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UniStar
NUCLEAR ENERGY

10 CFR 50.4
10 CFR 52.79

September 29, 2010

UN#10-241

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Calvert Cliffs Nuclear Power Plant Unit 3, Calvert County, Maryland
Puritan Tiger Beetle Evaluation

The purpose of this letter is to transmit the scope of proposed work for the restoration of an unnamed tributary to the Chesapeake Bay in the vicinity of Camp Conoy on the Calvert Cliffs Nuclear Power Plant Campus. The enclosed technical memorandum provides the Nuclear Regulatory Commission (NRC) with relevant information to evaluate potential impacts or improvements to Puritan Tiger Beetle habitats located in the vicinity of the project.

This letter contains no new regulatory commitments.

If you have any questions concerning the attached document, please call Mr. Dimitri Lutchenkov at (410) 470-5524.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 29, 2010

Greg Gibson

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NRO

Enclosure – EA Technical Memorandum, Proposed Mitigation at SE-4, Unnamed Tributary to the Chesapeake Bay, September 20, 2010

cc: Woody Francis – US Army Corps of Engineers
Susan Gray – Power Plant Research Program
Laura Quinn – NRC Project Manager, Environmental Projects Branch 2

UN#10-241

Enclosure
EA Technical Memorandum
Proposed Mitigation at SE-4
Unnamed Tributary to the Chesapeake Bay
September 20, 2010

TECHNICAL MEMORANDUM

EA Project No. 14621.03

To: **Ed Miller, P.E., UniStar Nuclear Energy**
From: **Jim Morris, Civil Engineer, EA Engineering**
Project: **CCNPP Unit3, Phase II Nontidal Wetland & Stream Mitigation Plan**
Re: **Proposed Mitigation at SE-4, Unnamed Tributary to the Chesapeake Bay**
Date: **September 20, 2010**

Introduction

As requested at the August 18, 2010 Joint Evaluation Committee Meeting, EA Engineering, Science, and Technology, Inc. (EA) is providing a detailed summary of the scope of proposed work for the restoration of the reach identified as SE-4 in the Phase II Mitigation Plan, an unnamed tributary to the Chesapeake Bay in the vicinity of Camp Conoy on the Calvert Cliffs Nuclear Power Plant Campus. The purpose of this technical memorandum is to provide Nuclear Regulatory Commission (NRC) the relevant information to evaluate potential impacts or improvements to Puritan Tiger Beetle habitats located in the vicinity of the project.

Project Background

UniStar requested environmental review of the project site for threatened and endangered species from United States Fish and Wildlife Service (FWS) and Maryland Department of Natural Resources (DNR), Wildlife and Heritage Service. The agencies identified several federal and state-listed threatened and endangered species including the Puritan tiger beetle (*Cincindela puritana*) and the northeastern beach tiger beetle (*C. dorsalis dorsalis*) that occur or could potentially occur within the site.

In April 2009 EA completed a Biological Evaluation for the two tiger beetle species in support of construction and restoration activities at Calvert Cliffs Nuclear Power Plant (CCNPP). The Biological Evaluation included two reports by Dr. Barry Knisley (Knisley 2006 and Knisley 2008) that provided survey results, status assessments and an evaluation of potential impacts from activities proposed including restoration of the SE-4 stream reach.

In addition, a meeting was held on April 7, 2009 for the purpose of visiting the SE-4 stream reach and barge slip areas with Dr. Knisley and personnel from Constellation, UniStar, Maryland Department of the Environment (MDE), DNR, Department of Energy, NRC, United States Army Corps of Engineers (USACE), FWS, and EA. Discussion of the proposed activities and the potential for impacts to the cliff face at SE-4 were a part of that discussion. Based on his knowledge of the beetles life history, habitat use, and presence in the area, Dr. Knisley concluded that habitat for the Puritan tiger beetle at the beach end of SE-4 provided marginal habitat for Puritan tiger beetle larvae because the habitat was more the result of erosion than sloughing of the cliff face which is preferred. As a result, larval habitat was considered marginally suitable. Adult Puritan tiger beetles could use the beach during their activity period from mid-June to early August and staging of equipment on the beach during that time frame could result in impacts.

Discussions during the meeting determined that to avoid "take" of any Puritan tiger beetles, time of year restrictions and a limit of disturbance of 100 ft from bank to bank at the mouth of the stream would provide protection to adult Puritan tiger beetles that may use the beach area at SE-4. In addition, USACE requested that flagging and stakes be used to delineate areas to avoid so contractors would not gain access to restricted areas. A letter providing "Commitment to Time of Year Restrictions for the Calvert Cliff Unit 3 project" was developed and included in the Biological Evaluation. The completed Biological Evaluation is attached to this Technical Memorandum as Appendix A.

Existing Conditions

SE-4 is an intermittent stream receiving the watershed of the existing Camp Conoy Pond. The reach is approximately 1,044 feet in length and has a contributing drainage area of approximately 66 acres. The area is primarily forested with scattered larger trees and numerous smaller trees as well as a riparian community along the stream reach. The upland and riparian community is composed of pines and maples with a groundcover of Japanese stilt grass (*Microstegium vimineum*) (Japanese stilt grass), an invasive species and exposed ground. There are few shrubs present and widespread evidence of grazing by whitetail deer.

The lower portion of the reach cascades down a shear silt/clay bank onto a small stony beach adjacent to the Chesapeake Bay. The cliff face and incised channel banks are characterized by some bare earth and the presence of common reed (*Phragmites australis*) as well as other invasive species, grasses and some small shrubs all of which assist in partially stabilizing the slope.

Within the upper reach, two ponds are present. These are believed to be the remnants of constructed impoundments formerly maintained as part of the facility's camp. The ponds hold water throughout the year, even when the channel connecting them is dry and are jurisdictional wetlands as regulated by the US Army Corps of Engineers.

SE-4 is entrenched along its length, and as a result, flow does not regularly over top the stream bank inundating the floodplain under common flow events, nor is sediment regularly deposited onto the floodplain. Groundwater is shallow and normally below the invert of the existing channel, and baseflow is usually absent from the reach in drier months. Additionally, the degree of entrenchment creates conditions of excess sediment transport which result in deeper entrenchment through channel incision.

As typical of streams in Calvert County directly discharging to the Chesapeake Bay, SE-4 allows a means of sediment transport sourced from multiple geologic formations. The primary formations found at the site are the St. Mary's, Choptank, and Calvert Formations.

Proposed Conditions

Restoration goals for this reach include work to improve the utilization of SE-4 by American eels (*Anguilla rostrata*), reconnect the channel with its floodplain, create and enhance wetlands, and promote base flow conditions by raising the shallow groundwater table within the reach. Draft Final Design Plans limited to the work planned for the SE-4 area are included in Appendix B for review. Appendix C presents photos of the mitigation site and surrounding area.

The SE-4 restoration design applies natural channel design principles of riffle/pool grade controls and headwater wetland creation to dissipate flow energy, lift the existing channel to connect with the existing floodplain, and filter stormwater runoff through a sand and woodchip channel-fill media. Riffle/pool grade controls follow a similar design methodology to that of the regenerative stormwater conveyance principles outlined in Anne Arundel County stormwater design guidance, the hydraulic design of which will be presented in the Draft Final Phase II Mitigation Plan. Additionally, recognizing the nature of this coastal plain system, restoration techniques will utilize woody grade controls to capture sandy bed load, and strive to mimic the natural series of grade controls and impoundments found in beaver dam systems, found nearby on site and throughout the region.

The design for SE-4 reach upstream of the lowest pond applies these principles to convey the 100-year peak discharge safely and without channel degradation. As this reach is proposed to convey stormwater

resulting from the site development, stormwater peak discharge criteria were identified through the proposed facility stormwater management plans provided by the Bechtel Corporation, October 2009. These plans utilize the existing ponds as stilling basins to reduce flow velocity, with grading and planting proposed to reduce open water habitat in favor of creating emergent wetland habitat which, through natural succession, will shift towards forested wetland habitat.

Below the lowest pond a series of stone step pools is proposed to provide American eel passage, grade stability, and connection to the Chesapeake Bay. The step pools are designed to prevent vertical channel incision and maintain channel profile stability. Additionally, energy dissipation is provided through the pools, limiting peak velocity of the flows and allowing refuge for American eels that may use this tributary.

The banks above the step pools are currently vegetated with *Phragmites*. Proposed grading on the banks above these step pools would eliminate the invasive reed and when graded would allow natural erosion from slope sloughing and corresponding sediment deposition at the cliff base (colluvial processes). This would mimic the slope of the existing eroding silt/sand cliff faces rather than the existing conditions that occur through erosion of the channel bed from stream flow. After restoration of SE-4, erosion of the sand cliff faces would be driven by natural processes such as wind, rain splash, freeze/thaw cycling and natural slope instability, rather than through stream scour mechanisms. While the Phase I plan proposed vegetative stabilization of the outfall of SE-4, the Draft Final Phase II plan does not include vegetative stabilization and should result in enhancing the supply of sediment and thus, potentially increasing available larval habitat in this area. Existing invasive and stabilizing plant species are proposed to be removed (through physical removal and limited chemical treatment) from the cliff vicinity and graded slopes. The graded and adjacent portions of the slope designed to allow colluvial erosion are to not be re-vegetated. In this way the design seeks to maintain a stable and natural erosion of sandy soils to mimic the specialized habitat critical to the life cycle of Puritan tiger beetles.

The step pool system would outfall to a small basin graded landward of the mean high water (MHW) line but graded to below the MHW elevation. The maximum width of the limit of disturbance in this area is less than 30 feet. This basin is designed to collect and flush sediment in accordance with existing near-shore sediment transport and wave action processes, and provide log habitat for American eel and other aquatic species.

Avoidance and Minimization

Grading at the step pool system is proposed to occur only on the landward portions of the cut through the cliff face, and not to disturb outward (bay side) portions of the cliff which currently provide marginal larval Puritan Tiger Beetle habitat. All work proposed shall be in accordance with the time of year restrictions committed to by UniStar (1 June – 31 August) for Puritan tiger beetles as well as Maryland waterway use class designations.

Additionally, no work is proposed below the MHW line of the Chesapeake Bay. Although the sediment transport conditions in this portion of the Chesapeake Bay are presently unevaluated, by not performing any work below the MHW, revetment, or shore stabilization, it is anticipated that the proposed design will not impact any near-shore sediment transport conditions.

Portions of the work area relevant to Puritan Tiger Beetle habitat are not proposed to have any means of vegetative stabilization, matting, or other stabilization. Creation of this sediment source will require special provisions in the required Erosion and Sediment Control Plan to be developed prior to the initiation of construction.

Construction Monitoring

The on-site engineer will coordinate with regulating agencies (USACE, DNR, MDE, FWS, etc.) to directly monitor all work relating to SE-4, and will, in conjunction with these agencies, ensure strict adherence to all work restrictions including the 100 foot limit of disturbance and time of year restrictions.

Additionally; the on-site engineer will monitor construction access, logistics and staging to ensure compliance with the approved provisions included in the design plans and the approved Final Phase II Mitigation Plan, and restrict all unnecessary use of the waterfront beach areas during the construction of reach SE-4.

Post-Construction Monitoring

Puritan tiger beetle populations are highly variable from year to year due to the sensitive two-year larval stage, the potential for mortality of larval stage individuals from large slope failures and other environmental factors including weather. It is anticipated that regulatory agencies will continue to perform Puritan tiger beetle surveys and habitat assessments in area of the SE-4 beach in conjunction with periodic tiger beetle monitoring conducted throughout this coastal area.

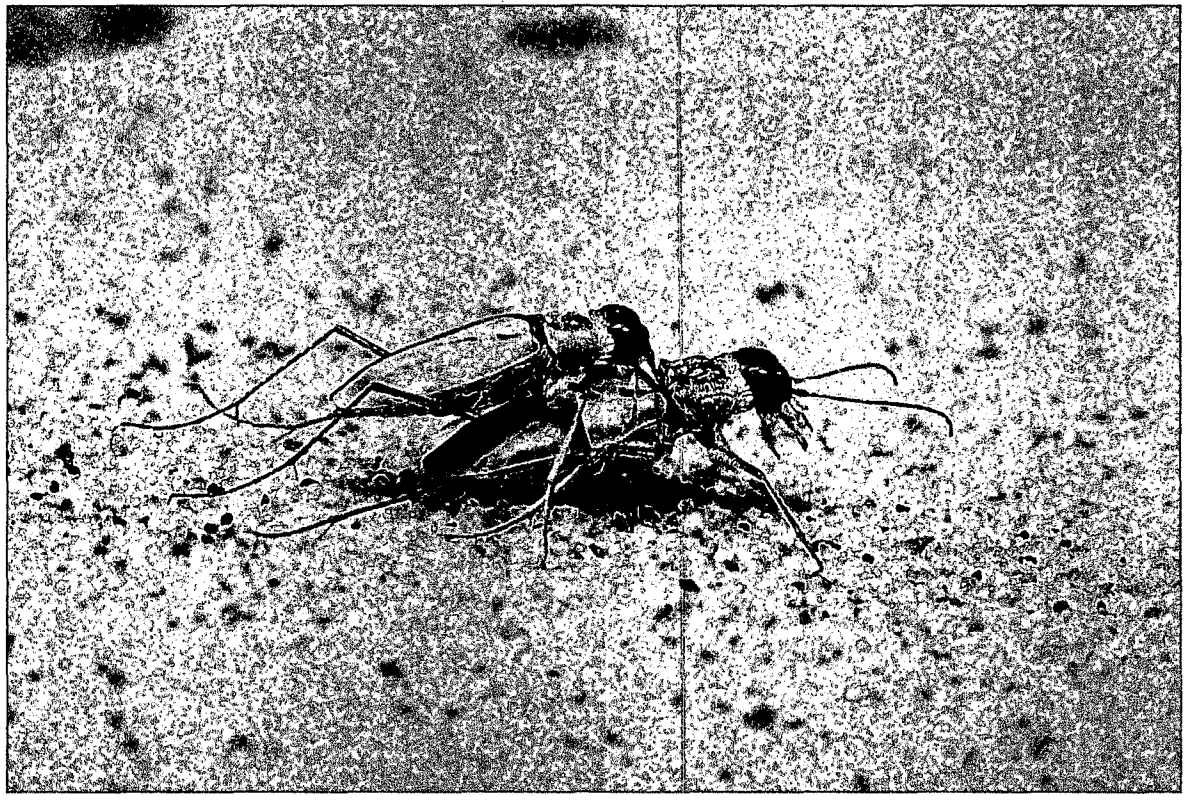
Post construction monitoring of the SE-4 restoration will be in accordance with the Final Phase II Mitigation Plan. No specific surveys or habitat assessment for Puritan tiger beetle s are presently proposed to be performed as part of the Final Phase II Mitigation Plan. Additionally, no goals of recovery for the Puritan tiger beetle are presently established in relation to the mitigation.

Attachments:
Appendix A – Biological Evaluation Report
Appendix B – Draft Final (Not For Construction) Design Plans
Appendix C – Photo Log

APPENDIX A:

BIOLOGICAL EVALUATION REPORT

Biological Evaluation for the Puritan Tiger Beetle (*Cicindela puritana*) and the Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*) at the Calvert Cliffs Nuclear Power Plant Unit 3 Project



Submitted To:
U.S. Fish and Wildlife Service

Submitted By:
UniStar Nuclear Operating Services, LLC

With Support Of:
EA Engineering, Science, and Technology, Inc.

April 2009

Biological Evaluation for the Calvert Cliffs Nuclear Power Plant Unit 3 Project

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LIST OF ACRONYMS

BA	Biological Assessment
BE	Biological Evaluation
BMPs	Best Management Practices
CCNPP	Calvert Cliffs Nuclear Power Plant
CPCN	Certificate of Public Convenience and Necessity
DNR	Maryland Department of Natural Resources
EIS	Environmental Impact Statement
FWS	United States Fish and Wildlife Service
MLW	Mean Low Water
NRC	Nuclear Regulatory Commission
the Act	Endangered Species Act
UniStar	UniStar Nuclear Energy, LLC
USACE	United States Army Corps of Engineers

Cover Photo: Northeastern Beach Tiger Beetle
Source: FWS Digital Library System - http://images.fws.gov/

BIOLOGICAL EVALUATION
FOR THE CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3 PROJECT

1. INTRODUCTION

Background

The Nuclear Regulatory Commission (NRC) is considering the license application of UniStar Nuclear Energy (UniStar) for the construction and operation of a third nuclear power generating station at the Calvert Cliffs Nuclear Power Plant (CCNPP) complex, Lusby, Maryland, the site of Constellation Energy's two existing nuclear power generating stations. The site is located on the western shore of the Chesapeake Bay approximately 35 miles south of Annapolis, Maryland in Calvert County (Figure 1).

The NRC is the lead agency for the proposal and is preparing an Environmental Impact Statement (EIS) for work associated with the construction of the new unit. The decision to award a license will be made by the NRC upon the completion of their EIS and fulfillment of conditions placed on the license application. Certain non-safety related activities, such as land clearing, have been designated by the NRC to be pre-construction. The U.S. Army Corps of Engineers (USACE) is serving as a cooperating agency with the NRC and taking the lead agency role with respect to pre-construction activities.

Under Section 7, of the Endangered Species Act (the Act) all federal agencies participate in the conservation and recovery of listed threatened and endangered species. Section 7(a)(2) of the Act requires that federal agencies insure that any action they authorize, fund or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Section 7 further provides guidance for the consultation process and federal interagency cooperation to conserve federally listed species and designated critical habitats including the development of a Biological Assessment (BA). A BA may be required by the U.S. Fish and Wildlife Service (FWS) if listed species or critical habitat may be present in the Project action area.

A Certificate of Public Convenience and Necessity (CPCN) constitutes permission of the State of Maryland to construct the third nuclear power generating station at the CCNPP complex. A list of required permits that must be issued for construction are contained within the CPCN. Permits from the U.S. Army Corps of Engineers (USACE) are also required for construction. In response to the public notice requesting review of their permit application, the USACE received a letter, dated September 30, 2008, from the FWS identifying two federally listed threatened species as occurring within the project vicinity: the Puritan tiger beetle (*Cicindela puritana*) and the northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*). FWS further requested a BA discussing potential effects on species found or assumed to occur within the Project action area, and determining whether there would be any effects from the Project on the federally protected species. The NRC is the lead agency preparing the BA; this biological evaluation (BE) has been prepared to assist with the site preparation activities. Appendix A provides the consultation record for the project. Appendix B provides the site specific tiger beetle surveys conducted for this project. Appendix C provides the documentation for UniStar's commitment to minimizing impacts to tiger beetles and habitat associated with the Calvert Cliffs Unit 3 Project.

Purpose

The purpose of this BE is to assess potential effects of site preparation activities, the construction of support facilities, mitigation and restoration activities, and the construction, operation and maintenance of

the CCNPP Unit 3 on two tiger beetle species identified by FWS as possibly present in the area affected by the project.

Proposed Action

UniStar is planning construction of the new CCNPP Unit 3 on property adjacent to the existing CCNPP Units 1 and 2. CCNPP Unit 3 will be constructed in the U.S. Evolutionary Power Reactor design. Plant structures planned for construction include main power block buildings, cooling towers, desalination plant, an intake structure, a discharge structure and other associated buildings. The project will also include restoration of an existing barge dock on the property and dredging activities.

Affected Species

The two listed species identified by FWS as occurring within the project vicinity are the Puritan tiger beetle and the northeastern beach tiger beetle (FWS, 2008).

2. CONSULTATIONS AND SITE SURVEYS

UniStar requested environmental review of the project site for threatened and endangered species from FWS and Maryland Department of Natural Resources (DNR), Wildlife and Heritage Service. The response from FWS, in a letter dated May 22, 2007 (see Appendix A), indicated that no federally proposed or listed endangered or threatened species are known to exist within the project impact area (except for occasional transient individuals). DNR responded in a letter dated June 23, 2008 (see Appendix A), which identified several federal and state-listed threatened and endangered species that occur in Chesapeake Bay including the Puritan tiger beetle and the northeastern beach tiger beetle. There are recorded occurrences of the Puritan tiger beetle and the northeastern beach tiger beetle, both federally listed as threatened and state listed as endangered species, on the Calvert Cliffs site.

Tiger beetle surveys have been conducted by Dr. C. Barry Knisley at Calvert Cliffs most of the past ten years. As a result of the DNR letter, Constellation Energy, contracted with Dr. Knisley to conduct surveys and provide an assessment of the presence and status of both tiger beetle species at CCNPP. In 2006, his surveys indicated that the Puritan tiger beetle occurs on the Calvert Cliffs site in suitable habitat south of the Calvert Cliffs barge dock, from the middle of the Camp Conoy area southward and that the northeastern beach tiger beetle occurs only occasionally at the northern CCNPP property border (Knisley, 2006). An updated supplement to the 2006 survey report was issued in 2008 describing the results of the 2008 surveys in the same area (Knisley, 2008). In 2008, Dr. Knisley reported that the distribution of the Puritan tiger beetle along the shoreline was similar to the 2006 findings and the numbers of adults continued to vary greatly. The 2008 report further stated that no northeastern beach tiger beetles had been found adjacent to CCNPP in recent years and that the closest population was near extirpation with only two individual observed in 2008 (Knisley, 2008). Both reports are included in Appendix B.

3. PROJECT DESCRIPTION

The CCNPP site consists of 2,070 acres of land that support a variety of habitats as well as the facilities for the existing CCNPP Units 1 and 2. The construction of CCNPP Unit 3 would require the use of approximately 460 acres of the site of which 320 acres would be permanently committed to CCNPP Unit 3 and its supporting facilities. Impacts to natural resources are expected to originate primarily from the preparation activities and construction phase of the project. Impacts to natural resources from the operation and maintenance of the new unit are considered to be negligible.

Construction

UniStar has committed to avoidance and minimization of impacts to both species of tiger beetles and habitat occurring on the CCNPP campus. Condition #52 of the CPCN states that "for the protection of the two species of State-endangered, federally threatened tiger beetles (northeastern beach tiger beetle and Puritan tiger beetle) that are known to occur along the Chesapeake Bay shoreline and proximal to the project site, no construction activities shall occur within 500 feet of currently suitable habitat for either species, with the exception of those activities (a) occurring within the designated Intensively Developed Area, (b) associated with the demolition of the Eagle's Den building and removal of related impervious surfaces, and (c) associated with any Forest Interior Dwelling Species habitat restoration or wetlands mitigation. Activities undertaken in these areas will be conducted, to the greatest extent practicable, to minimize impacts to any adjacent cliff or beach habitats that are suitable for either species. Administrative controls that restrict personnel access to beaches shall be implemented. UniStar shall allow DNR to access the shoreline as requested to conduct surveys to examine the health of tiger beetle populations."

If all necessary permits/approvals are received, UniStar may decide to initiate site preparation and building demolition activities as soon as October 2009. Construction activities that would occur within 500 feet of potential tiger beetle habitat are limited to demolition of one building (Eagle's Den), removal of impervious roadways, planting of trees, construction of a forested wetland mitigation project, restoration/enhancement of a stream, construction of a heavy haul road to the barge dock, and restoration and maintenance of the existing barge dock. Figure 2 shows the location of these activities relative to the existing tiger beetle habitat and buffer. All other activities would be completed outside of the delineated 500-foot tiger beetle buffer.

Eagle's Den Building Demolition

Demolition of a building (Eagle's Den) in Camp Conoy within 50 feet of the cliff edge would require a geotechnical evaluation of the stability of the area to determine appropriate construction loads and methods of construction to complete the proposed work and minimize impacts to tiger beetles and their habitat. Sediment and erosion control best management practices (BMPs) will be implemented in accordance with the Calvert County approved grading permit. Construction of a forested wetland mitigation project approximately 200 feet from the cliff edge would also employ BMPs to minimize any impacts to tiger beetle habitat. The design of stream restoration and enhancement projects will be designed to minimize any impacts and where feasible to enhance tiger beetle habitat.

Heavy Haul Road

Construction of the haul road from the barge slip to the construction site would permanently impact 2,570 square feet (0.06 acres) along 642 linear feet of stream bed and would be located partially within the 500-foot buffer. Sediment and erosion control BMPs would be implemented in accordance with the Calvert County approved grading permit.

Restoration of Barge Unloading Facility including Maintenance and New Dredging

To facilitate the receipt of equipment and materials for the construction of the new unit, two existing pile cap crane supports and one mooring bollard will be removed. The existing barge slip will be restored and extended to re-establish use of an approximately 1,500-foot by 130-foot (average width), 195,000 square foot area to a bottom elevation of - 16 feet mean low water (MLW), requiring approximately 50,000 cubic yards of mechanical dredging. Nearshore maintenance dredging of approximately 1,065-feet will be

maintenance dredging to remove sediment that has mounded up over the past 30 years. The remaining 435-feet of dredging extends beyond the original dredging limits and is required to reach the bottom elevation of -16 feet MLW. Of the approximately 50,000 cubic yards of dredging required, 45,000 cubic yards would result from maintenance dredging, and 5,000 cubic yards from new dredging. Ten-year maintenance dredging is requested to maintain the barge slip.

A new sheet pile wall will be installed along the shoreline in front of the existing bulkhead built as part of the original design. The bulkhead will be approximately 90 feet in length starting from the barge slip extending south to an existing outfall culvert. On the landside of the new sheet pile bulkhead, a concrete apron will be placed along with a gravel apron to allow equipment to be off-loaded from barges with wheeled mounted transporters.

Restoration of the barge slip area will also include restoration of an existing culvert outfall and channel. Due to silt build up over the years, the discharge from this outfall meanders in a north-south direction prior to discharging into the barge slip area. The restoration activities in this area will include the installation of a 40-foot by 40-foot by 2-foot deep riprap apron extending approximately 40 feet channelward and placed directly in front of the existing outfall allowing the discharge to flow directly into the Chesapeake Bay as originally designed.

Mitigation Activities

On-site and in-kind wetland and stream mitigation is intended to meet the mitigation requirements of the USACE, Baltimore District. Wetland enhancement and creation areas and stream enhancement and restoration areas would occur within the same hydrologic units as proposed impacts and are designed to adhere to the Code of Maryland Regulations, Subsection 26.23.04.03 (as cited in MACTEC, 2009).

Wetland mitigation will be required for the CCNPP Unit 3 project to offset unavoidable impacts to approximately 11.2 acres of wetlands. No activities involved with wetland mitigation efforts are expected to impact either species of tiger beetle or their larval or adult habitats.

