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October 14, 2019

Lynn Lankshear
Atlantic Sturgeon Program Coordinator
Protected Resources Division
Greater Atlantic Regional Fisheries Office
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Dear Ms. Lankshear,

Thank you for the opportunity to respond to the claim by SELC that Atlantic sturgeon embryos and larvae will be swept to or toward the Chesterfield CWIS because the intakes are located on the bottom and in the outside of a curve of the James River. Dominion Energy has researched the matter and offers the following analysis for your consideration.

SELC first notes that the station CWIS is located on the outside bend of a curve in the river as part of the introduction to comment C. Chesterfield Power Station Operations (page 10), and indicates that this location results in increased impingement and entrainment effects because "Water flowing downstream is pushed to the outside of this curve, sweeping directly across the structures at CPS,…". SELC goes on to repeat this concern in a number of other places within their comment documents.

Dominion does not have detailed information related to the flow patterns of the river in the immediate vicinity of the Chesterfield Power Station CWIS. However, as a result of numerous environmental studies conducted over many years, Dominion does have general knowledge of river hydraulics, impingement and entrainment effects, and Atlantic Sturgeon biology that provide the basis for the following information.

SELC (2017, page 8) indicates that the Atlantic Sturgeon larvae collected as part of entrainment sampling in 2015 "…were likely free embryos. Without any real swimming ability,[35]…". Dominion concurs. The larvae had not fully absorbed their yolk sac, and fin development was incomplete. As such, they were drifting organisms, similar to passive inorganic particles suspended in the water column or being moved along the bottom of the river. SELC (2017, page 9) also notes that "Research on the dispersal of early life stages of other sturgeon species strongly suggests that Atlantic sturgeon will similarly disperse in deep water near the bottom.[50] Likewise, exhausted, post-spawned adults will drift or weakly swim downstream in the channel near the bottom.[51]". Dominion concurs with this comment in regards to movements of larval sturgeon near the river bottom, and provides specific references that the early life history stages of Atlantic Sturgeon will move downstream from spawning sites along the deeper river channel in the Conservation Plan. However, Dominion is not aware of any studies that have documented the movements of exhausted, post-spawned adults.

As part of Dominion's submittal to the NMFS of September 18, 2019, Dominion has provided information that was not available in the initial ITP application, and therefore was not available to SELC at the time of their comments. The most relevant information concerns the design and improvements to CWIS intake guards that provide the first barrier to debris and large organisms that may approach the CWIS. The intake guards consist of sheet pile or concrete walls located in front of the trash racks of each unit's intake bay. A barred opening in the sheet pile or concrete wall of each intake bay allows James River water to be withdrawn for cooling purposes, and the lowermost edge of the opening is located approximately one meter above the river bottom at all units except for Unit 7. The water withdrawal for Unit 7 occurs at a barred opening near the river bottom.

With redesign and repair of the intake guards, Dominion believes it has eliminated the potential to impinge adult sturgeon. Inspection of the intake guards was conducted following the impingement of four adult Atlantic Sturgeon in October of 2018. It was discovered that significant deterioration of wood timbers that had been installed to bar the openings had occurred, which in turn allowed the impinged sturgeon access to the CWIS. In an effort to prevent any further access by Atlantic Sturgeon exhausted from spawning, Dr. Matthew Balazik was consulted with reference to bar spacing that would prevent the smallest adult male sturgeon from passing through the guards. Dominion made use of Dr. Balazik's recommendation in repairing the intake guards, increased the opening size at select units to reduce intake velocity to less than 2 feet per second (fps), and installed rounded bars that would allow any sturgeon that did lay along the bars to slide off with tidal currents. Intake velocities at the intake guards are less than 1.4 fps, whereas predicted tidal velocities (NOAA 2019) are as shown below:

Event	Average Current Speed (fps)	Maximum Current Speed (fps)
Ebb	1.6	2.6
Flood	1.5	2.8

The predicted tidal velocities do not account for river flow, which would add force and speed to the Ebb currents, but lessen the Flood currents. Given that intake guard through-bar velocities are less than 1.4 fps, sweeping tidal currents should prevent any exhausted sturgeon from being impinged during tidal Ebb, regardless of river stage. During tidal Flood, river stage and discharge will determine how effective the tidal velocities are in providing sweeping flows, with greater effect at higher river stage. Noteworthy is the fact that regardless of river stage, there is an approximately one meter area at the bottom of the barred opening that has zero through velocity in the portion of the water column near bottom where sturgeon are most likely to occur. Braaten et al. (2010) experimentally released larval Pallid Sturgeon (*Scaphirhynchus albus*) into the Missouri River to determine how best to sample larval Pallid Sturgeon in large rivers. More than 98% of the collected larvae were caught in nets fished near bottom.

With regards to entrainment, Dominion is not aware of any principle that would increase the density of passively drifting organisms on the outside bend of a river. It is an accepted hydrologic principal that river velocity is greater along the outside bend of a river. The location of fish protection structures such as downstream bypasses, which function in a manner similar to cooling water intakes, in areas of higher velocity may actually be beneficial to organisms. US DOI (2006), in their guide for designing fish exclusion facilities, notes that, "A major source of juvenile fish loss at and around fish exclusion facilities is predation." DOI goes on to provide the recommendation "…strong steady flow will prevent fish holding because the fish physically cannot sustain position for extended periods…". Balazik (pers. comm.) has noted that predation on young sturgeon by non-native Blue Catfish (*Ictalurus furcatus*) may be an Atlantic Sturgeon restoration issue in the James River. The location of the Chesterfield Power Station CWIS in the outside bend of the James River, an area expected to have above average water velocities, may therefore be beneficial versus other locations that would allow predators to hold near the intake.

For an increase in the entrainment of drifting organisms to occur with a given volume of water withdrawn, a concurrent increase in the density of organisms would need to occur. This potentially could occur by means of the weak swimming ability post-yolk sac and early juvenile fish possess (e.g., Rayford 2014). Braaten et al. (2010) demonstrated this may be the case for larval Pallid Sturgeon in the Missouri River, where they found the lateral distribution of released larvae increased from an inside-bend to outside-bend location. Braaten et al. (2010) further found the lengths of larvae collected at the mid-channel location were slightly smaller than larvae sampled at the inside- and outside-bend locations. Larger larvae would be expected to have greater swimming ability, and while their swimming ability may be weak, they may be able to move closer to river banks by swimming perpendicular to the current (Rayford 2014). It would not be expected the larvae collected at Chesterfield Power Station in 2015 would have such ability, given their recently hatched condition. Braaten et al. (2010) conclude that sampling in the river thalweg is the optimal location for collecting Pallid Sturgeon larvae. If such is the case for Atlantic Sturgeon larvae in the James River, this would be an area located in the main channel approximately 100-300 feet out into the river from the CWIS (Attachment 1).

In conclusion, there is information that indicates larval sturgeon may be more abundant in the outside bend of large rivers. Larvae in the outside bend of rivers may also be slightly larger than their cohorts, indicating greater individual growth rates, or older age. If in fact older fish tend to occur in outside bends, it would be an indication the fish had more time to develop, hatched farther upstream, and may possess greater swimming ability. It was evident the two larvae collected at CPS in October 2015 were newly hatched, and therefore had not travelled a long distance after hatching. There is also a good body of information that indicates the majority of larval sturgeon may occur in the river thalweg and near the river bottom. Larval sturgeon in such areas would be expected to derive a level of protection from the location and design of the intake guards, as the main river channel is a distance from the station CWIS, and the intake guard openings are located above the river bottom.

Thanks again for the opportunity to provide our comments. If you have any questions or need additional information, please don't hesitate to contact Bob Graham at (804) 273-2661.

T. N. Effinger

Thomas Effinger
Director, Environmental Services

CH CWIS
Nat Marine Fisheries Letter
2019 Oct 14

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Enclosed
Attachment 1: James River Bathymetry Near CPS CWIS

References

Balazik, M. 2019. Personal communication.

Braaten, P.J., D.B. Fuller, R.D. Lott, M.P. Ruggles and R.J. Holm. 2010. Spatial Distribution of Drifting Pallid Sturgeon Larvae in the Missouri River Inferred from Two Net Designs and Multiple Sampling Locations. North American Journal of Fisheries Management 30(4).

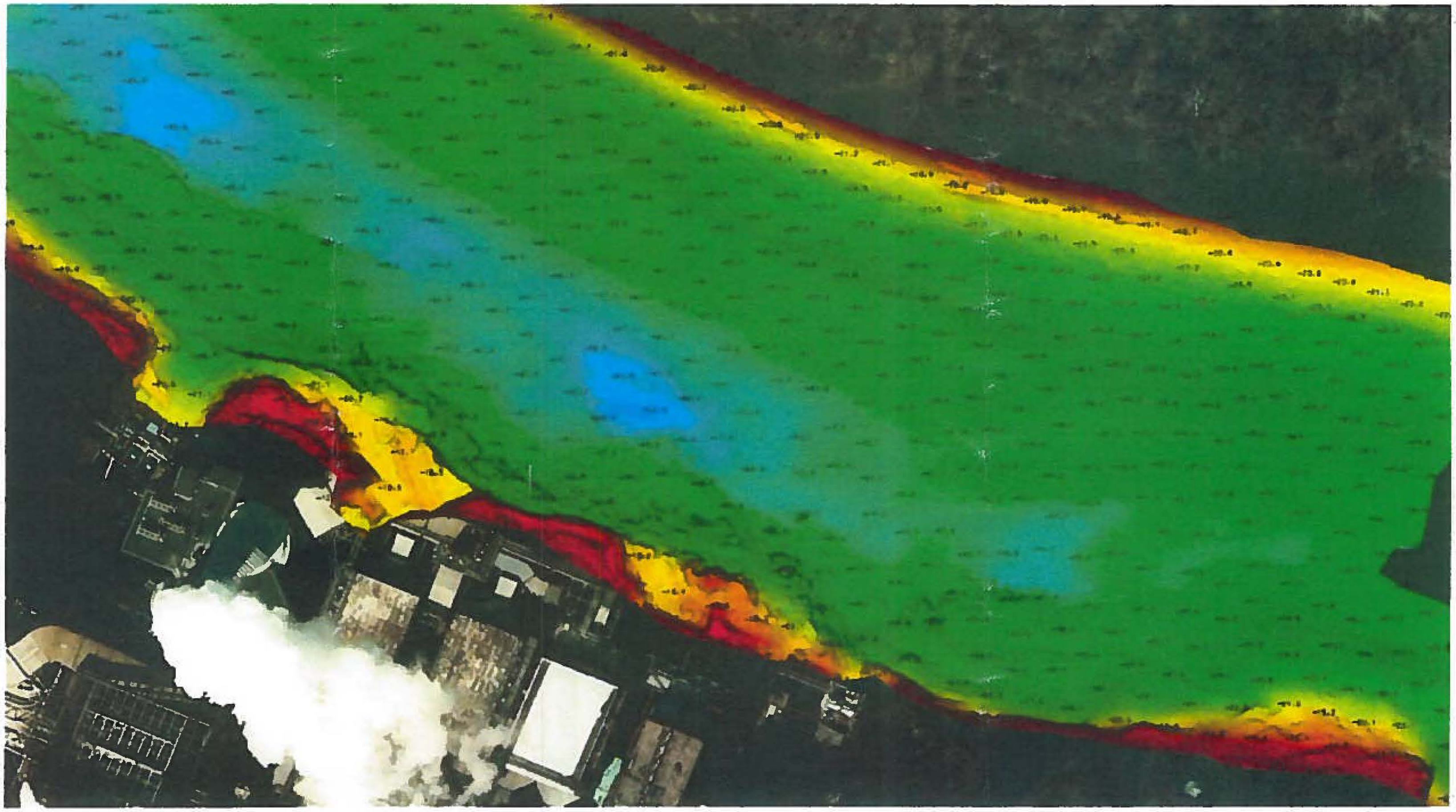
U.S. Department of the Interior. 2006. Water Resources Technical Publication - Fish Protection at Water Diversions, A Guide for Planning and Designing Fish Exclusion Facilities. Bureau of Reclamation, Denver, Colorado.

NOAA. 2019. NOAA Tides & Currents for Dutch Gap (ACT5386), Annual Prediction Tables https://tidesandcurrents.noaa.gov/noaacurrents/Annual?id=ACT5386_1

Rayford, S.V. 2014. Habitat Association of Larval and Juvenile Fishes in a Large Unimpounded River. Masters Thesis, Eastern Illinois University.

SELC. 2017. Email to Ms. Julie Crocker (NMFS) Re: Proposed Incidental Take Permit and Habitat Conservation Plan, and Draft Environmental Assessment, for Virginia Electric and Power Company's Chesterfield Power Station; Docket ID NOAA-NMFS-2017-0051. September 13, 2017.

Attachment 1: James River Bathymetry Near CPS CWIS



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October 16, 2019

Ms. Julie Crocker
Endangered Species Coordinator
Protected Resources Division
Greater Atlantic Regional Fisheries Office
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Re: Virginia Electric and Power Company (Dominion) Chesterfield Power Station, Chesterfield, Virginia; Incidental Take Permit Application; Responses to February 13, 2019 Comments and Revised Incidental Take Estimates

Dear Ms. Crocker,

The information enclosed provides additional details to our submittal of September 18, 2019, regarding the Virginia Electric and Power Company (Dominion) Chesterfield Power Station (CPS) Endangered Species Act (ESA) Section 10(a)(1)(B) permit application and associated conservation plan for incidental take of the Chesapeake Bay Distinct Population Segment (Chesapeake Bay DPS) of Atlantic Sturgeon. We respectfully submit the following clarifications and responses to the comments and questions that were raised in our September 30th conference call, as well as revised sections of Dominion's Incidental Take Permit (ITP) Application, as appropriate. These sections have been attached and supersede the corresponding sections included in prior submittals.

Permit Duration

Dominion concurs with NMFS' recommendation to revise the ITP Application for a five-year duration permit rather than a ten-year permit as originally submitted. The shorter duration may afford the opportunity to include new information, including measures which may be taken by Dominion under the Virginia Pollutant Discharge Elimination System (VPDES) permit requirements that may also minimize the incidental take of Atlantic Sturgeon. Dominion has revised Section 1.3, *Permit Duration*, and 1.4, *Contact Information of the Incidental Take Permit (ITP) Application,* accordingly and attached to this letter for your convenience (Attachment 1, Revised Sections of Incidental Take Permit Application). Because Dominion understands that NMFS intends to issue a 5-year ITP, the take estimates provided herein were calculated based on a five-year period.

Revised Larval Incidental Take Estimate

As NMFS notes, the information available to estimate entrainment and impingement of Atlantic Sturgeon at CPS is limited and changes as new research is conducted and discoveries are made, such as the capture of young-of-year Atlantic Sturgeon downriver of CPS in Fall 2018. Dominion has developed a revised incidental take estimate which accounts for new information that has become available since our application to NMFS in 2017, regarding the James River Atlantic Sturgeon population, fall spawning period and location, and anticipated CPS operations. Dominion has also updated Sections 3.2 of the Conservation Plan (CP) (Attachment 2, Revised Section of Conservation Plan) to reflect this new information in the proposed entrainment monitoring for the ITP. Dominion also provides clarifications in methodology in line with those suggested by the National Oceanic and Atmospheric Administration (NOAA) statistician, Daniel W. Linden, Ph. D., included with your February 2019 letter. The following is an overview of the changes that Dominion has made in the attached revised sections of the ITP application and CP.

