UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
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APR 15 2011

Robert G. Schaaf, Chief
Environmental Projects Branch 3
Division of Site and Environmental Reviews
Office of New Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Calvert Cliffs - Unit 3

Dear Mr. Schaaf,

This is in response to your letter regarding the proposed approval by the Nuclear Regulatory Commission (NRC) of an application submitted by Calvert Cliffs 3 Nuclear Project, LLC and UniStar Nuclear Operating Services, LLC (collectively referred to as UniStar) for a combined license (COL) for construction and operation of one new nuclear unit at its Calvert Cliffs Nuclear Power Plant (CCNPP) site near Lusby, Maryland. The US Army Corps of Engineers (ACOE) is proposing to approve the necessary permits to be issued under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. The NRC and the ACOE have made the preliminary determination that the proposed action is not likely to adversely affect any species listed as threatened or endangered by NOAA's National Marine Fisheries Service (NMFS) and have requested NMFS concurrence with this determination.

A "not likely to adversely affect" determination can only be made when effects on listed species are expected to be beneficial; or adverse effects are expected to be discountable and/or insignificant. As explained in the joint U.S. Fish and Wildlife and NMFS Section 7 Handbook, "beneficial effects are contemporaneous positive effects without any adverse effects. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur."

The action to be authorized is the construction and eventual operation of Calvert Cliffs Unit 3, for a period of up to 40 years. NMFS has determined that all effects of the construction and operation of Unit 3 are insignificant and/or discountable; therefore, NMFS concurs with the determination made by ACOE and NRC that the proposed action is not likely to adversely affect any species listed by NMFS. Our analysis supporting this determination is provided below and is based on information provided in the Draft EIS dated April 2010, inclusive of the Biological Assessment (BA) listed as Appendix F, and other information provided by Harriet Nash of your staff through March 15, 2011, and other sources of the best available scientific information.

Additionally, NMFS has reviewed the proposed action for impacts to species proposed for listing and provided technical assistance related to these species (loggerhead sea turtles and Atlantic sturgeon) at the end of this letter.

Description of the Facility and Proposed Action
As noted above, the NRC is reviewing an application for a COL to construct and operate a new nuclear reactor. Currently, there are two operating nuclear reactors on the Calvert Cliffs site, Units 1 and 2. The proposed new reactor, Unit 3, would be located adjacent to existing Units 1 and 2. The site is located along the Chesapeake Bay, approximately 60 miles south of Baltimore. The application under review does not involve Units 1 and 2 and there are no changes proposed to the operating licenses for these units. Unit 3 will be an AREVA NP, Inc. US EPR design pressurized water reactor steam electric system. Unit 3 would require a cooling water intake spate from Units 1 and 2. The proposed circulating water supply system (CWS) would be closed-cycle using a mechanical-draft cooling tower with plume abatement, drawing water and discharging a portion of it to Chesapeake Bay. The COL, if issued, would authorize the operation of Unit 3 for a period of 40 years.

For the proposed Unit 3, a 0.21 acre wedge-shaped pool would be build adjacent to the southern end of the existing forebay shared by Units 1 and 2. Water would enter the wedge-shaped pool from the Unit 1 and 2 forebay. Two safety-related 60-inch diameter intake pipes would extend from the wedge shaped pool 550 feet to a forebay. The ends of the pipes would be fitted with trash racks, consisting of metal bars with 3.5" spacing. The circulating water system (CWS) and safety-related ultimate heat sink (UHS) intake structures would have trash racks (bars 3.5" apart) and traveling screens, The traveling screens would be metallic or plastic mesh sized at 0.079 to 0.118 inch square (2-3mm). The CWS intake would have individual pump bays housing makeup pumps and a wash system to provide a spray to remove any biological material from the screens and transfer them to the fish-return system. The fish return outfall would consist of an 18-inch diameter pipe.

Construction of Unit 3 will involve the following: dredging and modification of the existing barge slip, including a sheet pile wall and a stone apron on the Chesapeake Bay shoreline; installation of the cooling water intake system including new sheet pile, armor removal, armor installation, and dredging; and, installation of the cooling water discharge system.

To construct the new Unit 3 intake, a sheet pile wall extending 180 linear feet from the existing shoreline to the existing baffle wall and extending approximately 90- feet channelward of the shoreline will be installed. Additionally approximately 75 linear feet of stone armor protection will be placed approximately 205 feet channelward of the sheet pile wall. An area surrounded by the sheet piling will be dredged to create an approximately 30-foot wide by 30-foot long by 25-foot deep area, resulting in the removal of approximately 900 cubic yards of sand and gravel to be disposed of at an upland location. After dredging, two 60-inch intake pipes with trash racks (3.5 inch spacing) at the pipe openings will be installed on the bottom. After the pipes are laid, approximately 80 linear feet of shoreline armor protection extending 10 feet channelward of the shoreline will be emplaced within the wedged-shaped area. After this work is completed, the temporary sheet pile wall around the 60-inch intake pipes will be removed, allowing the area to flood and submerge the pipes.

