	I. Tributary of Tuscarora Creek	I. Perennial	I. 395 LF
	J. Tributary of Tuscarora Creek	J. Perennial	J. 327 LF
	K. Tributary of Tuscarora Creek	K. Perennial	K. 378 LF
	L. Tributary of Tuscarora Creek	L. Perennial	L. 403 LF
	M. Tributary of Tuscarora Creek	M. Perennial	M. 317 LF
Thiokol	A. Tributary of Burnt Mill Creek	A. Perennial	A. 5430 LF
	B. Rich Neck Creek	B. Perennial	B. 2250 LF
	C. Tributary of Burnt Mill Creek	C. Perennial	C. 312 LF
	D. Horse Landing Creek	D. Perennial	D. 486 LF
	E. Tributary of Persimmon Creek	E. Perennial	E. 332 LF
	F. Persimmon Creek	F. Perennial	F. 324 LF
	G. Tributary of Killpeck Creek	G. Perennial	G. 300 LF
	H. Killpeck Creek	H. Perennial	H. 300 LF
	I. Tributary of Patuxent Creek	I. Perennial	I. 445 LF
	J. Tributary of Patuxent Creek	J. Perennial	J. 354 LF
	K. Tributary of Patuxent Creek	K. Perennial	K. 308 LF
	L. Tributary of Patuxent Creek	L. Intermittent	L. 201 LF
	M. Tributary of Patuxent Creek	M. Perennial	M. 310 LF
	L. Swanson Creek	L. Perennial	L. 379 LF

Sources:
USFWS, 2008. National Wetlands Inventory, U.S. Fish and Wildlife Service, CONUS_wet_poly, Classification of Wetlands and Deepwater Habitats of the United States, Washington, DC, FWS/OBS-79/31, National Wetlands Metadata, website: http://www.fws.gov/wetlands/Data/DataDownloadState.html, accessed June 17, 2009.
MDNR, 2002. Wetlands of Special State Concern Data, Geospatial Data from the Maryland Department of Natural Resources, Metadata, website: http://dnrweb.dnr.state.md.us/gis/data/data.asp, accessed June 27, 2009.

J.1 Onsite Alternatives Analysis

Clean Water Act Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material ("Guidelines"), stipulate that no discharge of dredged or fill material into a waters of the United States (including jurisdictional wetlands) shall be permitted if there is a practicable alternative which would have less adverse impact on the aquatic environment, so long as the alternative does not have other significant adverse environmental consequences. Even if an applicant's preferred alternative is determined to be the least environmentally damaging practicable alternative, the Corps must still determine whether the LEDPA is in the public interest. The Corps Public Interest Review (PIR), described at 33 CFR 320.4, directs the Corps to consider a number of factors in a balancing process. A permit will be not be issued for an alternative that is not the LEDPA, nor will a permit be issued for an activity that is determined to be contrary to the public interest. In considering both the LEDPA and the PIR the Corps must consider compliance with other applicable substantive laws such as the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA) as well as consult with other Federal Agencies. The Corps also must follow procedural laws such as National Environmental Policy Act (NEPA), and other applicable laws described in 33 CFR 320.3.

Section 230.10(a) of the Guidelines requires that "no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." Section 230.10(a)(2) of the Guidelines states that "an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant that could reasonably be obtained, utilized, expanded, or managed in order to fulfill the basic purpose of the proposed activity may be considered." Thus, this analysis is necessary to determine which alternative is the LEDPA that meets the project purpose and need.

Where the activity associated with a discharge is proposed for a special aquatic site (as defined in 40 CFR Part 230, Subpart E), and does not require access or proximity to or siting within these types of areas to fulfill its basic project purpose (i.e., the project is not "water dependent"), practicable alternatives that avoid special aquatic sites are presumed to be available, unless clearly demonstrated otherwise (40 CFR 230.10(a)(3)).

As part of the Corps permit review process, the Corps requested a detailed analysis on the steps taken to minimize UniStar's proposed onsite impacts and to quantify potential permanent and temporary impacts to all waters of the United States, including jurisdictional wetlands, for each onsite project alternative. The onsite analysis does not preclude the necessity to evaluate the alternative site analysis.

UniStar described the site layout study to select an appropriate location on the CCNPP campus for Unit 3 (UniStar 2008). The UniStar layout study, including design options to minimize impacts, evaluated north, south, and west parcel configurations. The criteria and considerations included environmental; security; land use and zoning; construction feasibility; switchyard/transmission lines; impact to existing facilities or structures; and process studies. UniStar also studied aesthetics; wetlands and streams; threatened and endangered species; and areas of historic and archeological resources. According to UniStar's delineation, the Calvert Cliffs campus has approximately 133 acres of wetlands and 94,200 linear feet of streams (UniStar 2008). Table J-1 describes the UniStar delineated potential wetland and stream impact areas for the four studied locations. UniStar determined that its selected south parcel would be the most ecologically sound location of proposed Unit 3.