Updated Population Estimates – Per Matt Balazik 2019 (pers. comms.) the estimated male population for the fall cohort is approximately 3,707 individuals based on modified Schnabel mark recapture methods. Per Balazik, a 1:1 sex ratio for the fall cohort is reasonable. On average, females return to spawning grounds once every three years, which would result in an estimated annual female spawning population in the James River of 1,250 individuals. Additionally, over 300 Age-0 sturgeon, also known as young-of-year, were collected downriver of CPS in October 2018 by researchers from the Rice Rivers Center of Virginia Commonwealth University (VCU). This collection suggests that Atlantic Sturgeon spawn upriver of CPS in the fall, and move downriver, past CPS, after hatching.

Timing and Location of the Fall Spawn – Based on existing research, which has been further informed by the coordination with local sturgeon researchers, the spawning season of Atlantic Sturgeon in the James River fall cohort is estimated to occur during September-October. A September-October spawning period is based upon telemetry studies conducted in the James River by VCU Rice Rivers Center researchers and is comparable in timing and duration to spawning periods in other similar river systems. Based on telemetry data in the upper Altamaha system in Georgia, adult Atlantic Sturgeon migrated upstream to potential spawning sites in early to mid-October, as water temperatures dropped below 25°C (Ingram and Peterson 2016). Similarly, spawning activity in the Roanoke River was estimated to occur when temperature ranged from 25.3 to 24.3°C (Smith et al. 2015). Telemetry data in the James River indicate the fall spawning population migrate upstream as water temperatures approach 26°C.

Duration of the Fall Spawn – The fall spawning period for the James River is thought to occur during an approximate three-week period typically in September (Balazik 2019 pers. comms.). Once hatched, it is anticipated that it takes approximately three weeks for Atlantic Sturgeon larvae to develop into young-of-year fish and move downstream of the CPS facility (see ITP Application for additional details). Based on this information, it was estimated that Atlantic Sturgeon larvae could be present within the water column in the vicinity of CPS for up to six weeks during September and October. Therefore, Dominion has revised the incidental take estimate to reflect this six-week period.

CPS Operations – After the 2017 ITP Application submittal, two of the six generating units at CPS have been retired and the mode of operation for CPS has transition from base load operation to more frequent cycling of units 5 and 6, while units 7 and 8 remain base loaded. Cycling refers to operating generating units at varying load levels in response to changes in system load requirements. Therefore, actual intake flows are expected to be lower in volume and intermittent in response to operating units 5 and 6 as cycling units, as compared with base load operations as described at the time of the original ITP Application submittal in 2017. In the first year of cycling operations, CPS water withdrawals were approximate 50 percent of design intake flow (DIF) for the September-October period. Future withdrawals are expected to be approximately 60 percent of DIF – with cycling of Units 5 and 6 (50% DIF) and base loading of Units 7 and 8 (100% DIF) assumed for estimating purposes. However, in any given month actual withdrawals, determined by actual generation levels, are difficult to project due to Dominion's participation in a regional transmission interconnection (PJM), which coordinates the movement of wholesale electricity and may demand generation under certain conditions.

Revised Estimate of Larval Entrainment Resulting from CWIS Operation – As noted in the ITP Application and CP, the likelihood of Atlantic Sturgeon entrainment resulting from CPS CWIS operation is expected to be low due to the behavior of early life-stage Atlantic Sturgeon and design elements of the

CPS intake facility that reduce entrainment, such as intake openings raised from the river bottom. Sampling at the CPS has resulted in the collection of only two Atlantic Sturgeon larvae in its history of sampling, which dates back to the 1970s.[1]

Based on entrainment samples collected during the fall (September and October) in 2005 and 2015 at CPS, we estimate less than 0.0015 Atlantic Sturgeon larvae would be entrained per cubic meter (m^3) of water withdrawn through the CPS river water intake. Entrainment estimates are based on a six-week period during September and October when early life-stage Atlantic Sturgeon may be entrainable (see discussion in "Duration of Fall Spawn" above). Using an estimated 60 percent DIF withdrawal and calculated interaction rate, the estimated take for projected intake flows at CPS during six weeks in September-October is 10,949 larvae (estimated range of 10,745 to 11,156) annually. Section 3.2 of the CP has been revised to reflect the anticipated CPS cycling plant operation.

The revised potential incidental take estimates were developed from samples collected in 2005 and 2015 associated with Clean Water Act (CWA) 316(b) sampling that was conducted twice per month for one 24-hour period per sample event. For a species such as Atlantic Sturgeon which spawn over a short period of time – peak spawning is thought to have occurred over just a few days in past seasons (Balazik pers. comms.). Limited early life history information is available for Atlantic Sturgeon, especially with regards to the timing of young-of-year downstream migration. Dominion recognizes the available information may not provide sufficient resolution to infer larval occurrence and annual entrainment, but has attempted to draw on the best information available regarding potential entrainment at CPS, spawning duration in the James River, and larval development and young-of-year outmigration to develop the revised estimates. The limited number of entrainment samples collected during the estimated six-week spawning period, the small volume of water sampled during this period, the rare nature of Atlantic Sturgeon larvae having been collected at CPS, and the atypical river conditions under which the larvae were collected in October 2015 have likely affected the take estimate. Additional sampling to meet our 316(b) requirements will allow Dominion to refine this number and to determine whether any additional takes are probable.

Moreover, though the incidental take of up to 10,949 Atlantic Sturgeon larvae annually may seem large without context, it is important to view those numbers in the context of the fecundity of Atlantic Sturgeon. As noted above, the annual female spawning population in the James River is approximately 1,250 individuals. The reported numbers of eggs an individual female can produce when they spawn ranges from 400,000 to 4 million eggs per spawning season (Boreman 1997, Van Eenennaam et al. 1996, Van Eenennaam and Doroshov 1998, Gross et al. 2002), although Balazik (2012) reported fecundities as high as 8 million eggs per spawning female per year. We would expect a spawning population of 1,250 adult sturgeon to produce an estimate of 41,294,134 larvae in a given fall spawning season (Range = 41,264,367 to 43,074,900).[2] Therefore, the incidental take of about 10,949 Atlantic Sturgeon larvae resulting from CPS entrainment would represent about 0.03 percent of the larvae produced annually by the estimated Atlantic Sturgeon spawning population in the James River. Even with these incidental take estimates, we do not anticipate that this level of incidental take would have a measurable individual or cumulative effect on the size, reproductive potential, or growth of the James River sturgeon population. For additional details regarding the potential impact of the incidental take on Atlantic Sturgeon, please see the revised CP Section 3.9.

Proposed Entrainment Sampling and Revised Sampling Take Estimate

Dominion has updated Sections 3.1, 3.2, 3.3, and 6.1.2 of the CP to reflect the proposed sampling frequency and period for ITP entrainment monitoring studies. These sections have been attached and supersede the

[1] The two larvae were collected in October 2015 during atypical river conditions.

[2] See Revised CP Section 3.9 (attached) for the methodology supporting these estimates.

corresponding sections included in the previous submittal. The proposed entrainment sampling program, which would be initiated as appropriate following issuance of the ITP, is summarized in Table 2 (below).

Table 2. Details of the Proposed Entrainment Sampling

Entrainment	Details
Units to be Sampled	Unit 6 (Primary Location) and Unit 4 (Secondary Location)
Sampling Events	Three times per week sampling events during September and October months (12/month x 2 months = 24 sampling events)
Daily Collection Schedule	Samples collected every 6 hours in a 24-hr period (4 collections/24-hr period) per sampling event
Targeted Organisms	Atlantic Sturgeon larvae life stages
Depths	Near-bottom samples only
Number of Samples Collected per Depth	1 near-bottom sample by pumping water through a 335-μm net suspended in a buffering tank
Sample Duration	~100 minutes per 6-hour period (or time required to get 100 m^3 per 6-hour period)
Number of Samples per Sampling Event	4 collections/sampling event x 1 depths/collection x 1 sample/depth = 4 samples/sampling event
Total Number of Samples	4 samples/sampling event x 12 sampling events/month x 2 months = 96 samples

Entrainment samples will be processed and analyzed according to procedures presented in Appendix A, *Entrainment Characterization Study Plan*, of the ITP. For entrainment monitoring for Atlantic Sturgeon, samples will be preserved with either RNA*later*® RNA Stabilization Solution, or 95 percent ethanol solution (to be determined), so that any Atlantic Sturgeon eggs or larvae collected can be genetically tested per the proposed mitigation plan.

To estimate the number of Atlantic Sturgeon larvae that might be taken in the 316(b) entrainment studies proposed over the remainder of 2019 and during 2020, we first calculated an interaction rate of larval Atlantic Sturgeon in entrainment sampling conducted from September and October of 2005 and 2015. During September and October of 2005 and 2015, there had been 16 sampling events, totaling 144 samples collected during the time when Atlantic Sturgeon larvae are most likely to be in the vicinity of the CPS. To ensure that our interaction-rate estimate considered relevant time intervals, we did not take sampling events that occurred during the spring, summer, and winter months into account because larval sturgeon would not be expected to occur in the James River during those seasons; therefore, including those months would have deflated the interaction-rate estimate.

The estimated interaction rate was 0.000132423 larvae per cubic meter (m^3) of water sampled using only September and October samples in 2005 and 2015. Based on the total number of near-bottom samples (i.e., 16 samples) to be collected during the fall spawning season (September to October) following issuance of the ITP permit, approximately 1,600 m^3 of sample water will be collected, resulting in the take estimate of 0.21 Atlantic Sturgeon larvae (i.e., less than one individual Atlantic Sturgeon larvae) for the remaining 316(b) sampling program. While we would expect less than one Atlantic Sturgeon larvae to be collected, the collection of one individual remains possible; therefore we have included the collection of one Atlantic Sturgeon larvae in the estimated take during the remainder of the 316(b) sampling program.

Revised Estimate of Impingement

Following the impingement event of adult Atlantic Sturgeon on September 22, 2018, Dominion completed an underwater survey of the guards which are the first of three structures that are intended to prevent debris and organisms from entering the intake structure (Figure 1). Inside of the intake guards are trash racks that prevent some debris and organisms from entering, followed by the rotating traveling screens that exclude smaller debris and organisms. During the survey it was discovered that most of the intake guards were degraded, and in one case missing. As a result of the survey, Dominion submitted an application to the U.S. Army Corps of Engineers (USACE) and Virginia Marine Resources Commission on February 8, 2019 to repair and/or replace the intake guards at CPS facility. As part of the intake guard renovations, the grid openings of the intake guards were designed to prevent the smallest adult male Atlantic Sturgeon in the James River from entering the intake structure. This reduced the grid openings from approximately 12 inches on center to 8 inches on center. The opening size was developed in coordination with Dr. Balazik and, based on specimens collected as part of the VCU Atlantic Sturgeon research programs (Balazik pers. comms.)

Following issuance of the USACE permit, intake guards for Units 3, 4, and 8 were removed and replaced. The Unit 5 and 6 intake opening was expanded to reduce water velocities and new intake guards were installed. A copy of the intake guard submittal to the USACE is provided in Attachment 3. The installation of intake guards in front of intake structures for Units 3, 4, 5, 6, and 8 was completed as of April 2019. The intake guard for Unit 7 did not need to be modified, as it met the new design criteria.

As noted above, there are three locations where impingement of organisms could occur at the CPS intakes: the intake guard, the trash racks, and the traveling screens. Dominion has calculated the through-rack (or through-screen) velocities for the intake guards, trash racks, and traveling screens for each intake (Figure 1, Table 3).

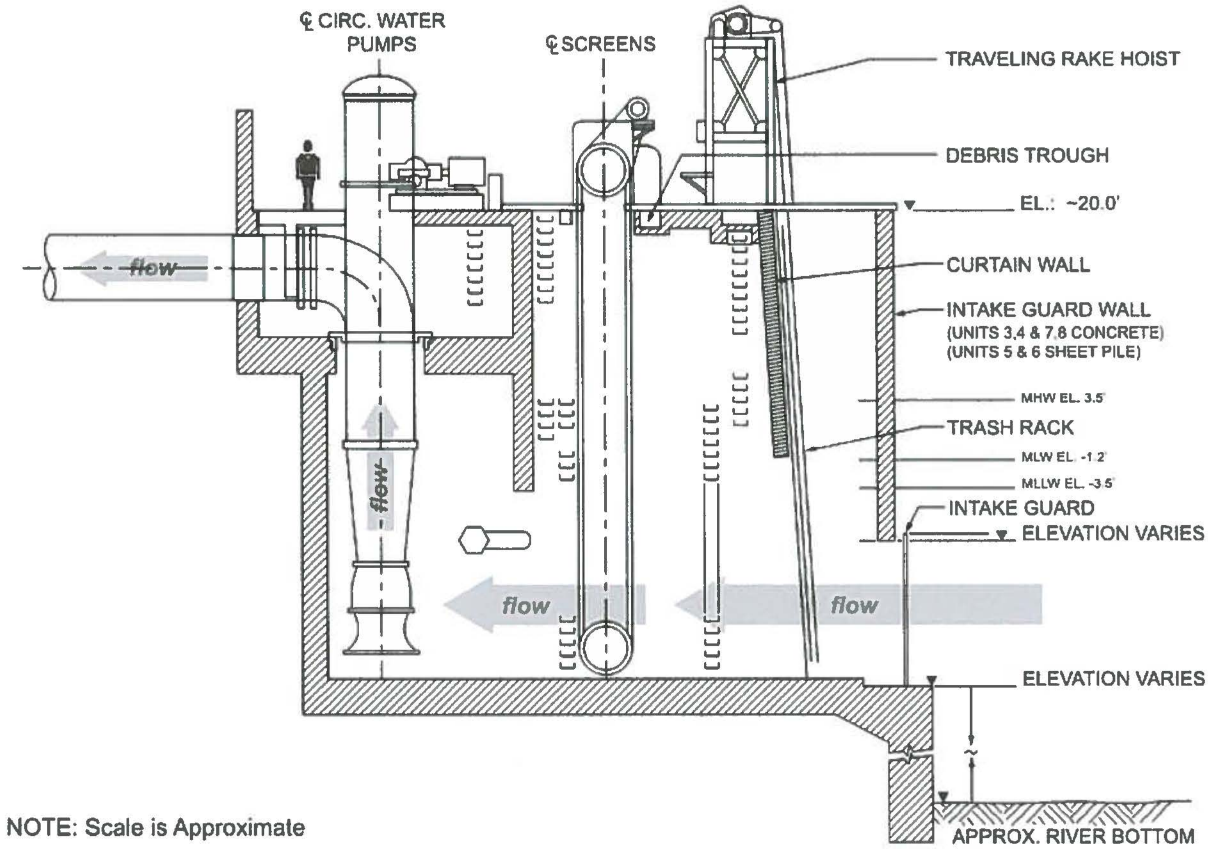

Figure 1. Typical Profile of Chesterfield Power Station Intake Structure

Table 3. Summary of Through-rack Velocities for Intake Guards, Trash Racks, and Traveling Screens at Chesterfield Power Station

	Water Velocity in fps based on Design Intake Flow				
Intake Location	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
Approach to intake	0.79	0.84	1.01	0.74	0.67
Intake guards	1.07	1.12	1.35	0.85	0.88
Trash racks	0.51 – 1.13				
Traveling screens*	1.19	1.53	1.99	1.30	1.30
*Assumed open area of 67.9 percent for a 3/8-inch mesh traveling screen					

Adult Atlantic Sturgeon may be susceptible to being impinged on the CPS intake guards or trash racks if they are damaged, unhealthy or exhausted from a stressful activity. As described above, juvenile Atlantic Sturgeon inhabit the James River downstream of the CPS and as subadults are known to use estuarine and coastal habitats, including extensive coastal migrations; thus it is assumed that juvenile Atlantic Sturgeon are not likely to occur in the vicinity of the CPS (Hager 2011, Balazik 2012, Balazik and Musick 2015). Additionally, subadults typically spend multiple years outside of their natal rivers on coastal migrations (Balazik 2012). The estimated through-rack water velocities through CPS intake structures designed to prevent entry of debris and organisms (Table 3) were calculated to be less than two fps at the at the intake guards, trash racks and traveling screens. In order for impingement to happen, a fish must be overcome by the intake or approach velocity. Based on evidence summarized in the CP Section 2.1.1 which demonstrated adult White Sturgeon are capable of critical swim speeds of up to 2.27 fps, it is expected that healthy Atlantic Sturgeon adults would be capable of maneuvering against the intake approach velocities at the CPS intake, and would not be subject to impingement, because the approach and through-rack velocities are expected to be less than two fps.