A 30-inch high density polyethylene (HDPE) discharge pipe with a three single port diffuser outfall structure approximately 550 linear feet channelward of the approximate MHW shoreline and depressed 4 feet below the bay bottom will be installed using mechanical dredging methods. The discharge point will be elevated 3 feet above the bay bottom. Additionally, a 20-foot by 40-foot riprap scour pad will be installed at the diffuser outfall permanently impacting 800 square feet (0.02 acres). The pipe will be installed with a minimum of 4 feet of cover to protect it from storms and snagging by small boat anchors. Turbidity curtains are anticipated to be used during the work to contain suspended sediments.

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, requiring approximately 50,000 cubic yards of mechanical dredging. All dredging will occur behind a turbidity curtain.

A new sheet pile wall will be installed along the shore line in front of the existing bulkhead. The bulkhead will consist of a new sheet pile wall driven immediately in front of the existing remaining bulkhead. This bulkhead will be approximately 90 feet in length starting from the barge slip extending south to an existing outfall culvert. Near shore maintenance dredging will require removal of silt/sediment which has mounded up over the past 30 years and will include restoration of an existing culvert outfall. The restoration activities in this area will include the emplacement of a 40-foot by 40-foot by 2-foot deep riprap apron extending approximately 40 feet channelward of the approximate MHW shoreline directly in front the existing outfall, allowing the discharge to flow directly in the bay as originally designed. The existing water depths range from approximately 0.00 feet to -16.0 mean low water within the proposed work area.

A fish return system will be provided as a part of the intake design. To construct the proposed fish return outfall, an 18-inch diameter HDPE pipe will be installed in a mechanically excavated trench. The pipe will be installed 4.0 feet below the bay bottom and will emerge from the bay bottom 40 feet channelward of the approximate MHW shoreline. The outfall location will be protected with a 10-foot by 10-foot riprap apron extending approximately 48 feet channelward of the approximate MHW shoreline. To install the pipe, approximately 40 linear feet of the existing shoreline revetment will be removed, and approximately 500 cubic yards of material will be dredged within the work area. The dredged material will be returned to the trench after the pipe is placed, and the existing shoreline revetment will be restored to its original design after pipe installation. All work will occur behind turbidity curtains.

NMFS Listed Species in the Action Area

The proposed project is located along the Chesapeake Bay, near Lusby, Maryland. The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50CFR§402.02). The majority of the work associated with this action will occur on land (e.g., site work for construction of the nuclear reactor); however, some work will occur in the Chesapeake Bay where NMFS listed species occur. The effects analysis presented below will be limited to work occurring in the Chesapeake Bay, where the action area overlaps with the occurrence of shortnose sturgeon and sea turtles, given that the rest of the construction and operations of the unit will have no effect on species listed under NMFS jurisdiction. For this action, the action area includes the area within the Chesapeake Bay where dredging, pile driving, and armoring will occur (i.e., the project footprint) as well as the underwater area where effects of pile installation and dredging (i.e., increase in suspended sediment, underwater noise) and the effects of discharges will be experienced.

Through March 2008, the incidental capture of 73 individual shortnose sturgeon in Maryland waters of the Chesapeake Bay had been reported via the Fish and Wildlife Service's Atlantic Sturgeon reward program. Two fish were recaptured within one to two weeks of their initial capture date (February 1999 in the mainstem of the Bay and then in the Sassafras River and May/June 2000 in the mainstem of the Bay). All of these fish were captured alive in either commercial or recreational fisheries. No directed studies targeting shortnose sturgeon have been conducted in the Chesapeake Bay outside of the Potomac River and nearly all of the data on shortnose sturgeon in the Chesapeake Bay system is a result of reporting incidental to the USFWS Atlantic sturgeon reward program. As such, the captures are dependent on the timing and distribution of fisheries gear which makes it difficult to use the data to draw conclusions regarding the distribution of the species in the Chesapeake Bay. As shortnose sturgeon use similar habitats throughout their range, it is possible to make some conclusions regarding the likelihood of shortnose sturgeon to occur in a particular location. Shortnose sturgeon early life stages (eggs and larvae) and juveniles are relatively intolerant to salinity and their distribution in the Chesapeake Bay and its tidal tributaries is likely limited to the freshwater reaches of rivers where shortnose sturgeon spawn. Based on the best available information (Kynard 2010), spawning in the Chesapeake Bay may be limited to the Potomac River. Shortnose sturgeon adults are typically found in the deepest areas (i.e., greater than 3 meters) with suitable dissolved oxygen (i.e., greater than 5 parts per million); often this type of habitat occurs in deepwater navigation channels. While foraging, shortnose sturgeon can also be found in shallower water over mudflats of shellfish beds. During the summer while seeking out thermal refugia, shortnose sturgeon are known to occur in deep holes. Overwintering is likely to occur only in rivers, and is not thought to occur in the mainstem Bay. Based on the best available information, including capture data reported through the FWS reward program, shortnose sturgeon adults are likely to be well distributed throughout the Maryland waters of the mainstem Chesapeake Bay wherever suitable habitat is present. However, as none of the habitat in the action area consists of deep channels, vegetated mudflats, or shellfish beds, shortnose sturgeon presence in the action area is likely to be sporadic and consist only of occasional transients. Shortnose sturgeon use of the action area is likely to be further limited by the low dissolved oxygen conditions which in the DEIS are described as well below the 5mg/l DO that is well tolerated by shortnose sturgeon.