Stream mitigation includes both stream restoration and stream enhancement activities. Two of the ten sites proposed for stream mitigation, one for stream enhancement (SE-4) and one for stream restoration (SR-3) are located near existing habitats for larval and adult Puritan tiger beetles (Figure 2). The stream enhancement at SE-4 is planned in conjunction with a wetland mitigation site and would involve providing a channel stabilization grade control feature at the confluence with the Chesapeake Bay. This feature would prevent upstream migration of a headcut and preserve the upstream sequence of wetlands and stream channels. Additional enhancement throughout the stream reach includes riparian re-vegetation and minor bank grading where knickpoints have initiated. Minor bank grading plus other enhancements will be performed in preparation for bioengineering application and native plant landscaping (MACTEC, 2009). Stream restoration at SR-3 is located adjacent to the barge dock and involves the establishment of a "new" active floodplain within the existing channel ("F"-Type) and would be accomplished through bank grading and substantial adjustment of the existing alignment and profile. The restoration would begin immediately below the proposed fill zone and continue downstream until it reconnects with the adjacent floodplain near an existing culvert. CCNPP would create a new channel within this gully shape minimizing the loss of healthy trees by stabilizing steep valley slopes using bioengineering applications (MACTEC, 2009).

Operation

CCNPP Unit 3 will produce approximately 1,600 megawatts of energy that would be sold into the regional market. This facility will consist of a four loop, pressurized water reactor with a Reactor Coolant System composed of a reactor pressure vessel containing fuel assemblies; a pressurizer, including ancillary systems to maintain system pressure; a reactor coolant pump and a steam generator for each loop; associated piping, and related control and protection systems. Operation of this facility will be regulated by the NRC.

CCNPP Unit 3 will use a closed-cycle, wet cooling system. A single plume abated mechanical draft cooling tower will be used to dissipate heat from the system. Makeup water will be drawn from the Chesapeake Bay to replace losses from evaporation, blowdown, and drift. Various types of waste would be generated by the operation of CCNPP Unit 3. Wastes are classified as: non-hazardous waste, sanitary waste, hazardous waste, mixed waste, and nuclear waste. It is expected that the new unit will recycle, recover, or send offsite for disposal all solid waste other than spent fuel.

Maintenance

Maintenance dredging at the barge slip would be scheduled on a ten-year cycle; all other maintenance activities would occur within the footprint of the proposed CCNPP Unit 3 and would be similar to the maintenance activities at a similarly configured power plant.

4. ACTION AREA

4.1 Puritan Tiger Beetle

For the BE, the Project action area described for the Puritan tiger beetle is a narrow stretch of shoreline along the Chesapeake Bay and the edge of the CCNPP property (Figure 2). The area stretches from just south of the barge dock and slip for approximately 2,500 feet and is considered potential Puritan tiger beetle habitat. The potential habitat and a 500-foot protective buffer surrounding the habitat are considered to be the action area. Activities proposed for the action area include the demolition of a building at Camp Conoy, removal of impervious roadways, tree planting, construction of a forested wetland mitigation area and an area of stream restoration/enhancement.

Physical Conditions

Where it has not been developed for the CCNPP complex, the Chesapeake Bay shoreline consists of a narrow sandy beach at the base of steep sandy cliffs. The beach is generally less than 20 feet wide during normal low tides (DNR, 2008). The southern portion of the shoreline within the CCNPP complex offers the best quality cliff habitat for larvae and beach habitat for adult Puritan tiger beetles. The portion of the shoreline adjacent to Camp Conoy has low and vegetated cliffs and provides little suitable habitat for Puritan tiger beetles. The area north of the barge dock is armored with rip-rap and does not include sand beach habitat. As a result, the area extending north of the barge dock and the area occupied by the existing Units 1 and 2 are not considered to be habitat for the Puritan tiger beetle.

Biological Conditions

Surveys for tiger beetles have been conducted nearly annually since 1997 using a visual search index count method and habitat quality assessment that acquires habitat quality through visual examination of beach width, surface character, presence and amount of suitable cliff strata. In 2006, Dr. C. Barry

Knisley completed a survey on the status of the Puritan and northeastern beach tiger beetles at CCNPP. His 2006 survey and report were followed by a supplemental survey and report in 2008. Both reports are located in Appendix B.

Results of the 2006 survey indicated that the Puritan tiger beetle was found on the CCNPP site south of the barge dock, from the middle of the Camp Conoy area southward where suitable habitat occurs (Knisley, 2006). The 2008 supplement reported that the distribution of the Puritan tiger beetle along the shoreline was similar to 2006 results and continues to show that the abundance of adult Puritan tiger beetles varies greatly from year to year. In 2008, adults were present along the majority of the shoreline at CCNPP, though abundance and density of organisms was variable. The highest numbers of adults and greatest densities of Puritan tiger beetles were within the southern third of the survey area; lower concentrations of adults were in a 500 meter section of south of the barge dock. No Puritan tiger beetles were found in the area north of the barge dock where riprap armoring replaces sand beach habitat (Knisley, 2008).

4.2 Northeastern Beach Tiger Beetle

The northeastern beach tiger beetle does not have an established population within the boundaries of CCNPP (Knisley, 2006). Nearly annual surveys at CCNPP between 1997 and 2008 have found northeastern tiger beetles only once. At the time of observation, small numbers (<25 individuals) were within the northernmost 300 ft of shoreline at CCNPP adjacent to Flag Ponds Nature Park where there has been an established breeding population. Most of the adults and all of the larvae of the northeastern beach tiger beetle population at Flag Ponds Nature Park are primarily restricted to the northern half of the park. No northeastern beach tiger beetles have been found in the area at CCNPP during more recent surveys and the Flag Ponds population has declined to the point of being extirpated as only 2 adults were found during the 2008 surveys (Knisley, 2006 and 2008).

Physical Conditions

The Chesapeake Bay shoreline on the CCNPP campus consists of a narrow sandy beach at the base of steep, sandy cliffs where it has not been developed for the existing nuclear power generating stations and barge dock. The beach is generally less than 20 ft (6 meters) wide during normal low tides (DNR 2008). The area north of the barge dock is armored with rip-rap and does not include sand beach habitat.

Biological Conditions

Most adults and all larvae of the northeastern beach tiger beetle are found only in the northern half of Flag Ponds Nature Park and are rarely observed in the southern portion of Flag Ponds Nature Park near the CCNPP property boundary. Since surveys were initiated in 1997, the northeastern beach tiger beetle has been observed once on CCNPP property within the northern most 300 feet (100 meters) of shoreline. No larvae or other evidence of a breeding population has been known from the northern section of CCNPP. No adult northeastern beach tiger beetles were observed in 2006 or 2008 on CCNPP property or in the portion of Flag Ponds Nature Park adjacent to CCNPP (Kinsley, 2006 and 2008). As of 2008, only two adults were observed in Flag Ponds Nature Park and that population has declined to the point of near extirpation.

5. SPECIES AND HABITAT DESCRIPTIONS

5.1 Puritan Tiger Beetle

The Puritan tiger beetle was federally listed as threatened in 1990 and is listed as endangered in Maryland.

Range and Population Level

There are populations of the Puritan beach tiger beetle in New England and Maryland. In New England two populations are known to exist, one in Connecticut and one in Massachusetts, both along the Connecticut River. As of 1993 and the issuance of the recovery plan for Puritan tiger beetle, there were 16 extant populations in Maryland in Calvert, Kent, and Cecil Counties (FWS, 1993). The largest numbers of the Puritan tiger beetle are in Calvert County, where there are eight populations. However, the Calvert County population has decreased dramatically since the late 1980's and early 1990's (Knisley, 2006). A five-year review by FWS in 2007 has confirmed that the Massachusetts and Connecticut populations are relatively stable, but the Puritan tiger beetle in the Chesapeake Bay Region has declined and may face extinction (FWS, 2007). In the five-year review, FWS recommended that the protection of the Puritan tiger beetle be reclassified to endangered at the federal level.

At CCNPP, the Puritan tiger beetle has been known to occur along the shoreline since 1997 and the population has fluctuated dramatically during that time – ranging from a low of 49 individuals to a high of 616 individuals from 1997 to 2006 (Knisley, 2006). Recent surveys have indicated that the Puritan tiger beetle population at CCNPP varies but its distribution along the shoreline at CCNPP has only changed slightly (Knisley, 2008).

Threats

In the Chesapeake Bay region, the primary threat to the Puritan tiger beetle is destruction, modification, or direct loss of habitat, especially larval habitat. Larval Puritan tiger beetles utilize unvegetated sandy cliff faces and increasing development along the Chesapeake Bay shoreline often results in the need for shoreline erosion control measures which stabilize the cliff face by establishing vegetation on the cliffs eliminating larval habitat (FWS, 2007).

Anecdotal evidence suggests that hurricanes and winter storms may dramatically affect population size by eroding larval habitat in certain years, however, it is believed that these same storms maintain beetle habitat over the long-term. As the Puritan tiger beetle populations become smaller and more isolated, they may not sustain the ability to recover from storm events and/or recolonize new habitat formed (FWS, 2007).

Other threats to Puritan tiger beetles include predation, the establishment of invasive, non-native plant species on the cliff faces and sea level rise (FWS, 2007).

Species Description

In Maryland, Puritan tiger beetle larvae live in deep burrows dug horizontally into sandy deposits on non-vegetated portions of the bluff face. They may also burrow at the base of the bluffs in sediment deposits that have eroded from the bluff face. Chesapeake Bay populations appear to be most abundant where bluffs are long and high and composed at least in part of sandy soil. Wave-producing storms and erosion of the bluffs are necessary to maintain the bare bluff faces required for larval habitat. Adult Puritan tiger

beetles prefer narrow sandy beaches with adjacent well-developed cliffs of sand and clay soil (Knisley, 1987 in NatureServe, 2009).

Puritan tiger beetles have a two-year larval cycle with three instar phases before emergence as adult beetles. Larvae hatch in late July or August and, after 2 to 4 weeks, become second instars. Larvae overwinter in the second instar and then molt and become the third instar. These third instars continue development into the fall before overwintering, pupating in the late spring and emerging in mid-June as adults (FWS, 1993). Larvae are active day and night during the spring and fall though activity is reduced during hot, sunny weather. Larvae feed opportunistically by positioning themselves at the mouths of their burrows to prey upon small invertebrates that pass by (FWS, 1993). Larval mortality can be the result of predation, parasitism, or winter storms. When winter storms cause the bluff face to shear larval mortality can be significant and may contribute to local population fluctuations (FWS 1993).

Adult Puritan tiger beetle populations peak in late June to early July and begin to decline in late July declining rapidly until the middle of August when only a few adults remain. Adults are active day and night and feed throughout the day. Adults feed actively on small invertebrates in the debris along the tide line and can occasionally be found feeding on the cliff face. Mating activities occur during the day, with a peak during the early evening. Adult Puritan tiger beetle mortality can be the result of predation. Periodic dispersal of adult Puritan tiger beetles has been documented but is not well understood (FWS, 1993).

5.2 Northeastern Beach Tiger Beetle

The northeastern beach tiger beetle was listed as threatened in 1990 by the FWS; it is listed as endangered in Maryland.

Range and Population Level

The northeastern beach tiger beetle has been documented along the coast from New England to south Texas and taxonomically is comprised of four subspecies. According to the *Northeastern Beach Tiger Beetle Recovery Plan,* (FWS 1994), the subspecies *Cicindela dorsalis dorsalis* is known to occur only in two sites along the Atlantic coast in Massachusetts and at many sites within the Chesapeake Bay Region (FWS, 1994). In the Chesapeake Bay Region, 55 sites in Virginia and 13 sites in Calvert County, Maryland, have documented populations of the northeastern beach tiger beetle. Of these sites, 16 had populations of over 500 adults and 10 sites had populations of 100 to 500 adults, based on data from the early 1990s (FWS, 1994). Populations of the northeastern beach tiger beetle have declined dramatically since this time. The nearest population to CCNPP is located at Flag Ponds Nature Park, Calvert County, Maryland. The Flag Ponds population contained approximately 4,000 individuals in 1992, but had declined to 62 individuals in 1998 (Knisley, 2006). Populations at Western Shores, Scientists Cliffs, and Cove Point sites in Calvert County, Maryland, have also experienced similar proportional declines. A report completed in 2005 (Knisley, 2005a, as cited in Knisley, 2006) stated that the Scientists Cliffs and Cove Point habitat no longer supported the northeastern beach tiger beetle and populations there were extirpated. As of 2005, only two sites in Calvert County, Maryland supported this species: Western Shores Estates and Flag Ponds Nature Park (Knisley, 2006). In 2008, Knisley reported that the Flag Ponds Nature Park population included only two adults (Knisley, 2008).

Within the CCNPP campus, the northeastern beach tiger beetle does not have an established population (Knisley, 2006). Small numbers of this species have been observed only once at the north end of CCNPP property adjacent to the southern boundary of Flag Ponds Nature Park. These individuals are thought to have dispersed south from the known breeding population at Flag Ponds Nature Park. During the 2006

survey, no adult tiger beetles were found in the stretch of CCNPP shoreline within 100 meters of Flag Ponds Nature Park. No observations of adult northeastern beach tiger beetles were found in the southern portion of Flag Ponds Nature Park adjacent to CCNPP during surveys in the same year. (Knisley, 2006).

Threats

Because the northeastern beach tiger beetle requires dynamic beaches as habitat, the main cause of decline to northeastern beach tiger beetle populations has been human activities including vehicular and foot traffic on beaches as well as beach nourishment/replenishment that can bury northeastern beach tiger beetles (NatureServe, 2009). Stabilization of beaches can alter or destroy habitat as vegetation increases in stabilization areas. Existing populations are also fragmented and as a result are vulnerable to extirpation from hurricanes other major storms that can remove surface sands and eliminate foredune areas of beach habitat (NatureServe, 2009).

FWS in the *Northeastern Beach Tiger Beetle Recovery Plan* also noted threats to the species originating from oil slicks and the use of pesticides for mosquito control (FWS, 1994).

Species Description

Similar to adult Puritan tiger beetles, the adult northeastern beach tiger beetle emerges in mid-June and reaches peak abundance by early July. Presence of adults then declines through August. Adults are most active on warm, sunny days and the number of adults active on rainy or cool, cloudy days is low. This species is thought to be more active during warmer periods because of a need to maintain a high body temperature for maximal predatory activity. Over half of the adult population may also be active nocturnally during summer months. Female adult beetles have been commonly found at night laying eggs (ovipositing) over shallow vertical burrows. Adults tend to concentrate in wide areas of beach habitat and may be found in small numbers or completely absent from narrow strands of beach. Mating and egg-laying occur from late June through August (FWS 1994).

Northeastern beach tiger beetle larvae have three instars (developmental stages) that live in vertical burrows in the beach sand of the upper tidal zone. The first instar appears during late July and August after hatching during June and July. Most larvae reach the second instar by September. Some larvae have developed into the third instar by November. The size of the burrow increases with each instar. During periods of high tide, northeastern beach tiger beetle larvae plug the opening to the burrow and re-open it after the water subsides. Individuals that live closer to the water's edge develop more quickly because of the greater abundance of prey organisms. On occasion, larvae have been found crawling on the beach, possibly relocating to dig new burrows. Larvae are inactive during hot, dry conditions when they are subject to desiccation. Northeastern beach tiger beetle larvae overwinter on the beach and emerge from hibernation in mid-March (FWS, 1994).

Larval activity is highly variable and influenced by temperature, substrate moisture tide levels, and season. Larvae feed opportunistically at the mouth of the burrow capturing small invertebrates in the vicinity. The major prey for this species appears to be amphipods (FWS 1994).

Predators for adults of this species include asilid flies, birds, and spiders. Larval populations are more limited by predators than adults, which are somewhat protected from predators by their size. The main predators of larvae are small, ant-like parasitic wasps that enter the burrow and parasitize the developing tiger beetle larvae (FWS, 1994).

6. EFFECTS OF PROJECT ACTIONS

6.1 Puritan Tiger Beetle

Construction

The construction of CCNPP Unit 3, and all of the associated facilities would be outside of the 1,000-foot Chesapeake Bay Critical Area except for a new heavy haul road and water-dependent cooling water intake and discharge facilities. The proposed heavy haul road is routed just north and west of a small tributary that enters the Chesapeake Bay south of the existing barge slip, and joins the existing haul road from the barge slip northwest of the identified tiger beetle habitat.

Construction of CCNPP Unit 3 will generally utilize existing access routes and structures associated with the existing CCNPP Units 1 and 2. When possible, construction activities would be restricted from the designated 500-foot buffer for the protection of tiger beetles. The only activities that are currently planned to overlap with the 500-foot buffer are the demolition of the Eagle's Den building at Camp Conoy, wetland mitigation activities in the vicinity of Eagle's Den, and the enhancement of one stream (SE-4) in the Camp Conoy area.

The preferred location of the new cooling water intake and discharge structures is in the area from the barge slip northward to the existing cooling water intake structure, with associated pipelines roughly coincident with the proposed heavy haul road route and existing road north of the barge slip all of which is located north of the identified tiger beetle habitat (Figure 2). The Puritan tiger beetle would not be adversely affected by any of these proposed construction activities. There is sufficient distance between the construction activities and the Puritan tiger beetle population and habitat. There is no larval Puritan tiger beetle habitat within approximately 1,000 feet of the haul road and barge dock and adult beetles only use the beach within 600 feet of the barge dock for foraging. The northern most 1,500 feet of cliffs closest to the barge dock provide marginal habitat for tiger beetles.

The structural modifications to the barge slip and dock area and the restoration activities associated with SR-3 would not impact Puritan tiger beetles or their habitat. Adult Puritan tiger beetles have on occasion used the beach south of the barge dock for feeding during their seasonal activity period (approximately mid-June through mid-August). If construction or dredging activities were to occur during that time period, vehicular or heavy equipment use on the beach could impact adults that may be present. To minimize any impacts to adult Puritan tiger beetles in this vicinity, time of year restrictions will be placed on activities from June 1 through August 31 to prevent any heavy equipment or vehicles from accessing the beach south of the barge dock. The area landward of mean low water and extending up to the sheet pile bulkhead as depicted in Figure 6D of Appendix C would be included in this restriction. An appropriate method will be used to delineate the restricted habitat to insure compliance by contractors working on the SR-3 restoration and the modifications to the barge slip and dock area. Larval Puritan tiger beetle habitat occurs in the bluffs approximately 500 feet south of the stream restoration project (SR-3) adjacent to the barge slip. This is sufficient separation to eliminate potential impacts resulting from project activities to larval habitat.

The proposed demolition of the Eagle's Den building, removal of impervious roadways, tree planting, and work at the forested wetland mitigation area would not affect the Puritan tiger beetle or their habitat. These activities would occur inland of the cliff face. Larvae of the Puritan tiger beetle would only be negatively affected by direct construction or other disturbance to the cliff face and no direct construction or disturbance to the cliff face is proposed. Surveys conducted by Dr. Knisley have indicated that, as

currently proposed, the work and activity for demolition and wetland mitigation would not have any impact on the Puritan tiger beetle or habitat (Knisley, 2008).

The proposed stream enhancement project (SE-4) is being considered in conjunction with wetlands mitigation. This project is being designed to provide a channel stabilization grade control feature at the confluence with the Chesapeake Bay and would include revegetation and minor bank grading. The project is not expected to impact adult Puritan tiger beetle habitat unless it becomes necessary to use equipment by staging it on the beach at the confluence of the stream. Time of year restrictions will be placed on work requiring use of the beach for staging and would protect the beach from June 1 through August 31 as proposed for the SR-3 restoration and barge slip and dock activities. An appropriate method will also be used to delineate the restricted habitat to insure compliance by contractors working on the SE-4 site. Potential larvae and larval habitat for the Puritan tiger beetle are located in the bluff face approximately 25-50 feet north and south of the stream outlet. No construction activity is proposed for the bluff face north or south of the stream outlet and no impacts to larvae or larval habitat are expected. To protect adult Puritan beetle, the channel stabilization structure and associated activity would be limited to 100 feet total width bank to bank (current width) at the mouth of the stream and would not extend onto the beach. Time of year restrictions will be used to protect adult beach habitat if it becomes necessary to stage equipment on the beach at the mouth of the stream. Over time, the enhancement of the stream channel has the potential to protect adult Puritan tiger beetle habitat at SE-4 from the beach erosion that has occurred at the stream outlet.

Operation

No impacts to the Puritan tiger beetle are anticipated as a result of the operation of the plant. All operational activities will occur outside of the designated 500-foot buffer.

Maintenance

No impacts to the Puritan tiger beetle are anticipated as a result of maintenance activities. All maintenance activities will occur outside of the designated 500-foot buffer.

6.2 Northeastern Beach Tiger Beetle

No habitat is located at CCNPP for the northeastern beach tiger beetle; therefore, no impacts to the species or its habitat are expected from activities occurring as a result of the construction, operation, or maintenance of CCNPP Unit 3. The northeastern beach tiger beetle is not typically found in the action area or in any area that would be affected by activities occurring within the action area. Adults of this species are active from mid-June through late August at in the northern portion of Flag Pond Nature Park. A few adults could potentially disperse onto the beach at the northern edge of CCNPP property, but would still be out of the proposed construction and restoration area near the barge dock. It is likely that the beetles would move away from any beach activity (Knisley, 2006). Because of the decline of the population at Flag Pond Nature Park, it is highly unlikely that the few remaining individuals would disperse to the CCNPP campus.

As a result, the proposed action, including construction, operation, and maintenance, would not affect the northeastern beach tiger beetle.

6.3 Proposed Tiger Beetle Mitigation

To reduce the potential effects of the actions related to site preparation and mitigation activities, UniStar has committed to time of year restrictions in conjunction with construction activities that may affect adult Puritan tiger beetle habitat. The restriction extends from June 1 through August 31 and is applicable to the beach south of the barge dock and in the area landward of mean low water and extending up to the sheet pile bulkhead as depicted in Figure 6D of Appendix C. In addition, the proposed stream enhancement at SE-4 in the vicinity of Camp Conoy would be subject to the same time of year restriction. The limits for proposed construction at SE-4 that would be prohibited under the time of year restrictions are presented in Enclosure 2 of Appendix C. Areas where construction would occur under time of year restrictions will be delineated in the field to insure compliance by construction contractors. The time-of-year restriction commitment is applicable to the construction/restoration activities of the barge unloading facility and associated stream outfall, but does not apply to the operation and use of this facility.

7. CUMULATIVE EFFECTS ANALYSIS

7.1 Puritan Tiger Beetle

The proposed activities are actions that would not result in cumulative effects when considered in combination with any other activities at CCNPP. Breeding populations of the Puritan tiger beetle occur in isolated pockets delineated by areas that do not provide appropriate habitat such as riprap armoring or vegetated areas. As a result, there is no documented migration of individuals between populations. The population at CCNPP is self-sustaining and is relatively protected from the threats described in *Section 5.1 Puritan Tiger Beetle*. No cumulative effects are expected as a result of the proposed activities.

7.2 Northeastern Beach Tiger Beetle

The proposed project is not likely to affect the northeastern beach tiger or the closest known population at Flag Ponds Nature Park which is near extirpation for reasons unrelated to activities at CCNPP. Other Chesapeake Bay populations of the northeastern beach tiger beetle are isolated and far enough from the proposed action that no affects to those populations would occur. The continued decline and potential extinction of the closest population is likely to occur with or without the implementation of the proposed action.

8. CONCLUSION

UniStar has conferred with Dr. Knisley and informally with the U. S. Fish and Wildlife Service to define mitigation and enhancement measures to avoid any take of larval or adult Puritan tiger beetles or their habitat. Activities proposed for the restoration of the barge dock and associated dredging and the restoration of SR-3 would not be likely to adversely affect any adult Puritan tiger beetles using habitat in or adjacent to the action area. Adherence to a time of year restriction for construction activities that may occur during the adult activity period (June 1 through August 31) on potential beach habitat as defined in Figure 6D (Appendix C) will minimize any impacts to adult tiger beetles. The nearest larval habitat is located 500 feet south of the proposed activities at SR-3 and the barge dock and would therefore, not be affected by any activities as proposed.

The proposed demolition of the Eagle's Den building, removal of impervious roadways, and work involved at the forested wetland mitigation project area would not affect Puritan tiger beetles and no further protective mechanisms would be necessary.

The site proposed for stream enhancement (SE-4) may affect adult tiger beetle habitat if construction equipment related to the stream enhancement activities would be staged on the beach at the stream outlet. Use of time of year restrictions, and delineating the protected habitat with appropriate measures will minimize any impacts to adult tiger beetles that may use the beach at the mouth of the stream during their activity period (June 1 through August 31). Additional protection for the adult Puritan beetle would be provided by limiting the channel stabilization structure and associated activity to 100 feet total width bank to bank (current width) at the mouth of the stream and would not extend onto the beach (Appendix C). Time of year restrictions would be used to protect adult beach habitat if it becomes necessary to stage equipment on the beach at the mouth of the stream. Protection of adult Puritan tiger beetle habitat may occur as a result of the enhancement of SE-4 by minimizing the erosion that currently exists at the stream outlet.

Based on the absence of the northeastern beach tiger beetle in the action area, the CCNPP Unit 3 Project is unlikely to affect the northeastern beach tiger beetle.