The addition of the intake guards is intended to prevent debris and large organisms, specifically adult Atlantic Sturgeon, from entering the intake structure. For this reason, no incidental take of Atlantic Sturgeon due to impingement is being requested. Dominion will monitor the trash racks and traveling screen to confirm that take does not occur as described in CP Section 3.3. Monitoring of the trash racks for impingement of Atlantic Sturgeon is noted in CP Section 6.1.3. However, monitoring at the intake guards is not practicable due to a lack of access to the intake guard wall to safely set up and deploy equipment to monitor for impingement. In addition, the normal turbidness of James River water makes visual observation below the surface ineffective at the intake guards. For these reasons, and because no impingement is expected, no monitoring is proposed at the intake guards.

Impacts of the Proposed Take on Atlantic Sturgeon

As explained above and addressed in revised CP Section 3.9 (attached), the revised estimates of incidental take of about 10,949 Atlantic Sturgeon larvae for CPS entrainment would represent about 0.03 percent of the larvae produced annually by the estimated Atlantic Sturgeon spawning population in the James River. We do not anticipate that these very minor losses would have a measurable individual or cumulative effect on the size, reproductive potential, or growth of the James River sturgeon population.

Mitigation

Dominion has updated Section 4.3.1 and Section 4.4.2 of the CP to reflect mitigation measures taken during this ITP application process to eliminate incidental take of Atlantic Sturgeon due to impingement; to provide more specifics on the proposed measures to mitigate impacts associated with the incidental entrainment of larval sturgeon to the maximum extent practicable; and has added Section 4.4.3 to outline a new proposal to implement a digital holography entrainment pilot study that – if successful – would further mitigate impacts and benefit conservation of Atlantic Sturgeon. Dominion is proposing several mitigation measures to further the understanding of Atlantic Sturgeon in the James River – in particular the timing of spawning migrations and presence of larval life stages in the vicinity of CPS – which would aid in the conservation of the species. This includes a partnership with the VCU Rice Rivers Center to make use of data from a real-time Vemco monitoring station near the Rice Rivers Center and Sturgeon Point. VCU will provide Dominion access to the real-time Vemco monitoring data to gather information as to when Atlantic Sturgeon are making their way upriver towards CPS to spawn. This information will be used to confirm or refine the spawning window and, in conjunction with an additional monitoring station upstream (see below), better define travel time.

In addition, Dominion will contract with VCU to deploy and maintain a real-time Vemco monitoring station downstream of the CPS facility from September through October for the duration of the ITP entrainment sampling program. This real-time monitoring station will be used to confirm the presence of spawning Atlantic Sturgeon moving up river and in the vicinity of the CPS facility. These data will be accessible to Dominion to correlate sturgeon movements with results of entrainment sampling. The data will also aid VCU in their research relating to sturgeon movements and spawning periods during the fall in the James River.

Finally, Dominion is proposing to implement a pilot study that utilizes real-time, in situ, digital holography to identify early life-stage Atlantic Sturgeon at the CPS facility. Digital holography utilizes an automated processing algorithm to detect, count, and identify larvae of endangered species (Attachment 4: Garavelli et al. 2019). The digital holography system would be tested against the previously proposed monitoring methods to compare results and improve the system's accuracy. Depending on the results of the study, the program may advance the conservation of protected species by providing a new method of real-time, non-lethal monitoring.

The real-time Vemco monitoring of Atlantic Sturgeon spawning movement and the use of real-time holographic imagery to identify early life-stage Atlantic Sturgeon in the vicinity of CPS should allow Dominion and VCU researchers to better define the Atlantic Sturgeon spawning season – such that Dominion can plan and implement routine maintenance outages, when practicable, to coincided with peak larval abundance periods – thereby further minimizing incidental take and benefiting the species.

Revisions to 2017 Draft Environmental Assessment (EA)

In July 2017, NMFS issued a Draft EA on the proposed ITP. In your February 2019 letter, you stated that NMFS is considering how new information may change its draft determinations under NEPA and whether revisions to the draft NEPA document are necessary. Some minor changes would be needed to the draft EA to reflect the new information and revised ITP and CP documents, but Dominion does not believe that those changes would alter NMFS' ultimate NEPA determinations for this ITP.

In particular, one change to the proposed action since the Draft EA is that Dominion now proposes a five-year permit duration. Indeed, one alternative that was considered in the Draft EA was issuance of a five-year ITP, so NMFS has already considered the revised proposed action in its NEPA analysis. The other change to the proposed action is the take estimate, which has changed based on new information and as Dominion has refined its methodology. As discussed in more detail above, even with the revised take estimates, CPS entrainment would represent about 0.03 percent of the larvae produced annually by the Atlantic Sturgeon spawning population in the James River. As a result, even with the revised take estimates, NMFS may still conclude (as it did in the 2017 Draft EA) that the estimated losses should not have a measurable effect on the size, reproductive potential, or growth of the James River population of Atlantic Sturgeon.

We appreciate the opportunity to provide these clarifications and hope our responses provide adequate details to address the questions and comments raised during our recent discussion on revisions to the 2017 ITP application. If you have any further comments or questions please do not hesitate to contact me or Bob Graham (phone: 804-273-2661 or e-mail: bob.graham@dominionenergy.com).

T. N. Effinger

Thomas Effinger
Director, Environmental Services

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Enclosed

Attachment 1: Revised Sections of Incidental Take Permit Application
Attachment 2: Revised Sections of Conservation Plan
Attachment 3: Dominion Energy Chesterfield Power Station, Chesterfield, Virginia Pre-Construction Notification-Intake Guard Project
Attachment 4: Garavelli et al. 2019, *Using in situ digital holography to detect larvae of endangered species in cooling water intake systems.*

Literature Cited

Balazik, M.T. 2012. Life history analysis of James River Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) with implications for management and recovery of the species. Doctoral Dissertation, Virginia Commonwealth University, Richmond, VA.

Balazik, M.T. (2019, June 30). Email with B. Graham regarding James River Atlantic Sturgeon population.

Balazik, M.T. (2019, June 9). Email with B. Graham regarding James River Atlantic Sturgeon spawning period.

Balazik, M.T. and J.A. Musick. 2015. Dual annual spawning races in Atlantic sturgeon. PLoS ONE 10(5): e0128234. Doi:101371/journal.pone.012834

Boreman, J. 1997. Sensitivity of North American sturgeons and paddlefish to fishing mortality. Environmental Biology of Fishes 48(1-4): 399-405.

Garavelli Lysel, Nayak Aditya, Mueller Robert, Bellgraph Brian. Using in situ digital holography to detect larvae of endangered species in cooling water intake systems.

Gross, M.R., J. Repka, C.T. Robertson, D.H. Secor and W. Van Winkle. 2002. Sturgeon conservation: insights from elasticity analysis. American Fisheries Society Symposium 28: 13-30.

Hager, C. 2011. Atlantic Sturgeon review: Gather data on reproducing subpopulation of Atlantic Sturgeon in the James River. Contract EA133FIOCN0317.

Ingram, E.C., & Peterson, D.L., 2016. Annual Spawning Migrations of Adult Atlantic Sturgeon in the Altamaha River, Georgia. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science, 8*, 595 - 606.

Smith, J.A., J.H. Flowers, J. E. Hightower, 2015. Fall Spawning of Atlantic Sturgeon in the Roanoke River, North Carolina, Transactions of the American Fisheries Society, 144:1, 48-54, DOI: 10.1080/00028487.2014.965344

Van Eenennaam, J.P., S.I. Doroshov, G.P. Moberg, J.G. Watson, D.S. Moore and J. Linares. 1996. Reproductive conditions of the Atlantic sturgeon (*Acipenser oxyrinchus*) in the Hudson River. Estuaries 19(4): 769-777.

Van Eenennaam, J.P. and S.I. Doroshov, 1998. Effects of age and body size on gonadal development of Atlantic Sturgeon. J. Fish Biol. 53(3):624-637.

Attachment 1: Revised Sections of Incidental Take Permit Application

1.3 Permit Duration

A permit is being requested for **5 years**.

1.4 Contact Information

Facility Name and Address:

Virginia Electric and Power Company
Dominion Chesterfield Power Station
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Glen Allen, Virginia 23060

Location:

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Officer's name:

Robert W Sauer
VP Power Generation System Operations

Business tax identification number:

54-0418825

Attachment 2: Revised Sections of Conservation Plan

3.1 Estimated Take for Clean Water Act 316(b) Entrainment Studies

The purpose of the CWA 316(b) sampling is to characterize entrainment and impingement associated with CPS operations. This subsection presents our estimates of the probability of larval Atlantic Sturgeon being taken during the remaining 316(b) entrainment sampling. The probability of Atlantic Sturgeon being taken by entrainment during CPS operations is addressed in Section 3.2, while the probability of Atlantic Sturgeon being taken by impingement during 316(b) sampling and CWIS operations is addressed in Section 3.3. The 316(b) entrainment sampling program, which would resume as appropriate following issuance of the ITP, is summarized in Table 3-1 (below). In order to complete the two-year, 316(b) sampling program, samples will need to be collected for six months during September through December and March through April. As discussed previously and indicated below, only bottom samples during September and October have the potential to entrain Atlantic Sturgeon larvae and are thus included in the take estimate. Water volumes collected for this sampling represent a subsample of CPS cooling water intake so the volume of water at CPS does not increase because of this sampling.

Table 3-1. Details of Remaining 316(b) Entrainment Sampling during Fall Spawning Period

Entrainment	Details
Units to be Sampled	Unit 6 (Primary Location) and Unit 4 (Secondary Location)
Sampling Events	Twice per month sampling events (within the first and third week of each month) for 2 months (2/month x 2 months = 4 sampling events)
Daily Collection Schedule	Samples collected every 6 hours in a 24-hr period (4 collections / 24-hr period)
Targeted Organisms	Fish eggs, larvae, and juveniles; shellfish life stages
Depths	Near-bottom depth only
Number of Samples Collected per Depth	1 sample collected by pumping water through a 335-µm net suspended in a buffering tank (Three sub-samples for each depth will be combined)
Sample Duration	~100 minutes per depth per 6-hour sample (or time required to get 100 m^3 per depth per 6-hour sample)
Number of Samples per Sampling Event	4 collections/survey x 1 depth/collection x 1 sample/depth = 4 samples/survey
Total Number of Samples Remaining	4 samples/survey x 2 surveys/month x 2 months = 16 samples

The best available data indicate that entrainment of Atlantic Sturgeon larvae is a very rare event. Historically, CPS conducted entrainment studies in 1977, 2005-2006 and 2015-2016. No Atlantic Sturgeon were captured during these studies except one sampling event during October 2015 when two Atlantic Sturgeon yolk sac larvae were collected. That is one occurrence out of 41 entrainment sampling events using more recent data (June 2005-May 2006 and July 2015-March 2016) only. If Atlantic Sturgeon larvae had been present in any of these samples, they would have been identified because of their distinctive morphology and behavioral and seasonal characteristics (Bath et al. 1981).

To estimate the number of Atlantic Sturgeon larvae that might be taken during the 316(b) entrainment studies proposed over the remainder of 2019 and during 2020, we first calculated an interaction rate of larval Atlantic Sturgeon in entrainment sampling conducted from September and October of 2005 and 2015. During September and October in 2005 and 2015, there had been 16 sampling events, totaling 144 samples collected during the time when Atlantic Sturgeon larvae are most likely to be in the vicinity of the CPS. To ensure that our interaction rate estimate considered relevant time intervals, we did not take sampling events that occurred during the spring, summer, and winter months into account because larval sturgeon would not be expected to occur in the James River during those seasons; therefore, including those months would have artificially deflated the interaction rate.

Table 3-2 presents the results of the take estimate for the remainder of the 316(b) entrainment sampling. The estimated interaction rate was 0.000132423 larvae per cubic meter (m^3) of water sampled using only September and October samples in 2005 and 2015. Based on the total number of near-bottom samples (i.e., 16 samples) to be collected during the fall spawning season (September to October) following issuance of the ITP permit, approximately 1,600 m^3 of sample water will be collected, resulting in the take estimate of 0.21 Atlantic Sturgeon larvae (i.e., less than one individual Atlantic Sturgeon larvae) for the remaining 316(b) sampling program. While we would expect less than one Atlantic Sturgeon larvae to be collected, the collection of one individual remains possible; therefore we have included the collection of one Atlantic Sturgeon larvae in the estimated take during the remainder of the 316(b) sampling program.

Table 3-2. Estimated Take of Atlantic Sturgeon during Remainder of 316(b) Entrainment Sampling

Input/Output	Value
Time interval used to estimate interaction rate	September and October 2005; September and October 2015
Estimated interaction rate (with 95 percent CI)	0.000132423
Expected number of samples (proposed)	16
Estimated take during the remainder of 316(b) sampling program	1

These analyses assume that the entrainment rates evident in the 2005 and 2015 samples are representative of future entrainment rates and allow for uncertainty in those rates. Based on the size and swimming capabilities of adult Atlantic Sturgeon described in Section 2.1, no incidental take of these life stages of Atlantic Sturgeon are anticipated as a result of entrainment during the CWA 316(b) studies. Also described in Section 2.1, juveniles are not expected to occur in the vicinity of the CWIS; therefore, incidental take is unlikely (i.e., the potential is so low that it is discountable and not anticipated to occur). Therefore, no incidental take coverage for entrainment resulting from CWA 316(b) studies is being requested for these life stages.

3.2 Estimated Entrainment Resulting from CWIS Operation

No Atlantic Sturgeon have been reported to have been entrained by CWIS operations independent of the most recent CWA 316(b) entrainment sampling program. As a result, to estimate the number of Atlantic Sturgeon larvae that might be entrained when the circulating cooling water system is in operation, the estimated interaction rate of 0.000132423 larvae per m^3 was used (see Section 3.1).