Sea Turtles

Several species of sea turtles are known to be present in the Chesapeake Bay. Leatherback sea turtles (*Dermochelys coriacea*) are present off the Maryland coast but are predominantly pelagic. Loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green sea turtles (*Chelonia mydas*) are present in the Chesapeake Bay area mainly during late spring, summer and early fall when water temperatures are relatively warm. Sea turtles are expected to be present in the Chesapeake Bay between April and November. In Maryland waters of the Chesapeake Bay, sea turtles are most often documented in the waters below the Bay's confluence with the Potomac River; however, they also occur in the mid and upper Bay and could be present in the action area during the warmer months if suitable conditions for foraging were present; however, the nearshore location and relatively shallow depths (i.e., less than 16 feet) of the action area make the action area inconsistent with preferred sea turtle habitats (i.e., depths of 16-49 feet while foraging). Based on the best available information regarding the habitat present in the action area and the known occurrence of sea turtles in the Bay, individual sea turtles are only occasionally likely to be present in the action area.

Effects of the Action

Construction of Unit 3

As noted above, the majority of construction activities associated with the building of Unit 3 will take place on land. As species listed under NMFS jurisdiction are strictly aquatic while in the action area[1], this consultation will focus on the effects of activities that either occur in the water or will affect conditions in the water where listed species occur. Three primary construction techniques will be used (dredging and pipeline trenching, pile driving, and rock armoring) and the analysis below is organized based on construction technique.

Dredging and Pipeline Trenching

Dredging of the bottom will be done using a shore-based or barge-mounted clamshell dredge to remove large rocks and soft sediment. As detailed above, dredging will be needed to re-establish the channel to the south side of the existing Units 1 and 2 barge dock and to create the trench for the cooling water discharge and the fish-return outfall pipelines. All dredging will occur behind turbidity curtains.

Most mobile organisms, including fish and sea turtles, are able to avoid mechanical dredge buckets. The slow movement of the dredge bucket through the water column and the relatively small area of bottom impacted by each dip of the bucket makes the likelihood of an interaction between a dredge bucket and an individual animal low. No interactions between mechanical dredges and sea turtles have ever been recorded, likely because sea turtles are able to avoid the slow moving dredge bucket. There are two reports of shortnose sturgeon being captured in dredge buckets, with one interaction being lethal (Dickerson 2006, ACOE 2009). However, hundreds of mechanical dredge operations occur each year in areas where shortnose sturgeon are known to occur and interactions are extremely rare. The likelihood of an interaction seems to be correlated to areas where there are large numbers of shortnose sturgeon present. Shortnose sturgeon may also be more vulnerable to interactions with a dredge while in a less alert state, such as when resting or while overwintering. Additionally, as both shortnose sturgeon captures occurred in the same location (Bath, Maine in the Kennebec River) at the same time of year, it is unknown if there is something unique about conditions at that site that make dredging interactions more likely.

1 Sea turtles nest on land; however, no sea turtle nesting activity occurs in the action area.

As explained above, due to the lack of deep water habitat, vegetated mudflats, or shellfish beds in the action area, use of the area to be dredged by shortnose sturgeon is likely to be sporadic and limited to occasional transients. All dredging will take place behind a turbidity curtain which will prevent shortnose sturgeon from accessing the area where dredging will take place. Therefore, as sturgeon will be excluded from the area to be dredged, no interactions between the dredge equipment and shortnose sturgeon are likely to occur. Similarly, as sea turtles will also be excluded from the area to be dredged, there is no potential for sea turtles to interact with the dredge equipment.