9. LITERATURE CITED

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FIGURES

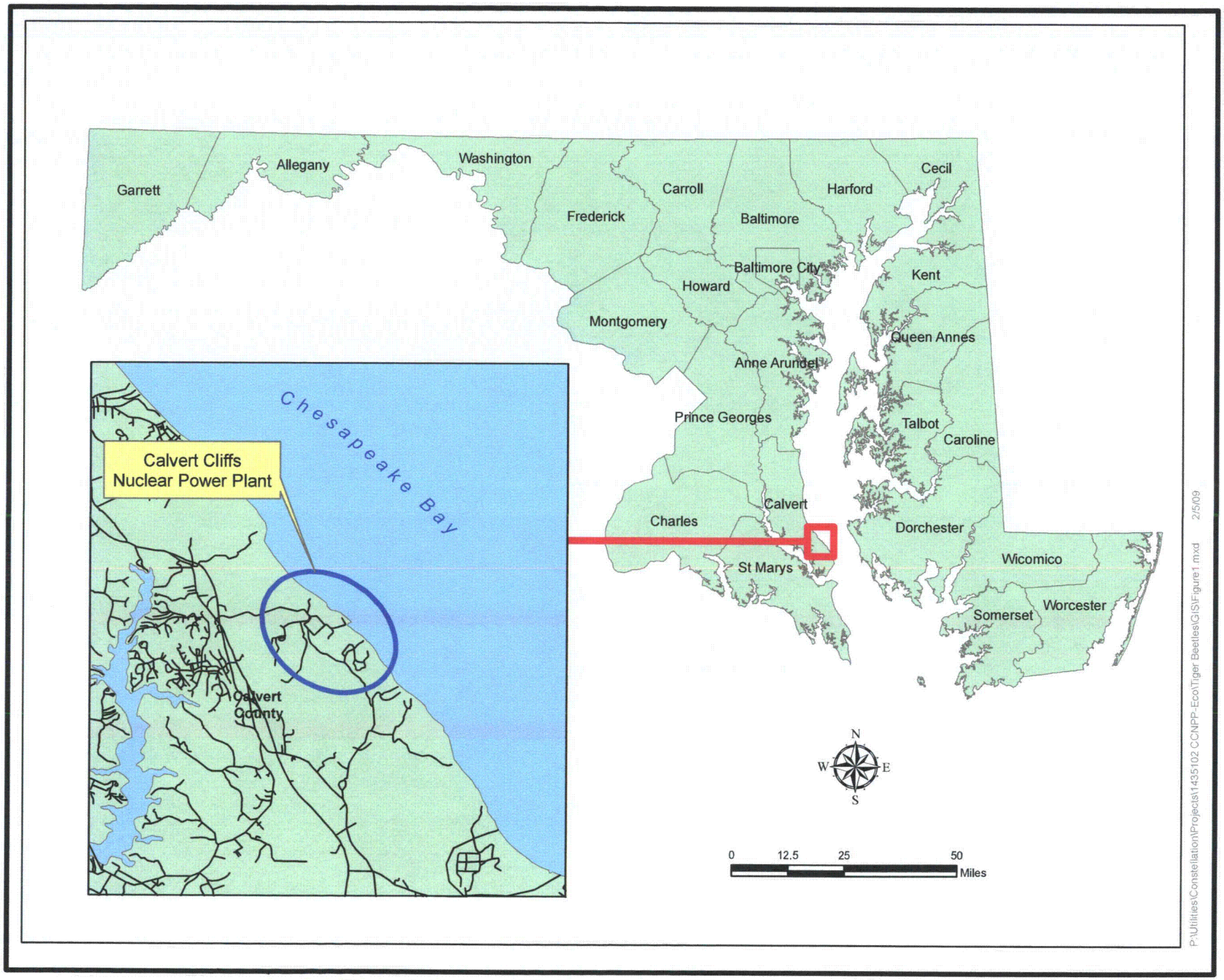
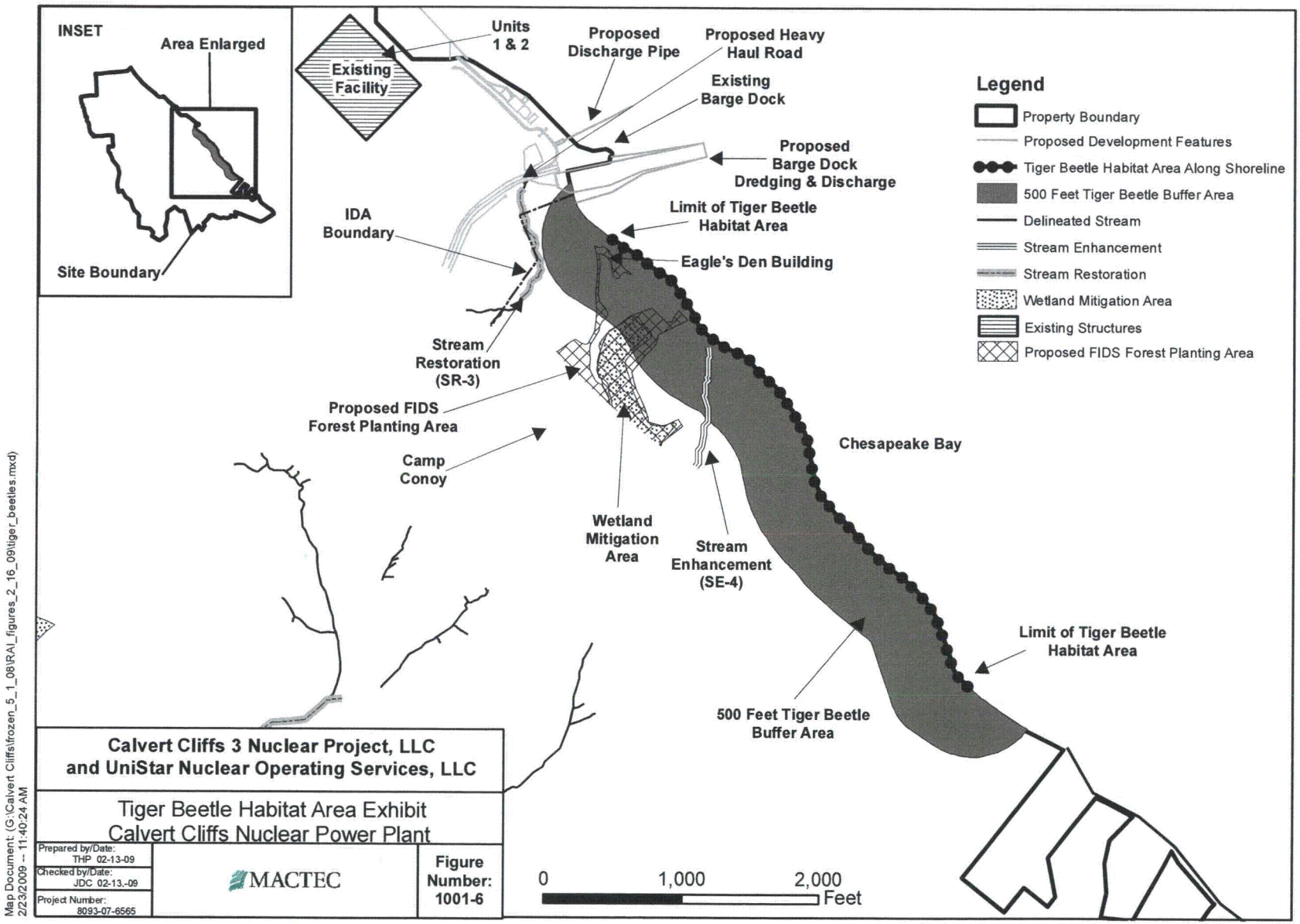


Figure 1. Calvert Cliffs Nuclear Power Plant Location Map


INSET
Area Enlarged
Site Boundary
Existing Facility
Units 1 & 2
Proposed Discharge Pipe
Proposed Heavy Haul Road
Existing Barge Dock
Proposed Barge Dock Dredging & Discharge
IDA Boundary
Limit of Tiger Beetle Habitat Area
Eagle's Den Building
Stream Restoration (SR-3)
Proposed FIDS Forest Planting Area
Camp Conoy
Wetland Mitigation Area
Stream Enhancement (SE-4)
Chesapeake Bay
Limit of Tiger Beetle Habitat Area
500 Feet Tiger Beetle Buffer Area
Legend
Property Boundary
Proposed Development Features
Tiger Beetle Habitat Area Along Shoreline
500 Feet Tiger Beetle Buffer Area
Delineated Stream
Stream Enhancement
Stream Restoration
Wetland Mitigation Area
Existing Structures
Proposed FIDS Forest Planting Area
0
1,000
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Calvert Cliffs 3 Nuclear Project, LLC
and UniStar Nuclear Operating Services, LLC
Tiger Beetle Habitat Area Exhibit
Calvert Cliffs Nuclear Power Plant
Prepared by/Date: THP 02-13-09
Checked by/Date: JDC 02-13,-09
Project Number: 8093-07-6565
MACTEC
Figure Number: 1001-6
Map Document: (G:\Calvert Cliffs\frozen_5_1_08\RAI_figures_2_16_09\tiger_beetles.mxd)
2/23/2009 -- 11:40:24 AM

FIGURE 2

APPENDIX A. CONSULTATION

R. M. Krich
Senior Vice President, Regulatory Affairs

111 Market Place
Suite 200
Baltimore, Maryland 21202

UniStar NUCLEAR

June 30, 2006

Ms. Lori Byrne
DNR Wildlife & Heritage Service
580 Taylor Avenue
Tawes Office Building E-1
Annapolis, Maryland 21401

Subject: Request for Environmental Review
Calvert Cliffs Nuclear Power Plant Site, Lusby, Maryland

Dear Ms. Byrne:

UniStar Nuclear, LLC, requests that an Environmental Review be performed by your office. The results of this Environmental Review will assist us with environmental characterization studies being undertaken in support of potential development of up to two additional nuclear power generation units at Constellation Energy's Calvert Cliffs Nuclear Power Plant (CCNPP) site near Lusby, Calvert County, Maryland. As currently envisioned, the generating facilities and construction and operation-phase support facilities would be located entirely on the CCNPP site except for water-dependent facilities (e.g., cooling water intake and discharge structures), which could be located on the Chesapeake Bay shoreline or a short distance offshore. The location of the CCNPP site is shown in the attachment, "Calvert Cliffs Nuclear Power Plant Site, Lusby, Maryland (Cove Point, MD Quadrangle)."

In view of the long lead times involved, we are planning initiation of field characterization studies to expedite the design, licensing and permitting of the facility in the event a decision is made to construct the units. In this context, we intend to initiate field surveys to determine the presence and status of federal and state rare, threatened, and endangered species and special-status habitats (e.g., Natural Heritage Areas) on the site following receipt of the results of the requested Environmental Review. As such, we would appreciate your performing the requested Environmental Review and informing us of its results, including an indication of those species and habitats that should be addressed in our field surveys. Your prompt response will allow us to plan and perform any required field surveys prior to finalizing the construction footprint and at the optimum seasons for observing targeted species.

Thank you for your attention to this matter. If you have any questions or need additional information, please contact me at (410) 230-4892.

Respectfully,

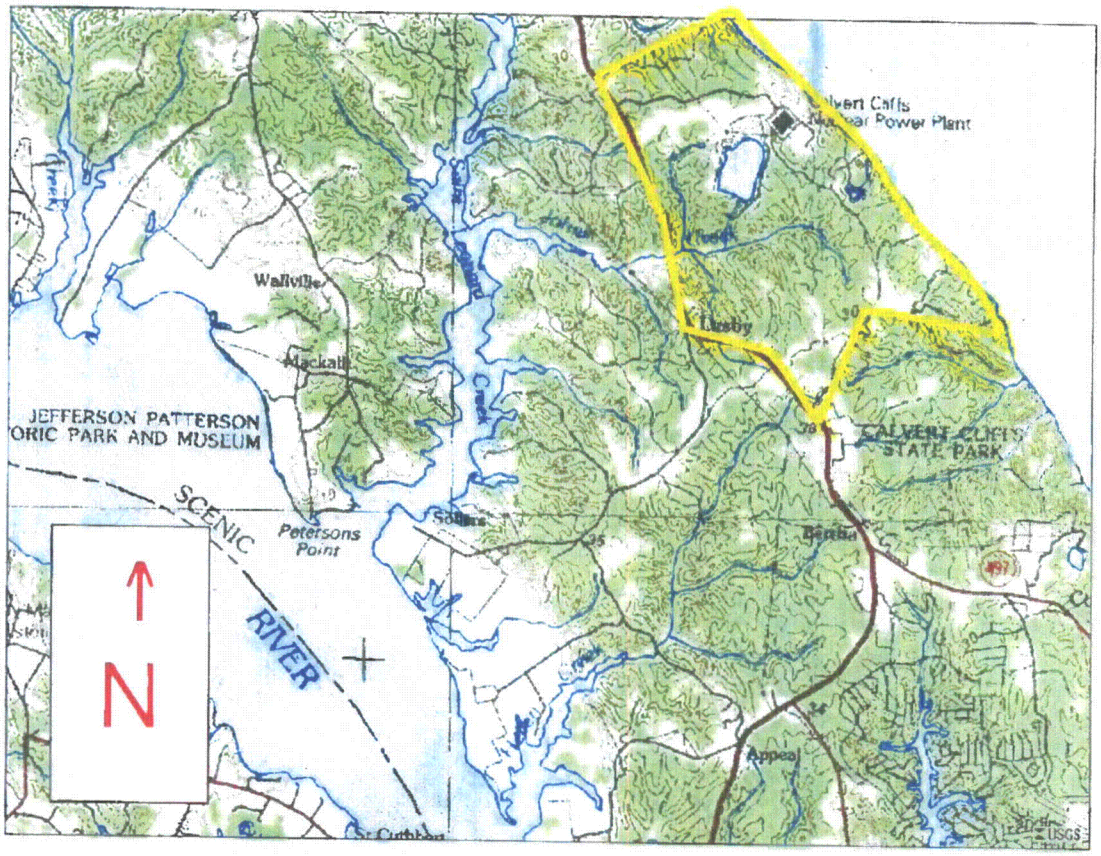
Daniel G. Stoa for

R.M. Krich

Attachment:
Calvert Cliffs Nuclear Power Plant Site, Lusby, Maryland (Cove Point, MD Quadrangle)

cc: R. McLean (Maryland Power Plant Research Program)

Attachment
Calvert Cliffs Nuclear Power Plant Site
Lusby, Maryland (Cove Point, MD Quadrangle)



Approximate Boundary of Calvert Cliffs Nuclear Power Plant Site

United States Department of the Interior

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

May 22, 2007

R.M. Krich
UniStar Nuclear
750 E. Pratt Street
14th Floor
Baltimore, MD 21202 3106

RE: Constellation Energy's CCNPP Site Calvert Cliffs Nuclear Power Plant Site Lusby Maryland

Dear Mr. Krich:

This responds to your letter, received April 12, 2007, requesting information on the presence of species which are federally listed or proposed for listing as endangered or threatened within the vicinity of the above reference 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.*).

Except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project impact area. Therefore, no Biological Assessment or further section 7 Consultation with the U.S. Fish and Wildlife Service is required. 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.

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 interests in these resources. If you have any questions or need further assistance, please contact Devin Ray at (410) 573-4531.

Sincerely,

Mary Ratnaswamy

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

due date Nov 17th

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

REPLY TO
ATTENTION OF:

OCT 23 2008

Operations Division

Calvert Cliffs 3 Nuclear Project, LLC
Mr. Thomas E. Roberts
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Dear Mr. Roberts:

This is in reference to your application, NAB-2007-08123-M05 (Calvert Cliffs 3 Nuclear Project, LLC/Unistar Nuclear Operating Services, LLC), for a Department of the Army (DA) permit to perform site preparation activities and construct supporting facilities at the site of a proposed nominal 1,710 MW nuclear power generation station, which is the third unit at Unistar's Calvert Cliffs site near Lusby, Calvert County, Maryland. The current proposal indicates that approximately 17.42 acres of jurisdictional waters would be impacted in the Chesapeake Bay and its unnamed tributaries, forested nontidal wetlands, Johns Creek and Goldstein Branch, and their unnamed tributaries.

The Nuclear Regulatory Commission (NRC) is the lead Federal agency in the preparation of an Environmental Impact Statement (EIS) for work associated with the expansion of the power plant facilities. The Corps will be cooperating with NRC to ensure that the information presented in the National Environmental Policy Act (NEPA) document is adequate to fulfill the requirements of Corps regulations, the Clean Water Act Section 404(b)(1) Guidelines and the Corps public interest review process. The Corps permit decision will be made following issuance of the final EIS.

The environmental impact of construction activities in Waters of the U.S., including jurisdictional wetlands, will be reviewed by the Corps and addressed in the EIS prepared by NRC. The decision to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest. The following factors that must be evaluated as part of the Corps public interest review include: conservation, economics, aesthetics, general environmental concerns, wetlands and streams, historic and cultural resources, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, energy needs, safety, food and fiber production, mineral needs, water quality, considerations of property ownership, air and noise impacts, and the general needs and welfare of the people. In addition, the following consultations and coordination efforts must be concluded prior to release of the EIS: Section 106 of the National Historic Preservation Act, including as appropriate, development and implementation of any Memorandum of Agreement; Endangered

Species Act; Essential Fish Habitat coordination; State Forest Conservation Plans; Marine Spill Prevention, Containment, and Control Plan; State Water Quality Certification; and State Coastal Zone Consistency determination.

The Clean Water Act Section 404(b)(1) Guidelines contain the substantive environmental criteria used by the Corps in evaluating discharges of dredged or fill material into waters of the U.S. A fundamental precept of the regulatory program is that impacts to jurisdictional waters, will be avoided and minimized where it is practicable to achieve. Under Section 404, only the least environmentally damaging practicable alternative can obtain Department of the Army authorization. Note that an alternative is practicable if it is available and capable of being accomplished after taking into consideration cost, logistics and existing technology in light of overall project purposes.

As part of the evaluation of permit applications subject to Section 404 of the Clean Water Act, the Corps is required by regulation to apply the criteria set forth in the Environmental Protection Agency's (EPA) 404(b)(1) guidelines (40 CFR Part 230). These guidelines establish criteria which must be met in order for the proposed activities to be permitted pursuant to Section 404. Specifically, these guidelines state, in part, that no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem provided the alternative does not have other significant adverse consequences. An area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered if it is otherwise a practicable alternative.

Regulations under 40 CFR 230.10 (a)(3) state that an activity is not water dependent if the activity associated with a discharge that is proposed for a special aquatic site does not require access or proximity to or citing within the special aquatic site in question to fulfill its basic purpose. In such instances, practicable alternatives that do not involve special aquatic sites are presumed to be available unless clearly demonstrated otherwise. In addition, all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise.

You have not yet demonstrated that no practicable alternatives exist to the filling of a special aquatic site to fulfill the basic purpose of the proposed project which is to create energy. The proposed project is not water dependent because it does not require access or proximity to or citing within a special aquatic site to fulfill its basic purpose of providing a source of energy. You must demonstrate why the project proposed to be built could not be reconfigured or reduced in scope to further minimize or avoid adverse impacts to Waters of the U.S. The proposed fill activity would not comply with the EPA 404(b)(1) guidelines in the absence of demonstrating that there are no practicable alternatives available with less damaging impacts to the special aquatic site. Current DA regulations 33 CFR 320.4(a) state that a permit will be denied for activities involving 404 discharges if the discharge that would be authorized by such permit would not comply with the EPA's 404 (b)(1) guidelines.

The Corps issued a public notice on September 3, 2008 to solicit comments from the public; Federal, State, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. The National Marine Fisheries Service (NMFS) defers final comments until its review of the EIS; however, the NMFS did identify potential issues of concern including the intake impact on finfish and crustaceans from impingement and entrainment; discharge pipe impacts on benthic habitat during installation and the thermal quality of the effluent; dredging impacts to benthic habitat and a natural oyster bar; and nontidal wetland and stream impacts. The Environmental Protection Agency (EPA) requested interagency site visits to evaluate avoidance and minimization and assist in the development and review of the mitigation plan. The U.S. Fish and Wildlife Service (FWS) requested the comment period remain open until the agencies review the EIS. FWS indicated that two Federally listed threatened tiger beetle species occur along the Chesapeake Bay shoreline of the project area and formal Endangered Species Act consultation may be required. The Maryland Historical Trust (MHT) stated that the project will result in the unavoidable and complete destruction of the National Register-eligible Camp Conoy property and resolution of all adverse effects will require negotiation and execution of a Memorandum of Agreement. A copy of the correspondence we received in connection with your application is enclosed for your review.

The Corps is required to evaluate permit applications based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interests. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. Based upon our preliminary evaluation of this project, we have determined that the project, as proposed, will have a significant adverse impact on the environment. We have also determined that the project may be conducive to additional alternatives in other project aspects that are less damaging to the aquatic environment and we request that they be considered.

Regulations under 40 CFR Part 230 describe the general compensatory mitigation requirement for losses of aquatic resources. In accordance with 40 CFR 332.3, the fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States. The Corps therefore must determine the compensatory mitigation to be required based on what is practicable and capable of compensating for the aquatic resource functions that will be lost as a result of a permitted activity.

In accordance with the above, we request the following information to assist us in the review of your proposal:

1. A detailed analysis of all possible forms of energy that could meet the project purpose. The analysis should include, but not be limited to fossil fuel, fission, hydroelectric, biomass, solar, wind, geothermal, fusion and other potential near

future energy options including a complete description of the criteria used to identify, evaluate, and screen project alternatives.

2. A detailed analysis of alternative locations for the proposed project or any of the alternate energy sources that would have less impact to wetlands and waterways. Data collected using resource mapping is acceptable and should be noted as appropriate in all evaluations

3. A detailed analysis of the steps taken to minimize the proposed on-site impacts and the reasons for amending the project as changes developed from the initial proposal through to the current proposal and ultimately to a project that would further minimize the currently proposed impacts, including a complete description of the criteria used to identify, evaluate, and screen project alternatives. This on-site analysis does not preclude the necessity to review of the off-site alternatives or various forms of energy. This information must include the following:

    a. Methods to avoid and minimize impacts to waters of the U.S.
        i. Methods to minimize dredging and construction related turbidity
        ii. Methods to minimize adverse effects to water quality
        iii. Methods to minimize adverse effects to natural and cultural resources

    b. Quantify impacts to waters of the U.S. (both temporary and permanent) to all waters of the U.S., including jurisdictional wetlands, for each on-site project alternative. For waterways, include both the linear feet of waterway impacts (measured along the centerline of the waterway) and square feet of impact; for wetlands, include both square foot and acreage impacts; and for temporary wetland impacts, quantify any change in wetland classification (e.g., palustrine forested to palustrine emergent, etc.) and method of work to accomplish these changes.

4. A revised proposal to reduce wetland and stream impacts to the minimum necessary to meet access and safety requirements.
    a. Relocate or redesign the proposed construction laydown areas to uplands.
    b. Modify the construction schedule so that the areas proposed for permanent impacts could be utilized as construction laydown areas.
    c. Construct a retaining wall for the switchyard in lieu of the proposed grading.

5. A revised proposal to reduce impacts to tidal waters to the minimum necessary for ingress and egress and erosion control.
    a. Reduce the width of the proposed dredge channel to the minimum necessary for barge ingress and egress and to ensure dredge barge access for the proposed method of dredging
    b. Reduce the stone revetment footprint channelward of the intake area.

c. Reduce the length and width of the impact area for the discharge pipe and fish return to the minimum necessary to meet the purpose of these projects aspects.

6. A detailed mitigation plan
    a. Proposed mitigation methods.
    b. Proposed mitigation site (s).
    c. Wetland creation and enhancement plans.
        i. Planting and grading plans.
        ii. Hydrologic inputs and maintenance of hydrology.
        iii. Monitoring and restoration plan.
    d. Stream Mitigation
        i. Baseline plan
        ii. Existing site conditions plan including photographic documentation; channel cross section; pattern and profile; ordinary high water mark (OHWM); and channel and structure stability in relationship to permanent survey markers that shall be installed.
        iii. Proposed project plans
        iv. Project plans related to the existing site conditions and the proposed conditions, including all structures or fill; dimensions of structures or fill; proposed water depths relative to the OHWM; channel cross section; pattern and profile; and channel and structure stability in relationship to permanent survey markers.
    e. Distinction between the wetland and stream mitigation plan, critical areas mitigation plan, forest mitigation plan and forest interior dwelling bird (FIDS) habitat mitigation plan.

7. Copies of all previously issued Federal, State and local permits and plans for the existing facilities at the project site as well as a description and plans for all mitigation completed for these previously authorized projects.

8. Vessel information including the ship/barge navigation needs to access the site; maximum draft when full; length and width of ships/barge; and the potential for the largest industry ships/barge necessary for project construction and future construction activities to access the site at the current proposed dredge depths.

9. A plan to manage potential impacts to aquatic species during pile driving work at the barge unloading facility site, including the use of curtains or containment structures.
    a. Describe any pre-cast concrete elements that may be installed into the water for pier facility construction or rehabilitation work.
    b. Explain the potential aquatic species turbidity impacts and shock wave impacts due to driving large diameter steel piles for dock facility construction and provide a construction plan that would minimize these impacts, as well as quantify the difference due to implementation of these

potential methods such as, but not limited to, silt or bubble curtains and netting.

10. A narrative to describe and quantify cumulative and indirect impacts resulting from the project.

11. A vicinity map and plan for the disposal options for any excess fill material resulting from construction.

12. A narrative addressing public benefits of this project separate from the project's proponents' benefit.

13. A description of the relative extent of the public and private need for the proposed project.

14. Are there any brownfields at the proposed project site?

15. Will the construction and heavy haul roads be permanent use roads?

You are hereby informed that additional information needs may arise as the EIS is developed. The information requested above is necessary for us to assist the NRC with the development of the draft EIS (DEIS). Inclusion of this information in the DEIS would allow the resource agencies and the public the opportunity to review and comment on this additional information prior to the release of the final EIS. Your modified plans and the required information are requested within 20 days of the date of this letter. If no response is received, your application will be considered withdrawn.

A copy of this letter will be furnished to the NRC and MDE. If you have any questions concerning this matter or if you wish to meet with the Corps to discuss this correspondence, please call Mrs. Kathy Anderson, at this office at (410) 962-5690.

Sincerely,

FOR William P. Seib
Chief, Maryland Section Southern

Enclosures

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
(410) 573-4575

September 30, 2008

Colonel Peter W. Mueller
District Engineer
Baltimore District, Corps of Engineers
P.O. Box 1715
Baltimore, Maryland 21203-1715

Attn: Ms Kathy Anderson, Regulatory Branch

Re: CENAB-OP-RMS(NAB-2007-08123-M05 (Calvert Cliffs 3 Nuclear Project, LLC/Unistar Nuclear Operating Services, LLC))

Dear Colonel Mueller:

The U.S. Fish and Wildlife Service has reviewed the referenced public notice. The applicants propose to build a third unit at the Calvert Cliffs Nuclear Power Plant (CCNPP). Extensive clearing and grading will occur, eliminating extensive forested wetland and streams. This letter constitutes the report of the Service and the Department of the Interior on the proposed permit and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.)

We understand that the Corps does not plan to issue a permit until the Nuclear Regulatory Commission (NRC) releases an Environmental Impact Statement. It would seem prudent that the permit comment period remain open until the agencies have a opportunity to review that document in order to better understand the full scope of effects. This is the first reactor being proposed in over 30 years in the United States and there is little institutional knowledge available within the agencies.