To calculate the estimated incidental take of Atlantic Sturgeon larvae during CPS CWIS operation, we estimated that the CPS facility would continue to operate cycling units and that the facility would withdraw water at approximately 60 percent of the Design Intake Flow (DIF). The 60 percent DIF withdrawal represents a likely projected operation as two of the six generating units at CPS have been retired and the mode of operation for CPS has transition from base load operation to more frequent cycling of units 5 and 6, while units 7 and 8 remain base loaded. Cycling refers to operating generating units at varying load levels in response to changes in system load requirements. The selection of an approximately 60 percent DIF withdrawal to characterize expected future operations was based on a) 2017 generation, when the station retired units and first began operating units 5 and 6 in a cycling mode, and b) plant operations continuing in this manner. 2018 data were not used because the station minimized water withdrawals during September and October as the intake guards were refurbished. A summary of the estimated total volume of water withdrawal is presented in Table 3-3 below with cycling of Units 5 and 6 (50% DIF) and base loading of Units 7 and 8 (100% DIF) assumed for estimating purposes. To determine the estimated take, the interaction rate of 0.000132423 larvae per m^3 is multiplied by the anticipated water volume withdrawn over the 6-week sturgeon spawning period.

Table 3-3. Summary of Volume of Water Withdrawal Based on approximately 60 percent of the Design Intake Flows at Chesterfield Power Station During a Six-Week Period in September-October

Unit	Daily Flow (m^3)	Total Volume of Water Withdrawal (m^3)
Unit 4*	98,705	4,145,610
Unit 5	395,197	16,598,274
Unit 6	817,649	34,341,258
Unit 7	328,574	13,800,108
Unit 8	328,574	13,800,108

*Unit 4 has been retired for power generation however pumps will be run intermittently as necessary to comply with Virginia Pollutant Discharge Elimination System Permit No. VA00004146. One of two pumps at Unit 4 is included at 50% of DIF to provide a conservative estimate of incidental take.

Fall migrating Atlantic Sturgeon have been collected by researchers in the James River (fall collections were made between river kilometer (rkm) 108 and 132) from August 5 to October 13 (Balazik et. al. 2012; Balazik and Musick 2015) with telemetry tagged fish departure from the river and entering Chesapeake Bay between October 6 and November 8 (Balazik et. al. 2012). Fish were first collected in early August before spawning that occurs starting in late August or September. Based on telemetry data, spawning lasts between one to three weeks. Most of the captured adults were males, and were considered ripe in that the fish expressed milt. Additionally, two females were captured and were considered post-spawn based on the presence of a few remaining mature eggs. Telemetry data show adults staging near the salt wedge in the lower river and then migrating upriver around September (Balazik and Musick 2015). A known female returning to the James River on 6 May 2013 staged below rkm 67 from May to November except for two quick suspected spawning movements, one to rkm 120 on September 1 and the other to rkm 132 on September 24 (Balazik and Musick 2015). This would indicate individual spawning events are brief, which is supported by additional sampling conducted by Balazik (pers. comms.) indicating that the peak spawn lasted approximately 3 weeks in 2017 and 1 week in 2018. Catch data from 2011 and 2012 in the James River were used to estimate the adult male population at 2,760 individuals (Balazik 2012). At Dominion's request, a revised population estimates was developed which provided an annual fall spawning female population estimate of 1,250 individuals in the James River (Balazik pers. comms.).

Preferred or suitable egg incubation temperatures are described as 20-21°C for culturing purposes (Mohler 2003). Other lab and field studies suggest optimal egg survival and hatching occurs at 13 – 25 °C (Borodin 1925; Smith 1985; Kieffer and Kynard 1993; Hatin et al. 2002; Smith et al. 2015). Aquaculture studies have reported successful incubation of eggs at temperatures of 15–20°C (Dean 1895; Smith et al. 1980; Chapman and Carr 1995), with high mortality at water temperatures ≥25°C (Chapman and Carr 1995). However, Smith et al. (2015) collected eggs spawned in the Roanoke River near temperatures of 24.5°C and estimated spawning periods temperature ranged from 25.3 to 24.3°C. The egg sampling in the Roanoke River ran from September 13 to October 4, but eggs were only collected on September 18 and 20. Ingram and Peterson (2016) found that adult Atlantic Sturgeon reached hard substrates in the upper Altamaha system in Georgia in early to mid-October, just as water temperatures dropped below 25°C.

Based on the temperature data from 2007 through 2018 at the USGS station 02035000 James River at Cartersville, 2007 – 2018, temperatures typically drop below 25°C during the first or second week of September. Typically water temperatures at Cartersville are more responsive to changes in air temperatures than the James River near CPS, and so tend to cool somewhat sooner. In some years temperatures near Cartersville drop below 25°C during August, but if that happens, there tend to be fluctuations above and below 25°C. Balazik (pers. comms.) has indicated that adult female Atlantic Sturgeon could be expected to be in the vicinity of CPS when water temperatures fall below 26°C.

Eggs are strongly adhesive and demersal, and occur only on the spawning grounds attaching to the substrate in 20 minutes (Jones et al. 1978). Eggs can hatch in 4 - 7 days at temperatures of 17.8°C to 20°C (Gilbert 1989; Hildebrand and Schroeder 1928). This is expected to be shorter for warmer temperatures.

The yolk-sac larval stage is completed in about 6 to 12 days (Jones et al. [1978]), or 8 to 10 days old (Kynard and Horgan 2002) at which time the larvae move downstream to the rearing grounds (Kynard and Horgan 2002). Downstream dispersal near the bottom lasts 6–12 days (Kynard and Horgan 2002). Snyder (1988) listed yolk sac absorption occurring at 13-14 mm SL or 6-7 days, and Hardy and Litvak (2004) state yolk is absorbed in 9 days at 21°C. As described in the literature, yolk-sac larvae are expected to inhabit the same areas where they were spawned (Bain et al. 2000; ASMFC 2012). Due to the collection of two yolk sac larvae in October 2015, this life stage should be considered vulnerable to entrainment for the purposes of this review. However, the role of the atypically high river flows immediately prior to the time of collection is unknown, but may be substantial.

Based on the above egg and larvae development information, it is estimated the yolk sac larvae collected at Chesterfield on October 7 and 8, 2015 were spawned in late September. This is within the period of collected upstream migrating ripe adults and the estimated spawning period of September and October as described in the ITP Application. This is also in agreement with temperature data dropping to below 25°C.

Our estimate of the spawning season occurring September-October is comparable in timing and duration to other similar systems. Based on telemetry data, adult Atlantic Sturgeon migrated upstream to suspected spawning sites in the upper Altamaha system in Georgia in early to mid-October, just as water temperatures dropped below 25°C (Ingram and Peterson 2016). Similarly, spawning activity in the Roanoke River was estimated to occur when temperature ranged from 25.3 to 24.3°C (Smith et al. 2015). Tagged adult Atlantic Sturgeon arrived between 9 August and 3 September; and departed between 18 September and 9 October. Spawning was confirmed through deployment of spawning pads where eggs were collected on September 18 and 20. Based on the literature reviewed above it is estimated that early life-stage Atlantic Sturgeon would be entrainable by CPS CWIS for a period of 6 weeks. This includes the 3-week spawning period and 3 weeks for early life-stage larvae to mature to post yolk-sac larvae, or young-of-the year where they would have moved downstream and would no longer be entrainable by the CPS CWIS operations.

Based on the most recent information presented above, we expect that in any given year, there is a six week period in the September-October timeframe when Atlantic Sturgeon larvae would be entrainable by the CPS CWIS operations.

We estimate the number of larval sturgeon that might be taken during the 5-year duration of the proposed permit based on a cycling mode of operation (i.e., approximately 60 percent of DIF), and provided a summary of our analysis below in Table 3-4. Based on our analyses, we estimate that approximately 10,949 Atlantic Sturgeon larvae would be incidentally entrained per year over the course of the 5-year ITP period and result in a total estimated incidental take of 54,747 larvae. The limited number of entrainment samples collected during the estimated six-week spawning period, the small volume of water sampled during this period, the rare nature of Atlantic Sturgeon larvae having been collected at CPS, and the atypical river conditions under which the larvae were collected in October 2015 have likely affected the take estimate. Additional sampling to meet our 316(b) requirements will allow Dominion to refine this number and to determine whether any additional takes are probable.

Though the incidental take of up to 10,949 Atlantic Sturgeon larvae annually may seem like a large number without context, it is important to view those numbers in the context of the fecundity of Atlantic Sturgeon. As noted above, the annual female spawning population in the James River is approximately 1,250 individuals. The reported numbers of eggs an individual female can produce when they spawn ranges from 400,000 to 4 million eggs per fall spawning season (Boreman 1997, Van Eenennaam et al. 1996, Van Eenennaam and Doroshov 1998, Gross et al. 2002), although Balazik (2012) reported fecundities as high as 8 million eggs per spawning female per year. We would expect a spawning population of 1,250 adult sturgeon to produce an estimate of 41,294,134 larvae in a given fall spawning season (Range = 41,264,367 to 43,074,900). Therefore, the incidental take of about 10,949 Atlantic Sturgeon larvae resulting from CPS entrainment would represent about 0.03 percent of the larvae produced annually by the estimated Atlantic Sturgeon spawning population in the James River. We do not anticipate that this level of incidental take would have an ecologically relevant impact on the James River sturgeon population.

Table 3-4. Estimated Entrainment of Atlantic Sturgeon from CPS Cooling Water Intake

Inputs/Outputs	Parameter/ Estimate
Time interval used to estimate interaction rate	September and October 2005; September and October 2015
Volume of water sampled (m^3)	15,103
Time interval for forecast	5 years
Interaction rate of monitoring program (larvae per m^3)	0.000132423
Estimated flow over 6-week spawning period (m^3)	82,685,315
Estimated annual take for CPS CWIS operations (larvae)	10,949
Estimated take for CPS CWIS operations over 5-year period (larvae)	54,747

Based on the size and swimming capabilities of adult Atlantic Sturgeon described in Section 2.1, no incidental take of these life stages is anticipated as a result of entrainment from CWIS operation. Also described in Section 2.1, juveniles are unlikely to occur in the vicinity of the CWIS and the potential for incidental take of juveniles is unlikely (i.e., the potential to occur is so low that it is discountable and not anticipated to occur). Therefore, no incidental take coverage for entrainment resulting from CWIS operation is being requested for these life stages.

3.3 Estimated Impingement Resulting from Clean Water Act 316(b) Studies and CWIS Operation

Eggs and larvae are too small to be impinged as a result of CWA 316(b) sampling and CWIS operations. As discussed in Section 2.1.1, the swimming capabilities and habitat preferences of sturgeon post yolk sac larvae, juveniles and adults, should generally prevent Atlantic Sturgeon from being impinged at CPS. No Atlantic Sturgeon were collected in impingement samples between July and December 2015, or during prior impingement sampling at CPS conducted from June 2005 to June 2006 (EA 2006) and January to December 1977 (VEPCO 1977). Nevertheless, one adult Atlantic Sturgeon was collected with debris during trash rack maintenance in October 2015, and four adult Atlantic Sturgeon were found in the Unit 5A recirculating water intake structure of CPS in September 2018.

One possible explanation of the impingement collections involved the occurrence of particularly high river discharge rates due to high precipitation associated with severe storms that occurred during the periods leading up to the incidents, coupled with degraded intake guards. As discussed in more detail below, since the September 2018 collection, intake guards have been repaired to meet design criteria specifically designed to prevent adult Atlantic Sturgeon from entering the intakes.

As described in Section 3.1, the best data available to estimate the probability of Atlantic Sturgeon being impinged in 316(b) samples or CWIS operations over the 5-year period of the proposed ITP is limited to the adult Atlantic Sturgeon captured in October 2015 and the four adult Atlantic Sturgeon captures in September 2018 during CWIS operations. No Atlantic Sturgeon were captured during impingement sampling conducted in 1977, 2005 to 2006, or in the impingement studies conducted between July 2015 and June 2019.

Following the impingement event of adult Atlantic Sturgeon on September 22, 2018, Dominion completed an underwater survey of the guards that are the first of three structures are intended to prevent debris and organisms from entering the intake structure (Figure 1). Inside of the intake guards are trash racks that prevent some debris and organisms from entering, followed by the rotating traveling screens that exclude the some smaller debris and organisms. During the survey it was discovered that most of the intake guards were degraded, and in one case missing. As a result of the survey, Dominion submitted an application to the U.S. Army Corps of Engineers (USACE) and Virginia Marine Resources Commission on February 8, 2019 to repair and/or replace the intake guards at CPS facility. As part of the intake guard renovations, the grid openings of the intake guards were designed to prevent the smallest adult male Atlantic Sturgeon in the James River from entering the intake structure. This reduced the grid openings from approximately 12 inches on center to 8 inches on center. The opening size was developed in coordination with Dr. Balazik and, based on specimens collected as part of the VCU Atlantic Sturgeon research programs (Balazik pers. comms.).

Following issuance of the USACE permit, intake guards for Units 3, 4, and 8 were removed and replaced. The Unit 5 and 6 intake opening was expanded to reduce water velocities and new intake guards were installed. A copy of the intake guard submittal to the USACE is provided in Attachment 3. The installation of intake guards in front of intake structures for Units 3, 4, 5, 6, and 8 was completed as of April 2019. The intake guard for Unit 7 did not need to be modified, as it met the new design criteria.

As noted above, there are three locations where impingement of organisms could occur at the CPS intakes: the intake guards, the trash racks, and traveling screens. Dominion has calculated the through-rack (or through-screen) velocities for the intake guards, trash racks, and traveling screens for each intake (Figure 3-1, Table 3-6).