Pile Driving

Pile driving would be used in three project areas, all involving the installation of sheet-pile walls. The installation process will use a vibratory hammer to install the sheet piling and a conventional pile driving hammer to install the 30 inch soldier piles to be placed at 10-foot intervals to support the sheet piling. In the BA, NRC estimates the noise levels for pile driving considering the method of pile driving, the types of materials and the water depth. The estimated cumulative sound exposure level (SEL2) values for driving the 30 inch steel piles is less than 183 dB. Driving of the steel sheet piles is expected to result in cumulative SEL values ranging from 160 dB to 165 dB. These levels are dependent not only on the pile and hammer characteristics, but also on the geometry and boundaries of the surrounding underwater and benthic environment. As the distance from the source increases, underwater sound levels produced by pile driving are known to dissipate rapidly. Using data from Illingworth and Rodkin, Inc. (2009) underwater noise levels produced from the driving of the 30-inch piles will attenuate approximately 5dB every 10- 20 meters and noise levels from the sheet piles will attenuate 3-5dB every 20 meters. This is based on a conservative literature estimate of attenuation rates for the driving of piles (Illingworth and Rodkin, Inc. 2007, 2009).

Pile driving affects fish through underwater noise and pressure which can cause effects to hearing and air containing organs, such as the swim bladder. Effects to fish can range from temporary avoidance of an area to death due to injury of internal organs. The type and size of pile, type of installation method (i.e., vibratory vs. hammer), type and size of fish (smaller fish are more often impacted), and distance from the sound source (i.e., sound dissipates over distance so noise levels are greater closer to the source) all contribute to the likelihood of effects to an individual fish. The available literature on effects of pile driving on aquatic species is difficult to summarize due to inconsistent methods of measuring underwater sound, the diversity of pile driving methods and receiving substrates, and the differing tolerances of aquatic species to underwater noise. Generally, however, the larger the pile and the closer a fish is to the pile, the greater the likelihood of effects.

Popper *et al.* (2006) have proposed a set of criteria for injury to fish exposed to pile driving. They propose that pile strikes which result in a sound exposure level (SEL) of driving. They propose that pile strikes which result in a sound exposure level (SEL) of 187 dB re 1 μPa as measured 10 meters from the source are expected to produce injuries to fish. These criteria are

2 Sound Exposure Level (SEL) is defined as that level which, lasting for one second, has the same acoustic energy as the transient and is expressed as dB re: 1 $\mu Pa^2 \cdot sec$. SEL values are used in the assessment of underwater noise effects on species of fish

similar to those adopted by NMFS Northwest Regional Office, the US Fish and Wildlife Service, and the Federal Highway Administration, who determined that based on the best available scientific information, that pile driving resulting in an SEL level of 187 dB re: 1 μPa^2 •sec *and* a peak sound pressure level of 206 dB re: 1 μPa_{peak} in any single strike has no potential to cause injury or mortality to fish weighing more than 2 grams. All shortnose sturgeon likely to occur in the action area will weigh considerably more than 2 grams.

As different fish species demonstrate differing sensitivities to sound levels and there is little information on the effects of underwater noise on shortnose sturgeon, it is difficult to determine whether this criterion is appropriate for shortnose sturgeon. The NMFS Northwest Region criteria noted above, considered effects to green sturgeon which are biologically similar to shortnose sturgeon. Thus, it is reasonable to consider that acoustic thresholds designed to be protective of green sturgeon would also be protective of shortnose sturgeon.

While no studies have been conducted on the effects of pile driving on shortnose sturgeon, two studies have been conducted on the effects of blasting on this species. Both activities produce sound waves that would act similarly in the water column, making effects comparable. Moser (1999) studied the effects of rock blasting in Wilmington Harbor on caged hatchery reared shortnose sturgeon. A study done in the Cooper River, South Carolina, by Collins and Post (2001) tested the use of blasting caps to possibly repel shortnose sturgeon from a blasting site. These studies indicate that mortality of shortnose sturgeon only occurred when recorded sound levels were 234 dB. At sound levels between 196-229 dB, some shortnose sturgeon were temporarily stunned. These studies suggest that, consistent with the recommendations by Popper *et al.* 2006, exposure of shortnose sturgeon to sound levels below 187dB is unlikely to result in effects to this species. Sound levels resulting from the proposed action (183 dB SEL at the source for 30-inch piles and 160-165 dB SEL at the source for sheet piles) are below the range that could negatively affect shortnose sturgeon. Based on this information, NMFS is able to conclude that the effects of pile driving on shortnose sturgeon are insignificant and discountable.

The hearing capabilities of sea turtles are poorly known and there is little available information on the effects of noise on sea turtles. Some studies have demonstrated that sea turtles have fairly limited capacity to detect sound, although all results are based on a limited number of individuals and must be interpreted cautiously. Ridgway et al. (1969) found that one green turtle with a region of best sensitivity around 400 Hz had a hearing threshold of about 126 dB in water. Streeter (in press) found similar results in a captive green sea turtle, which demonstrated a hearing threshold of approximately 125 dB at 400 Hz, but better sensitivity at 200 Hz (110-115 dB threshold). McCauley *et al.* (2000) noted that dB levels of 166 dB re 1 µPa were required before any behavioral reaction (e.g., increased swimming speed) was observed. Based on this and the best available information, any underwater noise below 166 dB is unlikely to cause any physiological or behavioral effects to sea turtles.