In addition, two Federally listed threatened species, the Puritan tiger beetle (*Cicindela puritana)* and the Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) occur along the Chesapeake Bay shoreline in the project vicinity. Formal consultation in accordance with Section 7 of the Endangered Species Act may be required. However, that determination will not be made until NRC/Corps or the project applicants have completed their Biological Assessment (which may be incorporated into the EIS) concerning effects of the project on these two threatened species. Until we have reviewed this Biological Assessment and this Section 7 process has been concluded with NRC and the Corps, no permit can be issued for the referenced project.

Therefore, the Service recommends that the comment period remain open until the EIS and the Biological Assessment are received and reviewed by the agencies.

Sincerely,

Leopoldo Miranda
Field Supervisor

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
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.

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

June 19, 2008

Ms. Susan Gray
Power Plant Research Program
MD Department of Natural Resources
Tawes State Office Building
Annapolis, MD 21401

Re: MHT Review of Draft ERD, Calvert Cliffs Nuclear Power Plant Unit 3, CPCN Case 9127
Calvert County, Maryland

Dear Ms. Gray:

In response to a June 10, 2008 request from DNR, the Maryland Historical Trust (MHT) has reviewed the above-referenced document with respect to the project's potential effects on historic properties. We understand that UniStar Nuclear Energy LLC and UniStar Nuclear Operating Services have submitted an application to the Maryland Public Service Commission (PSC) to add a third reactor to the Calvert Cliffs Nuclear Power Plant (CCNPP), and that DNR's Power Plant Research Program (PPRP) has performed the above-referenced environmental review as part of the PSC licensing process. Please note that the proposed undertaking is also regulated by the federal Nuclear Regulatory Commission (NRC) and is therefore subject to both federal and state historic preservation laws. For these reasons, we have reviewed the draft ERD in accordance with Section 106 of the National Historic Preservation Act and the Maryland Historical Trust Act, §§ 5A-325 and 5A-326 of the State Finance and Procurement Article, and are writing to provide the following comments/recommendations regarding effects on cultural resources.

Status of Historic Preservation Review: The proposed expansion of the Calvert Cliffs Nuclear Power Plant was first submitted to our office for review in October of 2006. Following our review of the initial submittal, we requested a Phase I archeological survey as well as the completion of Determination of Eligibility (DOE) forms for a variety of structures that are located within the project area and are included in the Maryland Inventory of Historic Properties (MIHP) (see MHT letter dated November 20, 2006). These investigations were carried out by GAI Consultants, Inc., and the resulting Phase I survey report and DOE forms were submitted to our office in March and April of 2007. Upon our review of these documents, we found that Phase II evaluative investigations were warranted for four of the identified archeological sites (18CV474, 18CV480, 18CV481, and 18CV482), and that four of the MIHP properties – CT-58 (Parran's Park), CT-1295 (Baltimore and Drum Point Railroad), CT-1312 (Camp Conoy), and CT-59 (Preston's Cliffs) are eligible for listing in the National Register of Historic Places (see MHT letter dated June 7, 2007). As noted in Section 5 of the draft ERD, GAI has completed the Phase II archeological investigations and an Assessment of Effects study has been conducted to evaluate the project's impacts on the four National Register-eligible MIHP properties. Please note, however, that the Phase II report and the Assessment of Effects documentation have not yet been submitted to our office for review. It is clear, of course, that the proposed expansion of the Calvert Cliffs Nuclear Power Plant will have an adverse effect on historic properties. The construction of the third reactor, for example, will result in the unavoidable (and complete) destruction of the National Register-eligible Camp Conoy property. However, as we have not yet received the complete Phase II report or the Assessment of Effects documentation, we are not yet able to provide definitive comments or recommendations regarding these effects or possible mitigation measures. Once we have received the necessary documentation, we will be able to work with all interested parties to evaluate the potential adverse effects and make appropriate recommendations regarding measures to avoid, minimize, or mitigate any such effects. The resolution of all adverse effects will require the negotiation and execution of a Memorandum of Agreement (MOA) between NRC, MHT, UniStar, and other involved parties stipulating the agreed-upon mitigation measures that will be implemented by UniStar. Please note that this consultation process must involve all relevant parties such as Calvert County and the Southern Maryland Heritage Area.

JUN 25 '08 RECD

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

Draft ERD/Draft Licensing Conditions: Below are our comments regarding the draft ERD and the draft licensing conditions that were submitted to our office by DNR, and we would like to ask that these items be addressed in the preparation of the final documents.

- Condition #56 states that "prior to construction, UniStar shall execute a Memorandum of Agreement (MOA) with the Maryland Historical Trust to mitigate the adverse effects of site preparation and construction upon on-site cultural resources that are eligible for the National Register of Historic Places." On page 1-2, however, it is stated that, "after receiving a CPCN, NRC rules would allow UniStar to commence limited site preparation and certain non-safety related pre-construction activities prior to obtaining final COL approval...UniStar states that it needs to begin site clearing and pre-construction site preparation by early 2009." We would therefore like to request that condition #56 more clearly specify that no site preparation activities (such as clearing or grading) or construction activities having the potential to effect historic properties will take place within the limits of National Register-eligible archeological or structural resources and no removal or demolition of eligible structures will take place until an MOA has been executed to mitigate the adverse effects of these activities.

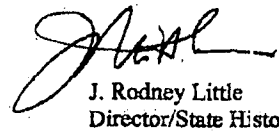
- When discussing the cultural impacts in Section 5, the draft ERD should reference the appropriate Maryland inventory site numbers (such as 18CV474) rather than listing the sites as "Site 1," Site 2," etc...

- In the first full paragraph of page 5-45, it may be more efficient and precise to eliminate much of the text and simply state that the complete Phase II report must be prepared in accordance with the *Standards and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994).

- It may be helpful to clarify on page 5-46 that the Captain John Smith Chesapeake National Historic Trail is not a historic property under Section 106 of the National Historic Preservation Act but is being considered nonetheless as an important resource.

If you have any questions or require further information, please do not hesitate to contact either Dixie Henry (for inquiries regarding archeological resources) at 410-514-7638 or dhenry@mdp.state.md.us or Jonathan Sager (for inquiries regarding the historic built environment) at 410-514-7636 or jsager@mdp.state.md.us. We look forward to receiving a copy of the full Phase I/Phase II report and Assessment of Effects documentation discussed above, when it becomes available, and we also look forward to further consultation as project planning proceeds. Thank you for providing us with this opportunity to comment.

Sincerely,



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

JRL/DLH/200801870

cc: Richard Raione (NRC)
Peter Hall (Metametrics)
Barbara Munford (GAI Consultants)
Kirsti Uunila (Calvert County)
George Wrobel (Constellation Energy)
Roslyn Racanello (Southern Maryland Heritage Area)

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

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

June 23, 2008

Mr. John E. Price
UniStar Nuclear Energy
750 E. Pratt Street, 14th Floor
Baltimore, MD 21202

RE: Environmental Review for Constellation Energy's Calvert Cliffs Nuclear Power Plant Site, Lusby, Calvert County, Maryland.

Dear Mr. Price:

The Wildlife and Heritage Service has determined that there is a Natural Heritage Area (NHA) known as Flag Ponds NHA in the northern portion of the project site, along the shoreline of the Chesapeake Bay. This NHA supports a population of the Puritan Tiger Beetle (*Cicindela puritana*) and a population of the Northeastern Beach Tiger Beetle (*Cicindela dorsalis dorsalis*). Both of these species are listed as endangered by the State and as threatened by the US Fish and Wildlife Service. Activities within NHAs are regulated by the Critical Area Commission so that the structure and species composition of the area are maintained. In addition, this area along the shoreline that supports the tiger beetles is designated in state regulations as a Wetland of Special State Concern and regulated by Maryland Department of the Environment.

South of the existing power plant, on CCNP property along the Chesapeake Bay shoreline, there are records for the Puritan Tiger Beetle. Habitat management or restoration for this endangered species is encouraged.

In the southeast portion of the project site near Rock Point the site overlaps with another NHA known as Cove Point Marsh, however, there are no known RT&E species associated with this NHA that occur on the project site. Just to the south of Rock Point there is an unnamed tributary to the Chesapeake Bay designated as a Wetland of Special State Concern which may overlap with the project site.

Three Bald Eagle nests occur on the property, one within the Critical Area and two outside the Critical Area. The nest within the Critical Area is along the shoreline north of Rocky Point. The two outside of the Critical Area are along Johns Creek and at Camp Conoy. The eagle nest at Camp Conoy is within the proposed development window. The bald eagle is currently listed as a threatened species by the state. Standard guidelines for Bald Eagle nest site protection are as follows:

1. Establish a protection area of ¼ mile radius around the nest tree. Within this area, establish three zones of protection: Zone 1 extends from the nest tree to a radius of 330

feet, Zone 2 extends from 330 feet to 660 feet in radius, and Zone 3 extends from 660 feet to ¼ mile (1320 ft).

2. No land use changes, including development or timber harvesting, should occur in Zone 1.

3. Construction activities, including clearing, grading, building, etc., should not occur within Zones 1 and 2 and ideally no closer than 750 feet from the nest.

4. Selective timber harvesting may occur in Zone 2, but clearcutting should be avoided.

5. No construction or timber harvesting activities should occur within the ¼ mile protection zone during the eagle nesting season, which is from December 15 through June 15.

These general guidelines are used by our biologists for Bald Eagle nest site protection. Specific protection measures depend on the site conditions, planned activities, nest history and other factors. If these guidelines cannot be followed, an incidental take permit will be required for disturbance to or removal of any Bald Eagle nests. If take of the Camp Conoy nesting territory cannot be avoided, consideration should be given to protecting the Rocky Point area of the property for nesting eagles.

Based on surveys by UniStar, there is a newly discovered population of Showy Goldenrod (*Solidago speciosa*) in the Camp Conoy area. Several large patches of this state threatened species were observed in lawn, old field, and mixed deciduous forest. The best-case scenario for the protection of this species is to avoid habitat alteration during the proposed construction activities. Mitigation for impacts to this population through transplanting individuals is discouraged. Transplanting of threatened or endangered plants is not considered a substitute for the protection of existing populations and may result in limited or no conservation value. However, since threatened and endangered plants are the property of the landowner, transplanting such species is not illegal provided the plants are not transported off the property. If such an action is pursued, adherence to DNR's guidelines for the reintroduction of rare plants (http://www.dnr.state.md.us/wildlife/rteplantreintro.html) is recommended.

UniStar surveys also documented several specimens of the state threatened Shumard's Oak (*Quercus shumardii*) on the CCNP property. These trees were found in well-drained bottomland deciduous forest in the floodplain adjoining the southern of the two main headwater streams to Johns Creek. Conservation of these trees and their habitat is encouraged.

There is a record for state rare Spurred Butterfly-pea (*Centrosema virginianum*) known to occur south of Johns Creek on the project site, in the western portion of the site. This record describes the population of Spurred Butterfly-pea as occurring in an open area along a fire-road through the wooded area there. Conservation of this species and its habitat is encouraged.

Our analysis of the information provided also suggests that the forested area on the project site contains Forest Interior Dwelling Bird habitat. Populations of many Forest Interior Dwelling Bird species (FIDS) are declining in Maryland and throughout the eastern United States. The conservation of this habitat is mandated within the Critical Area and must be addressed by the project plan. Specifically, if FIDS habitat is present, the following guidelines should be incorporated into the project plan:

1. Restrict development to nonforested areas.
2. If forest loss or disturbance is unavoidable, concentrate or restrict development to the following areas:
   a. the perimeter of the forest (i.e., within 300 feet of existing forest edge)
   b. thin strips of upland forest less than 300 feet wide
   c. small, isolated forests less than 50 acres in size
   d. portions of the forest with low quality FIDS habitat, (i.e., areas that are already heavily fragmented, relatively young, exhibit low structural diversity, etc.)
3. Maximize the amount if forest "interior" (forest area >300 feet from the forest edge) within each forest tract (i.e., minimize the forest edge:area ratio). Circular forest tracts are ideal and square tracts are better than rectangular or long, linear forests.
4. Minimize forest isolation. Generally, forests that are adjacent, close to, or connected to other forests provide higher quality FIDS habitat than more isolated forests.
5. Limit forest removal to the "footprint" of houses and to that which is necessary for the placement of roads and driveways.
6. Minimize the number and length of driveways and roads.
7. Roads and driveways should be as narrow and as short as possible; preferably less than 25 and 15 feet, respectively
8. Maintain forest canopy closure over roads and driveways.
9. Maintain forest habitat up to the edges of roads and driveways; do not create or maintain mowed grassy berms.
10. Maintain or create wildlife corridors.
11. Do not remove or disturb forest habitat during April-August, the breeding season for most FIDS. This seasonal restriction may be expanded to February-August if certain early nesting FIDS (e.g., Barred Owl) are present.
12. Landscape homes with native trees, shrubs and other plants and/or encourage homeowners to do so.
13. Encourage homeowners to keep pet cats indoors or, if taken outside, kept on a leash or inside a fenced area.
14. In forested areas reserved from development, promote the development of a diverse forest understory by removing livestock from forested areas and controlling white-tailed deer populations. Do not mow the forest understory or remove woody debris and snags.
15. Afforestation efforts should target a) riparian or streamside areas that lack woody vegetative buffers, b) forested riparian areas less than 300 feet wide, and c) gaps or peninsulas of nonforested habitat within or adjacent to existing FIDS habitat.

The Critical Area Commission's document "A Guide to the Conservation of Forest Interior Dwelling Birds in the Chesapeake Bay Critical Area" provides details on development standards and information about mitigation for projects where impacts to FIDS habitat cannot be totally avoided. Mitigation plantings for impacts to FIDS habitat may be required under the local government's Critical Area Program. The amount of mitigation required is generally based in whether or not the guidelines listed above are followed.

Thank you for allowing us the opportunity to review this project. If you should have any further questions regarding this information, please contact me at (410) 260-8572.

Sincerely,

Glenn D. Therres

Glenn D. Therres, Associate Director
Wildlife and Heritage Service
Natural Heritage Program

ER # 2008.1111.CT

cc: S. Gray, PPRP
M. Owens, CAC
A. Widmayer, CAC
D. Lutchenkov, UNE
L. Byrne, DNR

APPENDIX B. SITE SPECIFIC SURVEYS AND ASSESSMENTS

CURRENT STATUS OF TWO FEDERALLY THREATENED TIGER BEETLES AT CALVERT CLIFFS NUCLEAR POWER PLANT, 2006

October 26, 2006

To: Carla Logan
Constellation Generation Group
Environmental Services
1005 Brandon Shores Road
Baltimore, MD 21226

From: C. Barry Knisley
2844 Fairway Homes Way
Glen Allen, VA 23005

INTRODUCTION:

Objective

The objective of this report is to provide a current assessment of the status of two Federally Threatened species of tiger beetles that occur along the shoreline at Calvert Cliffs Nuclear Power Plant (CCNPP; Fig. 1). This assessment is based on some results from field surveys conducted in years prior to 2006 (see Knisley 2005a,c), but primarily from surveys of adult numbers and a habitat evaluation of this site conducted in 2006.

Background

The Puritan Tiger Beetle (PTB) is currently known to exist as three metapopulations: the largest in Calvert County, Maryland, where there are eight populations. The second largest metapopulation consists of nine mostly small populations around the mouth of the Sassafras River in eastern Maryland, and the third metapopulation consists of three small populations along the Connecticut River in Connecticut and Massachusetts (USFWS 1995; Knisley 2005b). The Calvert and Sassafras metapopulations have declined dramatically and somewhat progressively since the late 1980's and early 1990's (Knisley 2005 a,b,c). Specific causes for this decline are unknown but it is hypothesized that encroachment of vegetation onto the bases and faces of the cliffs are reducing habitat quality at many sites. Adults oviposit on the cliff face and larvae develop there during a two-year development period. The Calvert County population has fluctuated greatly from

peak numbers of over 9,000 in 1998 and 1988 to less than 6000 in the past three years (Fig. 2). The Sassafras metapopulation has declined from a total of 2755 adults in 1992 to 630 or less from 1999 to 2005. A population of the Puritan Tiger Beetle has been known from the shoreline of the Calvert Cliffs Nuclear Power Plant since 1997. This site, like all others, has exhibited dramatic fluctuations in population size since that time. Counts of adults at this site have varied more than some other sites, with the following estimates of adult numbers: 1997, 119 adults; 1998, 616; 1999, 49; 2000, 367; 2002 80; 2003, 226; 2004, 121; and 2006, 111 adults. These variations are caused by year-to-year variations in climatic and other factors that affect survival and reproduction, and to a lesser extent on survey conditions.

The Northeastern Beach Tiger Beetle *C. d. dorsalis*, is also Federally Threatened with numerous populations in Virginia and currently two populations in Calvert County, Western Shores Estates and Flag Ponds Nature Park. Numbers of this species have also declined dramatically in Maryland, and two sites which once supported viable populations (Scientists Cliffs and Cove Point) no longer have beetles (Knisley 2005a). Causes of the decline and disappearance of this species are unknown, but shoreline changes are a likely factor. No populations are known from CCNPP although small numbers of adults have been found in some years at the northern border of the property, adjacent to Flag Ponds.

2006 SURVEY RESULTS AND DISCUSSION

Cicindela puritana -- Adult Survey and Habitat Evaluation, 2006

Adults of the PTB were surveyed on July 22, 2006, using the same visual search index count methods as in all previous years. This method has been widely used by many workers for many tiger beetle species. The survey method for *C. puritana* at CCNPP and at all other Calvert sites involved moving slowly along the water edge and searching the ground surface 10-20 meters ahead and counting all adults seen. A hand held GPS unit (Garman Legend) was used to record coordinates every 100-200 meters so that adult numbers could be recorded within each shoreline section. The quality of habitat at CCNPP was further evaluated during surveys on September 27 and October 25, 2006. The basis of the habitat evaluation was:

1. visual examination of the beach width and surface character (adult habitat) along with the presence and amount of suitable cliff strata (oviposition sites and larval habitat);

2. adult numbers present in the 2006 survey and in other recent years; and

3. examination of photographs of the site. From these sources of information, a letter grading system (A to E) was used to provide a qualitative indication of habitat quality, with A being the best *C. puritana* habitat in Calvert County and E being non-habitat.

The results of the 2006 surveys indicated a generally similar distribution of adults as in previous surveys. Adult numbers in 2006 (111 adults) were nearly the same as the 2004 counts (121), but much lower than the high annual counts in 1998 (616) and 2000 (367). The adults in all years were generally present along the whole length of the shoreline at CCNPP, but abundance and densities varied greatly. In 2006 and in previous years, greatest numbers of adults and highest densities were within the southern third of the site, the area of waypoints 356 -361 (see Fig. 1, map). Smaller concentrations of adults were in the northern half of the site, waypoints 338 to 349. These adult numbers proved to be a reliable indicator of overall habitat quality, as indicated in Table 1 which provides overall habitat grades for each section within adjacent waypoints. The best cliff habitat for larvae and beach habitat for adults is in the southern part of the site (Fig 3). The shoreline adjacent to the Camp Conoy area near waypoints 343-344 have little habitat because of low and vegetated cliffs. There is minimal habitat in the section north of waypoint 344 to waypoint 338, but a more extensive stretch of more suitable habitat south of this section, extending to the south end of the property at waypoint 366.

The section of shoreline north of waypoint 336 was checked several times in the early 1990's by USFWS or Maryland DNR personnel and determined to be non-habitat for the PTB (Judy Jacobs, personal communication). This area was re-affirmed as non-habitat on the basis of my October 2006 survey. The section of shoreline from waypoint 338 to 336 is armored with rip-rap and has no sandy beach habitat for adults. The area behind the beach includes a road bed and heavily vegetated areas along each side of the road. The cliffs in this section are recessed over 40 meters from the shoreline and very heavily vegetated with large trees and shrubs (Fig. 3). The absence of open, bare areas on the cliff face (Fig. 3) and the distance from the shoreline indicates this area has been non-habitat for 20 or more years, perhaps much longer, if ever. The shoreline section extending north from waypoint 336 to the north boundary of the property at Flag Ponds Nature Park is also non-habitat because of the powerplant facilities, low cliffs and/or narrow beach.

Cicindela dorsalis – Adult Survey and Habitat Evaluation, 2006

This species does not have an established population within the boundaries of the CCNPP, and consequently this site has not been one of the target sites that are annually surveyed for tiger beetles in Calvert County. However, in some years small numbers of adults (<25 individuals) have been observed at the far north end of CCNPP. These adults were found to be confined to an approximate 100 meter section bordering Flag Ponds Nature Park, having apparently moved south from that area where a breeding population exists. No larvae or other evidence of a breeding population of *C. dorsalis* has been known in this northern section of the site. No adults were found with the CCNPP boundaries in 2006, nor were there any in the bordering section of Flag Ponds. At Flag Ponds most of the adults and all larvae of *C. dorsalis* are restricted to the northern half of this site, and only occasionally are small numbers of adults found in the southern end near the CCNPP boundary.

Literature Cited:

Knisley, C. B. 2005a. Monitoring *Cicindela puritana* and *C. dorsalis dorsalis* in Maryland, 2004 . Final report to: Maryland Department of Natural Resources, Annapolis, MD. 11 p.

Knisley, C. B. 2005b. Biological studies of the Puritan Tiger Beetle: distribution and abundance, 1988 to 2005, habitat ecology, and status of the Grove Point population. Final report to: U. S. Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD. 17 p.

Knisley, C. B. 2005c. Distribution and abundance of *Cicindela puritana* and *C. dorsalis dorsalis* in Maryland, 2005. Final report to: Maryland Department of Natural Resources, Annapolis, MD. 12 p.

U. S. Fish and Wildlife Service. 1994. Puritan tiger beetle (*Cicindela puritana*) recovery plan. U. S. Fish and Wildlife Service, Hadley, MA. 39 P.

Figure 1. CCNPP

Numbered points indicate GPS waypoints associated with beetle counts in Table 1.

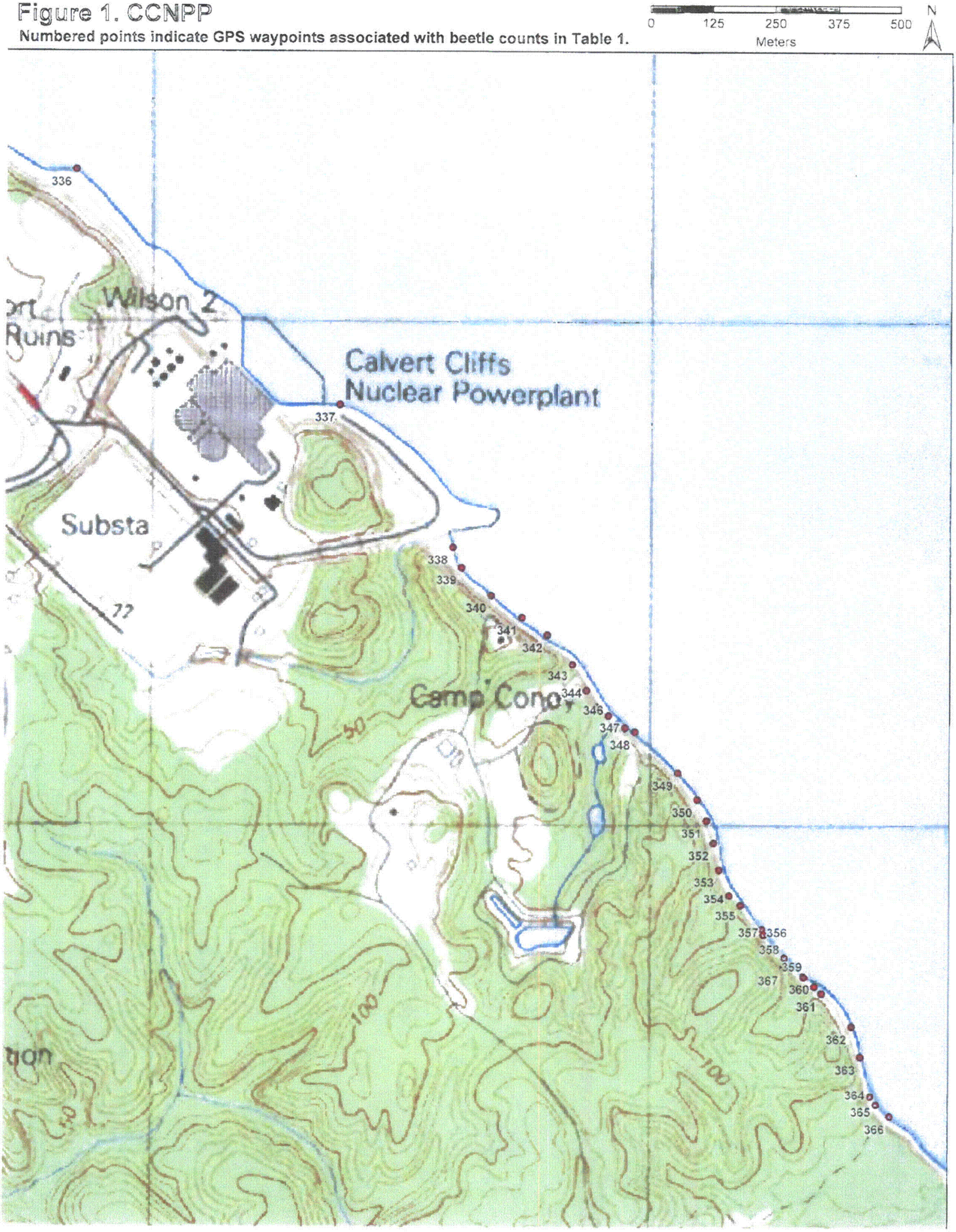


Fig. 2. Total numbers of *C. puritana* adults estimated at all Calvert County sites, 1988 to 2005

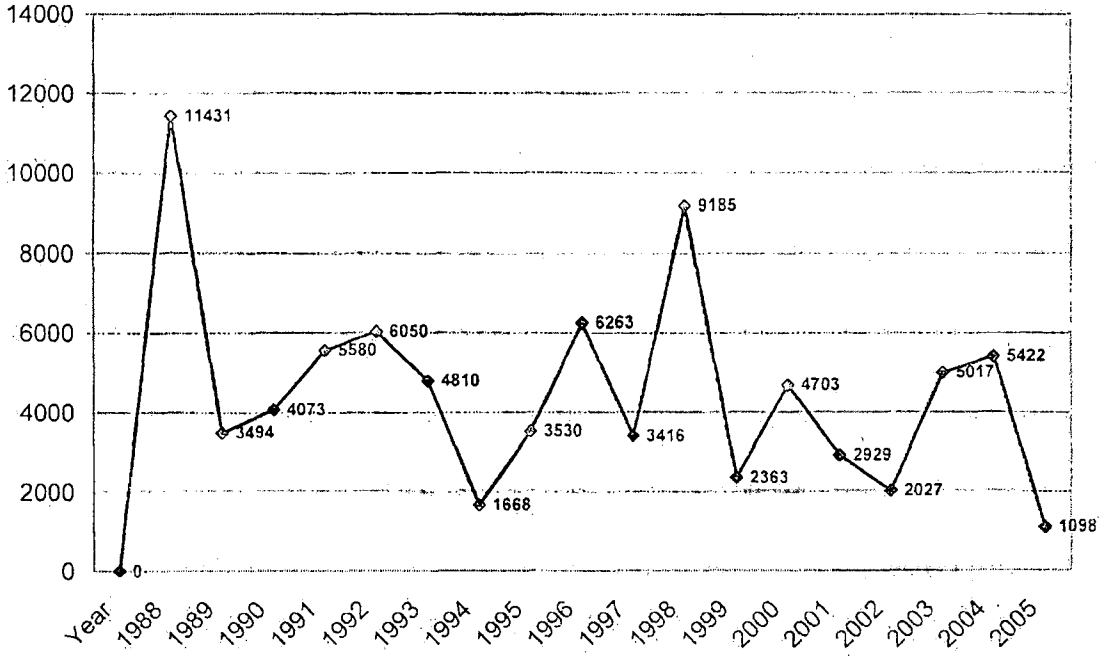


Fig. 3. Photographs of *C. puritana* (PTB) habitat at CCNPP. Top left: Cliff breakdown area south of Camp Conoy area showing rocky, unsuitable adult beach habitat (Fig. 1, waypoint 348). Top right: Close view of area near Camp Conoy showing low cliffs and poor habitat for PTB (Fig. 1, waypoint 343). Lower Left: High cliffs and beach providing good habitat for PTB (Fig. 1, waypoint 358; Lower right: Close view of upper cliff stata of fine sand and good PTB habitat (Fig. 1, waypoint 358).