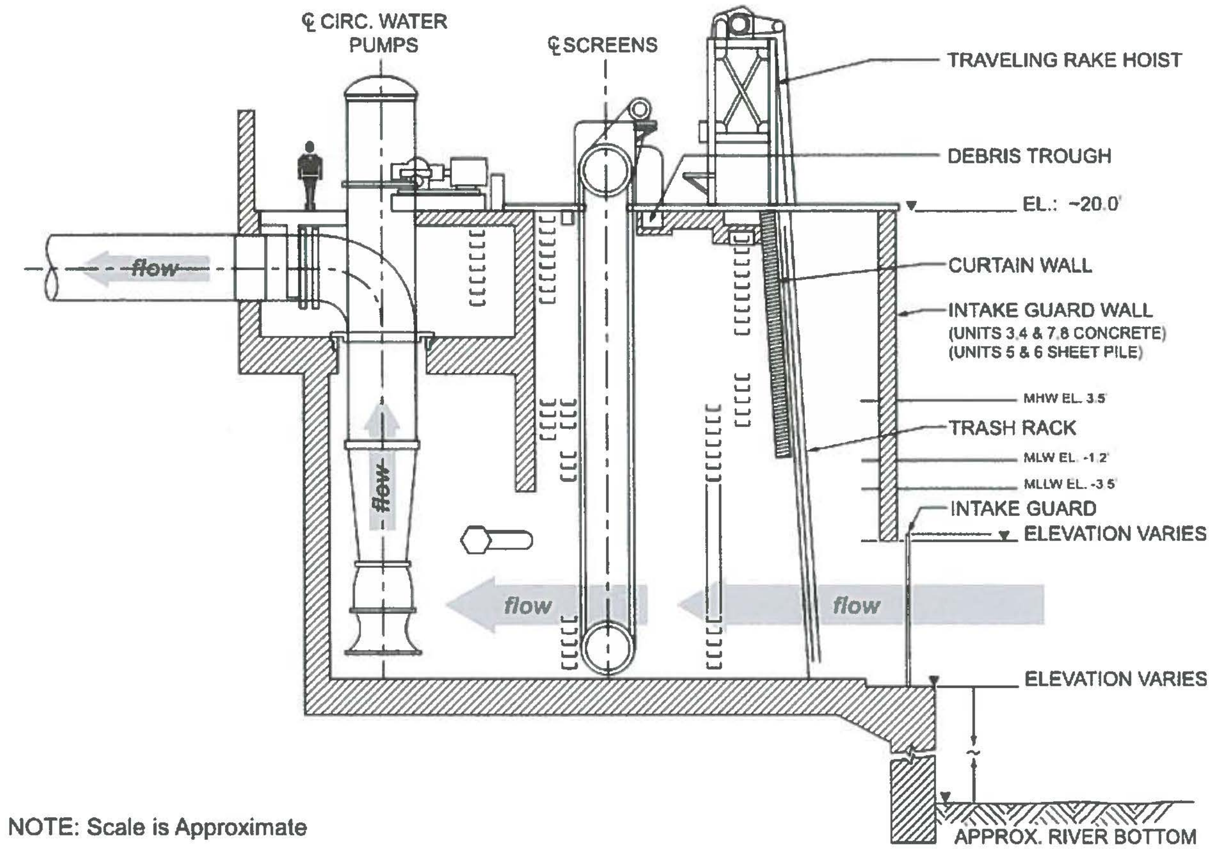


Figure 3-1. Typical Profile of Chesterfield Power Station Intake Structure

Table 3-6. Summary of Through-rack Velocities for Intake Guards, Trash Racks, and Traveling Screens at Chesterfield Power Station

	Water Velocity in fps based on Design Intake Flow				
Intake Structure	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
Approach to	0.79	0.84	1.01	0.74	0.67
Intake guards	1.07	1.12	1.35	0.85	0.88
Trash racks	0.51 – 1.13				
Traveling screens*	1.19	1.53	1.99	1.30	1.30

*Assumed open area of 67.9 percent for a 3/8-inch mesh traveling screen

Adult Atlantic Sturgeon may be susceptible to being impinged on the CPS intake guards or trash racks if they are damaged, unhealthy or exhausted from a stressful activity. As described above, juvenile Atlantic Sturgeon inhabit the James River downstream of the CPS and as subadults are known to use estuarine and coastal habitats, including extensive coastal migrations; thus it is assumed that juvenile Atlantic Sturgeon are not likely to occur in the vicinity of the CPS (Hager 2011, Balazik 2012, Balazik and Musick 2015).

Additionally, subadults typically spend multiple years outside of their natal rivers on coastal migrations (Balazik 2012). The estimated through-rack water velocities through CPS intake structures designed to prevent entry of debris and organisms (Table 3-6) were calculated to be less than two fps at the at the intake guards, trash racks and traveling screens.

In order for impingement to happen, an adult Atlantic Sturgeon must be overcome by the intake or approach velocity. Based on evidence summarized in the CP Section 2.1.1 which demonstrated adult White Sturgeon are capable of critical swim speeds of up to 2.27 fps, it is expected that healthy Atlantic Sturgeon adults would be capable of maneuvering against the intake approach velocities at the CPS intake, and would not be subject to impingement, because the approach and through-rack velocities are expected to be less than two fps. The intake guards are designed to prevent debris and large organisms, specifically adult Atlantic Sturgeon, from entering the intake structure. For this reason, no incidental take of Atlantic Sturgeon due to impingement is being requested. To confirm that no take of Atlantic Sturgeon will occur, monitoring of the trash racks for impingement of Atlantic Sturgeon will be conducted at the traveling screens and trash racks as noted in CP Section 6.1.3.Monitoring at the intake guards is not practicable due to a lack of access to the intake guard wall to set up and deploy equipment to monitor for impingement. In addition, the normal turbidness of James River water makes visual observation below the surface ineffective at the intake guards. For these reasons, and because no impingement is expected, no monitoring is proposed at the intake guards.

3.9 Impacts of the Take on Atlantic Sturgeon

We do not expect any impingement to result from sampling or CPS operations. As explained above, we estimate that entrainment sampling will result in the capture of about 1 larval sturgeon for the 5-year duration of the permit. We estimate that CPS operations will result in the entrainment of approximately 10,949 Atlantic Sturgeon larvae per year over the course of the 5-year ITP period, resulting in a total estimated take of 54,747 larvae. It is important to view the incidental take estimate of up to 10,949 Atlantic Sturgeon larvae annually in context with the fecundity of Atlantic Sturgeon. Per Balazik 2019 (pers. comms.) the annual female spawning population in the James River is estimated to be approximately 1,250 individuals. The reported numbers of eggs an individual female can produce when they spawn ranges from 400,000 to 4 million eggs per spawning year (Boreman 1997, Van Eenennaam et al. 1996, Van Eenennaam and Doroshov 1998, Gross et al. 2002), although Balazik (2012) reported fecundities as high as 8 million eggs per spawning female per year. The percentages of eggs to survive to become larvae, and larvae to become juveniles is very small due to natural mortality. The loss of about 10,949 Atlantic Sturgeon larvae for an annual take estimate for CPS would represent only 0.03 percent of the larvae produced annually by the estimated Atlantic Sturgeon spawning population in the James River. We do not anticipate that this level of incidental take would have an ecologically relevant impact on the James River sturgeon population.

To illustrate this, we constructed a conceptual model that assumed that CPS only interacts with Atlantic Sturgeon from the Chesapeake Bay population (although we recognize that adult Atlantic Sturgeon in the James River could represent other populations). We further assumed that an adult population of 1,250 Atlantic Sturgeon occurred in the James River (based on unpublished data from a personal communication with M.T. Balazik. This number of females would be expected to produce approximately 5 billion eggs per year.

We were unable to locate life history models for Atlantic Sturgeon or other species of sturgeon that estimated the probability or proportion of eggs that would be expected to survive to the larval stage. However, Caroffino et al. (2010) published data on egg-to-larval and larval-to-Age 0 juvenile survival for Lake Sturgeon that we used to estimate mortality and survival rates for the egg and larval stages: mean egg-to-larval mortalities in their study were 99.17 percent (95 percent CI = 99.14 to 99.17 percent) while mean larval-to-Age mortalities were 94.36 percent (95 percent CI = 90.62 to 95.43). These mortality estimates are within the general range of estimates other authors have published for sturgeon (Gross et al. 2002, Duong et al. 2011, Jarić et al. 2015).

If we apply these mortality rates to our previous estimates of the number of eggs that might be produced in a year, we would expect a spawning population of 1,250 adult sturgeon to produce an estimate of 41,294,134 larvae in a given fall spawning season (Range = 41,264,367 to 43,074,900), which would survive to produce between 1,883,944 and 4,039,630 Age 0 juveniles. If 10,949 larvae were lost in a year as a result of entrainment this would represent 0.03 percent of the larvae that might occur in the James River in that year.

The estimates in the preceding paragraph treat potential entrainment at CPS as a risk factor that would have been captured in the literature-derived mortality estimates we applied. We also considered the possibility that entrainment at CPS represents an additional risk factor for Atlantic Sturgeon larvae in the James River by subtracting the mean number of larvae that might be entrained at CPS from the larval abundance estimates produced by our life table models. To capture the potential effect of this reduction, we calculated the effect of larval losses associated with CPS operations on the number of Age-0 sturgeon we would expect in the population. In this case, reducing the number of larvae in a spawning population by 10,949 might reduce the number of Age 0 juveniles by an average of 618 (Range = 509 to 1,008) or between 0.02 and 0.03 percent of the Age-0 juveniles that might occur in the population in any given year. Extending these estimates over the 5-year term of a permit – these very minor losses should not have measurable individual or cumulative effect on the size, reproductive potential, or growth of the James River population.

Recent analyses of catch rates of Atlantic Sturgeon spawning in the fall suggests that the adult population of James River spawning population has increased in numbers into the thousands of individuals rather than the 300 which were the best available information used in the 2017 analysis (Hilton et al. 2016, Balazik pers. comms. 2019). The calculations presented above represent our estimate based on limited data collected at the CPS facility from 2005 and 2015 samples. The issuance of ITP will provide the necessary data to further characterize entrainment at the CPS facility. We would not expect reductions of this small magnitude to have ecologically-meaningful effect on the abundance, growth, or viability of the James River spawning population of Atlantic Sturgeon.

4.3.1 Cooling Water Intake

There are three locations where impingement of organisms could occur at the CPS intakes: the intake guard, the trash racks, and the traveling screens. As described in CP Section 3.3, following the impingement event of adult Atlantic Sturgeon on September 22, 2018, Dominion completed an underwater survey of the guards which are the first of three structures that are intended to prevent debris and organisms from entering the intake structure. During the survey it was discovered that most of the intake guards were degraded, and in one case missing. As a result of the survey, Dominion initiated a program to repair and/or replace the intake guards at CPS facility that would further minimize the chance for incidental take of Atlantic Sturgeon due to impingement. As part of the intake guard renovations, the grid openings of the intake guards were designed to prevent the smallest adult male Atlantic Sturgeon in the James River from entering the intake structure. This reduced the grid openings from approximately 12 inches on center to 8 inches on center. The opening size was developed in coordination with Dr. Balazik and, based on specimens collected as part of the VCU Atlantic Sturgeon research programs (Balazik pers. comms.)

As a result of the program, intake guards for Units 3, 4, and 8 were removed and replaced. The Unit 5 and 6 intake opening was expanded to reduce water velocities and new intake guards were installed. The installation of intake guards in front of intake structures for Units 3, 4, 5, 6, and 8 was completed as of April 2019. The intake guard for Unit 7 did not need to be modified, as it met the new design criteria.

The addition of the intake guards is intended to prevent debris and large organisms, specifically adult Atlantic Sturgeon, from entering the intake structure. For this reason, no incidental take of Atlantic Sturgeon due to impingement is being requested. Dominion will monitor the trash racks and traveling screen to confirm that take does not occur as described in CP Section 3.3. Monitoring of the trash racks for impingement of Atlantic Sturgeon is noted in CP Section 6.1.3. However, monitoring at the intake guards is not practicable due to a lack of access to the intake guard wall to safely set up and deploy equipment to monitor for impingement. In addition, the normal turbidity of James River water makes visual observation below the surface ineffective at the intake guards. For these reasons, and because no impingement is expected, no monitoring is proposed at the intake guards.

4.4.2 Sturgeon Movement Research

Adult Atlantic Sturgeon move throughout the James River between its confluence with the Chesapeake Bay and the upriver terminus of tidal fresh water influence. Historically, Atlantic Sturgeon may have occupied the river up to Boshers Dam below the City of Richmond (Bushnoe et al. 2005). Data describing these movements in recent years have been collected by the James River Sturgeon Partnership through long-term deployment and maintenance of an array of passive acoustic receivers at multiple points along the river. The receivers are strategically placed to form "gates" through which acoustically tagged sturgeon are detected.

Dominion proposes a partnership with the Virginia Commonwealth University (VCU) Rice Rivers Center to make use of data from a real time Vemco monitoring stations near the Rice Rivers Center and Sturgeon Point. VCU will provide Dominion access to the real-time Vemco monitoring data to gather information as to when Atlantic Sturgeon are making their way upriver towards CPS to spawn. This information will be used to confirm or refine the spawning window and, in conjunction with an additional monitoring station upstream (see below), better define travel time.

In addition, Dominion will contract with VCU to deploy and maintain a real-time Vemco monitoring station downstream of the CPS facility September through October for the duration of the ITP entrainment sampling program. This real-time monitoring station will be used to further confirm the presence of spawning Atlantic Sturgeon moving up river and in the vicinity of the CPS facility. These data will be accessible to Dominion to correlate sturgeon movements with results of entrainment sampling. The data will also aid VCU in their research relating to sturgeon movements and spawning periods during the fall in the James River.

This mitigation measure would take advantage of the large number of acoustically tagged Atlantic Sturgeon already occupying the James River. Several hundred Atlantic Sturgeon captured in the James River since 2009 have been released with acoustic tags. The capture and release effort is ongoing, ensuring that as batteries in old tags expire newly tagged individuals are present for detection and tracking. Tag detections in the existing array are currently shared among all parties engaged in the Atlantic coast-wide network of Atlantic Sturgeon researchers and managers. As presently configured, the acoustic receiver array's closest downriver gate is a passive receiver located several miles below the CPS downstream of the Interstate 295 river crossing. Likewise, the closest upriver gate is several miles from the CPS. Deployment of an additional real-time receiver within that gap would provide finer scale data on spatial and temporal occupation of the reach of the river potentially influenced by CPS operations. The objective of the deployment would be to gain an improved understanding of the behavior patterns of Atlantic Sturgeon as they enter the reach of the James River potentially influenced by CPS operations. The deployment could also provide additional evidence of seasonal patterns of movement that distinguish the size and behaviors of cohorts in the fall versus spring spawning migrations. Derived data would be processed and shared based on a formal understanding coordinated with James River sturgeon researchers as approved by NMFS.

Data derived from the deployment could contribute to the research already being conducted to define spawning periods (spring and fall) and better define spawning locations. These results would provide useful insights into the levels of risk posed by the various plant operations, such as attraction, avoidance, or neutrality in response to intake flows. This research conducted in the fall of 2019 will also help to develop site-specific management actions that would directly benefit the conservation of the species by further minimizing incidental take, such as planning and implementing routine maintenance outages, when practicable, to coincided with peak spawning movements, as well as to assess other threats to Atlantic Sturgeon, based on movement patterns. The proposed deployment would be fully coordinated with the James River Sturgeon Partnership to ensure that a rigorous plan of receiver positioning, maintenance, downloading and data analysis was integrated into future data collection efforts.

Additional data defining spring and fall spawning seasons and spawning locations would benefit and conserve the species by informing stock assessments, recovery plans, and management practices, so that effective measures such as seasonal restrictions protecting spawning habitat can be developed. These data would provide insights on their migratory behavior and where mortality is occurring, which was identified as a data need for the upcoming stock assessment at the December (2015) Atlantic Sturgeon Stock Assessment Subcommittee Meeting. Stock assessments are instrumental to the conservation of Atlantic Sturgeon and in defining objective, measurable criteria to determine that the Chesapeake DPS has recovered (see Section 4.4).

4.4.3 Digital Holography Entrainment Pilot Study

Dominion is proposing to implement a pilot study that utilizes real-time, in situ, digital holography to identify early life-stage Atlantic Sturgeon at the CPS facility. Digital holography utilizes an automated processing algorithm to detect, count, and identify larvae of endangered species. The system would be tested against the previously proposed monitoring methods to compare results and improve the system's accuracy. While details are still being contemplated, current plans include obtaining sufficient imagery (as many as 1,000-2,000 images) of larval Atlantic Sturgeon at various angles to develop an algorithm that will allow identifying and counting in situ larvae, and deploying instrumentation at CPS concurrent with the ITP entrainment sampling program proposed and described in Section 6.1.2. In effect, two sampling methods will be used simultaneously and their results (larval density) compared. Because Atlantic Sturgeon larvae are rarely captured in entrainment samples at CPS, monitoring will include a more common, but morphologically distinct, species for proof of concept. The program is expected to advance the conservation of protected species by contributing to the development of a new method of real-time, non-lethal monitoring.