Table J-1. Wetland and Stream Impact Areas of Onsite Alternatives

Onsite Alternative	Approximate Wetland Impact	Approximate Stream Impact
Option A layout Northern	29.27 ac	9753 linear ft
Option B layout Northern	29.27 ac	9753 linear ft
Option C layout Northern	29.67 ac	11,474 linear ft
UniStar's selected layout Southern	11.7 ac	8350 linear ft

At the request of the Corps, UniStar minimized potential project impacts to waters of the United States, including wetlands. Site layout for this project was based on an extensive site layout study to determine a layout that would most practicably avoid and minimize impacts to Corps jurisdictional waters and wetlands (UniStar 2008). Efforts were made to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and streams and to avoid direct or indirect support of new construction in wetlands and streams wherever there was a practicable alternative. The proposed impacts were further reduced through relocation of or reconfiguration of facility components. Project siting was limited by design constraints, which allowed integration with the existing Units 1 and 2 and exclusion zones. UniStar prepared a summary of the stages of avoidance and/or minimization of potential onsite wetland and stream impacts within the selected southern layout that reduced wetland impacts from the initially proposed 18.6 ac reduced to 11.7 ac by relocating a construction road and the batch plant; reducing impact from stormwater drainage basins; optimizing the switchyard; and refining the wetland delineation (UniStar 2008). Decision options available to the Corps (which embraces all of the applicant's alternatives) are issue the permit; issue with modifications or conditions; or deny the permit.

J.2 References

33 CFR Part 320. Code of Federal Regulations. Title 33, *Navigation and Navigable Waters*, Part 320, "General Regulatory Policies."

40 CFR Part 230. Code of Federal Regulations, Title 40, *Protection of Environmen*t, Part 230, "Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material."

Clean Water Act. 33 U.S.C. 1251, et seq. (also referred to as the Federal Water Pollution Control Act [FWPCA]).

Endangered Species Act of 1973. 16 U.S.C. 1531 et seq.

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

National Historic Preservation Act of 1966 (NHPA). 16 U.S.C. 470, et seq.

UniStar Nuclear Development, LLC (UniStar). 2008. Letter from Dimitri Lutchenkov (UniStar) to Mr. William Seib (Corp) dated November 11, 2008. "Subject: Joint Federal/State Application of Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC, Calvert Cliffs Nuclear Power Plant Site, Lusby, Calvert County, Maryland, USACE Tracking No. NAB-2007-08123-M05". Accession No. ML091530687.

UniStar Nuclear Energy (UniStar). 2009. Letter from G. Gibson (UniStar) to NRC dated October 15, 2009. "Subject: UniStar Nuclear Energy, NRC Docket No. 52-016, Calvert Cliffs Nuclear Power Plant, Unit 3, Supplemental Response to Environmental Report, RAI No. 1019, U.S. Army Corps of Engineers (USACE), Question No. 1 and No. 5." Accession No. ML092920352.

Appendix K

UniStar's Phase I Mitigation Plan Summary for Wetlands and Stream Impacts

Appendix K

UniStar's Phase I Mitigation Plan Summary for Wetlands and Stream Impacts

SUMMARY OF PHASE I COMPENSATORY MITIGATION PLAN FOR NONTIDAL WETLAND AND STREAM IMPACTS ASSOCIATED WITH CALVERT CLIFFS UNIT 3

The proposed compensatory "in kind" mitigation for the scheduled impacts to wetlands and surface waters of the proposed Unit 3 project at the Calvert Cliffs site is intended to meet the mitigation requirements of the USACE Baltimore District, and includes the creation and enhancement of wetlands and streams to conditions more suitable for use by wildlife species native to the region. Appropriate and practicable steps to minimize adverse impacts were conducted through analysis of multiple site development plan concepts. The mitigation areas were chosen following a mitigation site selection process. Four general mitigation strategies were initially identified: (1) onsite and in kind; (2) onsite and not in kind; (3) offsite and in kind; and (4) offsite and not in kind. The mitigation strategy chosen for the proposed Unit 3 project at the Calvert Cliffs site provides for onsite and in-kind mitigation, as this strategy, or mitigation action, would replace nontidal wetland acreage and functional losses more effectively than the other three strategies. The project was designed to adhere to the Code of Maryland Regulations (COMAR), 26.23.04.03 (COMAR 2007).

This work includes the enhancement of one manmade, abandoned sediment basin within the Lake Davies Disposal Area; the enhancement of portions of Johns Creek; the creation of forested and herbaceous wetland habitat within the largest manmade abandoned, sediment basin on the Lake Davies disposal area; creation of forested wetland habitat within the Camp Conoy area; stream restoration; and stream enhancement. The wetland mitigation proposes to create an approximate 0.9-ac area of open water pond habitat; 1.3 ac of freshwater marsh; 7.2 ac of bottomland hardwood forest; eradication of invasive vegetation and enhancement of approximately 2.4 ac of bottomland hardwood forest; enhancement of wetlands abutting Johns Creek by eradication of invasive vegetation and enhancement of approximately 15.7 ac of bottomland hardwood forest; and creation of approximately 4.6 ac of forested wetland habitat. The stream mitigation proposes to restore stream functions along approximately 6283 linear feet of stream portions by employing treatments such as instream habitat structures (cover logs, lateral/longitudinal diversity and root wads); bank stabilization (vegetative and bioengineering solutions); and riparian wetland enhancements (hydraulic and vegetative). The stream mitigation also proposes to enhance a total of approximately 4146 linear feet of specific stream portions by improving aquatic habitat, constructing bank stabilization and planting native riparian vegetation. These projects will be monitored for a 5-year period and shall be protected in perpetuity through establishment of a legally binding protection mechanism.