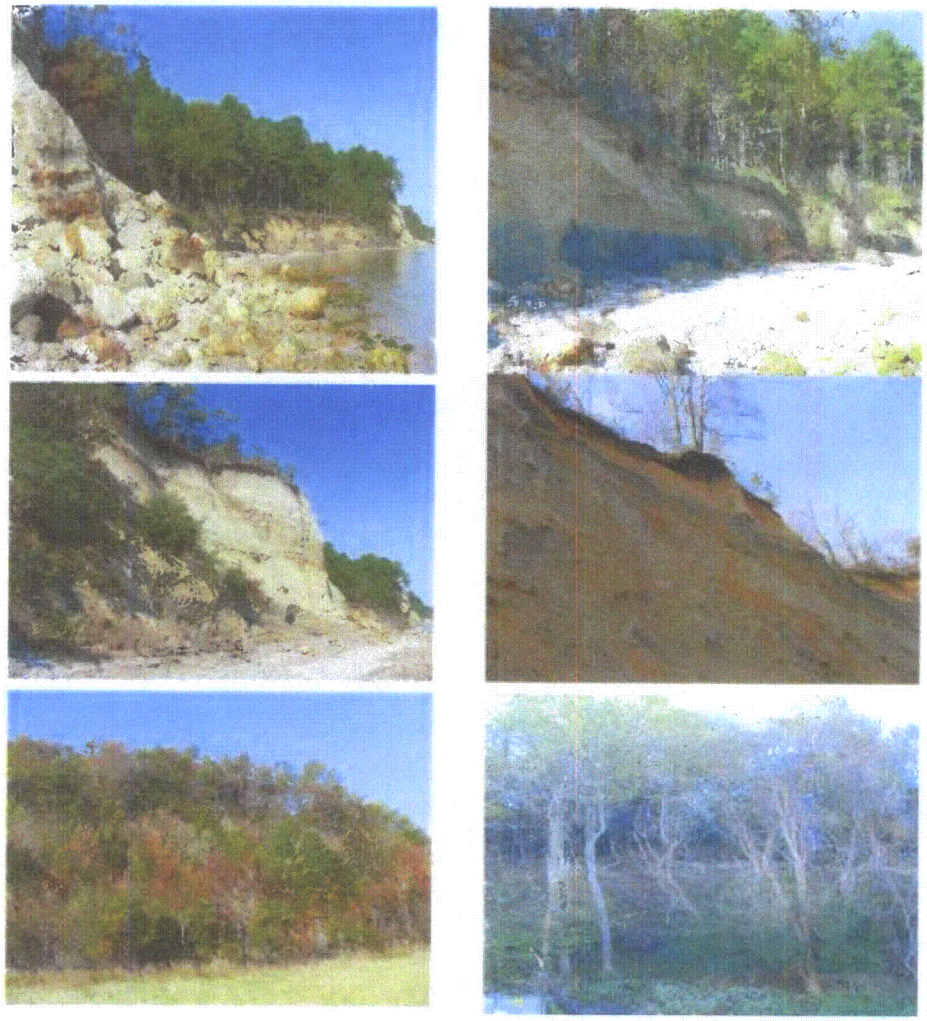


Table 1. Results of adult *C. puritana* survey and habitat evaluation along shoreline sections at CCNPP.

Map Waypoints	Adults 2006	Overall Habitat Grade	Habitat Characteristics
North end with No Habitat			
N end	0	E	Flag Pond boundary south to 336; low or no cliffs, narrow beach
336	0	E	Low or recessed cliffs, powerplant facilities, no adult or larval habitat
337	0	E	Heavily vegetated, recessed cliffs, no adult or larval habitat
North Section with Little Habitat			
338	0	E	Area south of barge dock, no cliffs wide sandy beach
339	3	D	rocky more narrow beach, poor habitat
340	6	C	high cliffs, very rocky beach,
341	0	E	very rocky beach, unsuitable
342	4	E	less rocky, wider beach
343	**3**	**D**	**Section of current intake; wider beach, low cliffs**
344	**2**	**C**	**Section of current intake; wider beach, low cliffs.stream cut**
345	6	C	low cliffs, target area, good beach
346	5	C	gap in cliffs, stream bed
347	4	B	good beach and cliff habitat
348	6	C	start rocky, shelly beach at mini point
Middle Section with Little Habitat			
349	0	D	narrow rocky beach, with good high cliffs
350	2	D	as above
351	0	D	point area, poor rocky beach
352	0	D	mostly poor, rocky beach with good tall cliffs
353	3	C	wider, more sandy beach
354	3	D	poor shelly beach, low cliff area
355	0	D	heavy tree rubble, debris on beach, good cliffs
South Section with Best Habitat			
356	2	C	heavy shells on beach, good cliffs
357	6	C	start wide sandy beach with some shells, good cliff habitat
358	10	B	same
359	7	B	same
360	17	B	good beach and recessed cliff habitat
361	3	C	narrow rocky beach, with good high cliffs
362	0	D	same as above; very poor beach
363	0	D	same as above; very poor beach
364	0	C	start wide beach with low cliffs
365	13	B	same, higher cliffs
366	6	B	same
Total	111		

APPENDIX

Conclusions on Potential Impacts on Proposed Plans at CCNPP

Under current plans for development of new nuclear generating unit(s) at the CCNPP site, all associated plant facilities would be outside of the 1000-foot Chesapeake Bay Critical Area except for a new heavy haul road and cooling water intake and discharge facilities, which are water-dependent. The proposed heavy haul road is routed just north and west of a small tributary stream that outfalls to the bay south of the existing CCNPP barge slip, and joins the existing haul road from the barge slip northwest of survey waypoint 338 (Figure 1). The preferred location of the new cooling water intake and discharge structures is north of waypoint 338 in the area from the barge slip northward to the existing CCNPP cooling water intake structure, with associated pipelines roughly coincident with the proposed heavy haul road route and existing road north of the barge slip. An alternative location for cooling water intake and/or discharge structures considered by the project is on the Chesapeake Bay shoreline at survey waypoints 343-344, with associated pipelines routed westward through a topographic depression (swale) to the power block area (Figure 1).

The results of the 2006 survey support and extend the findings used in the initial site layout studies conducted in the first quarter of 2006, and indicated that the work being proposed at CCNPP will not have any effect on the Puritan or Northeastern Beach Tiger Beetles or their habitats. Larvae of the Puritan tiger beetle would be negatively affected by direct construction or other disturbance to the cliff where developing larvae are found. Adults of the PTB could be affected by heavy equipment or intense human activity on the beaches during their activity period, mid-June to early August. However, since no such activity is planned in the areas of suitable habitat, no negative effects would be expected. The Northeastern Beach Tiger Beetle would also not be negatively impacted because there is no breeding habitat for this species at CCNPP. Adults of this species are active from mid-June through late August at the Flag Pond site. Few, if any adults could potentially move onto the beach along the north edge of CCNPP, but would move away if there is beach activity occurring.

A SUMMARY OF THE CURRENT STATUS OF TWO FEDERALLY LISTED TIGER BEETLES AT CALVERT CLIFFS NUCLEAR POWER PLANT

C. Barry Knisley, Dept. of Biology, Randolph-Macon College, Ashland, VA 23005

August 29, 2008

Included here is an updated supplement to an earlier report (Knisley 2006) assessing the status of the Puritan (*Cicindela puritana*) and Northeastern Beach (*Cicindela dorsalis dorsalis*) Tiger Beetles at Calvert Cliffs Nuclear Power Plant. This site has been surveyed for tiger beetles each year for most of the last 10 years, and most recently in July 2008. Northeastern Beach tiger beetles have been found only once at the site several years ago when a few were present adjacent to Flag Ponds with the northern most 100 m of shoreline. This beetle will thus not be affected by any planned construction or related activities. Also, no beetles have been found adjacent to the Plant site in recent years and the Flag Ponds population has now declined to the point of near extinction (2 adults in 2008). The Puritan Tiger Beetle is present in scattered sections of the shoreline and adjacent cliffs south of the existing barge dock. Numbers of adults have varied greatly but their distribution along the shore has changed only slightly.

As result of my earlier and most recent 2008 surveys, I conclude that the Puritan Tiger Beetle population at Calvert Cliffs Nuclear Power Plant will not be adversely affected by any of the proposed construction activities in the areas nearest tiger beetle habitat. The planned construction of a heavy haul road to the barge dock will have no impact because these activities will be at a distance sufficient to avoid disturbance to both beetles and habitat. My mapping and habitat examination showed no larval habitat within 300 m of this area and only rarely do a few adults forage on the beach within 200m of the barge dock. In fact, this whole northern 500 m section of the cliffs is marginal habitat. It is my judgment also that the proposed demolition of the Eagles Den building and the installation of the forested wetlands mitigation area would not impact Puritan tiger beetles which could be present on the upper cliff face in this area. This cliff area is marginal habitat and larvae may or may not occur there, but if so, numbers should be low. Larvae would only be affected by severe disturbance to the cliff face in which they are found.

Literature Cited:

Knisley, C. Barry. 2006. Current status of two federally threatened tiger beetles at Calvert Cliffs Nuclear Power Plant, 2006. Draft report to Constellation Generation Group, Baltimore, MD

APPENDIX C. COMMITMENT TO TIME-OF-YEAR RESTRICTIONS

Greg Gibson
Vice President, Regulatory Affairs

250 West Pratt Street, Suite 2000
Baltimore, Maryland 21201

UniStar
NUCLEAR ENERGY

10 CFR 52.3
10 CFR 52.79

April 14, 2009

UN#09-189

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: UniStar Nuclear Energy, NRC Docket No. 52-016
Calvert Cliffs Nuclear Power Plant, Unit 3
Restrictions of Construction/Refurbishment of the
Barge Slip/Unloading Facility and Associated Dredging

References: 1) Phase I Compensatory Mitigation Plan, MACTEC Engineering and Consulting, Inc., February 18, 2009.

This letter provides UniStar Nuclear Energy's commitment to a time-of-year restriction for the work described below associated with construction and refurbishment of the barge slip and unloading facility, and stream stabilization. The time-of-year restriction commitment is being made to protect Puritan Tiger Beetle habitat during the time of the year when the adult tiger beetles are normally active.

For work at the barge dock area, including the restoration of the bulkhead and stream outfall riprap apron, a time-of-year restriction will be followed in order to avoid the potential for a "take" of adult tiger beetles on the beach. Though there is no larval beetle habitat present, adult beetles have been documented foraging on the beach in this area. The time-of-year restriction extends from June 1 to August 31.

For the barge dock area, this restriction will apply only to project activities occurring landward of mean low water and extending up to the sheet pile bulkhead. Dredging from mean low water extending out into the bay is not subject to a seasonal restriction relative to Tiger Beetles. Project activities landward of the sheet pile wall are also not subject to the seasonal restriction for the protection of Tiger Beetles. Figure 6D, dated April 8, 2009, and Figures 6A and 6E, dated July 14, 2008, in Enclosure 2 illustrate the area subject to restriction.

In addition, the proposed stream stabilization activity at Camp Conoy, identified in the Phase I Compensatory Mitigation Plan, dated February 18, 2009, as SE-4 (Reference 1), would also be subject to the same time-of-year restriction. The restricted areas are indicated in the Enclosure 2, figure entitled "Mitigation Areas and Area Subject to Restrictions – June 1 to August 31," dated April 8, 2009. Outside of this June 1 through August 31 period, restoration activities can be carried out within this 100 foot wide corridor at the confluence of the stream with the Chesapeake Bay, centered on the run of the stream as illustrated in the enclosed figure.

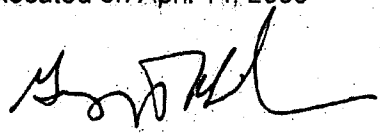
The time-of-year restriction commitment is applicable to the construction/restoration activities of the barge unloading facility and associated stream outfall, but does not apply to the operation and use of this facility.

The regulatory commitment in this correspondence is summarized in Enclosure 1.

If you have any questions, please call Mr. Dimitri Lutchenkov at (410) 470-5524.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 14, 2009



Greg Gibson

Enclosures: 1) New Regulatory Commitment
2) Modifications for New Bulkhead & Apron Tiger Beetle Seasonally Restricted Work Areas, Mitigation Areas and Area Subject to Restrictions – June 1 to August 31, Modifications @ Existing Barge Unloading Facility, Section Thru Concrete Apron

cc: John Rycyna, NRC Safety Project Manager, U.S. EPR COL Application
Laura Quinn, NRC Project Manager, Environmental Projects Branch 2
Harriet Nash, NRC Senior Aquatic Biologist
Silas Kennedy, U.S. NRC Resident Inspector, CCNPP, Units 1 and 2
Loren Plisco, Deputy Regional Administrator, NRC Region II
Getachew Tesfaye, NRC Project Manager, U.S. EPR DC Application
U.S. NRC Region I Office
Susan Gray – Power Plant Research Program, MD Department of Natural Resources
Kathy Anderson – U.S. Army Corps of Engineers – Baltimore District
Andy Moser – U.S. Fish and Wildlife Service
Bob Zepp – U.S. Fish and Wildlife Service
Cheryl Kerr – Maryland Department of the Environment
Amanda Sigalito – Maryland Department of the Environment

bcc:

Commitment: CC-09-0001

Enclosure 1
New Regulatory Commitment

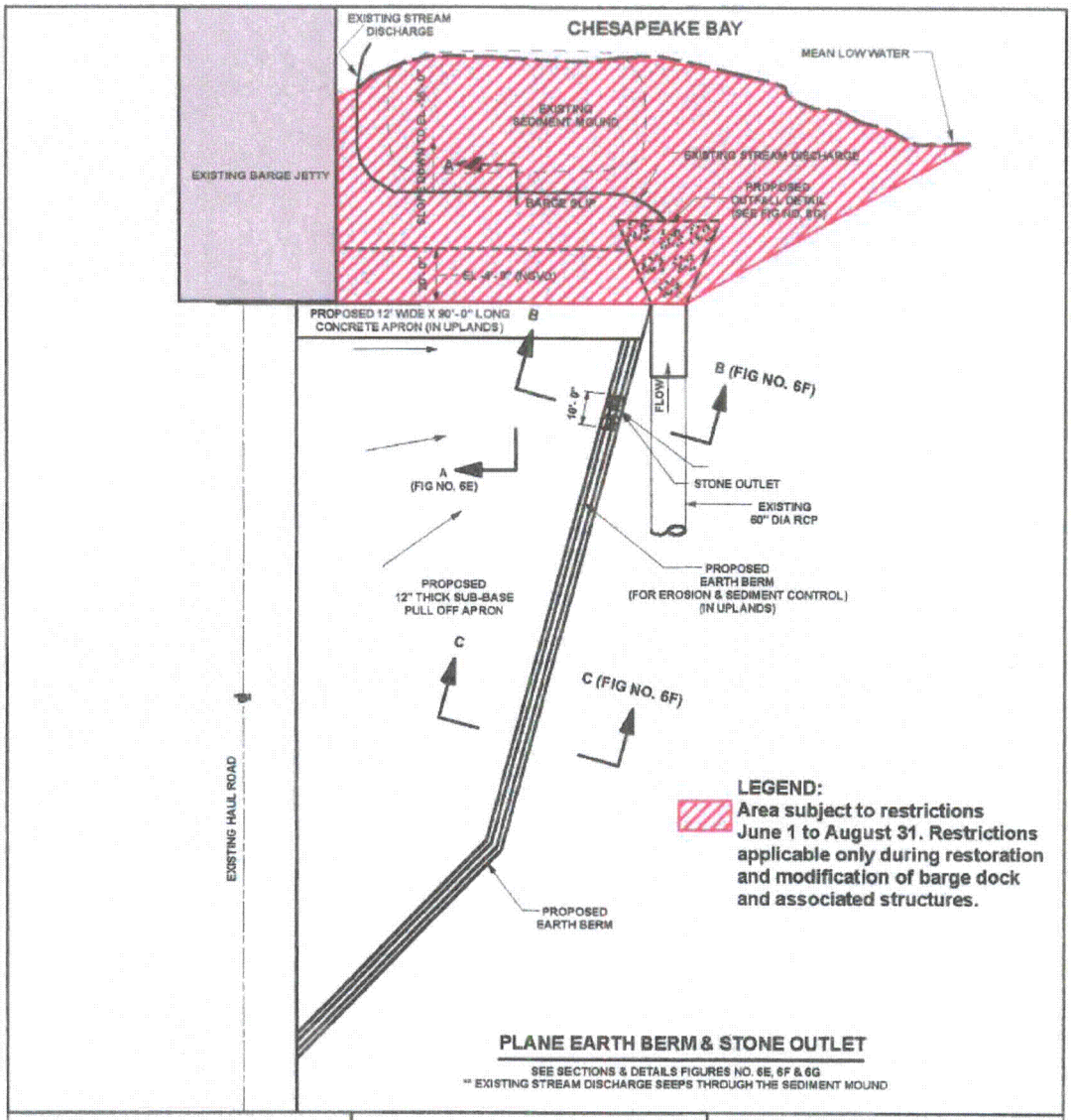
The regulatory commitment in this correspondence is summarized below:

Regulatory Commitment No.	Regulatory Commitment Description	Regulatory Commitment Due Date
CC-09-0001	UniStar Nuclear Energy commits to a June 1 through August 31 restriction for construction and refurbishment of the barge slip and unloading facility, and associated excavation; and stabilization of the stream outfall as described and illustrated in UniStar Letter UN#09-189.	N/A

Enclosure 2
Modifications for New Bulkhead & Apron Tiger Beetle Seasonally Restricted Work Areas, Mitigation Areas and Area Subject to Restrictions – June 1 to August 31, Modifications @ Existing Barge Unloading Facility, Section Thru Concrete Apron

NOTES: 1. -MEAN HIGH WATERLINE: 0.57'
-MEAN LOW WATERLINE: -0.60'
-MAXIMUM SPRING WATERLINE: 1.47'

TIDAL



PURPOSE: PLANT EXPANSION
DATA SOURCE:
BECHTEL CORPORATION
DATUM: (NGVD 29)
PROJECT LATITUDE/LONGITUDE:
38.424133
-76.441598

FIGURE 6 D
MODIFICATIONS FOR NEW BULKHEAD & APRON TIGER BEETLE SEASONALLY RESTRICTED WORK AREAS

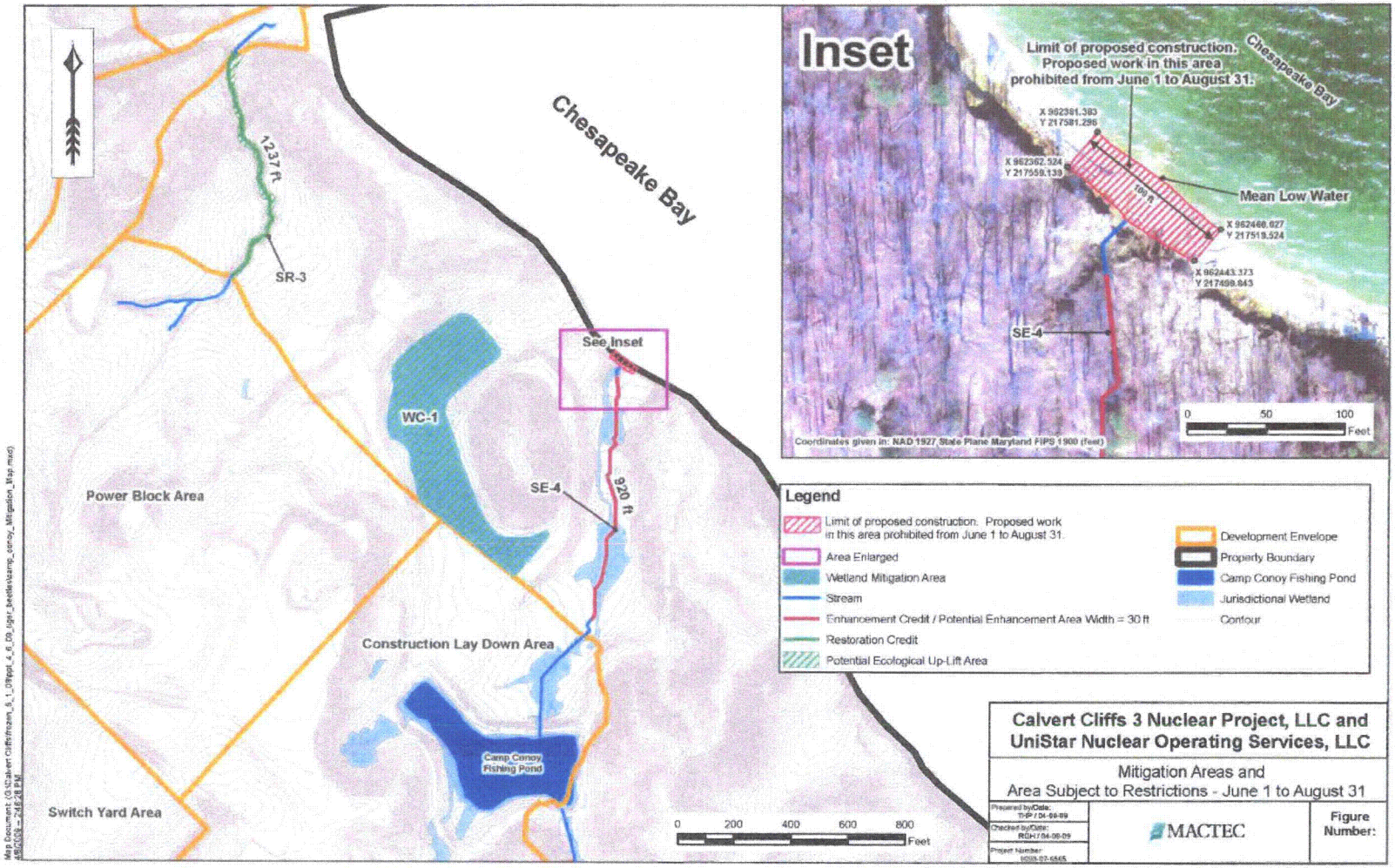
SCALE IN FEET
NOT TO SCALE

CALVERT CLIFFS NUCLEAR POWER PLANT

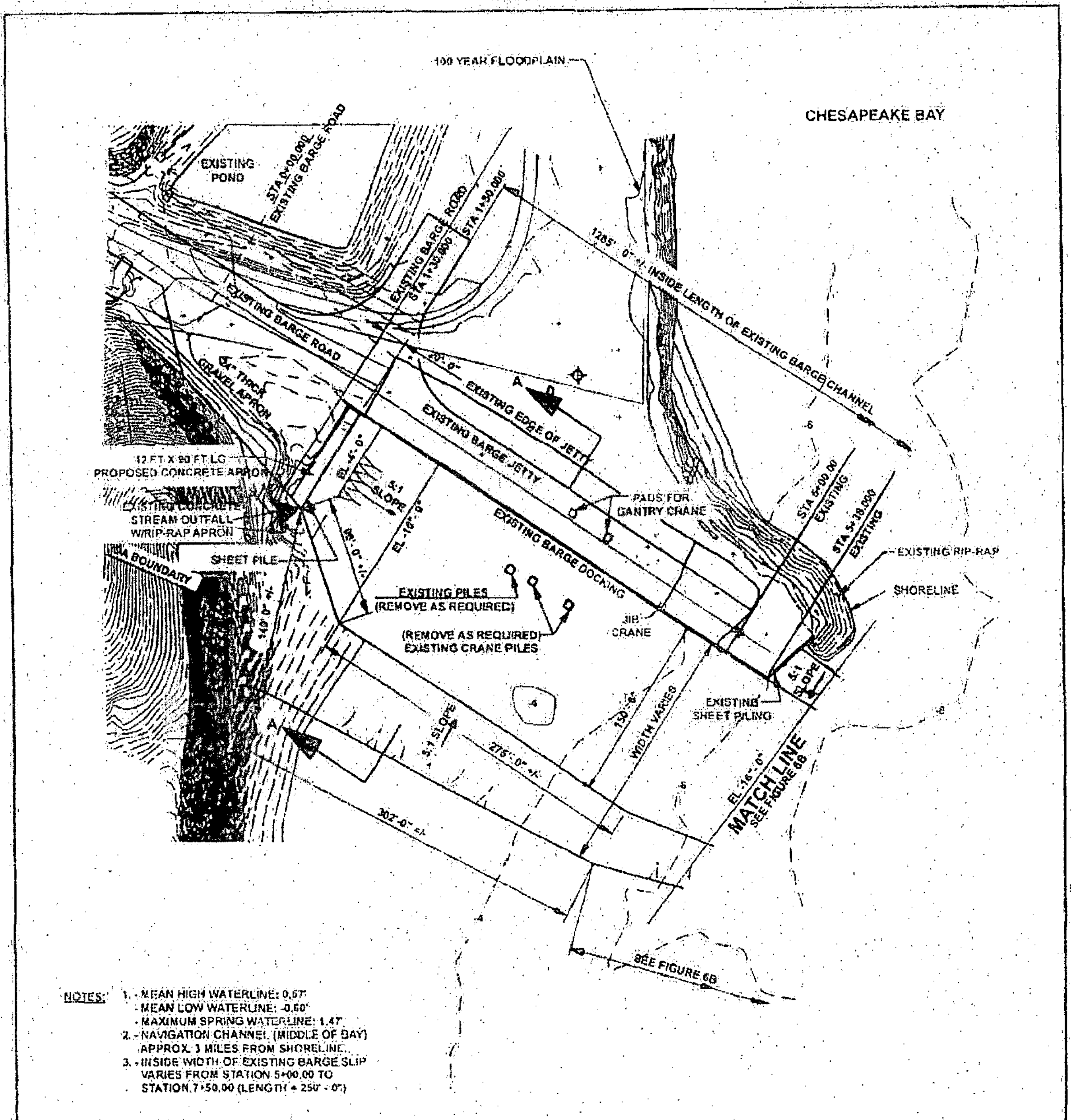
TIGER BEETLE SEASONALLY RESTRICTED WORK AREAS