Though this technology is in its infancy, digital holography has the potential to sample continuously (24-hours per day, 7-days per week) a much larger volume of water passing through the intake (in theory potentially the entire volume of water passing through the intake), thus providing a more accurate and complete understanding of the potential for entrainment of larval Atlantic Sturgeon under a wider variety of river and CPS operating conditions. It also has the potential for field deployment to detect the presence of larval Atlantic Sturgeon on the spawning grounds. Dominion, PNNL and EPRI representatives have discussed a variety of field applications that could directly contribute to the conservation of Atlantic Sturgeon. Among these are deploying a monitoring camera in a stationary mode on the spawning grounds to detect and quantify the density of early life history sturgeon. The instrumentation is also suitable for use with remotely operated underwater vehicles, which would allow searches for early life history stages in areas where their occurrence has been suspected, but hard to detect. Such information can be used by Dominion and VCU to better define the spawning season such that routine maintenance outages, when practicable, can coincide with peak larval abundance period – thereby minimizing impacts due to entrainment to the greatest extent practicable. This pilot study would help to provide a testing platform to evaluate the effectiveness and accuracy of this technology. Following the pilot study, Dominion will review the results and submit a report to NMFS for review and comment. Following the pilot study, the use of digital holography for real-time monitoring of the CPS CWIS operations will be evaluated for use during the duration of the permit in consultation with NMFS. A separate pilot study plan and sampling program will be developed for approval by NMFS prior to implementing the study.

6.1.2 Entrainment Sampling Details

Entrainment samples will be collected on the river side, directly in front of the trash racks at the Unit 6 CWIS, similar to the sample collections made for the most recent CWA 316(b) studies (see Section 5.2 of the ITP Application). If Unit 6 is not operating or it is unsafe or infeasible to sample at Unit 6 for other reasons, the secondary sample location will be at Unit 4 in front of the trash rack.

Unit 6 was selected as the primary sampling location because it withdraws the highest volume (approximately 40 percent) of the total water used at the CPS; additionally, pumps at Unit 6 have been operated most often. Since the 2017 ITP application, Unit 3 has been retired. As a result, Unit 4 is chosen as the secondary location in the event that Unit 6 was not operating because Unit 4 shared a common intake structure with Unit 3, and the combined volume of water withdrawn at Units 3 and 4 were the second highest prior to retirement of Unit 3. Additionally, Unit 4 also has relatively close access to the water from the deck, and sufficient deck space for the sampling equipment. Additional detail for the basis of the sampling design is provided in Section 5 of the *Entrainment Characterization Study Plan* (Dominion 2016a) (see Appendix A of the ITP Application).

Near-bottom pumped samples will be collected from intake piping installed along the front of the trash racks with the face of trash racks used to stabilize the temporary intake piping. The near-bottom sample will be collected approximately 3 feet above the intake bottom.

Samples will be collected by pumping water through a 0.5-m diameter mouth plankton net constructed of 500-µm netting suspended in a buffering tank. A total of four samples representing 6-hour time blocks will be collected from each depth over a 24-hr period sampling event. Table 6-1 provides the details of entrainment sampling.

Table 6-1. Proposed ITP Additional Atlantic Sturgeon Entrainment Sampling Details*

Entrainment	Details
Units to be Sampled	Unit 6 (Primary Location) and Unit 4 (Secondary Location)
Sampling Events	Three times per week sampling events during September and October months (12/month x 2 months = 24 sampling events)

Entrainment	Details
Daily Collection Schedule	Samples collected every 6 hours in a 24-hr period (4 collections / 24-hr period) per sampling event
Targeted Organisms	Atlantic Sturgeon larvae life stages
Depths	Near-bottom samples only
Number of Samples Collected per Depth	1 near-bottom sample by pumping water through a 335-µm net suspended in a buffering tank
Sample Duration	~100 minutes per 6-hour period (or time required to get 100 m³ per 6-hour sample)
Number of Samples per Sampling Event	4 collections/sampling event x 1 depths/collection x 1 sample/depth = 4 samples/sampling event
Total Number of Samples	4 samples/sampling event x 12 sampling events/month x 2 months = 96 samples

*Note: Sampling protocol for the Proposed ITP Additional sampling differs from the Remaining 316(b) Sampling (Table 3-1) in order to focus on Atlantic Sturgeon, and better determine station effects on Atlantic Sturgeon.

Sample flows will be monitored and adjusted as necessary; a maximum flow of 250-275 gpm has been selected to minimize potential damage to the organisms in the net during the sample collection interval. An inline flowmeter will be used to monitor and maintain the flow for each sample. The target water volume for each entrainment sample is 100 m^3 (26,417 gallons).

Samples will consist of four sub-samples of approximately 25 m^3 each (~25 minutes) will be collected and composited for each sample collection. After each sub-sample collection, the net will be removed from the buffer tank and switched with a second net (this is to be performed without shutting down the pump). The removed net containing the first sub-sample will then be washed down from the outside of the net into the cod-end bucket and the sample will be transferred to a sample container for sorting. The second and third sub-samples will be washed down and transferred to the same container for sorting. The samples will be sorted on site by a trained taxonomist with the use of magnifying equipment as needed. If any Atlantic Sturgeon eggs or larvae are collected, they will be placed in a labeled container with the pertinent sample information. Label information shall include: sample number/ID, date, time (start and end), sample location, sample depth, and crew member initials. The sample containers will be preserved in RNA*later*® RNA Stabilization Solution, or 95 percent ethanol, to be determined. All preserved samples that are not processed in the field due to debris will be packaged and transported to the laboratory for processing. All preserved eggs or larvae will be transported to the appropriate laboratory for genetic analysis.

6.1.3 Impingement Monitoring

As described below, debris inspection at the trash racks is being proposed for impingement monitoring. The trash racks are located in front of each intake structure and form a barrier to debris between the James River and the intake traveling screens that passes beyond the intake guards. Upon approach, river water passes an intake guard before encountering a curtain wall that extends beyond the low water level 4.0 – 4.5

feet depending on intake. Figure 3-1 provides a typical cross section of CWIS at the CPS. The trash racks front the curtain wall and extend to the bottom of the intake structure. The trash racks installed for Units 3 and 4 are approximately 14.5 feet (ft) tall by 9.9 ft wide with 0.375-inch (in) bars on 4.0-in centers. The Unit 5 trash rack is approximately 16.5 ft tall by 12.5 ft wide with 0.375-in bars on 4.5-in. centers. The Unit 6 trash rack is approximately 19.0 ft high by 15.0 ft wide with 0.375-in bars on 4.0-in. centers. Units 7 and 8 have trash racks that are approximately 14.5 ft high by 11.0 ft wide with 0.375-in bars on 3.0-in centers. The traveling screens are located between 10 and 20 ft on the interior side of the trash racks.

The first monitoring method will be visually inspecting the debris on the water surface at the trash racks. Station personnel will visually inspect the trash racks for impinged Atlantic Sturgeon at each active operating unit, at least once during a 12-hour shift, during daylight hours. During the winter months this will result in a period when visual inspections are only conducted during one shift per day. However, available information on the seasonal movements of Atlantic Sturgeon in the James River indicate adult fish large enough to be impinged on the trash racks will have moved downstream of CPS during the winter months (see Section 2.1). In the event a sturgeon is observed, attempts to gently dislodge the fish from the trash rack into the James River flow will be made as described below. Failing that, the fish will be removed with the trash rake (see next paragraph) and handled as describe below.

The second monitoring method consists of inspection of materials collected during operation of the trash rakes. Trash rake operations will occur during each 12-hour operating shift during the sturgeon spawning seasons. Mechanical trash rakes, consisting of steel grabs that lift and hold debris as they clean the racks, will be used at least once per shift or more often as needed to clear large debris from the trash racks. The rakes bring moderately large debris (most often woody debris) that has been filtered by the trash racks up to the level of the intake deck, and deposit the debris into a bin. Visual inspection of the debris and other material collected during trash rack cleaning operations will be performed by operators trained in the identification and handling of sturgeon. In the event a sturgeon is collected, the fish will be removed from the trash bin and handled as describe below.

Debris Inspection

Debris and other material collected will be visually inspected from the intake deck and during trash rack cleaning operations (i.e., operating the trash rake), when performed at least once per shift. The following procedures will be employed for monitoring:

1. Cooling water intake trash racks (and immediate area upstream) will be inspected visually at least once per 12-hour shift throughout the year, during daylight hours only.
    a. The times of inspections, including those when no sturgeon were sighted, will be recorded.
    b. In the event a sturgeon is observed to be impinged on the trash rack, station personnel will use extension poles or, as last resort, the trash rake to dislodge the fish from the rack so long as the fish can be reached safely.
2. Trash racks will be cleaned via a mechanical trash rake at least once per 12-hour shift during the sturgeon spawning seasons.
    a. Cleaning will include the full length of the trash rack, i.e., down to the bottom of each intake bay.
    b. Personnel will be instructed to look at surface debris beneath the rake, before operating the rake.

c. The raking process will be closely monitored. If a sturgeon is observed, it will be recovered from the trash rake as soon as it is accessible by a net or other equipment and can be safely removed (see details of sturgeon handling procedures below).
d. Personnel cleaning the racks will inspect all debris that is deposited in the debris trough to ensure that no sturgeon are present within the debris.
e. Sturgeon will be removed from the trash rake as quickly and carefully as possible. Note that a net or sling will be used, if possible. In all cases, personnel safety will be given the highest priority.
f. Personnel will report and handle sturgeon present within the debris, as specified below.

3. Equipment such as nets, baskets, and a tank will be available for sturgeon removal and handling. Application of specific handling procedures will be contingent upon safety and practicality.

Due to emphasis on return of live sturgeon to the river, the operators will not obtain measurement metrics (e.g., mouth width to interorbital distance ratio) excepting an estimate of fork length. CPS will provide operators training on sturgeon identification and handling and will also provide sturgeon alerts and post signs with pictures of Atlantic Sturgeon during spawning season or if any sturgeon are observed at the station in order to heighten awareness. Training will include measurement of fork length and identification of gross sturgeon morphometric features such as subterminal mouth, heterocercal tail, and the presence of scutes. Visual aids (posters) will be displayed at strategic locations at CPS. The verification of identity will occur at distance if the sturgeon is impinged on the trash rack, or within the trash trough if brought to the intake deck during normal trash rack cleaning operations. All procedures will be incorporated into the CPS Equipment Inspection Guidelines.

Sturgeon Handling. The handling and return of any adult Atlantic Sturgeon to the James River will be conducted in accordance with following handling procedures, depending on condition. Note: Immediately upon retrieval, each sturgeon will be assessed to confirm status (live/dead).

For live sturgeon:

1. The Operator that identifies the sturgeon will immediately notify the Control Room, that will in turn notify the station Environmental Compliance Coordinator (ECC). The ECC will then immediately notify Dominion Environmental Biology.
2. In the event a sturgeon is brought to the intake deck, operators will ensure the following PPE is in use prior to attempting to handle the fish or assist those attempting to handle the fish: Hard Hat, Safety Glasses, Protective Gloves, Safety Shoes. This PPE is routinely worn when working on the intake deck, and so donning PPE should not delay attending to the fish.
3. A live sturgeon will be placed into a tub filled and overflowing with aerated ambient river water continuously supplied to the tub while it contains a fish.
4. The sturgeon will then be measured if a measurement can safely be obtained. The sturgeon will be kept wet throughout the data collection procedure. The fork length (mm) will be quickly recorded.
5. If possible, while maintaining the fish in a wet condition, photographs will be quickly taken of the top, bottom and sides of fish to document the condition of the fish. Injuries and physical abnormalities will also be photographed.
6. Sturgeon will be visually inspected for external tags or markings.
7. Priority will be given to sturgeon survival over data collection.

8. After the requisite measurements have been collected, live fish will be returned to the river away from the intakes as quickly and as gently as possible. The size of the sturgeon will dictate how the fish will be handled.
    a. For live fish greater than 1 m, operators will move the fish to the screenwash debris/fish return for immediate release to the James River. While it will be desirable to return the fish to the river away from the intakes, manually moving a large fish at the CPS intakes will be difficult and unsafe for the fish and workers, due to the narrow stairwells leading from the intake decks to ground level where vehicular traffic is possible, and due to the weight and strength of large sturgeon. Similarly, use of a crane to move the sturgeon from the intake deck to ground level, which is standard procedure for movement of heavy objects on the intake deck, will entail significant delay in moving the fish and potential injury.
    b. Live fish that are 1 m or less will be transported in a 150 cm cradle-style net (i.e., stretcher) for transport to a holding tank at ground level. The holding tank will be of sufficient size to accommodate a 1 m sturgeon, contain fresh river water, and will be aerated while the sturgeon is transported to the Dutch Gap boat ramp, located approximately 0.6 km downstream of the intakes. The fish will be released at the boat ramp after informing boaters to stay clear of the release point.

For dead sturgeon: The Operator that identifies the sturgeon will notify the Control Room, which will in turn notify the station ECC. The ECC will then notify Dominion Environmental Biology.

1. In the event a sturgeon is brought to the intake deck, operators will ensure the following PPE is in use prior to attempting to handle the fish: Hard Hat, Safety Glasses, Protective Gloves, Safety Shoes. This PPE is routinely worn when working on the intake deck, and so donning PPE should not delay attending to the fish.
2. The fork length (mm) will be recorded.
3. Photographs will be taken of the top, bottom and sides of fish to document the condition of the fish. Injuries and physical abnormalities will also be photographed.
4. Sturgeon will be visually inspected for external tags or markings.
5. The sturgeon will be transported by crane or cradle-style net to ground level, and transported by vehicle to an onsite container. If requested by NMFS, the fish will be iced and held for release to a party authorized by the NMFS.
6. If the specimen is not requested by NMFS, the sturgeon carcass will be spray-painted orange and placed along the riverbank, above the high-water line in a secluded area away from populated or public places. The location of the fish will be included in the reporting described below.

Reporting:

Atlantic Sturgeon occurrences and observations will be reported to NMFS within 24 hours of observation and identification. Additional information to be reported will include date and time of the observation, condition, and length of any sturgeon collected, disposition of collected sturgeon (e.g., released back to the James River), operational data and river conditions, as appropriate.

Sturgeon captures, injuries or mortalities, and sturgeon sightings in the Project area will be immediately reported to the ECC. The ECC will report it to the Dominion Environmental Biology Manager or designee, who will report incidental sturgeon take to NMFS within 24 hours to the following.

- Incidental Take Hotline at incidental.take@noaa.gov, 978-281-9328,
- Lynn Lankshear, the Atlantic Sturgeon Recovery Coordinator will also be contacted about genetic samples, at lynn.lankshear@noaa.gov, 978-282-8473.