WETLAND MITIGATION

Compensatory mitigation for unavoidable impacts to approximately 11.72 ac of jurisdictional, nontidal forested wetlands, emergent (herbaceous) wetlands, and surface waters (including Camp Conoy Fishing Pond) (USACE and/or MDE jurisdictional) and 8350 linear feet of stream will be required to satisfy Clean Water Act s. 404 standards and obtain regulatory authorization for Unit 3 construction. After field reconnaissance and site walk-through of the Calvert Cliffs site property in 2007 and 2008, including the Unit 3 project area, specific locations were identified as having ecological lift potential for wetland enhancement, or as being suitable for the creation of wetland communities from upland landscape.

Among the group of wetlands that will not be impacted by development of the Unit 3 facility, specific sites were selected that would benefit from mitigation providing for an increase in wetland values and functions. The wetland mitigation actions will include creation and enhancement within the Lake Davies Disposal Area (former sediment settling basins), the portion of Johns Creek to the south of the sediment basins, and an upland grassed field at the Camp Conoy area (wetland creation site). Phragmites (*Phragmites australis*) is found throughout the entire site, especially within the wetland sites proposed for mitigation. By eradicating Phragmites, the wetlands infested with this invasive nuisance species will have uplift for wildlife habitat and other important wetland functions. Increased diversification of native plant species will also be provided by planting these mitigation sites with native bottomland hardwood tree species and/or shrubs. Finally, by removing the Phragmites from the degraded wetlands, a more normal hydrologic regime will be established.

The wetland mitigation component of the compensatory mitigation plan includes the following proposed activities:

- The creation of forested wetland habitat within the Camp Conoy area that lies within the CBCA (Mitigation Site WC-1);
- The creation of palustrine forested and emergent wetland habitat within the middle manmade, abandoned, sediment basin of the Lake Davies Disposal Area (Mitigation Site WC-2);
- The enhancement of a smaller manmade, abandoned, sediment basin within the Lake Davies Disposal Area (Mitigation Site WE-1);
- The enhancement of a portion of Johns Creek and a linear drainageway extension occurring to the south of the Lake Davies Disposal Area (Mitigation Site WE-2);

- The eradication of Phragmites through herbicide application and establishment of a native vegetation community (Mitigation Sites WC-2, WE-1, and WE-2);
- The use of soil material from impacted onsite wetland areas that do not contain phragmites as a supplemental growth medium within wetland creation sites (Mitigation Sites WC-1 and WC-2).

Following the onsite wetland creation and wetland enhancement activities for the proposed Unit 3 project, a 5-year annual monitoring program will be implemented in accordance with the requirements of the *Mitigation and Monitoring Guidelines* (USACE) and the protocols in the *Maryland Compensatory Mitigation Guidance* (IMTF). Furthermore, the monitoring program will be conducted pursuant to the Maryland Department of the Environment, Water Management Administration (MDEWMA) mitigation monitoring guidelines and protocols.

Mitigation credit ratios for activities designed to replace impacted forested wetlands functions and values are 2:1 for creation and 3:1 for enhancement. The use of a 3:1 mitigation credit ratio for enhancement is based on controlling Phragmites coupled with the planting of native bottomland hardwood species. The credit ratio for the mitigation activity to replace impacted emergent wetlands functions and values is 1:1 for creation.

STREAM MITIGATION

The proposed Unit 3 site contains five proposed stream restoration reaches and five proposed stream enhancement reaches (perennial and intermittent) onsite. The stream reaches proposed for mitigation activities are primarily contained within the Woodland Branch and Johns Creek watershed, and secondarily in the Camp Conoy area that lies within the CBCA.

The stream mitigation component of the compensatory mitigation plan includes the following proposed activities:

- The restoration of stream channel corridor within the onsite portion of upper and lower Woodland Branch;
- The enhancement of stream channel within the middle reach of Woodland Branch and two unnamed tributaries;
- The restoration of stream channel within an unnamed tributary to and a portion of the mainstem of Johns Creek;
- The enhancement of stream channel within an additional unnamed tributary to Johns Creek; and
- The restoration and enhancement of stream channel within unnamed tributaries of the Camp Conoy area.

The proposed stream restoration and stream enhancement measures are intended to compensate for the unavoidable, direct loss of physical, biological and/or riparian function of impacted streams. Stream restoration will take advantage of opportunities to reconnect channels to their historic flow paths and restore active connection to wooded floodplains. Areas where degraded channels are abandoned will be designed to function as pockets of seasonal wetlands, ephemeral ponds, and oxbow lakes in the riparian zone. Stream enhancement activities, intended to improve existing stream physical and ecological functions within the channel's current flow path include bank grading operations and floodplain creation at lower elevations, bank treatments, and native plantings.

The stream restoration and enhancement mitigation opportunities, combined with the proposed stormwater management plan, will offset losses to watershed functions by increasing the ability to provide floodwater storage, naturally recharge local aquifers, improve water quality, and maintain stream and riparian functions that support corresponding ecology.

The amount of stream mitigation proposed is based on a mitigation ratio of 1:1 for stream restoration and 2:1 for stream enhancement impacts.

K.1 Reference

Clean Water Act. 33 USC 1251, et seq. (also referred to as the Federal Water Pollution Control Act [FWPCA]).

COMAR 26.23.04.03. 2007. "Mitigation Standards." *Code of Maryland Regulations*.