IN:
PATUXENT / WEST CHESAPEAKE BAY
COUNTY OF: CALVERT STATE: MD
DATE: 4/08/09

Map Document: (G:\Calvert Cliffs\Figures_5_1_09\ppt_4_6_09_figs_beddesfig_6_d_TB.mxd)
4/8/2009 -- 12:56:54 PM


Inset
Limit of proposed construction. Proposed work in this area prohibited from June 1 to August 31.
Chesapeake Bay
X 962381.383
Y 217581.296
X 962362.524
Y 217559.139
100 ft
Mean Low Water
X 962468.627
Y 217519.524
X 962443.373
Y 217499.843
SE-4
0 50 100 Feet
Coordinates given in: NAD 1927 State Plane Maryland FIPS 1900 (Feet)
Chesapeake Bay
1237 ft
SR-3
See Inset
WC-1
SE-4
920 ft
Power Block Area
Construction Lay Down Area
Camp Conoy Fishing Pond
Switch Yard Area
0 200 400 600 800 Feet
Legend
Limit of proposed construction. Proposed work in this area prohibited from June 1 to August 31.
Area Enlarged
Wetland Mitigation Area
Stream
Enhancement Credit / Potential Enhancement Area Width = 30 ft
Restoration Credit
Potential Ecological Up-Lift Area
Development Envelope
Property Boundary
Camp Conoy Fishing Pond
Jurisdictional Wetland
Contour
Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC
Mitigation Areas and Area Subject to Restrictions - June 1 to August 31
MACTEC
Figure Number:

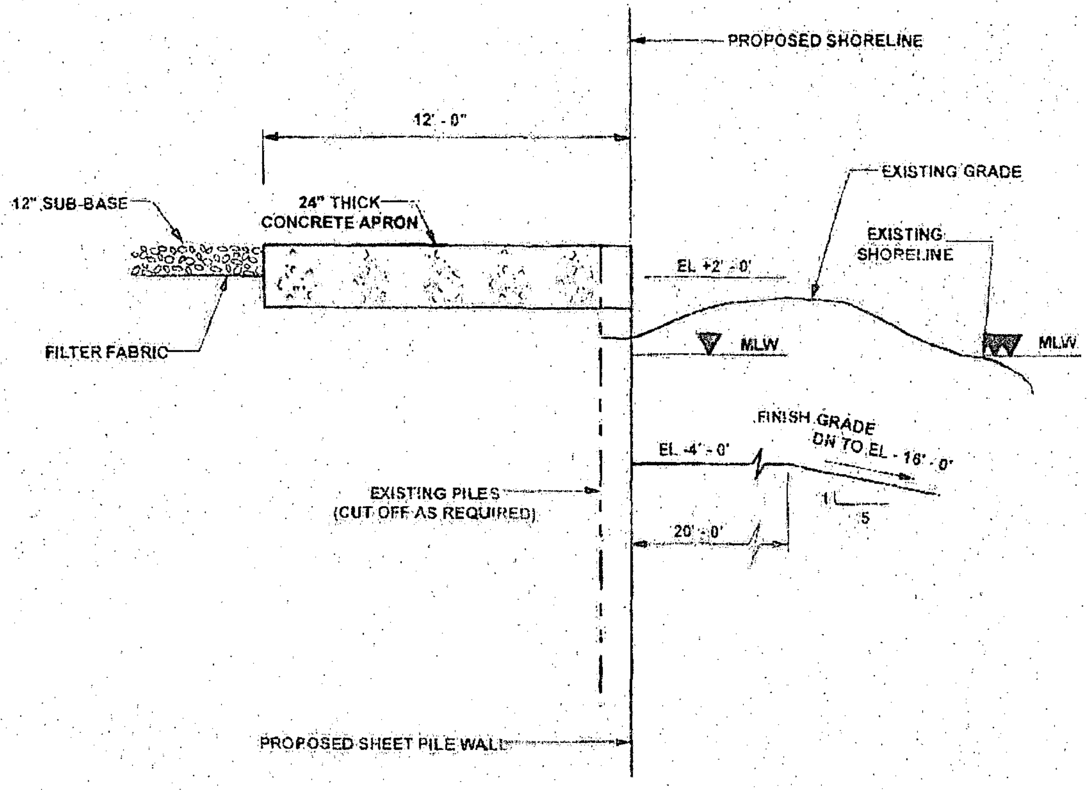
TIDAL



PURPOSE: PLANT EXPANSION DATA SOURCE: BECHTEL CORPORATION DATUM: (NGVD 29) PROJECT LATITUDE/LONGITUDE: 38.424133 -76.441598 N	**FIGURE 6 A** **MODIFICATIONS @ EXISTING BARGE UNLOADING FACILITY** SCALE IN FEET 0 50 100 150 Feet	**CALVERT CLIFFS NUCLEAR POWER PLANT** IN: PATUXENT / WEST CHESAPEAKE BAY COUNTY OF: CALVERT STATE: MD APPLICATION BY: CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC DATE: 5/09/08 REV1 7/14/08

Enclosure 2
Page 5

TIDAL



SECTION A-A

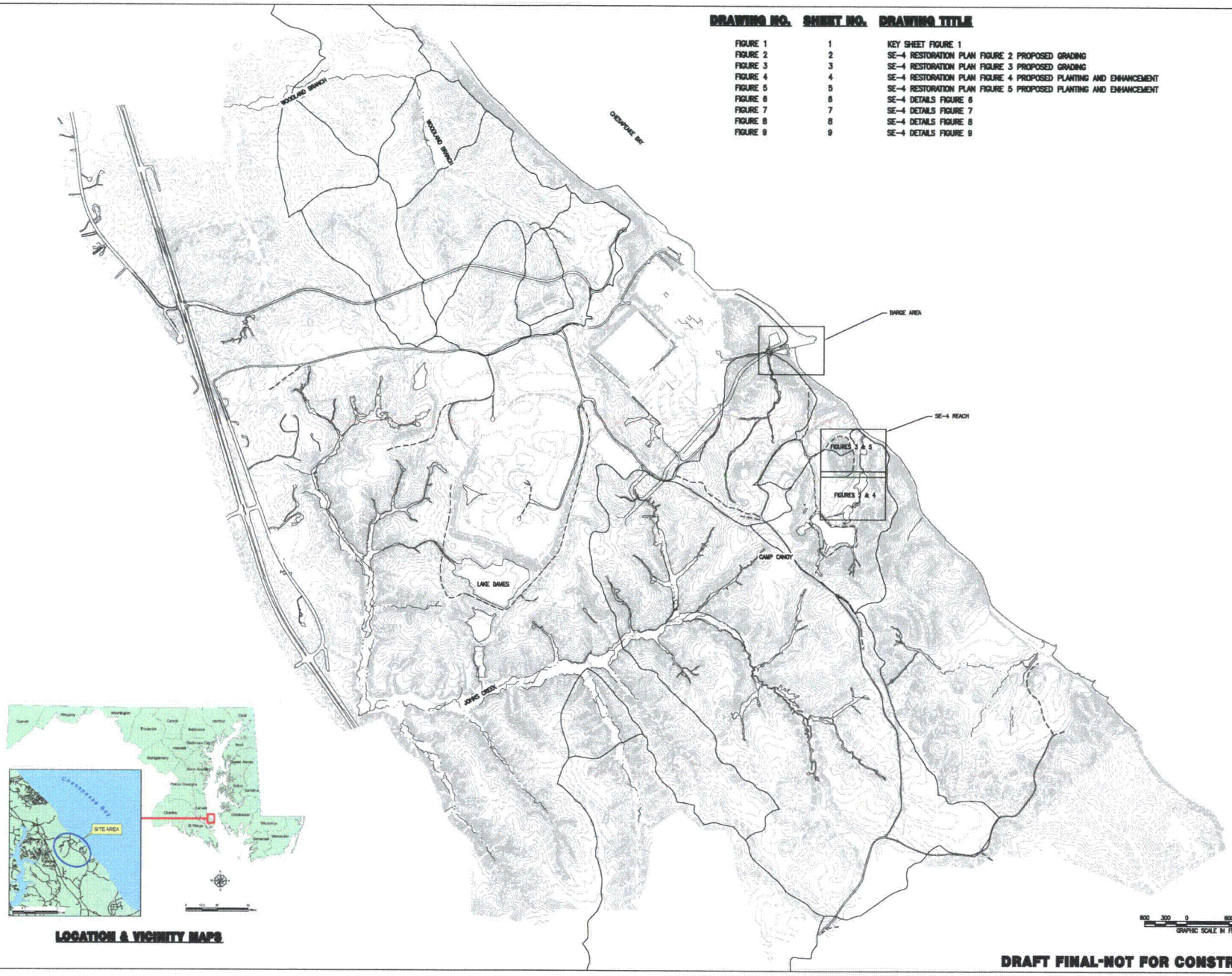
SEE FIGURE 6A FOR LOCATION OF APRON AND SHEET PILING
SEE FIGURE 6D FOR MODIFICATIONS OF NEW BULKHEAD AND APRON

PURPOSE: PLANT EXPANSION DATA SOURCE: BECHTEL CORPORATION DATUM: (NGVD 29) PROJECT LATITUDE/LONGITUDE: 38.424133 -76.441598	FIGURE 6 E SECTION THRU CONCRETE APRON SCALE IN FEET NOT TO SCALE	CALVERT CLIFFS NUCLEAR POWER PLANT IN: PATUXENT / WEST CHESAPEAKE BAY COUNTY OF: CALVERT STATE: MD APPLICATION BY: CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES LLC DATE: 5/09/08 REV1 7/14/08

APPENDIX B:

DRAFT FINAL (NOT FOR CONSTRUCTION) DESIGN PLANS

DRAWING NO.	SHEET NO.	DRAWING TITLE
FIGURE 1	1	KEY SHEET FIGURE 1
FIGURE 2	2	SE-4 RESTORATION PLAN FIGURE 2 PROPOSED GRADING
FIGURE 3	3	SE-4 RESTORATION PLAN FIGURE 3 PROPOSED GRADING
FIGURE 4	4	SE-4 RESTORATION PLAN FIGURE 4 PROPOSED PLANTING AND ENHANCEMENT
FIGURE 5	5	SE-4 RESTORATION PLAN FIGURE 5 PROPOSED PLANTING AND ENHANCEMENT
FIGURE 6	6	SE-4 DETAILS FIGURE 6
FIGURE 7	7	SE-4 DETAILS FIGURE 7
FIGURE 8	8	SE-4 DETAILS FIGURE 8
FIGURE 9	9	SE-4 DETAILS FIGURE 9



LOCATION & VICINITY MAPS

DRAFT FINAL-NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

SEAL

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 15653, EXPIRATION DATE: JULY 1, 2011.

UNISTAR NUCLEAR ENERGY
CALVERT CLIFFS NUCLEAR POWER PLANT
UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

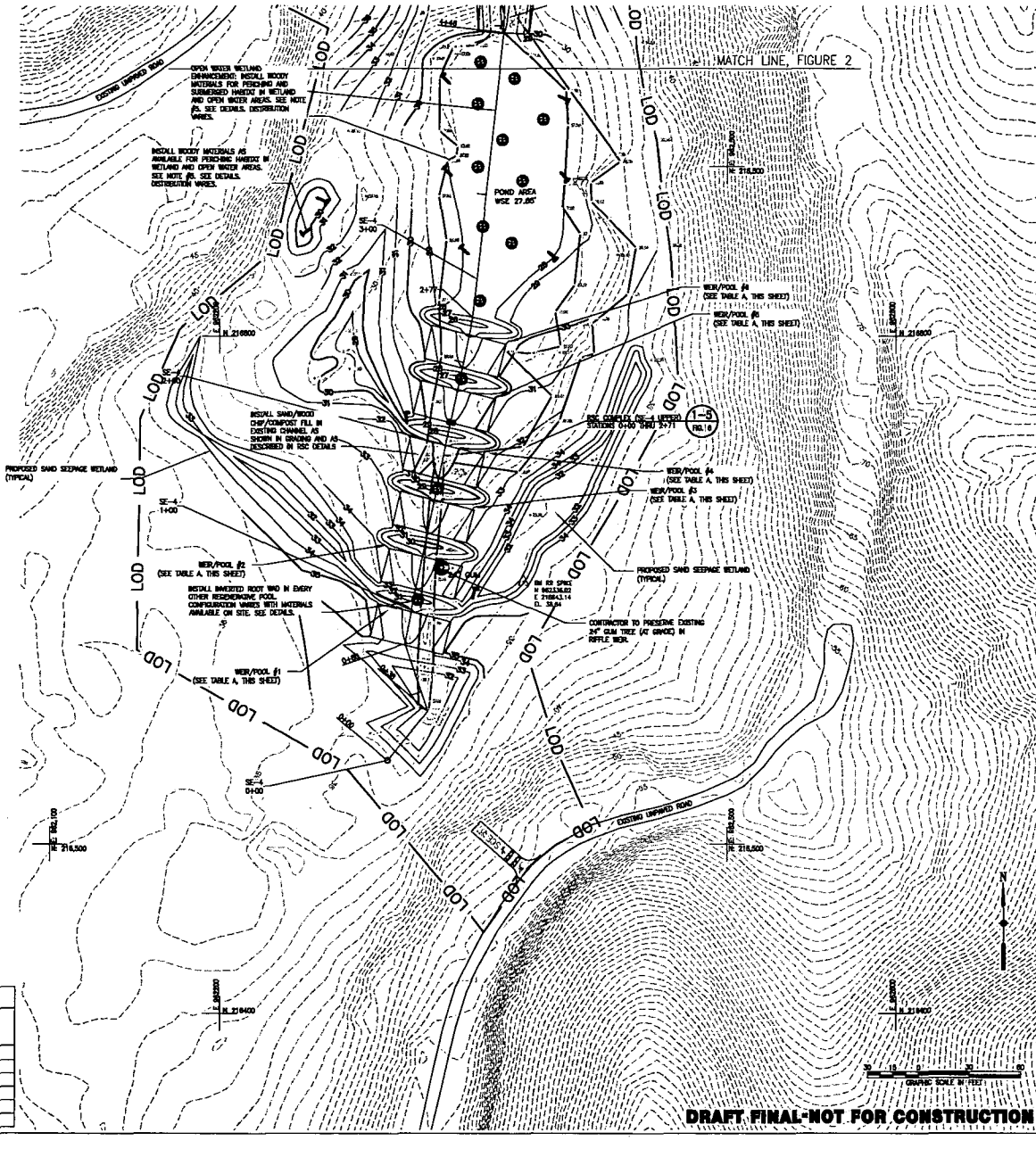
KEY SHEET FIGURE 1

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
Lovelton Center
15 Lovelton Circle
Sparks, Maryland 21152
(410) 771-4950

DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JAP
CHECKED BY	GT/LS
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 1
SHEET NUMBER	1 OF 9

GENERAL NOTES:

1. CONTRACTOR TO PRACTICE SAME DAY E&S STABILIZATION FOR ALL DISTURBED AREAS UNLESS OTHERWISE NOTED.
2. ALL EXISTING WETLAND RESOURCES ARE TO BE FIELD-DEFINABLE PRIOR TO SITE DISTURBANCE.
3. CONTRACTOR TO ADHERE STRICTLY TO TIME OF YEAR RESTRICTIONS AND LOD TO PRESERVE EXISTING POPULATIONS OF PURITAN TIGER BEETLE (CICINDELA PURITANA).
4. WORK AREA IS IN CHESAPEAKE CRITICAL AREA. CONTRACTOR TO PRESERVE AND RELOCATE EXISTING VEGETATION WHERE POSSIBLE. EXISTING VEGETATION MAY BE ACCOMMODATED WITH FIELD-MODIFICATION OF THE DESIGN UNDER DIRECT SUPERVISION OF THE ON-SITE ENGINEER ONLY.
5. CONTRACTOR TO PLACE WOODY DEBRIS AT A RATE OF 40 TONS/ACRE UNDER SUPERVISION OF THE ON-SITE ENGINEER. THIS INCLUDES OPEN WATER WETLAND ENHANCEMENT, UPPER THIRD OF RIFFLE WEIR STRUCTURES, POOLS AND SURROUNDING AREAS.
6. DETAILED TOPOGRAPHY PROVIDED BY COA, INC. CORNERSTONE SURVEYORS, 2008.
7. SEED RIPARIAN ZONES WITH ERNST MIX 178 OR EQUIVALENT AT A RATE OF 15 POUNDS/ACRE. SEED EMERGENT WETLAND ZONES WITH ERNST MIX 175 OR EQUIVALENT AT A RATE OF 15 POUNDS/ACRE.



DRAFT FINAL-NOT FOR CONSTRUCTION

LEGEND:

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING ROAD
- LOD — PROPOSED LINE OF DISTURBANCE
- MLW — MEAN LOW WATER LINE (0.1')
- MHW — MEAN HIGH WATER LINE (1.28')
- EXISTING TREE
- PROPOSED ROOTWAD
- PROPOSED LOG/ROOTWAD PLACEMENT
- PROPOSED SINGLE LOG PLACEMENT
- PROPOSED SANDSTONE BOULDERS
- STATION LINE
- CONTROL POINT FROM COA, INC. SURVEY, 2008
- SCE P's — STABILIZED CONSTRUCTION ENTRANCE
- EXISTING EDGE OF CHANNEL OR POND

STRUCTURE SCHEDULE (TABLE A)

NUMBER	RIFFLE AND POOL WIDTH	RIFFLE/POOL LENGTH	WEIR DEPTH	THROAT ELEVATION AT TOP OF WEIR	THROAT ELEVATION AT BOTTOM OF WEIR	MAX POOL DEPTH	POOL WATER ELEVATION (ESTIMATE)
1	45	20/13.67	2	33	32	31	33
2	45	20/13.67	2	32	31	30	32
3	45	20/13.67	2	31	30	29	31
4	45	20/13.67	2	30	29	28	30
5	45	20/13.67	2	29	28	27	29
6	45	20/13.67	2	28	27	26	28

NO.	DATE	BY	DESCRIPTION
			REVISIONS

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 15621, EXPIRATION DATE: JULY 9, 2011.

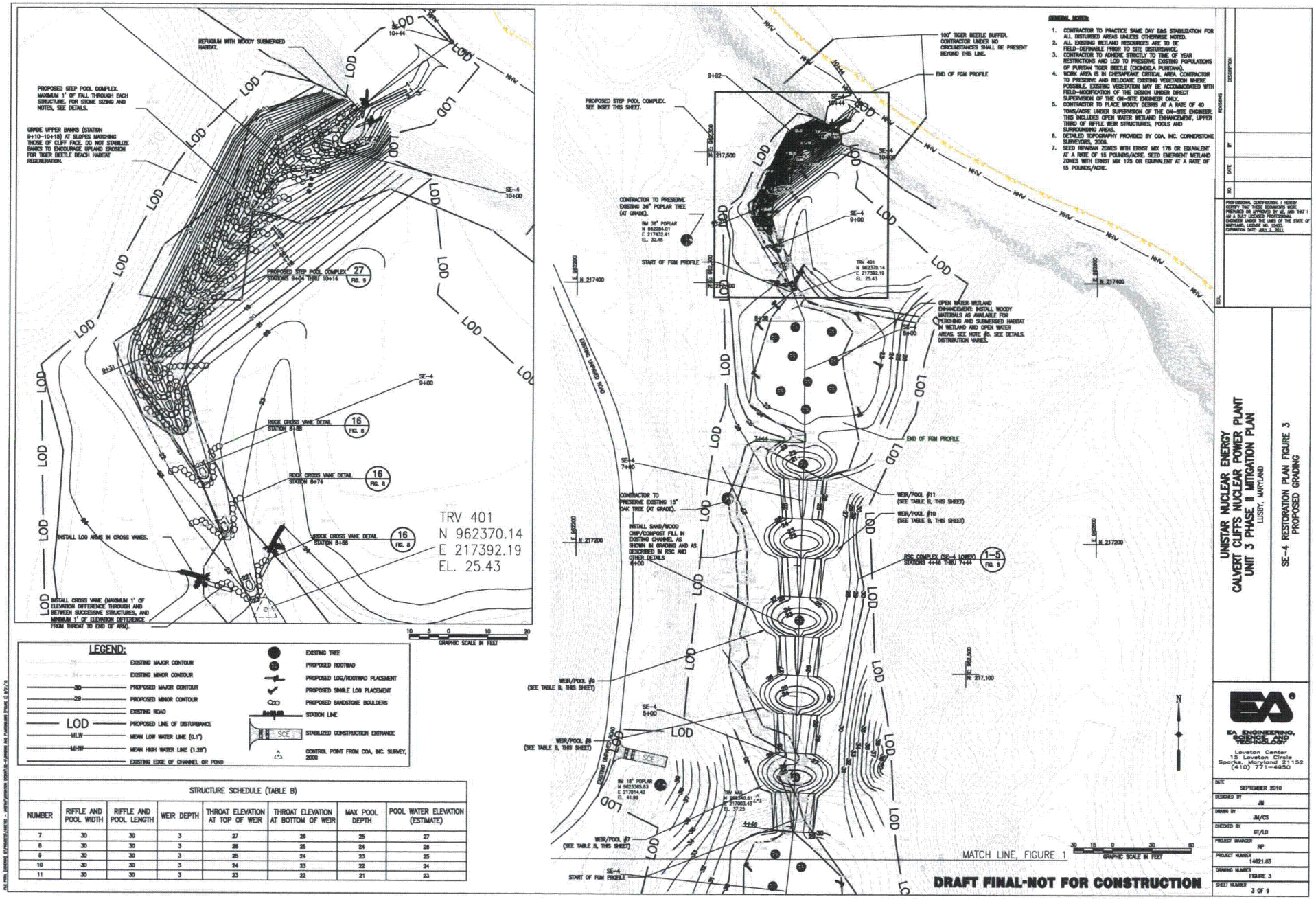
SEAL

UNISTAR NUCLEAR ENERGY
CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

SE-4 RESTORATION PLAN FIGURE 2 PROPOSED GRADING

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(410) 771-4950

DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 2
SHEET NUMBER	2 OF 9



LEGEND:

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING ROAD
- LOD — PROPOSED LINE OF DISTURBANCE
- MLW — MEAN LOW WATER LINE (0.1')
- MHW — MEAN HIGH WATER LINE (1.28')
- EXISTING EDGE OF CHANNEL OR POND
- EXISTING TREE
- PROPOSED ROOTWAD
- PROPOSED LOG/ROOTWAD PLACEMENT
- PROPOSED SINGLE LOG PLACEMENT
- PROPOSED SANDSTONE BOULDERS
- STATION LINE
- SCE — STABILIZED CONSTRUCTION ENTRANCE
- CONTROL POINT FROM COA, INC. SURVEY, 2009

STRUCTURE SCHEDULE (TABLE B)

NUMBER	RIFFLE AND POOL WIDTH	RIFFLE AND POOL LENGTH	WEIR DEPTH	THROAT ELEVATION AT TOP OF WEIR	THROAT ELEVATION AT BOTTOM OF WEIR	MAX POOL DEPTH	POOL WATER ELEVATION (ESTIMATE)
7	30	30	3	27	26	25	27
8	30	30	3	26	25	24	26
9	30	30	3	25	24	23	25
10	30	30	3	24	23	22	24
11	30	30	3	23	22	21	23

GENERAL NOTES:

1. CONTRACTOR TO PRACTICE SAME DAY E&S STABILIZATION FOR ALL DISTURBED AREAS UNLESS OTHERWISE NOTED.
2. ALL EXISTING WETLAND RESOURCES ARE TO BE FIELD–DEFINABLE PRIOR TO SITE DISTURBANCE.
3. CONTRACTOR TO ADHERE STRICTLY TO TIME OF YEAR RESTRICTIONS AND LOD TO PRESERVE EXISTING POPULATIONS OF PURITAN TIGER BEETLE (CICINDELA PURITANA). WORK AREA IS IN CHESAPEAKE CRITICAL AREA. CONTRACTOR TO PRESERVE AND RELOCATE EXISTING VEGETATION WHERE POSSIBLE. EXISTING VEGETATION MAY BE ACCOMMODATED WITH FIELD–MODIFICATION OF THE DESIGN UNDER DIRECT SUPERVISION OF THE ON–SITE ENGINEER ONLY.
4. CONTRACTOR TO PLACE WOODY DEBRIS AT A RATE OF 40 TONS/ACRE UNDER SUPERVISION OF THE ON–SITE ENGINEER. THIS INCLUDES OPEN WATER WETLAND ENHANCEMENT, UPPER THIRD OF RIFFLE WEIR STRUCTURES, POOLS AND SURROUNDING AREAS.
5. DETAILED TOPOGRAPHY PROVIDED BY COA, INC. CORNERSTONE SURVEYORS, 2009.
6. SEED RIPARIAN ZONES WITH ERNST MIX 176 OR EQUIVALENT AT A RATE OF 15 POUNDS/ACRE. SEED EMERGENT WETLAND ZONES WITH ERNST MIX 175 OR EQUIVALENT AT A RATE OF 15 POUNDS/ACRE.