If necessary, the Dominion Environmental Biology Manager will coordinate the release of a collected specimen to a NMFS-authorized party. A written report will be submitted to the NMFS and VDGIF within 48 hours of discovery of Atlantic Sturgeon that will include the date and time of observation, count of fish, fork length, disposition of collected sturgeon (i.e., released alive back to the James River, spray painted orange and disposed, or released to a NMFS-authorized party), and operational data and river conditions, as available.

Attachment 3: Dominion Energy Chesterfield Power Station, Chesterfield, Virginia Pre-Construction Notification-Intake Guard Project

Dominion Energy Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060
DominionEnergy.com

Dominion Energy

BY EMAIL

February 8, 2019

Dr. Silvia Gazzera
Silvia.B.Gazzera@usace.army.mi

Mr. Mark Eversole
Mark.Eversole@mrc.virginia.gov

RE: Dominion Energy Chesterfield Power Station, Chesterfield, Virginia
Pre-Construction Notification-Intake Guards Project

Dear Dr. Gazzera and Mr. Eversole:

Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion) is planning to conduct maintenance activities on the intake guards located on the sheet walls in front of the intake screens in the James River at the Chesterfield Power Station in Chesterfield, Virginia.

As previously discussed, this project is being fast tracked. Dominion would like to start the installation of the guards as soon as possible.

The Joint Permit Application is enclosed here for your review. Your immediate attention and quick processing would be greatly appreciated. If you have any questions regarding this submittal, please contact Oula Shehab-Dandan at (804) 273-2697 or oula.k.shehab-dandan@dominionenergy.com.

Sincerely,

Jason E. Williams
Director, Environmental

Attachment

FOR AGENCY USE ONLY	
	Notes:
JPA#	

APPLICANTS

PLEASE PRINT OR TYPE ALL ANSWERS. If a question does not apply to your project, please print N/A (not applicable) in the space provided. ***If additional space is needed, attach extra 8 ½ x 11 inch sheets of paper.***

Check all that apply			
Pre-Construction Notification (PCN) ☒ NWP # 3 *(For Nationwide Permits ONLY - No DEQ-VWP permit writer will be assigned)*	SPGP ☐	DEQ Reapplication ☐ Existing permit number:	Receiving federal funds ☐ Agency providing funding:
Regional Permit 17 (RP-17) ☐			

PREVIOUS ACTIONS RELATED TO THE PROPOSED WORK (Include all federal, state, and local pre application coordination, site visits, previous permits, or applications whether issued, withdrawn, or denied)				
Historical information for past permit submittals can be found online with VMRC - https://webapps.mrc.virginia.gov/public/habitat/ - or VIMS - http://ccrm.vims.edu/perms/newpermits.html				
Agency	Action / Activity	Permit/Project number, including any non-reporting Nationwide permits previously used (e.g., NWP 13)	Date of Action	If denied, give reason for denial
--	--	--	--	--
--	--	--	--	--

1. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR INFORMATION

The applicant(s) is/are the legal entity to which the permit may be issued (see How to Apply at beginning of form). The applicant(s) can either be the property owner(s) or the person/people/company(ies) that intend(s) to undertake the activity. The agent is the person or company that is representing the applicant(s). If a company, please also provide the company name that is registered with the State Corporation Commission (SCC), or indicate no registration with the SCC.

Applicant			Agent		
Legal Name(s) of Applicant(s): Virginia Electric and Power Company c/o Robert W. Sauer			Agent (if applicable): Oula Shehab-Dandan		
Mailing address: 5000 Dominion Boulevard			Mailing address: 5000 Dominion Boulevard		
City: Glen Allen	State: VA	ZIP Code: 23060	City: Glen Allen	State: VA	ZIP Code:
Phone number w/area code: 804-273-3685	Fax: --		Phone number w/area code: 804-273-2697	Fax: --	
Mobile: --	E-mail: See below		Mobile: 804-310-4881	E-mail: See below	
State Corporation Commission Name and ID number (if applicable): 006371-2			State Corporation Commission Name and ID number (if applicable): N/A		

Certain permits or permit authorizations may be provided via electronic mail. If the applicant wishes to receive their permit via electronic mail, please provide an e-mail address here: oula.k.shehab-dandan@dominionenergy.com

robert.w.sauer@dominionenergy.com   oula.k.shehab-dandan@dominionenergy.com

1. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR INFORMATION (Continued)					
Property owner(s) legal name, if different from applicant Same as Applicant			Contractor, if known --		
Mailing address --			Mailing address --		
City --	State --	ZIP code --	City --	State --	ZIP code --
Phone number w/area code --	Fax --		Phone number w/area code --	Fax --	
Mobile --	E-mail --		Mobile --	E-mail --	
State Corporation Commission Name and ID number (if applicable) --			State Corporation Commission Name ID number (if applicable) --		

2. PROJECT LOCATION INFORMATION (Attach a copy of a detailed map, such as a USGS topographic map or street map showing the site location and project boundary, so that it may be located for inspection. Include an arrow indicating the north direction. Include the drainage area if the SPGP box is checked on Page 7.)	
Street Address (911 address if available) 500 Coxendale Road	City/County/ZIP Code Chester/ Chesterfield/ 23836
Subdivision N/A	Lot/Block/Parcel # N/A
Name of water body(ies) within project boundaries and drainage area (acres or square miles). James River	
Tributary(ies) to: Chesapeake Bay Basin: James River Sub-basin: Lower James River (*Example: Basin: James River Sub-basin: Middle James River*)	
Special Standards (based on DEQ Water Quality Standards 9VAC25-260 et seq.): bb	
Project type (check one) ___ Single user (private, non-commercial, residential) X Multi-user (community, commercial, industrial, government) ___ Surface water withdrawal	
Latitude and longitude at center of project site (decimal degrees): 37.38361 / -77.3822 (Example: 37.33164/-77.68200)	
USGS topographic map name: Drewry Bluff/Dutch Gap (Attachment 1)	
8-digit USGS Hydrologic Unit Code (HUC) for your project site (See http://cfpub.epa.gov/surf/locate/index.cfm): 0208020806 If known, indicate the 10-digit and 12-digit USGS HUCs (see http://dswcapps.dcr.virginia.gov/htdocs/maps/HUExplorer.htm : 020802080601 02080208060106	
Name of your project (*Example: Water Creek driveway crossing*) Chesterfield Power Station- Intake Guards Replacement Project	
Is there an access road to the project? ☑ Yes ☐ No. If yes, check all that apply: ☐ public ☑ private ☐ improved ☐ unimproved	
Total size of the project area (in acres): N/A Installation of guards on existing sheet walls.	

2. PROJECT LOCATION INFORMATION (Continued)

Provide driving directions to your site, giving distances from the best and nearest visible landmarks or major intersections:

From 1-295 South-Take exit 16 to State Route 618. Turn right on Route 10 West. Turn right on Old Stage Road. Follow Old Stage Road to Chesterfield Power Station.

Does your project site cross boundaries of two or more localities (i.e., cities/counties/towns)? ☐ Yes ☑ No
If so, name those localities: __

3. DESCRIPTION OF THE PROJECT, PROJECT PRIMARY AND SECONDARY *PURPOSES*, PROJECT *NEED*, INTENDED USE(S), AND ALTERNATIVES CONSIDERED (Attach additional sheets if necessary).

- The purpose and need must include any new development or expansion of an existing land use and/or proposed future use of residual land.
- Describe the physical alteration of surface waters, including the use of pilings (#, materials), vibratory hammers, explosives, and hydraulic dredging, when applicable, and *whether or not tree clearing will occur* (include the area in square feet and time of year).
- Include a description of alternatives considered and measures taken to avoid or minimize impacts to surface waters, including wetlands, to the maximum extent practicable. Include factors such as, but not limited to, alternative construction technologies, alternative project layout and design, alternative locations, local land use regulations, and existing infrastructure.
- For utility crossings, include both alternative routes and alternative construction methodologies considered.
- For surface water withdrawals, public surface water supply withdrawals, or projects that will alter in stream flows, include the water supply issues that form the basis of the proposed project.

See Attachment 2

Date of proposed commencement of work (MM/DD/YYYY) March 7, 2019	Date of proposed completion of work (MM/DD/YYYY) March 22, 2019
Are you submitting this application at the direction of any state, local, or federal agency? ____Yes X No	Has any work commenced or has any portion of the project for which you are seeking a permit been completed? ____Yes X No

If you answered "yes" to either question above, give details stating when the work was completed and/or when it commenced, who performed the work, and which agency (if any) directed you to submit this application. In addition, you will need to clearly differentiate between completed work and proposed work on your project drawings.

--

Are you aware of any unresolved violations of environmental law or litigation involving the property? ____Yes X No
(If yes, please explain).

--

4. PROJECT COSTS

Approximate cost of the entire project, including materials and labor: $ 500,000
Approximate cost of only the portion of the project affecting state waters (channelward of mean low water in tidal areas and below ordinary high water mark in nontidal areas): $ 500,000

5. PUBLIC NOTIFICATION (Attach additional sheets if necessary)

Complete information for all property owners adjacent to the project site and across the waterway, if the waterway is less than 500 feet in width. If your project is located within a cove, you will need to provide names and mailing addresses for all property owners within the cove. If you own the adjacent lot, provide the requested information for the first adjacent parcel beyond your property line.

Failure to provide this information may result in a delay in the processing of your application by VMRC.

Property owner's name	Mailing address	City	State	ZIP code
County of Chesterfield (downstream)	P.O. Box 40	Chesterfield	VA	23832
Reynolds Real Estate Ventures, LLC. (upstream)	P.O. Box 40	Rockville	VA	23146

Name of newspaper having general circulation in the area of the project: Richmond Times Dispatch
Address and phone number (including area code) of newspaper 300 East Franklin Street, Richmond, VA 23219 (804) 643-4414

Have adjacent property owners been notified with forms in Appendix A? _____Yes X No (attach copies of distributed forms)

6. THREATENED AND ENDANGERED SPECIES INFORMATION

See Attachment 4

Please provide any information concerning the potential for your project to impact state and/or federally threatened and endangered species (listed or proposed). Attach correspondence from agencies and/or reference materials that address potential impacts, such as database search results or confirmed waters and wetlands delineation/jurisdictional determination. Include information when applicable regarding the location of the project in Endangered Species Act-designated or -critical habitats. Contact information for the U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration, Virginia Dept. of Game and Inland Fisheries, and the Virginia Dept. of Conservation and Recreation-Division of Natural Heritage can be found on page 4 of this package.

7. HISTORIC RESOURCES INFORMATION

See Attachment 5

***Note:** Historic properties include but are not limited to archeological sites, battlefields, Civil War earthworks, graveyards, buildings, bridges, canals, etc. Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the USACE from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the USACE, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.*

Are any historic properties located within or adjacent to the project site? ____ Yes X No _____ Uncertain
If Yes, please provide a map showing the location of the historic property within or adjacent to the project site.

Are there any buildings or structures 50 years old or older located on the project site? ____ Yes X No _____ Uncertain
If Yes, please provide a map showing the location of these buildings or structures on the project site.

Is your project located within a historic district? ____ Yes X No ____ Uncertain

If Yes, please indicate which district: --

7. HISTORIC RESOURCES INFORMATION (Continued)

Has a survey to locate archeological sites and/or historic structures been carried out on the property?
___ Yes X__ No ___ Uncertain

If Yes, please provide the following information: Date of Survey: --

Name of firm: --

Is there a report on file with the Virginia Department of Historic Resources? ____ Yes X___ No ___Uncertain

Title of Cultural Resources Management (CRM) report: --

Was any historic property located? ____ Yes X____ No __ Uncertain

8. WETLANDS, WATERS, AND DUNES/BEACHES IMPACT INFORMATION

Report each impact site in a separate column. If needed, attach additional sheets using a similar table format. Please ensure that the associated project drawings clearly depict the location and footprint of each numbered impact site. For dredging, mining, and excavating projects, use Section 17.

	Impact site number 1	Impact site number 2	Impact site number 3	Impact site number 4	Impact site number 5
Impact description (use all that apply): F=fill EX=excavation S=Structure T=tidal NT=non-tidal TE=temporary PE=permanent PR=perennial IN=intermittent SB=subaqueous bottom DB=dune/beach IS=hydrologically isolated V=vegetated NV=non-vegetated MC=Mechanized Clearing of PFO (*Example: F, NT, PE, V*)	N/A See Attachment 1	--	--	--	--
Latitude / Longitude (in decimal degrees)	--	--	--	--	--
Wetland/waters impact area (square feet / acres)	--	--	--	--	--
Dune/beach impact area (square feet)	--	--	--	--	--
Stream dimensions at impact site (length and average width in linear feet, and area in square feet)	--	--	--	--	--
Volume of fill below Mean High Water or Ordinary High Water (cubic yards)	--	--	--	--	--

8. WETLANDS/WATERS IMPACT INFORMATION (Continued)					
Cowardin classification of impacted wetland/water or geomorphological classification of stream *Example wetland: PFO; Example stream: 'C' channel and if tidal, whether vegetated or non-vegetated wetlands per Section 28.2-1300 of the Code of Virginia*	--	--	--	--	--
Average stream flow at site (flow rate under normal rainfall conditions in cubic feet per second) and method of deriving it (gage, estimate, etc.)	--	--	--	--	--
Contributing drainage area in acres or square miles (*VMRC cannot complete review without this information*)	--	--	--	--	--
DEQ classification of impacted resource(s): Estuarine Class II Non-tidal waters Class III Mountainous zone waters Class IV Stockable trout waters Class V Natural trout waters Class VI Wetlands Class VII http://leg1.state.va.us/cgi-bin/legp504.exe?000+reg+9	--	--	--	--	--
For DEQ permitting purposes, also submit as part of this section a wetland and waters boundary delineation map – see (3) in the Footnotes section in the form instructions.					
For DEQ permitting purposes, also submit as part of this section a written disclosure of all wetlands, open water, or streams that are located within the proposed project or compensation areas that are also under a deed restriction, conservation easement, restrictive covenant, or other land-use protective instrument.					

9. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR CERTIFICATIONS

READ ALL OF THE FOLLOWING CAREFULLY BEFORE SIGNING

PRIVACY ACT STATEMENT: The Department of the Army permit program is authorized by Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and Section 103 of the Marine Protection Research and Sanctuaries Act of 1972. These laws require that individuals obtain permits that authorize structures and work in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters prior to undertaking the activity. Information provided in the Joint Permit Application will be used in the permit review process and is a matter of public record once the application is filed. Disclosure of the requested information is voluntary, but it may not be possible to evaluate the permit application or to issue a permit if the information requested is not provided.

CERTIFICATION: I am hereby applying for permits typically issued by the DEQ, VMRC, USACE, and/or Local Wetlands Boards for the activities I have described herein. I agree to allow the duly authorized representatives of any regulatory or advisory agency to enter upon the premises of the project site at reasonable times to inspect and photograph site conditions, both in reviewing a proposal to issue a permit and after permit issuance to determine compliance with the permit.