As noted above, sound levels may be as high as 183 dB_{SEL} at the source when installing 30-inch diameter piles. However, based on the attenuation rates, noise levels during the installation of the 30-inch piles will be lower than 166 dB at a distance beyond approximately 70 meters from the pile being driven. If a sea turtle was within 70 meters of the 30-inch pile being driven, this sea turtle is likely to exhibit avoidance behavior and leave the area where noise levels are greater than 166dB. As all pile driving will occur behind turbidity curtains, sea turtles will be excluded from the immediate area surrounding the pile driving; however, the area within the turbidity curtain will not contain the entire esonified area. However, as the area outside of the turbidity curtain where noise levels could be higher than 166 dB is extremely small (less than 50 meters), any avoidance behavior would not result in any disruption of essential behaviors such as foraging or migrating, which are expected to be able to be completed without a detectable delay. As such, any effect of exposure to sound associated with the installation of the 30-inch piles will be insignificant. Noise associated with the installation of the sheet piles (16-165 dB SEL) is below the level that would cause any effects to sea turtles. Based on the analysis presented here, the acoustic effects of pile driving on sea turtles are insignificant and discountable.

Water Quality Effects of Dredging and Pile Driving

Turbidity levels associated mechanical dredging activities produce sediment plumes typically ranging from 26.0-350.0 mg/L (ACOE 2007, Anchor Environmental 2003). Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). The studies reviewed by Burton demonstrated lethal effects to fish at concentrations of 580.0 mg/L to 700,000.0 mg/L depending on species. Sublethal effects have been observed at substantially lower turbidity levels. For example, prey consumption was significantly lower for striped bass larvae tested at concentrations of 200 and 500 mg/L compared to larvae exposed to 0.0 and 75.0 mg/L (Breitburg 1988 in Burton 1993). Studies with striped bass adults showed that pre-spawners did not avoid concentrations of 954.0 to 1,920.0 mg/L to reach spawning sites (Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993). While there have been no directed studies on the effects of TSS on shortnose sturgeon, shortnose sturgeon juveniles and adults are often documented in turbid water and Dadswell (1984) reports that shortnose sturgeon are more active under lowered light conditions, such as those in turbid waters. As such, shortnose sturgeon are assumed to be as least as tolerant to suspended sediment as other estuarine fish such as striped bass.

The TSS levels expected to result from mechanical dredging (26.0-350.0 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (390.0 mg/L (EPA 1986)). The installation/removal of piles within the action area will disturb shoreline sediments and may cause a temporary increase in suspended sediment in the nearshore area. However, little increase in sedimentation or turbidity is expected to result from these construction activities due to the use of a turbidity curtain. If any sediment plume does occur, it is expected to be small and suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity will be short term. Turbidity levels associated with pile installation/removal are expected to be only slightly elevated above background levels (average range of 10.0 – 120.0 mg/L) (ACOE 2007, Anchor Environmental 2003).

TSS is most likely to affect sea turtles if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle prey. As any turbidity plume will be contained within the turbidity curtain, no sea turtles or shortnose sturgeon are likely to be exposed to increased turbidity. As such, any effects to sea turtles resulting from increased turbidity associated with pile driving or dredging will be insignificant and discountable.

Armoring

The benthic substrate near key underwater structures in the project area would be armored by depositing rocks. The largest area to receive rock armor is the area next to the new sheet-pile wall to be installed to create the intake area for Unit 3 (0.11acres). Four overlying layers of rock would be added, ranging from washed gravel on the bottom to large quarry rock (average weight per rock of 2 tons). Smaller areas of armor would also be placed at the end of the fish-return system, the cooling water discharge diffuser, and the nearshore area of the barge dock. An area of less than 0.5 acres would be armored, in total.

As explained above, an area of less than 0.5 acres will be armored with large rocks. Due to the small size of the area, the loss of this benthic habitat is not likely to result in the loss of foraging opportunities or cause any change in essential behaviors. As such, effects to shortnose sturgeon and sea turtles from the loss of benthic habitat associated with the placement of rocks at these nearshore areas will be insignificant.

Operation of the Facility

As noted above, the proposed COL would authorize the operation of Unit 3 for a period of 40 years. The operation of the facility could affect listed species by causing impingement or entrainment of these species or their prey and by affecting water quality. The following analysis considers the effects of the operation of the facility on listed species.