Appendix L

Carbon Dioxide Footprint Estimates for a 1000-MW(e) Reference Reactor

Appendix L

Carbon Dioxide Footprint Estimates for a 1000-MW(e) Reference Reactor

The review team has estimated the carbon dioxide (CO_2) footprint of various activities associated with nuclear power plants. These activities include building, operating, and decommissioning the plant. The estimates include direct emissions from the nuclear facility and indirect emissions from workforce transportation and the uranium fuel cycle.

Construction equipment estimates listed in Table L-1 are based on hours of equipment use estimated for a single nuclear power plant at a site requiring a moderate amount of terrain modification. Equipment usage for a multiple unit facility would be larger, but it is likely that it would not be a factor of 2 larger. A reasonable set of emissions factors used to convert the hours of equipment use to CO_2 emissions are based on carbon monoxide (CO) emissions (UniStar 2007) scaled to CO_2 using a scaling factor of 165 tons of CO_2 per ton of CO. This scaling factor is based on emissions factors in Table 3.3-1 of AP-42 (EPA 1995). Equipment emissions estimates for decommissioning are one-half of those for construction.

Table L-1. Construction Equipment CO_2 Emissions (metric tons equivalent)

Equipment	Construction Total[(a)]	Decommissioning Total[(b)]
Earthwork and Dewatering	1.1×10^4	5.4×10^3
Batch Plant Operations	3.3×10^3	1.6×10^3
Concrete	4.0×10^3	2.0×10^3
Lifting and Rigging	5.4×10^3	2.7×10^3
Shop Fabrication	9.2×10^2	4.6×10^2
Warehouse Operations	1.4×10^3	6.8×10^2
Equipment Maintenance	9.6×10^3	4.8×10^3
TOTAL[(c)]	3.5×10^4	1.8×10^4

(a) Based on hours of equipment usage over 7-yr period.
(b) Based on equipment usage over 10-yr period.
(c) Total not equal to the sum due to rounding.

Workforce estimates are typical workforce numbers for new plant construction and operation based on estimates in various COL applications, and decommissioning workforce emissions estimates are based on decommissioning workforce estimates in NUREG-0586 S1, *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors* (NRC 2002). A typical construction workforce averages about 2500 for a 7-year period with a peak workforce of about 4000. A typical operations workforce for the 40-year life of the plant is assumed to be about 400, and the decommissioning workforce during a decontamination and dismantling period of 10 years is assumed to be 200 to 400. In all cases, the daily commute is assumed to involve a 100-mi roundtrip with 2 individuals per vehicle. Considering shifts, holidays, and vacations,1250 roundtrips per day are assumed each day of the year during construction, 200 roundtrips per day are assumed each day during operations, and 150 roundtrips per day are assumed 250 days per year for the decontamination and dismantling portion of decommissioning. If the SAFSTOR decommissioning option is included in decommissioning, 20 roundtrips each day of the year are assumed for the caretaker workforce.

Table L-2 lists the review team's estimates of the CO_2 equivalent emissions associated with workforce transport. The table lists the assumptions used to estimate total miles traveled by each workforce and the factors used to convert total miles to metric tons CO_2 equivalent. CO_2 equivalent accounts for other greenhouse gases, such as methane and nitrous oxide that are emitted by internal combustion engines. The workers are assumed to travel in gasoline-powered passenger vehicles (cars, trucks, vans, and SUVs) that get an average of 19.7 mi per gallon of gas (FHWA 2006). Conversion from gallons of gasoline burned to CO_2 equivalent is based on U.S. Environmental Protection Agency emissions factors (EPA 2007a, 2007b).

Table L-2. Workforce CO_2 Footprint Estimates

	Construction Workforce	Operational Workforce	Decommissioning Workforce	SAFSTOR Workforce
Roundtrips per day	1250	200	150	20
Miles per roundtrip	100	100	100	100
Days per year	365	365	250	365
Years	7	40	10	40
Miles traveled	3.2×10^8	2.9×10^8	3.8×10^7	2.92×10^7
Miles per gallon[(a)]	19.7	19.7	19.7	19.7
Gallons fuel burned	1.6×10^7	1.5×10^7	1.9×10^6	1.58×10^6
Metric tons CO_2 per gallon[(b)]	8.81×10^{-3}	8.81×10^{-3}	8.81×10^{-3}	8.81×10^{-3}
Metric tons CO_2	1.4×10^5	1.3×10^5	1.7×10^4	1.3×10^4
CO_2 equivalent factor[(c)]	0.971	0.971	0.971	0.971
Metric tons CO_2 equivalent	1.5×10^5	1.3×10^5	1.7×10^4	1.3×10^4

(a) FHWA 2006
(b) EPA 2007b
(c) EPA 2007a

Published estimates of uranium fuel cycle CO_2 emissions required to support a nuclear power plant range from about 1 percent to about 5 percent of the CO_2 emissions from a comparably sized coal-fired plant (Sovacool 2008). A coal-fired power plant emits about 1 metric ton of CO_2 for each megawatt hour generated (Miller and Van Atten 2004). Therefore, for consistency with Table S-3 of Title 10 of the Code of Federal Regulations (CFR) Part 51.51, the NRC staff estimated the uranium fuel cycle CO_2 emissions as 0.05 metric tons of CO_2 per MWh generated and assumed an 80 percent capacity factor. Finally, the review team estimated the CO_2 emissions directly related to plant operations from the typical usage of various diesel generators on site using EPA emissions factors (EPA 1995). The review team assumed an average of 600 hours of emergency diesel generator operation per year (total for 4 generators) and 200 hours of station blackout diesel generator operation (total for 2 generators).