NO.	DESCRIPTION	DATE	BY
	REVISIONS		

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SEAL

UNISTAR NUCLEAR ENERGY
CALVERT CLIFFS NUCLEAR POWER PLANT
UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

SE–4 RESTORATION PLAN FIGURE 3
PROPOSED GRADING

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(410) 771–4950

DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 3
SHEET NUMBER	3 OF 9

GENERAL NOTES:

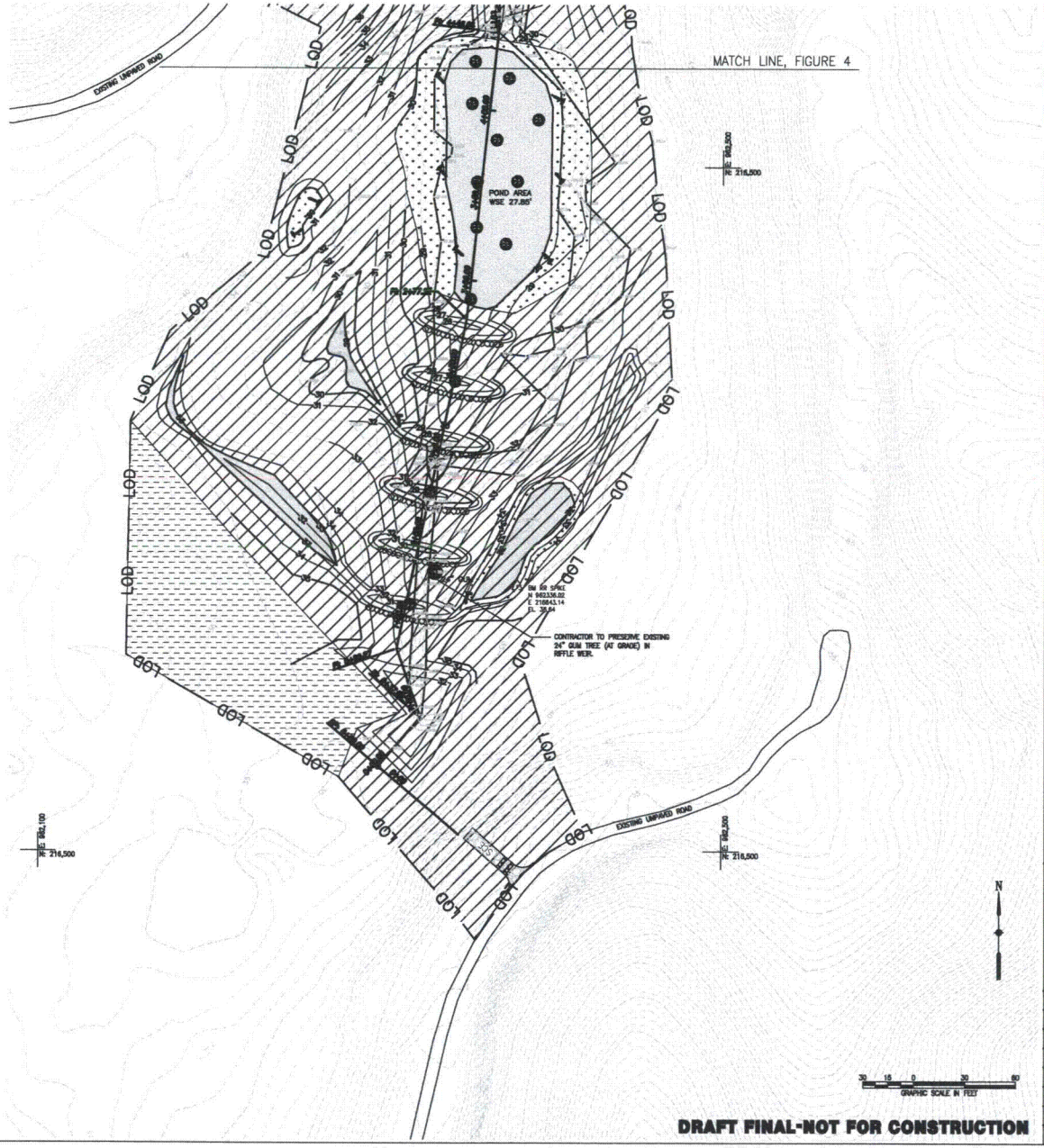
1. CONTRACTOR TO PRACTICE SAME DAY E&S STABILIZATION FOR ALL DISTURBED AREAS UNLESS OTHERWISE NOTED).
2. ALL EXISTING WETLAND RESOURCES ARE TO BE FIELD-DEFINABLE PRIOR TO SITE DISTURBANCE.
3. CONTRACTOR TO ADHERE STRICTLY TO TIME OF YEAR RESTRICTIONS AND LOD TO PRESERVE EXISTING POPULATIONS OF PURITAN TIGER BEETLE (CICINDELA PURITANA).
4. WORK AREA IS IN CHESAPEAKE CRITICAL AREA. CONTRACTOR TO PRESERVE AND RELOCATE EXISTING VEGETATION WHERE POSSIBLE. EXISTING VEGETATION MAY BE ACCOMMODATED WITH FIELD-MODIFICATION OF THE DESIGN UNDER DIRECT SUPERVISION OF THE ON-SITE ENGINEER ONLY.
5. CONTRACTOR TO PLACE WOODY DEBRIS AT A RATE OF 40 TONS/ACRE UNDER SUPERVISION OF THE ON-SITE ENGINEER. THIS INCLUDES OPEN WATER WETLAND ENHANCEMENT, UPPER THIRD OF RIFFLE WEIR STRUCTURES, POOLS AND SURROUNDING AREAS.
6. DETAILED TOPOGRAPHY PROVIDED BY COA, INC. CORNERSTONE SURVEYORS, 2009.
7. SEED RIPARIAN ZONES WITH ERNST MIX 178 OR EQUIVALENT AT A RATE OF 15 POUNDS/ACRE. SEED EMERGENT WETLAND ZONES WITH ERNST MIX 175 OR EQUIVALENT AT A RATE OF 15 POUNDS/ACRE.

PLANTING PLAN

REGION	COMMON NAME	SCIENTIFIC NAME	QUANTITY
OPEN WATER (0.24 AC.)	PONDWEED	POTAMOGETON SP.	
	AMERICAN WHITE LILY	NYMPHAEA ODORATA	
EMERGENT WETLAND (0.18 AC.)	SWAMP MILKWEED	ASCLEPIAS INCARNATA	
	FRINGED SEDGE	CAREX CRINITA	
	SOFT RUSH	JUNCUS EFFUSUS	
	LURID SEDGE	CAREX LURIDA	
	SWITCHGRASS	PANICUM VIRGINATUM	
	LIZARDS TAIL	SAURURUS CERNUUS	
	ARROW ARUM	PELTANDRA VIRGINICA	
	SMALL SPIKE FALSE NETTLE	BOEHMERIA CYLINDRICA	
FORESTED WETLAND (1.74 AC.)	RED MAPLE	ACER RUBRUM	
	AMERICAN SYCAMORE	PLANTANUS OCCIDENTALIS	
	WILLOW OAK	QUERCUS PHELLOS	
	PIN OAK	QUERCUS PALUSTRIS	
	POST OAK	QUERCUS STELLATA	
	SHUMARDI OAK	QUERCUS SHUMARDII	
	SHINGLE OAK	QUERCUS IMBRICARIA	
UPLAND/RIPARIAN ZONE (0.32 AC.)	RED MAPLE	ACER RUBRUM	
	AMERICAN SYCAMORE	PLANTANUS OCCIDENTALIS	
	WILLOW OAK	QUERCUS PHELLOS	
	PIN OAK	QUERCUS PALUSTRIS	
	POST OAK	QUERCUS STELLATA	
	SHUMARD OAK	QUERCUS SHUMARDII	
	SHINGLE OAK	QUERCUS IMBRICARIA	

LEGEND:

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING ROAD
- LOD — PROPOSED LINE OF DISTURBANCE
- MLW — MEAN LOW WATER LINE (0.1')
- MHW — MEAN HIGH WATER LINE (1.28')
- EXISTING TREE
- PROPOSED ROOTWAD
- PROPOSED LOG/ROOTWAD PLACEMENT
- PROPOSED SINGLE LOG PLACEMENT
- PROPOSED SANDSTONE BOULDERS
- STATION LINE
- CONTROL POINT FROM COA, INC. SURVEY, 2009
- SCE — STABILIZED CONSTRUCTION ENTRANCE
- EXISTING EDGE OF CHANNEL OR POND



DRAFT FINAL-NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 19651, EXPIRATION DATE: JULY 1, 2011.

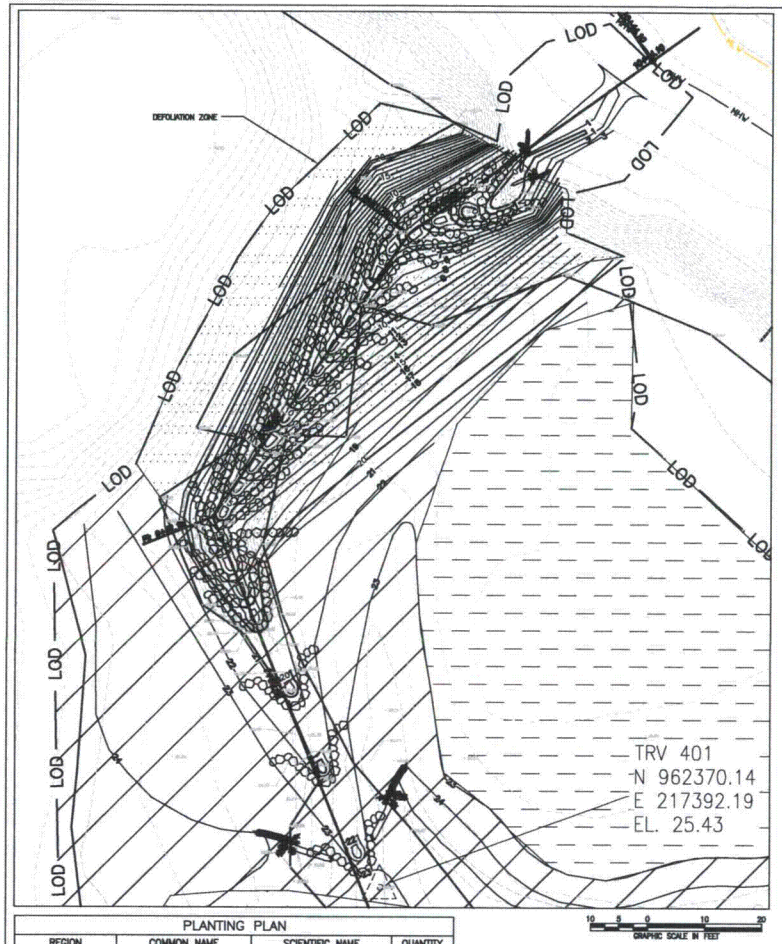
SEAL

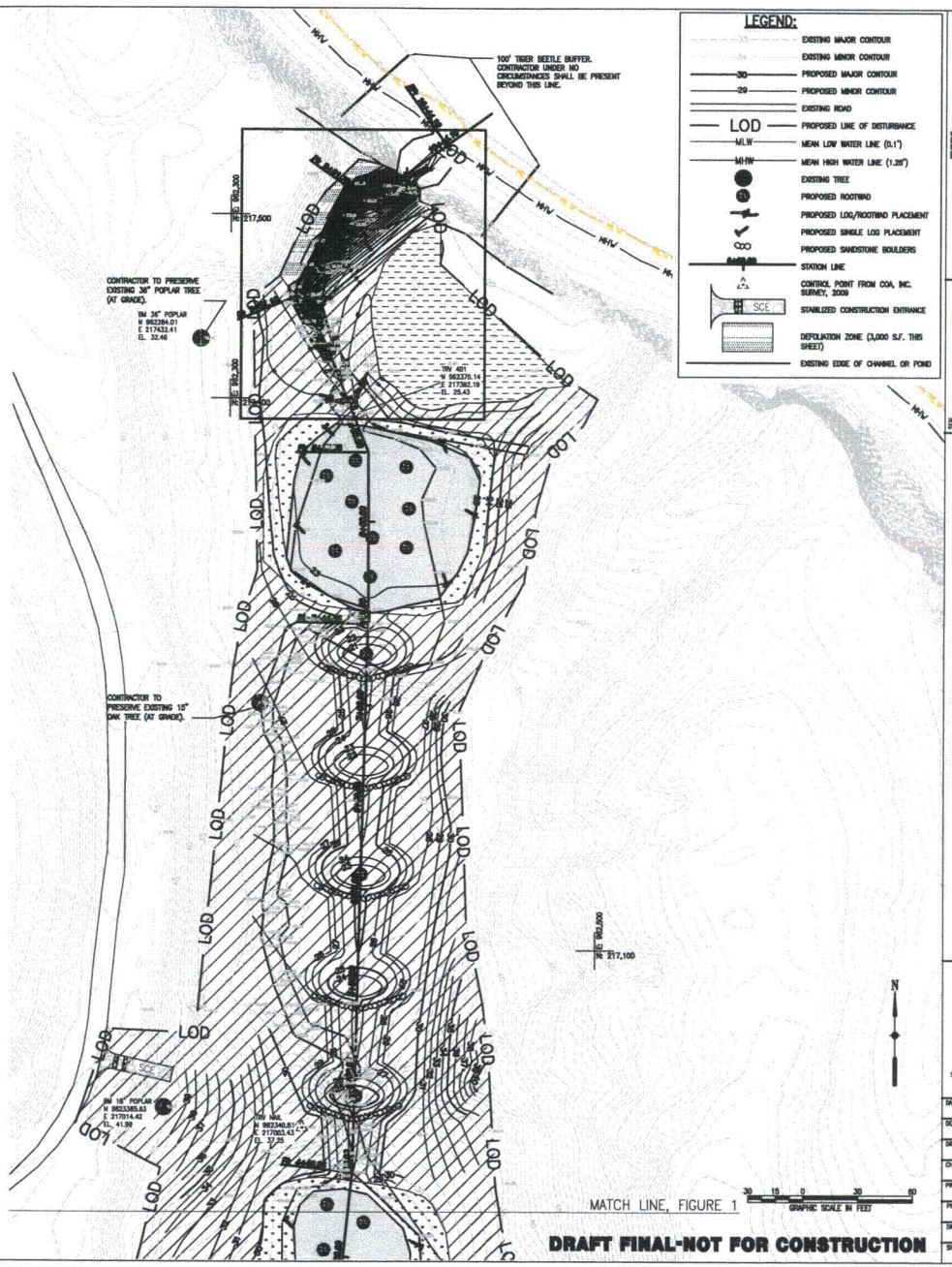
UNISTAR NUCLEAR ENERGY
CALVERT CLIFFS NUCLEAR POWER PLANT
UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

SE-4 RESTORATION PLAN FIGURE 4
PROPOSED PLANTING AND ENHANCEMENT

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(410) 771-4950

DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 4
SHEET NUMBER	4 OF 9





LEGEND:

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
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- PROPOSED SINGLE LOG PLACEMENT
- PROPOSED SANDSTONE BOULDERS
- STATION LINE
- CONTROL POINT FROM COA, INC. SURVEY, 2008
- SCE — STABILIZED CONSTRUCTION ENTRANCE
- DEFOLIATION ZONE (3,000 S.F. THIS SHEET)
- EXISTING EDGE OF CHANNEL OR POND

PLANTING PLAN

REGION	COMMON NAME	SCIENTIFIC NAME	QUANTITY
OPEN WATER (0.21 AC.)	PONDWEED	POTAMOGETON SP.	
	AMERICAN WHITE LILY	NYMPHAEA ODORATA	
EMERGENT WETLAND (0.09 AC.)	SWAMP MILKWEED	ASCLEPIAS INCARNATA	
	FRINGED SEDGE	CAREX CRINITA	
	SOFT RUSH	JUNCUS EFFUSUS	
	LURID SEDGE	CAREX LURIDA	
	SWITCHGRASS	PANICUM VIRGINATUM	
	LIZARDS TAIL	SAURURUS CERNUUS	
	ARROW ARUM	PELTANDRA VIRGINICA	
	SMALL SPIKE FALSE NETTLE	BOEHMERIA CYLINDRICA	
FORESTED WETLAND (1.48 AC.)	RED MAPLE	ACER RUBRUM	
	AMERICAN SYCAMORE	PLANTANUS OCCIDENTALIS	
	WILLOW OAK	QUERCUS PHELLOS	
	PIN OAK	QUERCUS PALUSTRIS	
	POST OAK	QUERCUS STELLATA	
	SHUMARDI OAK	QUERCUS SHUMARDII	
	SWINGLE OAK	QUERCUS IMBRICARIA	
UPLAND/RIPARIAN ZONE (0.14 AC.)	RED MAPLE	ACER RUBRUM	
	AMERICAN SYCAMORE	PLANTANUS OCCIDENTALIS	
	WILLOW OAK	QUERCUS PHELLOS	
	PIN OAK	QUERCUS PALUSTRIS	
	POST OAK	QUERCUS STELLATA	
	SHUMARDI OAK	QUERCUS SHUMARDII	
	SWINGLE OAK	QUERCUS IMBRICARIA	

GENERAL NOTES:

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3. CONTRACTOR TO ADHERE STRICTLY TO TIME OF YEAR RESTRICTIONS AND LOD TO PRESERVE EXISTING POPULATIONS OF PURITAN TIGER BEETLE (CICINDELA PUNCTIMA).
4. WORK AREA IS IN CHESAPEAKE CRITICAL AREA. CONTRACTOR TO PRESERVE AND RELOCATE EXISTING VEGETATION WHERE POSSIBLE. EXISTING VEGETATION MAY BE ACCOMMODATED WITH FIELD-MODIFICATION OF THE DESIGN UNDER DIRECT SUPERVISION OF THE ON-SITE ENGINEER ONLY.
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DRAFT FINAL-NOT FOR CONSTRUCTION

NO.	DATE	BY	REVISIONS DESCRIPTION

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 21625, EXPIRATION DATE: JULY 1, 2011.

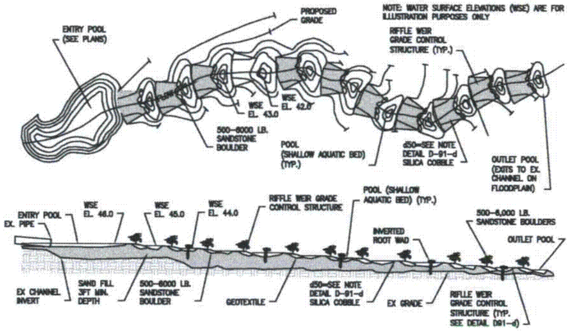
SEAL

UNISTAR NUCLEAR ENERGY
CALVERT CLIFFS NUCLEAR POWER PLANT UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

SE-4 RESTORATION PLAN FIGURE 5
PROPOSED PLANTING AND ENHANCEMENT

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
Lawton Center
15 Lawton Circle
Sparks, Maryland 21152
(410) 771-4950

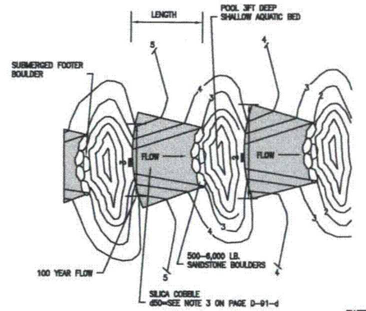
DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 5
SHEET NUMBER	5 OF 9



REGENERATIVE STORMWATER CONVEYANCE TYPICAL PLAN AND PROFILE

1 / FIG 6

NOT TO SCALE. ELEVATIONS STATED HERE ARE ILLUSTRATIVE ONLY. USE ELEVATIONS AS NOTED IN STRUCTURE SCHEDULES.



NOTE: CONTOURS ARE LABELED FOR ILLUSTRATION PURPOSES ONLY.

1. WEIR CONSTRUCTION: WEIR SIZING MUST CONTAIN THE 100–YEAR STORM EVENT. MINIMUM LENGTH AND WIDTH BASED UPON LIMITS OF CONSTRUCTABILITY.

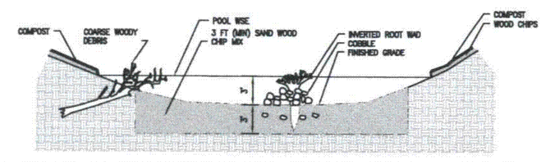
2. SANDSTONE BOULDERS: SANDSTONE BOULDERS SHALL CONTAIN INDIVIDUAL PIECES BETWEEN 2 AND 6 FT IN LENGTH. NOT MORE THEN 10% OF THE TOTAL WEIGHT OF BOULDERS IN EACH STRUCTURE SHALL BE SMALLER THAN 15" IN DIAMETER.

3. SILICA COBBLES: COBBLE SHALL BE COMPOSED OF A WELL-GRADED MIXTURE OF STONE SIZE SO THAT 50% OF THE PIECES, BY WEIGHT, SHALL BE LARGER THAN THE d50 SIZE DETERMINED BY USING CHARTS PREPARED BY THE US DEPARTMENT OF AGRICULTURE, NATURAL RESOURCES CONSERVATION SERVICE. A WELL-GRADED MIXTURE IS DEFINED AS A MIXTURE OF OTHER SIZED STONES TO FILL THE SMALL VOIDS BETWEEN THE STONES. THE DIAMETER OF THE LARGER STONE SIZE IN SUCH A MIXTURE SHALL BE 1.5 TIMES THE d50 SIZE (EG. 8" X 1.5" = 12")

RIFFLE WEIR GRADE CONTROL PLAN VIEW

2 / FIG 6

NOT TO SCALE



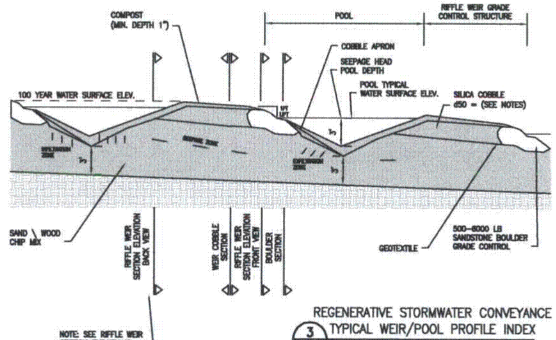
1. INVERTED ROOTWAD SHALL CONSIST OF THE ROOT FAN AND TRUNK OF A TREE WITH A TRUNK DIAMETER AT BREAST HEIGHT (DBH) OF 8" TO 24". ROOT FANS SHALL BE OBLONG TO CIRCULAR IN SHAPE AND HAVE A MINIMUM AREA OF 16 SQUARE FEET. THE ATTACHED TRUNK SHALL BE A MINIMUM OF 5 FEET IN LENGTH. INVERTED ROOTWAD TO BE USED CAN BE SALVAGED FROM THE PROJECT PROVIDED THAT THEY MEET THE ABOVE REQUIREMENTS, ARE WITHIN THE LIMITS OF GRADING, AND ARE CLEARLY FLAGGED FOR CLEARING AND GRUBBING. INVERTED ROOTWADS SHALL BE HARVESTED BY PUSHING OVER TREES, LEAVING AS MUCH OF THE ROOT FAN AND ACCOMPANYING SOD AND SOIL CLUMPS INTACT AS POSSIBLE. CARE SHALL BE TAKEN IN TRANSPORTING ROOTWAD TO THE CONSTRUCTION SITE TO MINIMIZE BREAKAGE OF THE ROOT FAN AND LOSS OF SOD AND ATTACHED SOIL. INVERTED ROOTWADS ARE PLACED IN SHALLOW AQUATIC POOLS AT LOCATIONS SHOWN ON THE PROFILE. TRUNKS WILL BE SHARPENED LIKE A PENCIL AND DRIVEN INTO THE GROUND BY THE EXCAVATOR, THROUGH THE CLAY CORE AND UNDERLYING SUBSTRATE. THE INVERTED ROOTWAD MUST SIT WITH THE ROOT MASS UPWARD IN THE SHALLOW AQUATIC POOLS. PLACEMENT OF THE INVERTED ROOTWAD SHALL BE VERIFIED BY THE ENGINEER TO ENSURE THAT THE ROOTWADS ARE SECURE.

2. COMPOST SHALL HAVE A pH BETWEEN 5.0 AND 7.0. IT SHALL BE STABLE AND NOT REHEAT UPON RESTACKING. COMPOST SHALL HAVE A MOISTURE CONTENT BETWEEN 30 AND 55 PERCENT AND HAVE A PARTICLE SIZE OF 0.5" OR LESS. COMPOST SHALL BE OF THE FOLLOWING TYPE. SOURCE – SEPARATED COMPOST (TYPE B), SOURCE – SEPARATED COMPOST WILL BE APPROVED BY THE MARYLAND DEPARTMENT OF AGRICULTURE (MDA). COMPOST SHALL BE PRODUCED BY AN MDA CERTIFIED COMPOST OPERATOR. COMPOST SHALL HAVE A SOLUABLE SALT CONCENTRATION NOT TO EXCEED 5 DS (mmhos/cm), SOURCE – SEPARATED COMPOST SHALL BE ONE OF THE FOLLOWING TYPES: TREE LEAF COMPOST OR NON-TREE LEAF COMPOST, WHEN COMPOST IS FROM LAWN CLIPPINGS, IT SHALL BE TESTED FOR CONTAMINANTS IN CONFORMANCE WITH COMAR 15.18.04.05.