Impingement and Entrainment

The impingement of sea turtles and shortnose sturgeon has been documented at some nuclear power plants on the East Coast. However, at Calvert Cliffs Unit 3 the approach velocities of the intake structures and intake screens are such that shortnose sturgeon and sea turtles are able to readily avoid becoming impinged on the structures. As reported in the BA and DEIS, under the worst case scenario, through-screen flow velocity and intake approach velocities within the forebay would be less than 0.5 feet per second. Shortnose sturgeon adults are able to readily avoid intakes with approach velocities of less than 3.5 feet per second and even the less mobile life stages such as larvae, are able to avoid approach velocities of 0.5 feet per second. As such, any shortnose sturgeon in the vicinity of the intakes are expected to be able to readily swim away from the screens or pipes and avoid impingement. Sea turtles are known to be strong swimmers and are also expected to be able to readily swim away from the screens or pipes and avoid impingement. Spacing between the trash bars is 3.5 inches, while screening is 2-3 mm mesh. Due to the small size of the intakes and screening, the individuals of these species that are likely to be present in the action area are too large to be vulnerable to entrainment. Based on this analysis, the impingement or entrainment of any shortnose sturgeon or sea turtles is extremely unlikely to occur. This conclusion is supported by past monitoring data. NRC has reviewed the impingement and entrainment monitoring data collected for Units 1 and 2, which has occurred since 1975. No shortnose sturgeon have been reported. The only record of a sea turtle at the facility was the collection of 1 previously dead sea turtle (unknown species) in 2001. The volume of water taken in by Units 1 and 2 is significantly larger than Unit 3 (Unit 3 will intake approximately 1.82% of the amount of water taken in by Units 1 and 2) and the intake velocity at these units is higher. Thus, the likelihood of impingement of a sea turtle at Units 1 and 2 would reasonably be expected to be higher than at Unit 3, where intake velocities will be lower and the volume of water removed is significantly smaller. As the level of impingement at Units 1 and 2 is extremely low (1 sea turtle in 35 years) and it is reasonable to expect that the impingement of sea turtles at Unit 3 would be even lower, it is reasonable to conclude that the impingement of a sea turtle at Unit 3 is extremely unlikely to occur.

Impingement and Entrainment - Effects on Prey

Despite the low intake velocities, some aquatic organisms are likely to be impinged or entrained at the Unit 3 intake. Shortnose sturgeon feed on benthic invertebrates. As these species are immobile and do not occur in the upper water column where they could be vulnerable to impingement or entrainment, no potential shortnose sturgeon forage items are likely to be affected by water withdrawal. As such, the effects of water withdrawal on shortnose sturgeon forage is discountable.

Green turtles are herbivorous, feeding primarily on seagrasses while in the Chesapeake Bay. As sea grasses are immobile and rooted in the substrate, sea grasses are not likely to be subject to impingement or entrainment in the cooling water system. As such, effects of water withdrawal on green sea turtle forage will be discountable.

Loggerhead turtles feed on benthic invertebrates such as gastropods, mollusks and crustaceans. Kemp's ridleys are largely cancrivirous (crab eating), with a preference for portunid crabs including blue crabs. Leatherback sea turtles feed exclusively on jellyfish. The DEIS provides information on the likely mortality of aquatic life associated with the cooling water intake at Unit 3. While the DEIS does not provide an estimate of the number of jellyfish likely to be killed as a result of impingement or entrainment at Unit 3, the DEIS includes a calculation of the average annual estimated mortality of fish in at Unit 3 of approximately 6,000 fish/year. NRC reports that the estimated mortality values are extremely low compared to Bay populations of these species. Given that the numbers of fish killed as a result of impingement at Unit 3 is extremely small compared to the population numbers for these species, it is likely that any mortality resulting from Unit 3 is undetectable at a population level. For example, bay anchovy are the most commonly impinged species; however, there are approximately 11.2 billion individual bay anchovies in the Chesapeake Bay each year, making the death of even 6,000 individuals an extremely small percentage of the population (less than 0.000001%).

Blue crabs are a significant prey species for loggerhead and Kemp's ridley sea turtles in the Chesapeake Bay. NRC has estimated the number of blue crab mortalities resulting from impingement or entrainment at the intake to be approximately 62 blue crabs a year. NRC reports that the 2007 commercial blue crab catch, which represents only a portion of the available blue crabs in the Chesapeake Bay, was approximately 22 million individuals. The mortality of 62 blue crabs per year represents an extremely small percentage of the available blue crabs in the Bay.

While the operation of Unit 3 is likely to result in the loss of some potential forage items for sea turtles (fish, jellyfish and crabs), this loss is likely to be undetectable compared to the availability of prey in the action area and in the Chesapeake Bay as a whole. Based on the best available information outlined above, while the operation of Unit 3 may result in a reduction of forage items available for loggerhead, Kemp's ridley and leatherback sea turtles in the action area, this loss is likely to insignificant and discountable.

Discharge of heated effluent

The effluent discharge from Unit 3 would be directly into Chesapeake Bay. Using a CORMIX[3] model, the applicant determined that the thermal discharge from Unit 3 would be small and that waste heat would dissipate quickly because of the small size of the thermal plume. As reported in the DEIS, NRC staff conducted an independent evaluation with the CORMIX model and the maximum discharge volume proposed by UniStar and confirmed this determination. Using the model, the area of bottom touched by waters 2°C above ambient will be limited to about 6 acres. As the thermal plume is limited to the nearshore area, shortnose sturgeon and sea turtles are expected to be able to avoid the plume by swimming around it. Due to the small area affected by the thermal discharge, any avoidance will not result in any disruption or delay in any essential behaviors that these species may be carrying out in the action area, including foraging, migrating or resting.