Given the various sources of CO_2 emissions discussed above, the review team estimates the total life CO_2 footprint for a reference 1000-MW(e) nuclear power plant to be about 18 million metric tons. The components of the footprint are summarized in Table L-3. The uranium fuel cycle component of the footprint dominates all other components. It is directly related to power generated. As a result, it is reasonable to use reactor power to scale the footprint to larger reactors.

Table L-3. Reference Reactor Lifetime Carbon Dioxide Footprint

Source	Activity Duration (yr)	Total Emissions (metric tons)
Construction Equipment	7	3.5×10^4
Construction Workforce	7	1.5×10^5
Plant Operations	40	1.9×10^5
Operations Workforce	40	1.3×10^5
Uranium Fuel Cycle	40	1.7×10^7
Decommissioning Equipment	10	1.8×10^4
Decommissioning Workforce	10	1.7×10^4
SAFSTOR Workforce	40	1.3×10^4
TOTAL		1.8×10^7

In closing, the review team considers the footprint estimated in Table L-3 to be appropriately conservative. The CO_2 emissions estimates for the dominant component (uranium fuel cycle) are based on 30-year-old enrichment technology, assuming that the energy required for enrichment is provided by coal-fired generation. Different assumptions related to the source of energy used for enrichment or the enrichment technology that would be just as reasonable could lead to a significantly reduced footprint.

Emissions estimates presented in the body of this environmental impact statement (EIS) have been scaled to values that are appropriate for the proposed project. The uranium fuel cycle emissions have been scaled by reactor power using the scaling factor determined in Chapter 6 of this EIS and by the number of reactors to be built. Plant operations emissions have been adjusted to represent the number of large CO_2 emissions sources (e.g., diesel generators, boilers) associated with the project. The workforce emissions estimates have been scaled to account for differences in workforce numbers and commuting distance. Finally, equipment emissions estimates have been scaled by estimated equipment usage. As shown in Table L-3, only the scaling of the uranium fuel cycle emissions estimates makes a significant difference in the total carbon footprint of the project.

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Appendix M

Supplemental Terrestrial Ecology Information

Appendix M

Supplemental Terrestrial Ecology Information

This appendix supplements information provided in the draft environmental impact statement (EIS) related to the Puritan tiger beetle (*Cicindela puritana*) and the northeastern beach tiger beetle (*C. dorsalis dorsalis*).

M.1 Tiger Beetle Species Descriptions

Management of listed tiger beetles on the Calvert Cliffs site began in 1993 when Baltimore Gas and Electric Company, the prior operator of Calvert Cliffs Units 1 and 2, entered a conservation agreement with the Nature Conservancy that designated a Tiger Beetle Habitat Protection Area (NRC 2000). Tiger beetle populations have been monitored within Calvert County annually since 1997 and on the Calvert Cliffs site, with the exception of 2001 and 2005 (Knisley 2009). Annual pedestrian surveys are conducted along Chesapeake Bay from late June to mid-July when adult beetle populations are at their peak seasonally. All adults were counted at the water's edge where the beach is narrow, while wider beach sections were canvassed using a circuitous route. Waypoints are recorded to divide the beach into sections about 328 ft in length, and habitat attributes are noted. The remainder of this section describes the life history and habitat use of the two tiger beetle species that occur on and in the vicinity of the Calvert Cliffs site.

M.1.1 Puritan Tiger Beetle (*Cicindela puritana*)

Tiger beetles are typically the dominant invertebrate predators in the open, sandy dunes and beaches that they inhabit (FWS 1993). The Puritan tiger beetle (*Cicindela puritana*), measuring 11.5 to 12.4 mm, occurred historically on beaches in Connecticut, New Hampshire, Massachusetts, and along the shore of the Chesapeake Bay in Maryland (55 FR 32088). Recently, the Puritan tiger beetle's distribution has been drastically limited, with only three known locations: the Chesapeake Bay shoreline in Calvert County, around the mouth of the Sassafras River in eastern Maryland, and along the Connecticut River in Connecticut and Massachusetts (Figure M-1) (FWS 1993). The largest of these populations, found in Calvert County, has declined in numbers since the early 1990s (Knisley 2006). There also appear to be wide fluctuations in the numbers of adults observed at these sites from year to year.