INVERTED ROOTWAD AND COARSE WOODY DEBRIS

6 / FIG 6

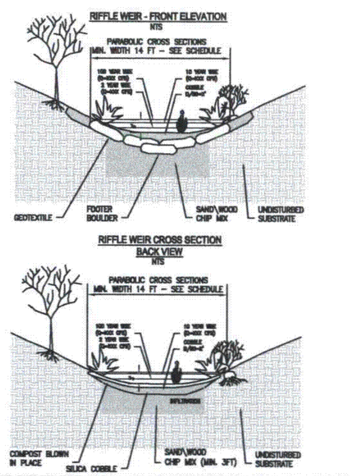
NOT TO SCALE



REGENERATIVE STORMWATER CONVEYANCE TYPICAL WEIR/POOL PROFILE INDEX

3 / FIG 6

NOT TO SCALE

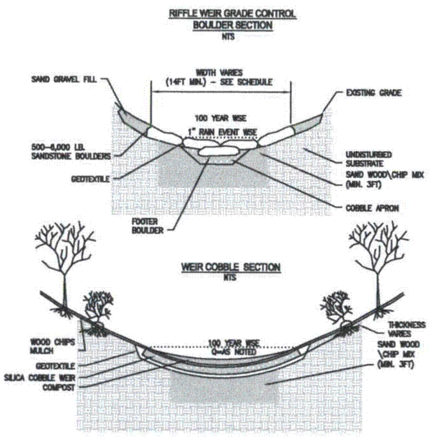


1. SAND AND BANK RUN GRAVEL: SAND SHALL MEET THE REQUIREMENTS OF AASHTO M-6 OR ASTM C-33. BANK-RUN GRAVEL SHALL CONFORM TO AASHTO M-43. SEE MD SWM MANUAL B-3.3. BANK RUN GRAVEL AND SAND TO BE INSTALLED IN ACCORDANCE WITH CONSTRUCTION DRAWINGS. IN ADDITION, ALL REMAINING FILL AREAS ALONG THE EDGES, ENDS OF THE PLACED COBBLE, AND THE UNDERLYING SAND BED SHALL BE BACKFILLED WITH A SOIL MIX COMPRISED OF MASONRY OR CONCRETE SAND, CONTAINING LESS THEN 10% SILT OR CLAY, MIXED AND EVENLY BLENDED WITH 20% WOOD CHIPS OR STUMP GRINDINGS, BY VOLUME. THIS MATERIAL SHALL BE PLACED TO BLEND IN WITH CONTIGUOUS SLOPES, SWALES, EXISTING GROUND, OR USED TO FORM POOL BOTTOMS. BANK RUN GRAVEL AND SAND SHALL BE PLACED BY MECHANICAL OR OTHER METHODS WITH A MINIMUM OF VOIDS. THE BANK RUN GRAVEL AND SAND SHALL BE PLACED TO FORM A NEAT AND UNIFORM AREA. NO MORTAR IS PERMITTED.

RIFFLE WEIR FRONT AND BACK SECTION ELEVATIONS

4 / FIG 6

NOT TO SCALE

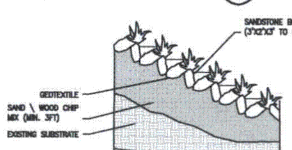


1. WOOD CHIPS AND SHREDDED MULCH SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
2. GEOTEXTILE (ASTM D-4833 OR ASTM D-463) IS PLACED OVER THE PREPARED SURFACE OF THE EXCAVATION \ FILL. SECURING PINS ARE USED TO ANCHOR THE FABRIC IN PLACE. WHERE FABRIC OVERLAPS ARE NECESSARY, THE MINIMUM OVERLAP SHALL BE AT LEAST 12 INCHES WITH THE UPSTREAM GEOTEXTILE PLACED OVER THE DOWNSTREAM PIECE. GEOTEXTILE FABRIC UNDER THE COBBLE WEIRS IS NOT REQUIRED. BUT GEOTEXTILE IS REQUIRED UNDER THE SANDSTONE BOULDERS. IF GEOTEXTILE IS PUNCTURED THE BOULDERS SHALL BE FULL REMOVED FOR AT LEAST THREE FEET OUTSIDE THE LIMITS OF THE FABRIC PUNCTURE AND A NEW GEOTEXTILE FABRIC OVERLAP SHALL BE SECURELY FASTENED OVER THE PUNCTURE WITH SECURING PINS.

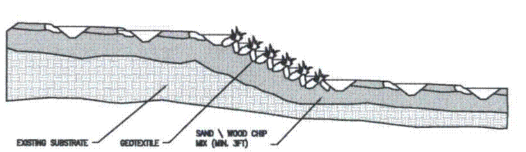
RIFFLE WEIR BOULDER AND COBBLE TYPICAL SECTIONS

5 / FIG 6

NOT TO SCALE



MINIMUM STANDARD FOR USE ON NEW PROJECTS REQUIRES 3 POOLS PRECEDING CASCADE AND 3 POOLS FOLLOWING CASCADE. MAXIMUM OF 5 FT TOTAL HEIGHT OF CASCADE WITH MAXIMUM SLOPE OF 2:1. OTHERWISE, FOLLOW ALL OTHER CRITERIA FOR REGENERATIVE STORMWATER CONVEYANCE.



TYPICAL CASCADE PROFILE

7 / FIG 6

NOT TO SCALE

DRAFT FINAL-NOT FOR CONSTRUCTION

REVISIONS | NO. | DATE | BY | DESCRIPTION

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 13452, EXPIRATION DATE: JULY 5, 2011.

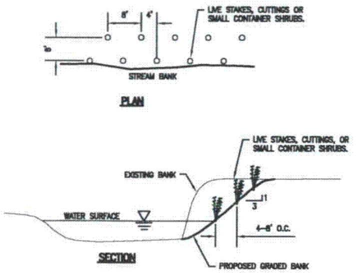
SEAL

UNISTAR NUCLEAR ENERGY
CALVERT CLIFFS NUCLEAR POWER PLANT
UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

SE-4 DETAILS FIGURE 6

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
Loveton Center
15 Loveton Circle
Sparks, Maryland 21152
(410) 771-4950

DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 6
SHEET NUMBER	6 OF 9



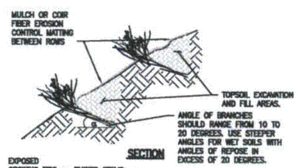
8 / FIG 7 RIPARIAN PLANTING DETAIL FOR GRADED STREAM BANK
NOT TO SCALE

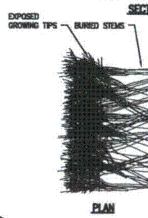
PLANTING NOTES:

THIS PROJECT WILL UTILIZE SEVERAL BIOENGINEERING TECHNIQUES WHICH WILL INVOLVE:

- ROOTED WILLOW CUTTINGS
- UNROOTED WILLOW CUTTINGS
- WILLOW LIVE STAKES

CONTAINER 12-18" DOGWOOGS 4-8' O.C. AND VARIOUS RIPARIAN TREE PLANTINGS USING 12-24" CONTAINER TREES 4-8' O.C.

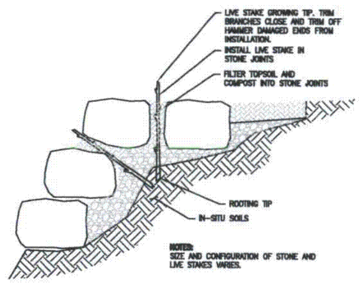




NOTES:
LIVE BRANCHES SHOULD HAVE DIAMETERS BETWEEN 0.5 AND 2.5 INCHES. BRANCH CUTTINGS SHOULD BE ARRANGED IN A CRISSCROSS FASHION IN 4-6 INCH THICK LAYTERS WITH THE GROWING TIPS ORIENTED TOWARDS THE SLOPE FACE. A MAXIMUM OF 25% OF THE BRANCH LENGTH SHALL BE EXPOSED ABOVE THE FINISHED GRADE.

INSTALLATION SHOULD OCCUR DURING LOW FLOW CONDITIONS AND WHEN THE SOIL IS MOIST BUT NOT SATURATED, PROCEEDING FROM LOWER ELEVATIONS AND UP TO TOP OF BANK.

9 / FIG 7 TYPICAL BRANCH LAYERING DETAIL
NOT TO SCALE

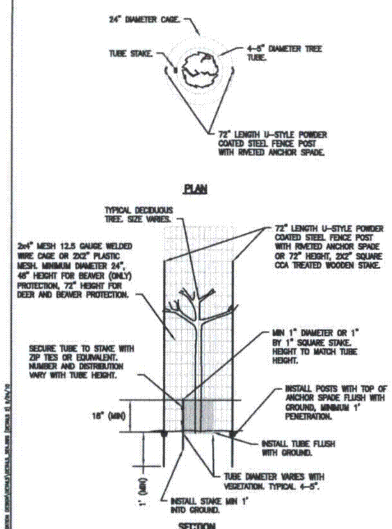


NOTES:
SIZE AND CONFIGURATION OF STONE AND LIVE STAKES VARIES.

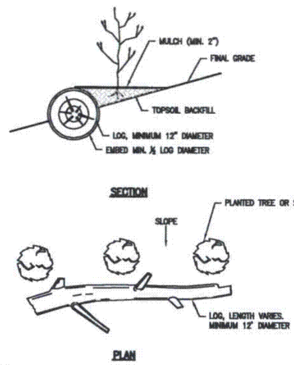
10 / FIG 7 JOINT PLANTING DETAIL
NOT TO SCALE

NOTES:
LOCATION, TYPE, DEPTHS AND CONSTRUCTION SPECIFICATIONS OF FILL, DRAINS AND WALLS VARY. SEE PLANS AND SPECIFICATIONS.

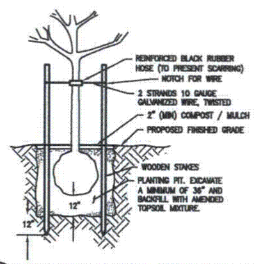
11 / FIG 7 UPLAND TREE PRESERVATION DETAIL
NOT TO SCALE



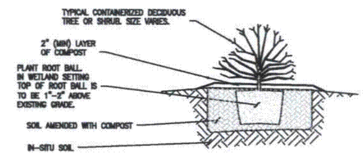
12 / FIG 7 MESH AND TUBE COMBINATION TREE PROTECTION DETAIL
NOT TO SCALE



13 / FIG 7 LOG PLANTING TERRACE DETAIL
NOT TO SCALE



14 / FIG 7 BALLED TREE PLANTING AND STAKING DETAIL
NOT TO SCALE



NOTES:
SHRUB PIT CONFORMS WITH DEPTHS AND WIDTHS IN SPECIFICATIONS.

PRUNE SHRUBS ONLY AFTER INSTALLED AND AFTER THE PLANT HAS BEEN SUFFICIENTLY WATERED.

MULCH DIAMETER OF PLANTING HOLE, MINIMUM 2" DEPTH, WITH COMPOST.

15 / FIG 7 CONTAINER STOCK PLANTING DETAIL
NOT TO SCALE

NOTE: SOME OF THE ABOVE DETAILS MAY NOT PERTAIN TO THE SE-4 STREAM MITIGATION REACH.

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REVISIONS			
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UNIT 3 PHASE II MITIGATION PLAN
LUSBY, MARYLAND

SE-4 DETAILS FIGURE 7

EA ENGINEERING, SCIENCE, AND TECHNOLOGY
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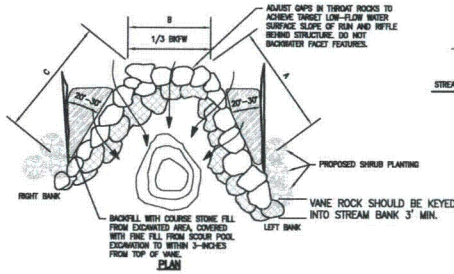
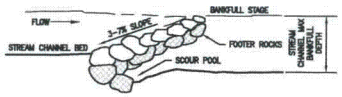
15 Loveton Circle
Sparks, Maryland 21152
(410) 771-4950

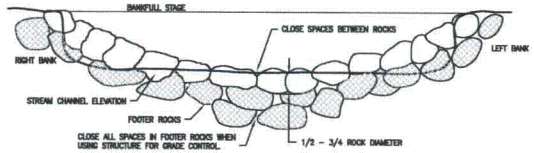
DATE	SEPTEMBER 2010
DESIGNED BY	JM
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 7
SHEET NUMBER	7 OF 9



PLAN

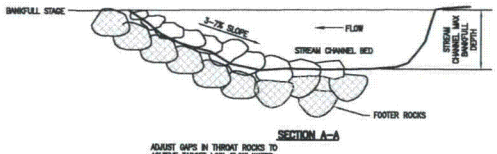


PROFILE

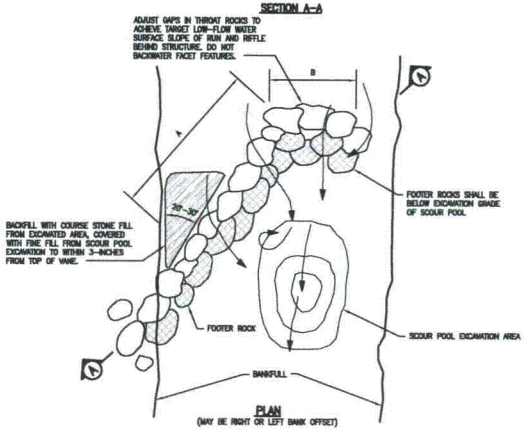


SECTION

16 FIG 8 CROSS ROCK VANE DETAIL
NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.

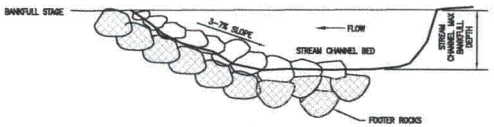


SECTION A-A

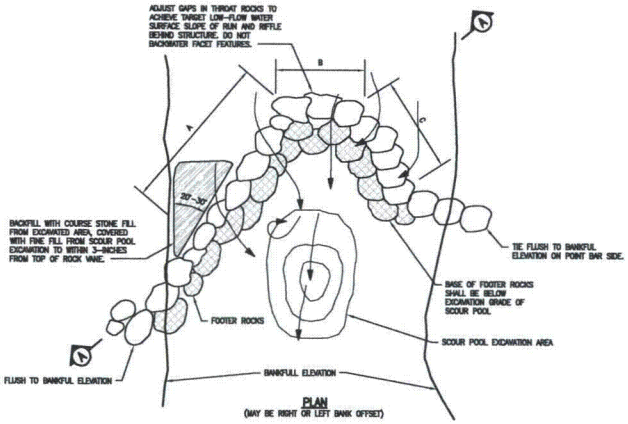


PLAN
(MAY BE RIGHT OR LEFT BANK OFFSET)

17 FIG 8 J HOOK DETAIL (JH)
NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.

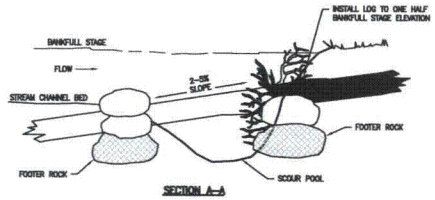


SECTION A-A



PLAN
(MAY BE RIGHT OR LEFT BANK OFFSET)

18 FIG 8 J HOOK VANE DETAIL (JHV)
NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.



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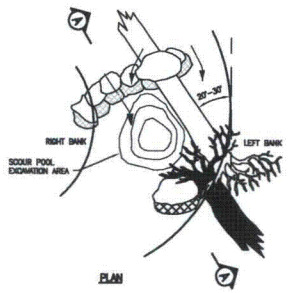
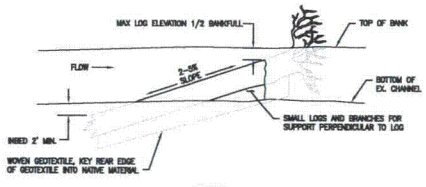
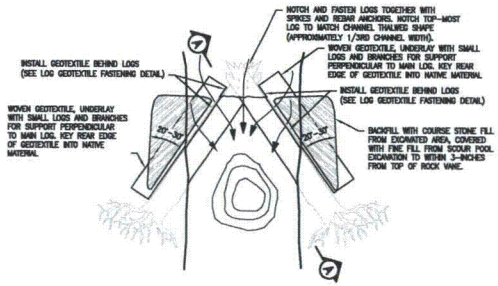


PLAN

19 FIG 8 ROOT WAD / LOG VANE DETAIL
NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.



SECTION A-A



PLAN

20 FIG 8 LOG CROSS VANE DETAIL
NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.

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LUSBY, MARYLAND

SE-4 DETAILS FIGURE 8

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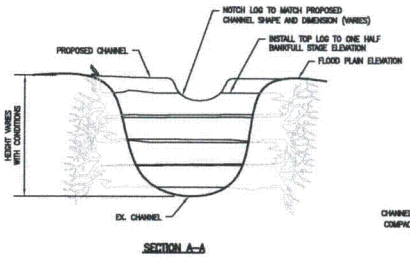
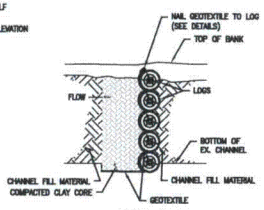
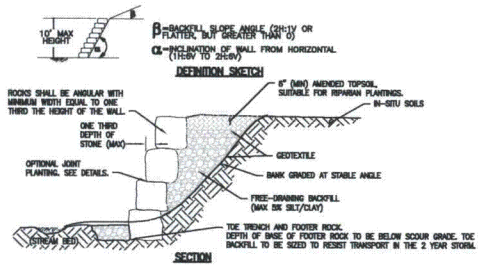
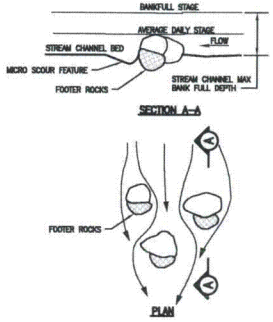
DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14421.03
DRAWING NUMBER	FIGURE 8
SHEET NUMBER	8 OF 8

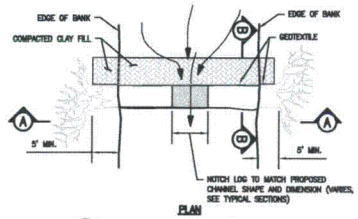




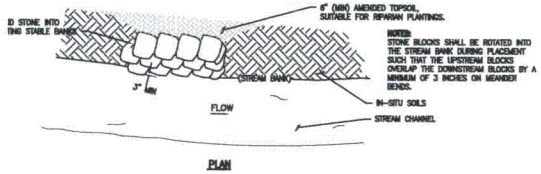




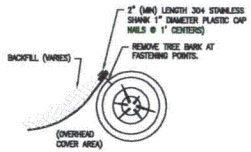
23 RANDOM BOULDER PLACEMENT
FIG 9 NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.



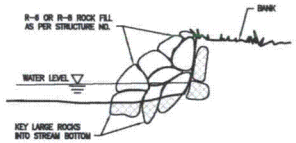
21 LOG CHANNEL CUTOFF STRUCTURE
FIG 9 NOT TO SCALE



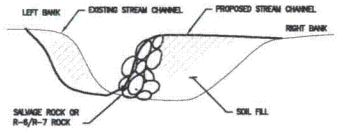
22 IMBRICATED RIPRAP DETAIL
FIG 9 NOT TO SCALE



24 LOG GEOTEXTILE FASTENING DETAIL
FIG 9 NOT TO SCALE



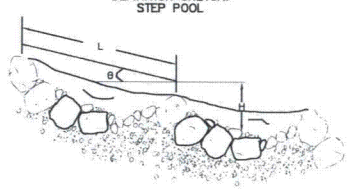
25 ROCK TOE PROTECTION/ROCKFILL DETAIL
FIG 9 NOT TO SCALE



26 SOIL FILL ROCK STABILIZATION TYPICAL DETAIL
FIG 9 NOT TO SCALE

DETAIL 3.9(a): STEP POOLS
Adapted From Abrahams et al. (1995)

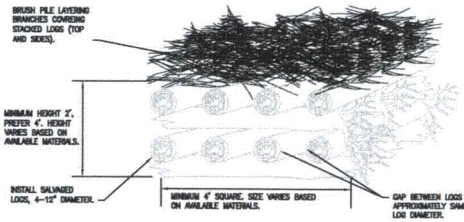
DEFINITION SKETCH: STEP POOL



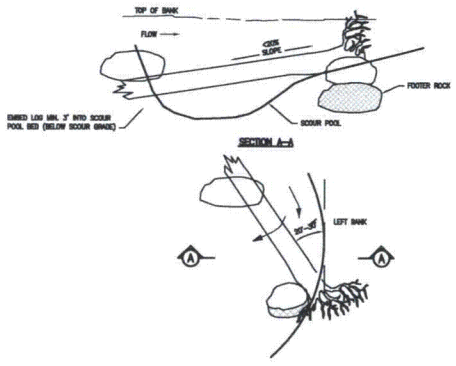
Note: L is measured parallel to the bed slope (tan)
H is measured perpendicular to the horizontal

27 MARYLAND STANDARD STEP POOLS DETAIL
FIG 9 NOT TO SCALE

REVISED NOVEMBER 2000
PAGE 3.8 - 3



28 BRUSH PILE HABITAT STRUCTURE DETAIL
FIG 9 NOT TO SCALE



29 LOG IN BANK DETAIL
FIG 9 NOT TO SCALE
MUST BE FIELD-FIT. CONFIGURATION AND NUMBER MAY VARY.

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SE-4 DETAILS FIGURE 9

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DRAWN BY	JM/CS
CHECKED BY	GT/LB
PROJECT MANAGER	RP
PROJECT NUMBER	14621.03
DRAWING NUMBER	FIGURE 9
SHEET NUMBER	9 OF 9

APPENDIX C:

PHOTO LOG

PHOTO 1: Upper pond, SE-4 reach

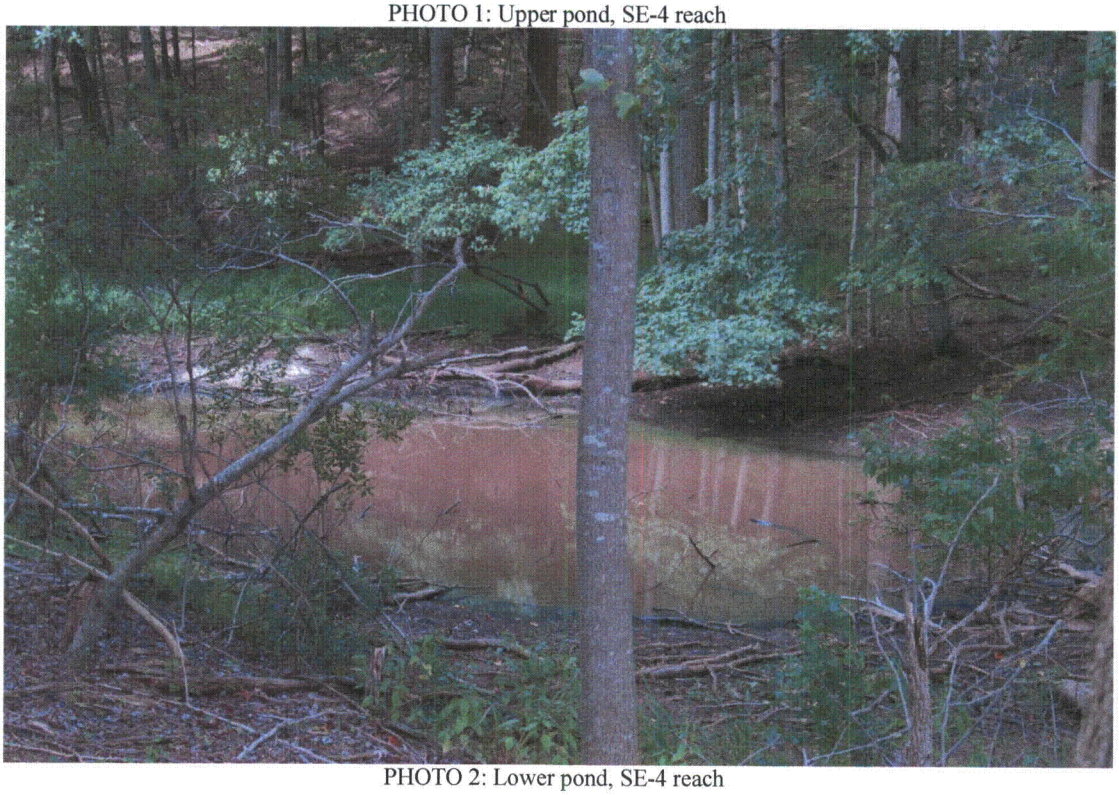

PHOTO 2: Lower pond, SE-4 reach

PHOTO 3: Outfall of SE-4 to the Chesapeake Bay

PHOTO 4: Southern side of SE-4 outfall (extensive Phragmites on slopes)

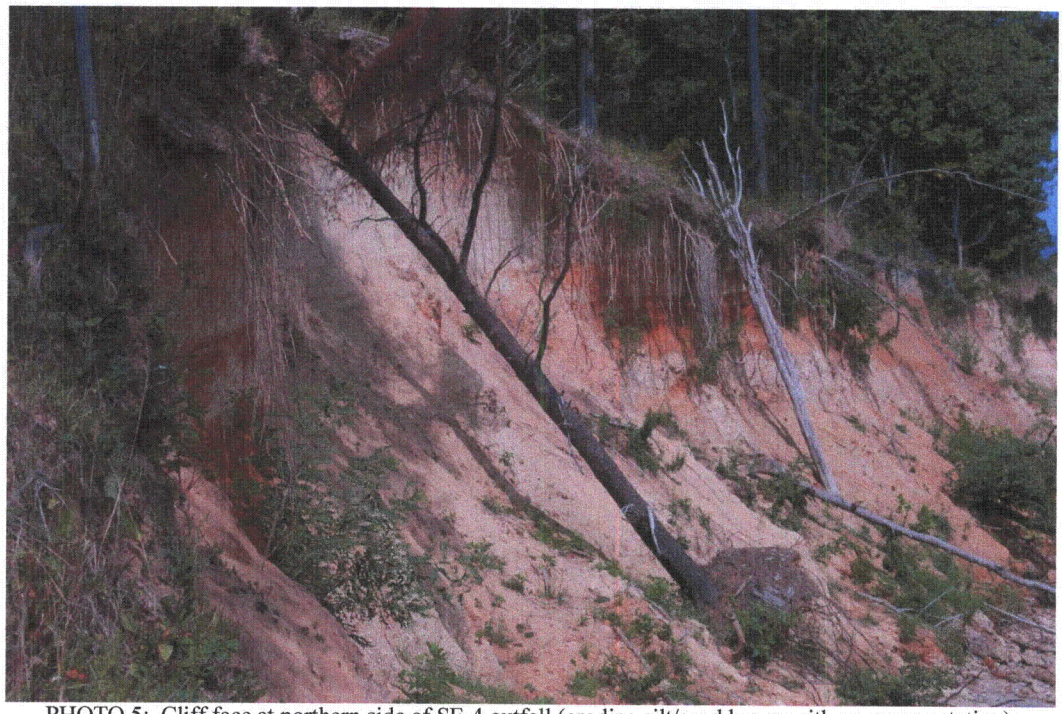

PHOTO 5: Cliff face at northern side of SE-4 outfall (eroding silt/sand layers with sparse vegetation)

PHOTO 6: Existing head-cut location (proposed step pool location)