Based on the limited size of the thermal plume, the rapid dispersion of heat and the ability for sea turtles and shortnose sturgeon to avoid the area of heated water, any effects of the discharge of heated effluent on these species is likely to be insignificant.

Pollutants Discharged from the Facility

Chemicals, such as anti-scaling compounds, corrosion inhibitors and biocides, would be added to the cooling water system and the essential water system. Biofouling in the CWS would be controlled by the limited application of chlorine or bromine. NRC has compared the estimated concentrations of the constituents of the waste stream to the Maryland State aquatic life criteria and found that the expected levels are well below the aquatic life criteria. NRC also reports that bioassay testing completed for effluent from Units 1 and 2, which is chemically similar to effluent expected from Unit 3, has not indicated any toxicity to test organisms.

Water quality criteria are developed by EPA for protection of aquatic life. Both acute (short term exposure) and chronic (long term exposure) water quality criteria are developed by EPA based on toxicity data for plants and animals. Often, both saltwater and freshwater criteria are developed, based on the suite of species likely to occur in the freshwater or saltwater environment. For aquatic life, the national recommended toxics criteria are derived using a methodology published in *Guidelines for Deriving Numeric National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*. Under these guidelines, criteria are developed from data quantifying the sensitivity of species to toxic compounds in controlled chronic and acute toxicity studies. The final recommended criteria are based on multiple species and toxicity tests. The groups of organisms are selected so that the diversity and sensitivities of a

3 CORMIX is a water quality modeling system designed to predict plume geometry and dilution resulting from wastewater discharge from point sources.

broad range of aquatic life are represented in the criteria values. To develop a valid criterion, toxicity data must be available for at least one species in each of eight families of aquatic organisms. The eight taxa required are as follows: (1) salmonid (e.g., trout, salmon); (2) a fish other than a salmonid (e.g., bass, fathead minnow); (3) chordata (e.g., salamander, frog); (4) planktonic crustacean (e.g., daphnia); (5) benthic crustacean (e.g., crayfish); (6) insect (e.g., stonefly, mayfly); (7) rotifer, annelid (worm), or mollusk (e.g., mussel, snail); and, (8) a second insect or mollusk not already represented. Where toxicity data are available for multiple life stages of the same species (e.g., eggs, juveniles, and adults), the procedure requires that the data from the most sensitive life stage be used for that species.

The result is the calculation of acute (criteria maximum concentration (CMC)) and chronic (criterion continuous concentration (CCC)) criteria. CMC is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly (i.e., for no more than one hour) without resulting in an unacceptable effect. The CCC is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. EPA defines "unacceptable acute effects" as effects that are lethal or immobilize an organism during short term exposure to a pollutant and defines "unacceptable chronic effects" as effects that will impair growth, survival, and reproduction of an organism following long term exposure to a pollutant. The CCC and CMC levels are designed to ensure that aquatic species exposed to pollutants in compliance with these levels will not experience any impairment of growth, survival or reproduction.

Data on toxicity as it relates to sea turtles and shortnose sturgeon is extremely limited. In the absence of species specific chronic and acute toxicity data, the EPA aquatic life criteria represent the best available scientific information. Absent species specific data, NMFS believes it is reasonable to consider that the CMC and CCC criteria are applicable to NMFS listed species as these criteria are derived from data using the most sensitive species and life stages for which information is available. As explained above, a suite of species is utilized to develop criteria and these species are intended to be representative of the entire ecosystem, including marine mammals and sea turtles and their prey. These criteria are designed to not only prevent mortality but to prevent all "unacceptable effects", which, as noted above, is defined by EPA to include not only lethal effects but also effects that impair growth, survival and reproduction.

For the Calvert Cliffs facility, the relevant water quality criteria are the Maryland water quality criteria, which must be certified by EPA every three years and are the criteria against which NRC compared the expected levels of pollutants in the effluent. This certification process is designed to ensure that the MD water quality standards are consistent with, or more protective than, the EPA national recommended aquatic life criteria. Based on this reasoning outlined above, for the purposes of this consultation, NMFS considers that pollutants that are discharged with no reasonable potential to cause excursions in water quality standards, will not cause effects that impair growth, survival and reproduction of listed species. Therefore, the effect of the discharge of these pollutants at levels that are less that the relevant water quality standards, which by design are consistent with, or more stringent than, EPA's aquatic life criteria, will be insignificant on NMFS listed species.