In 1990, the Puritan tiger beetle was Federally listed as threatened due to its limited distribution, coupled with threats from habitat loss and degradation and vulnerability to natural and human threats (55 FR 32088). A more recent status review of this species recommended the

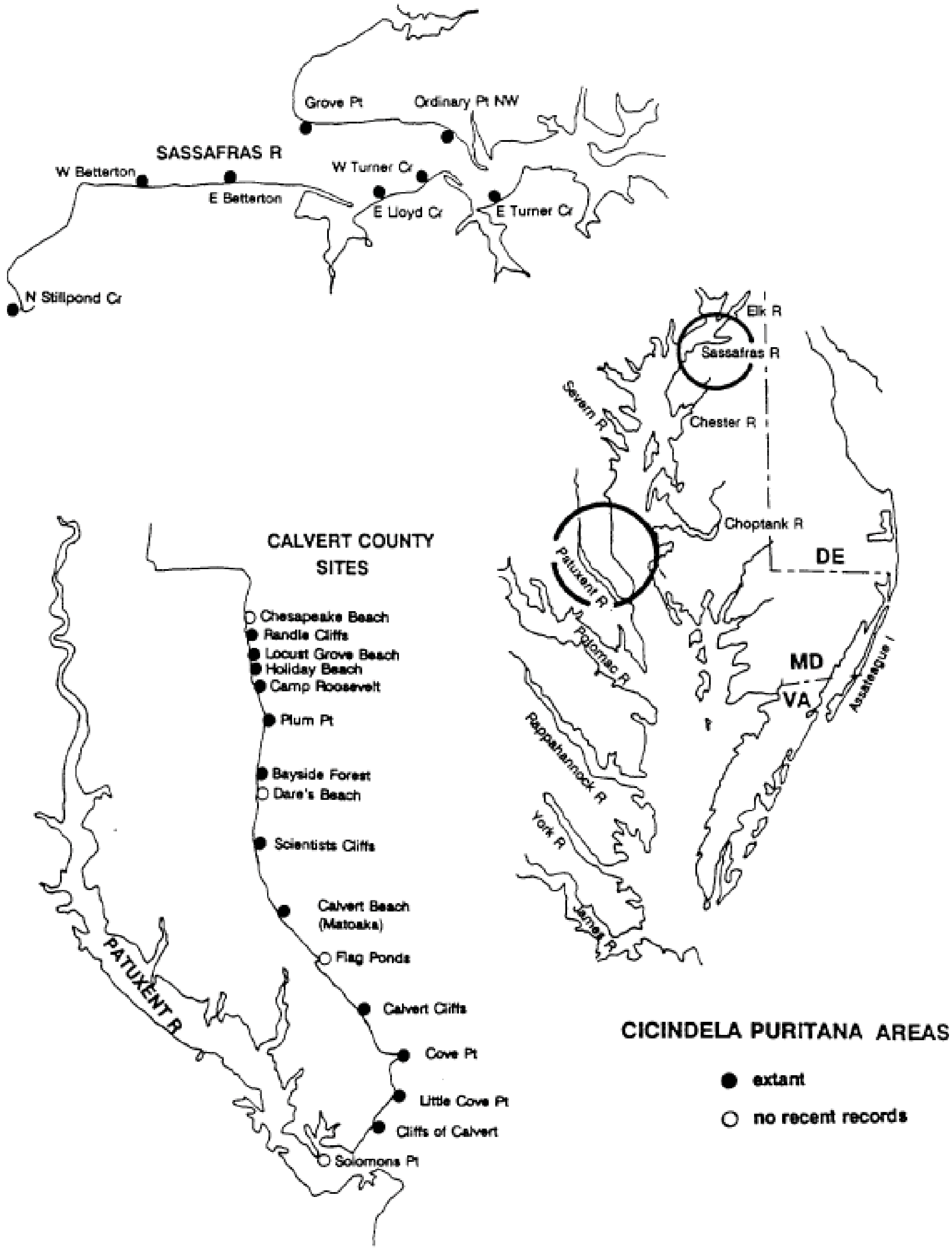

Figure M-1. Distribution of the Puritan Tiger Beetle in the Chesapeake Bay Region (FWS 1993)

Puritan tiger beetle be reclassified to endangered (FWS 2007). It is also a State of Maryland endangered species (MDNR 2007).

The life cycle of *Cicindela puritana* takes up to 2 years to complete during which they transition through three larval instar stages. The adults emerge in June, and their numbers peak in late June through early July (FWS 1993; 55 FR 32088). Mating activities typically occur in the late afternoon. The females then move up to the adjacent cliff face to deposit their eggs (55 FR 32088). The larvae hatch in late July or August and remain as first instars for 2 to 4 weeks then overwinter as second instars (FWS 1993). The following spring they molt into third instars and spend the summer and following winter in that stage (FWS 1993).

Puritan tiger beetle larvae in the Chesapeake Bay populations construct and inhabit deep burrows in sparsely or non-vegetated sandy clay bluffs adjacent to the beaches where adults are found (FWS 1993; 55 FR 32088). The larvae tend to be most active during cool weather, especially in the fall as evidenced by observed open burrows (FWS 1993). The larvae are carnivorous and feed on small invertebrates that pass within reach of their burrows. They attach themselves to the lip of their burrows with hooks on their abdomen (FWS 1993). Adults exhibit some flexibility in beach habitat preference from wide sandy beaches to narrow beaches below clay banks (FWS 1993). Thus, important habitat is where the larvae inhabit the sparsely vegetated sandy bluffs adjacent to beaches.

Adults are active day and night and are prey for other predators, including robber flies and spiders, and larvae are parasitized by an ant-like wasp (*Methoca* sp.) (FWS 1993). The larvae are also susceptible to erosion and destruction of their burrows from winter storms. However, the largest threat to the survival of these beetles is from loss and destruction of habitat required for larval survival from shoreline stabilization and development (FWS 1993). Natural erosion of cliffs by wave action and rainfall creates newly exposed habitat, suitable for oviposition and larval development, which is being destroyed by cliff stabilization structures such as the construction of bulkheads (55 FR 32088). Development often requires bank stabilization, and, as banks are stabilized, plant cover becomes established, reducing or eliminating suitable habitat and occupation by this beetle species (FWS 1993).