ESA Section 7 Conclusions
Based on the analysis that all effects to shortnose sturgeon will be insignificant or discountable, NMFS is able to concur with the determination that the proposed approval of the COL by NRC and the issuance of necessary permits by the ACOE is not likely to adversely affect any listed species under NMFS jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required. Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. Should you have any questions about this correspondence please contact Julie Crocker at (978) 282-8480 or by e-mail (Julie.Crocker@Noaa.gov).

Technical Assistance for Proposed Species
Once a species is proposed for listing, the conference provisions of the ESA apply. As stated at 50 CFR 402.10, "Federal agencies are required to confer with NMFS on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. The conference is designed to assist the Federal agency and any applicant in identifying and resolving potential conflicts at an early stage in the planning process."

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)* are known to occur in the Chesapeake Bay. On October 6, 2010, NMFS published two rules proposing to list four distinct population segments (DPS) of Atlantic sturgeon as endangered (i.e., New York Bight, Chesapeake Bay, Carolina, and South Atlantic) and one DPS as threatened (Gulf of Maine DPS) under the ESA (75 FR 61872; 75 FR 61904). Atlantic sturgeon are well distributed throughout the mainstem Chesapeake Bay and sturgeon from any of the 5 DPSs could be present in the action area.

Under the provisions of 50 CFR §402.10, federal agencies shall confer with NMFS on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. If present in the action area, Atlantic sturgeon would be exposed to effects of the proposed action. However, as none of the habitat in the action area consists of deep channels, vegetated mudflats, or shellfish beds, Atlantic sturgeon presence in the action area is likely to be sporadic and consist only of occasional transients. Atlantic sturgeon use of the action area is likely to be further limited by the low dissolved oxygen conditions which in the DEIS are described as well below the 5mg/l DO that is well tolerated by Atlantic sturgeon. If present in the action area during construction, NMFS anticipates that effects to Atlantic sturgeon would be similar to those described for shortnose sturgeon above. As such, all effects resulting from dredging, pile driving and other in-water construction are expected to be insignificant and discountable.

NMFS has considered the effects of the operation of Unit 3 on Atlantic sturgeon. Like shortnose sturgeon, potential impacts to Atlantic sturgeon are likely limited to impingement or entrainment at the CWS intakes or exposure to pollutants associated with the discharge of effluent (chemicals or heat). Atlantic sturgeon are expected to demonstrate similar swimming abilities as shortnose sturgeon. Thus, they are likely to be able to actively avoid the screens and intakes with intake velocities of no more than 0.5 fps. As reported in the DEIS, no impingement or entrainment of Atlantic sturgeon has been reported at Units 1 or 2. Similar to the analysis for shortnose sturgeon presented above, all effects of the discharges are expected to be insignificant. As all effects of the construction and operation of Unit 3 are likely to be insignificant and discountable and the proposed action is not likely to result in the injury or mortality of any Atlantic sturgeon, the action is not likely to appreciably reduce the survival and recovery of any DPS of Atlantic sturgeon and therefore it is not reasonable to anticipate that this action would be likely to jeopardize the continued existence of any DPS of Atlantic sturgeon. As such, no conference is necessary for Atlantic sturgeon. Should project plans change, NMFS recommends that the NRC and/or the ACOE discuss the potential need for conference with NMFS.

On March 16, 2010, NMFS published a proposed rule to list two distinct population segments (DPS) of loggerhead sea turtles as threatened and seven distinct population segments of loggerhead sea turtles as endangered, including the Northwest Atlantic DPS. This rule, when finalized, would replace the existing listing for loggerhead sea turtles. Currently, the species is listed as threatened range-wide. In the analysis above, NMFS has considered effects to the current global listing of loggerhead sea turtles. Sea turtles in the action area are likely to be from the Northwest Atlantic DPS. As explained above, all effects to loggerhead sea turtles will be insignificant and discountable and the proposed action is not likely to result in the injury or mortality of any loggerhead sea turtles; as this determination was based on the potential effects to individuals, the change in status for these sea turtles (i.e., from threatened to endangered) would not change these determinations. As all effects of the construction and operation of Unit 3 are likely to be insignificant and discountable and the proposed action is not likely to result in the injury or mortality of any loggerhead sea turtles, the action is not likely to appreciably reduce the survival and recovery of any DPS of loggerhead sea turtles, including the Northwest Atlantic DPS and therefore it is not reasonable to anticipate that this action would be likely to jeopardize the continued existence of any DPS of loggerhead sea turtles. As such, no conference is necessary for loggerhead sea turtles. Should project plans change, NMFS recommends that the NRC and/or the ACOE discuss the potential need for conference with NMFS.

Should you have any questions regarding the conclusions reached above as they relate to the need for conference or the need for future consultation should these listings be finalized, please contact Julie Crocker of my staff at the number noted above.

Sincerely,

Patricia A. Kurkul
Regional Administrator

Cc: Nash, NRC
Crocker, Damon-Randall, F/NER3
Nichols, F/NER4

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