Most Puritan tiger beetles that occur along the Chesapeake Bay occur within Calvert County (see Figure M-1). On the Calvert Cliffs site, this habitat is found on the southern portion of the Calvert Cliffs site only. Calvert County populations have fluctuated from more than 9000 in 1988 and 1998 to less than 6000 in the past 3 years (Knisley 2006). Adult counts at the shoreline of the Calvert Cliffs site since 1997 have also fluctuated from a high of 616 in 1998 to a low of 49 in 1999, and the count was at 122 in 2008 (Knisley 2009). Adult beetles were observed where beach habitat was suitable, with most observations occurring south of the barge dock (Figure M-2).

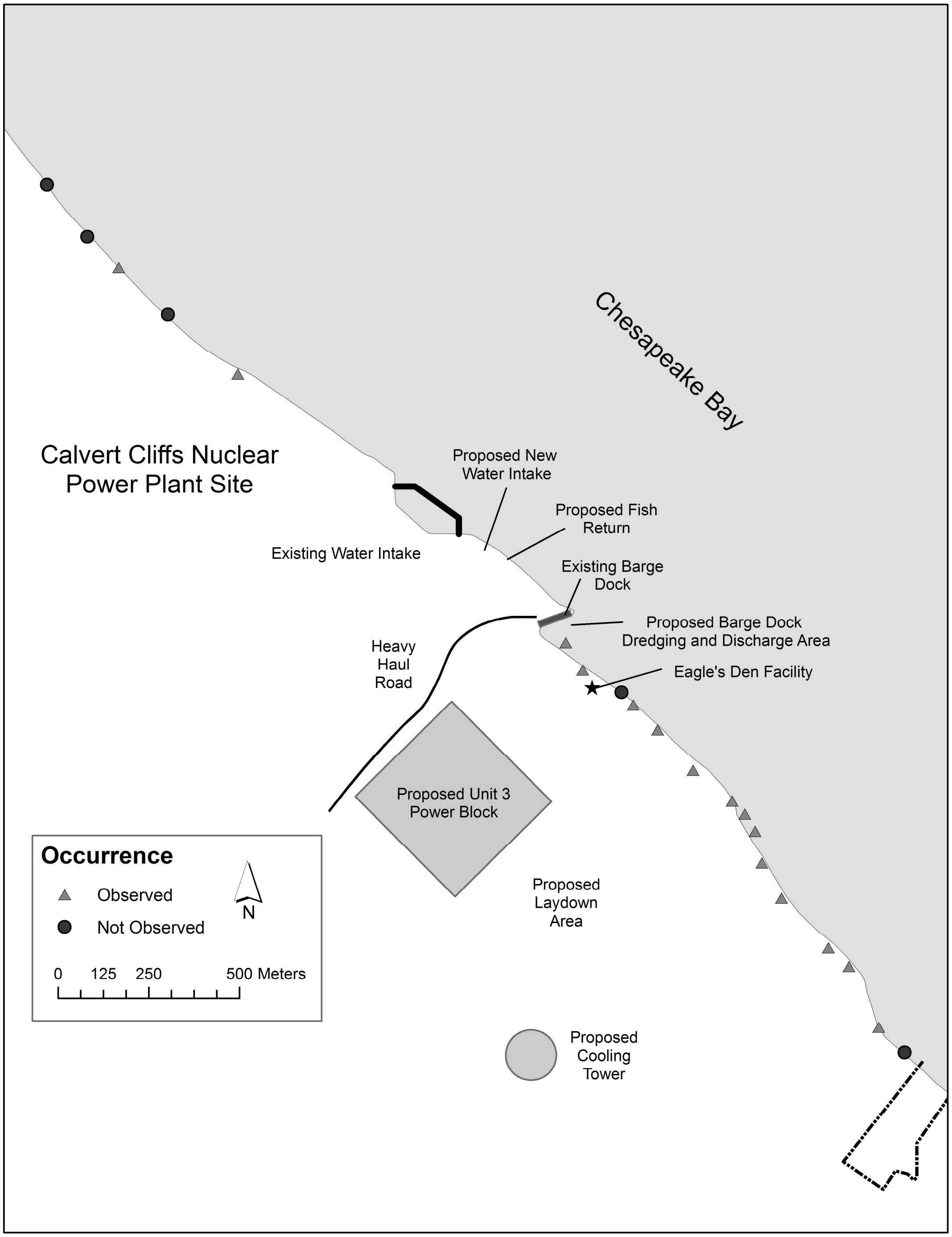

Figure M-2. Proposed Facilities and Puritan Tiger Beetle Survey Results from 2006 (Adapted from USACE 2008; Knisley 2009)

M.1.2 Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*)

Like the Puritan tiger beetle, the northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) is an important invertebrate predator. Its presence is an indication of a healthy beach community. Slightly larger than the Puritan tiger beetle at 13 to 15 mm (55 FR 32088), the northeastern beach tiger beetle inhabits dynamic beach environments closer to the water's edge (FWS 1994).

C. dorsalis dorsalis has historically occurred from Cape Cod, Massachusetts, south to central New Jersey, and along the shores of the Chesapeake Bay in Virginia and Maryland (FWS 1994). The species has been extirpated from Rhode Island; Connecticut; Long Island, New York; and New Jersey. Distribution is limited to two sites in coastal Massachusetts and throughout the Chesapeake shoreline (FWS 1994). Chesapeake Bay populations now constitute a significant portion of the known population of northeastern beach tiger beetles. The northeastern beach tiger beetle is a Federally threatened species, endangered in the State of Maryland (55 FR 32088; MDNR 2007), and a 5-year review of the status by the U.S. Fish and Wildlife Service (FWS) is pending for the northeastern beach tiger beetle (73 FR 3991).

Northeastern beach tiger beetles emerge as adults in early June through mid-August, peaking in July (55 FR 32088). Adults are diurnally active on wider beach sections near the water's edge on warm, sunny days where they mate and lay their eggs from late June through August (FWS 1994). They preferably inhabit beaches at least 20-ft wide and move into new areas of deposition (Fenster et al. 2006). The adults feed mainly on small amphipods, arthropods, and flies and have also been observed scavenging dead amphipods, crabs, and fish (FWS 1994).

The larval stages typically last through two winters with the first instar stage beginning in late July and August, and, by September, most of the larvae are second instars and remain active through November (FWS 1994; 55 FR 32088). Third instars from the previous summer's cohort are also active during the fall, and both cohorts then hibernate over the winter on the beach until around mid March (FWS 1994). The third instar larvae then emerge as adults, while the newer cohort remains over the summer and following winter as third instars. However, if they hatch early and have an abundance of food, some can emerge as adults after only one winter (FWS 1994).

Northeastern beach tiger beetle larvae construct and inhabit burrows from which they ambush prey. Unlike Puritan tiger beetles, northeastern beach tiger beetles are found much lower on the beach in the upper intertidal to high-drift zones where prey is abundant (FWS 1994). Although burrows may be inundated at high tide, larvae have adapted by closing the burrow until water levels drop (FWS 1994). Unlike most other species of tiger beetles, the larvae of *C. dorsalis dorsalis* have been observed crawling on the beach, presumably relocating their burrows to more favorable areas in response to changing conditions (FWS 1994). The larvae are susceptible to desiccation due to their lack of a hard cuticle and are inactive during hot, dry periods (FWS 1994).

Adults are preyed upon by birds, wolf spiders, and asilid flies (Fenster et al. 2006). The larvae are parasitized by an ant-like wasp (*Methocha* sp.) (FWS 1994), and they are also susceptible to erosion, flooding, and food availability. Larva-to-adult survival may be as low as 5 percent. Causes for decline of this species have been attributed to beach habitat destruction and direct mortality from recreational use, alteration by stabilization structures, and natural phenomena (FWS 1994). The larvae are particularly vulnerable to compaction or destruction of their burrows by human use and vehicular traffic on the beaches where they develop (55 FR 32088).

Annual population levels of this species fluctuate widely, and local extinction and repopulation likely are survival mechanisms as adults are able to disperse widely. Marked individuals have been recovered 5 to 12 mi away, and some adults have been observed more than 50 mi from known populations. Lack of undisturbed beaches and proximate populations are hampering recruitment despite the wide dispersal abilities of the adults (FWS 1994). Northeastern beach tiger beetles prefer large, wide, exposed beaches with fine sand particles subject to natural erosion with little disturbance by humans (Fenster et al. 2006; 55 FR 32088).

Historically in Calvert County, northeastern beach tiger beetles have been confined to the northernmost 300-ft section of beach on the Calvert Cliffs site that borders Flag Ponds Nature Park. No known population of the northeastern beach tiger beetle is established within the Calvert Cliffs site, although individuals have been observed on the Calvert Cliffs site. In 2004, four adult northeastern beach tiger beetles were observed on the beach approximately 5000 ft northwest of the existing Calvert Cliffs water intake structure, but none were observed from 2006 to 2008 despite annual surveys (Knisley 2006, 2009). This location is the nearest known occurrence of this species to the proposed construction activity. No suitable breeding habitat, larvae, or burrows have been observed on the Calvert Cliffs site, and it is believed that this species does not have an established population on the site (Knisley 2006).

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Docket 52-016

11. ABSTRACT *(200 words or less)*

This EIS has been prepared in response to to an application submitted to the U.S. Nuclear Regulatory Commission (NRC) by Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC (collectively referred to as UniStar) for a combined license (COL). UniStar also submitted a joint Federal/State Application for the Alteration of Any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland to the U.S. Army Corps of Engineers (Corps). The Corps is a cooperating agency on this EIS. This EIS includes the analysis by the NRC and Corps staff that considers and weighs the environmental impacts of constructing and operating a new nuclear unit at the Calvert Cliffs site and at alternative sites and mitigation measures available for reducing or avoiding adverse impacts.

After considering the environmental aspects of the proposed NRC action, the NRC's staff preliminary recommendation to the Commission is that the COL be issued as requested. This recommendation is based on (1) the application, including the Environmental Report, submitted by UniStar and responses to requests for additional information; (2) consultation with Federal, State, Tribal and local agencies; (3) the staff's independent review; (4) the staff's consideration of comments related to the environmental review that were received during the public scoping process; and (5) the assessments summarized in the EIS, including the potential mitigation measures identified in the ER and this EIS. The Corps' permit decision will be made following the issuance of the final EIS.

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