In addition, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

9. APPLICANT, AGENT, PROPERTY OWNER, AND CONTRACTOR CERTIFICATIONS (Continued)	
Is/Are the Applicant(s) and Owner(s) the same? ☐ *Yes* ☐ *No*	
Legal name & title of Applicant Robert W. Sauer, VP Power Generation System Operations	Second applicant's legal name & title, if applicable --
Applicant's signature [signature]	Second applicant's signature --
Date 2/8/19	Date –
Property owner's legal name, if different from Applicant --	Second property owner's legal name, if applicable --
Property owner's signature, if different from Applicant --	Second property owner's signature --
Date --	Date --

CERTIFICATION OF AUTHORIZATION TO ALLOW AGENT(S) TO ACT ON APPLICANT'S(S') BEHALF (IF APPLICABLE)

I (we), Robert Sauer (and) -- ,
APPLICANT'S LEGAL NAME(S) – *complete the second blank if more than one Applicant*

hereby certify that I (we) have authorized Oula Shehab-Dandan (and) --
AGENT'S NAME(S) – *complete the second blank if more than one Agent*
to act on my (our) behalf and take all actions necessary to the processing, issuance, and acceptance of this permit and any and all standard and special conditions attached. I (we) hereby certify that the information submitted in this application is true and accurate to the best of my (our) knowledge.

Applicant's signature [signature]	Second applicant's signature, if applicable --
Date 2/8/19	Date --
Agent's signature and title [signature] Environmental Consultant	Second agent's signature and title, if applicable --
Date 2/8/2019	Date --

CONTRACTOR ACKNOWLEDGEMENT (IF APPLICABLE)

I (we), -- (and) -- ,
APPLICANT'S LEGAL NAME(S) – *complete the second blank if more than one Applicant*

have contracted -- (and) --
CONTRACTOR'S NAME(S) – *complete the second blank if more than one Contractor*

to perform the work described in this Joint Permit Application, signed and dated -- .

I (we) will read and abide by all conditions as set forth in all federal, state, and local permits as required for this project. I (we) understand that failure to follow the conditions of the permits may constitute a violation of applicable federal, state, and local statutes and that we will be liable for any civil and/or criminal penalties imposed by these statutes.
In addition, I (we) agree to make available a copy of any permit to any regulatory representative visiting the project site to ensure permit compliance. If I (we) fail to provide the applicable permit upon request, I (we) understand that the representative will have the option of stopping our operation until it has been determined that we have a properly signed and executed permit and are in full compliance with all of the terms and conditions.

Contractor's name or name of firm (printed/typed) --	Contractor's or firm's mailing address --	
Contractor's signature and title --	Contractor's license number --	Date --
Applicant's signature --	Second applicant's signature, if applicable --	
Date --	Date --	

APPENDIX C

Chesapeake Bay Preservation Act Information

Please answer the following questions to determine if your project is subject to the requirements of the Bay Act Regulations:

1. Is your project located within Tidewater Virginia? X Yes ____No (See map on page 31) - If the answer is "no", the Bay Act requirements do not apply; if "yes", then please continue to question #2.

2. Please indicate if the project proposes to impact any of the following Resource Protection Area (RPA) features:

    ____ Tidal wetlands, The project will not impact any RPA features.

    ____ Nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow,

    ____ Tidal shores,

    ____ Other lands considered by the local government to meet the provisions of subsection A of 9VAC25-830-80 and to be necessary to protect the quality of state waters (contact the local government for specific information),

    ____ A buffer area not less than 100 feet in width located adjacent to and landward of the components listed above, and along both sides of any water body with perennial flow.

If the answer to question #1 was "yes" and any of the features listed under question #2 will be impacted, compliance with the Chesapeake Bay Preservation Area Designation and Management Regulations is required. **The Chesapeake Bay Preservation Area Designation and Management Regulations** are enforced through locally adopted ordinances based on the Chesapeake Bay Preservation Act (CBPA) program. Compliance with state and local CBPA requirements mandates the submission of a ***Water Quality Impact Assessment (WQIA)*** for the review and approval of the local government. Contact the appropriate local government office to determine if a WQIA is required for the proposed activity(ies).

The individual localities, not the DEQ, USACE, or the Local Wetlands Boards, are responsible for enforcing the CBPA requirements and, therefore, local permits for land disturbance are not issued through this JPA process. **Approval of this wetlands permit does not constitute compliance with the CBPA regulations nor does it guarantee that the local government will grant approval for encroachments into the RPA that may result from this project.**

Notes for all projects in RPAs
Development, redevelopment, construction, land disturbance, or placement of fill within the RPA features listed above requires the approval of the locality and may require an exception or variance from the local Bay Act ordinance. Please contact the appropriate local government to determine the types of development or land uses that are permitted within RPAs.

Pursuant to 9VAC25-830-110, *on-site delineation of the RPA is required for all projects in CBPAs*. Because USGS maps are not always indicative of actual "in-field" conditions, they may not be used to determine the site-specific boundaries of the RPA.

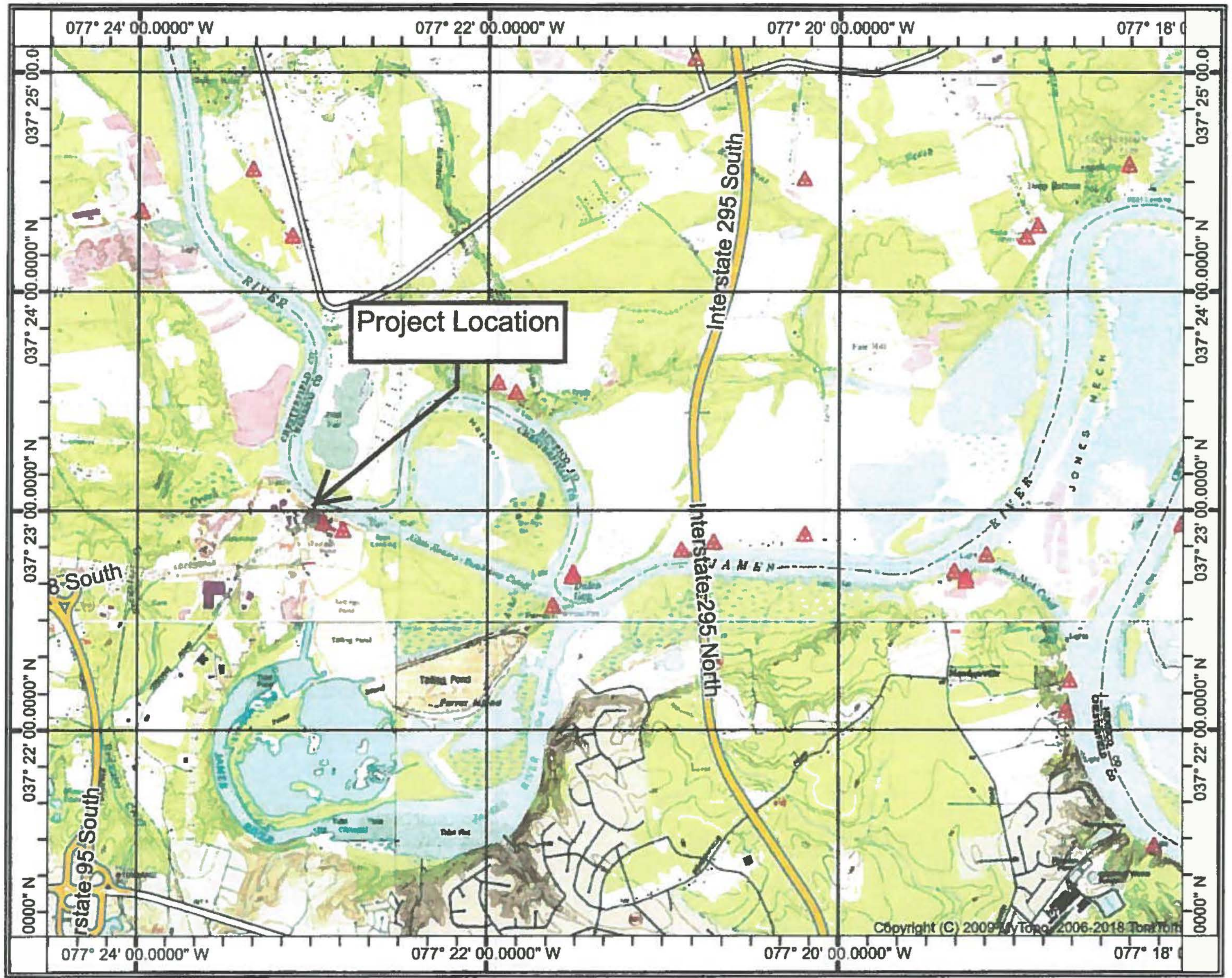
Notes for shoreline erosion control projects in RPAs
Re-establishment of woody vegetation in the buffer will be required by the locality to mitigate for the removal or disturbance of buffer vegetation associated with your proposed project. Please contact the local government to determine the mitigation requirements for impacts to the 100-foot RPA buffer.

Pursuant to 9VAC25-830-140 5 a (4) of the Virginia Administrative Code, shoreline erosion projects are a permitted modification to RPAs provided that the project is based on the "best technical advice" and complies with applicable permit conditions. In accordance with 9VAC25-830-140 1 of the Virginia Administrative Code, the locality will use the information provided in this Appendix, in the project drawings, in this permit application, and as required by the locality, to make a determination that:

1. Any proposed shoreline erosion control measure is necessary and consistent with the nature of the erosion occurring on the site, and the measures have employed the "best available technical advice"
2. Indigenous vegetation will be preserved to the maximum extent practicable
3. Proposed land disturbance has been minimized
4. Appropriate mitigation plantings will provide the required water quality functions of the buffer (9VAC25-830-140 3)
5. The project is consistent with the locality's comprehensive plan
6. Access to the project will be provided with the minimum disturbance necessary.

Attachment 1

PROJECT LOCATION



PROJECT LOCATION
CHESTERFIELD POWER STATION

SCALE 1:48000

0 1000 2000 3000 4000 5000 6000 7000 8000

Feet

Attachment 2

PROJECT DESCRIPTION

Chesterfield Power Station
Intake Guards Replacement Project

Project Description

Virginia Electric and Power Company d/b/a Dominion Energy (Dominion) is planning to conduct maintenance activities on the intake guards located on the sheet walls in front of the intake screens in the James River at the Chesterfield Power Station in Chester, Virginia. The maintenance activity includes replacing existing guards on Units 3, 4, 6, and 8 intakes sheet walls and installing new guards on Unit 5 intake sheet wall to protect of the intakes systems from large size debris and prevent large aquatic organisms from entering the intake bays.

Means and Methods

For Units 3, 4, and 8, the existing guards will be removed and replaced with the new guards. For Units 5 and 6 intakes, sheet pile openings will be increased to extend the opening up to elevation 0'-0" in order to maintain full pump capacity and keep water velocity down. The increase in height of the sheet wall opening at Unit 5 and Unit 6 does not affect volume nor does it affect the velocity at low water events. Increasing the height of the opening is needed to effectively slow the velocity at normal water levels. The river water bed will not be disturbed as part of this project. Steel fragments/cutouts from the sheet piles will be removed and sent offsite for proper disposal. See Attachment 3 for the guards design specifications and drawings.

Table 1. Intake Guards Dimensions and Proposed Maintenance Activities

	Unit 3	Unit 4	Unit 8	Unit 5	Unit 6	Unit 7
Width, ft	9.92	9.92	9.92	11.17	11.1	9.92
Height, ft	10	10	10	16.5	19	10
Comments	Replacement of existing intake guards			Cut steel sheet wall to extend the opening up to elevation 0'-0" Unit 5. Installation of new intake guard Unit 6. Replacement of existing intake guards		No Change

The guards will be constructed at an offsite location. They will be barged or trucked to the site, then lowered in the water using a crane located on a barge. The guards will then be bolted to the existing sheet walls from the riverside by divers.

The crane barge will be located close to the intakes sheet walls for the duration of the installation project (see Attachment 6 for Location Plan). The installation of the guards is expected to take two weeks weather permitting.

The crane barge location/position and the guards' installation activities are not expected to impact the navigational channel or traffic on the James River near the station.

Wetland Impacts

The installation of the guards on the intake sheet walls is not expected to disturb and/or modify the river bed. Wetlands and steams impacts are not expected

Threatened and Endangered Species

The installation of the guards is not expected to impact. See Attachment 4 for the IPAC Official Species List and the DGIF Initial Project Assessment Report.

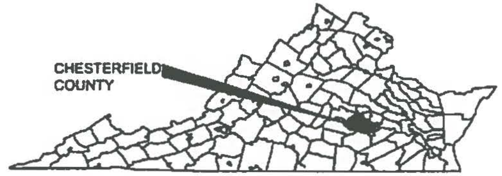
Cultural and Historic Resources

The installation of the guards is not expected to impact Cultural and Historic Resources. See Attachment 5 for the VCRIS map.

Attachment 3

DRAWINGS

JAMES RIVER INTAKE TRASH RACK
DOMINION ENERGY
CHESTERFIELD COUNTY, VIRGINIA
JANUARY 2019



COUNTY MAP
NTS

Sheet Index	
SHEET NUMBER	SHEET TITLE
1	TITLE
2	SPECIFICATIONS
3	UNITS 3, 4, 5, 6 & 8 PLAN & DETAIL
4	UNITS 3 & 4
5	UNIT 5
6	UNIT 6
7	UNIT 8

CHESTERFIELD COUNTY, VIRGINIA

ABBREVIATIONS:

ABOVE	ABV	DTL	DETAIL	GEN	GENERAL	NO	NUMBER	SHT	SHEET	WS	WATER SURFACE
ALT	ALTERNATE	DIA	DIAMETER	IN (")	INCHES	NOM	NOMINAL	SPA	SPACE	W/	WITH
&	AND	DS	DOWNSTREAM	INCL	INCLUDE	%	PERCENT	SQ	SQUARE	W/O	WITHOUT
@	AT	DWG	DRAWING	LBS/#	POUNDS	PL	PLATE	S S	STAINLESS STEEL		
BEL	BELOW	EA	EACH	LLV	LONG LEG VERTICAL	RAD	RADIUS	STD	STANDARD		
BTM	BOTTOM	EL	ELEVATION	MAX	MAXIMUM	REF	REFERENCE	STL	STEEL		
B/	BOTTOM OF	ETC	ET CETERA	MIN	MINIMUM	REQD	REQUIRED	TYP	TYPICAL		
CL / ℄	CENTERLINE	EQ	EQUAL	MISC	MISCELLANEOUS	SCH	SCHEDULE	T/	TOP OF		
		FT (')	FOOT					US	UPSTREAM		

DES BY TMR		1	1/10/19	REVIEW SET			NOT FOR CONSTRUCTION
DR BY RJW	PROJ NO 26-1699.00	2	1/10/19	REVIEW SET			
CHK BY TMR	DATE JANUARY 2019	NO	DATE	REVISION	NO	DATE	REVISION

JAMES RIVER INTAKE TRASH RACK
DOMINION ENERGY
CHESTERFIELD COUNTY, VIRGINIA

AYRES ASSOCIATES

TITLE

SHEET NO 1

TECHNICAL SPECIFICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Provide trash rack assembly items as shown and as specified.

1.2 SUBMITTALS

A. Shop Drawings and Product Data: Submit shop drawings for fabrication and delivery of metal assemblies. Include product data, layouts, details of sections, connections, and accessory items. Do not begin fabrication until shop drawings are approved.

B. Welder/Weld Certifications: Submit certificate of AWS or ASME Welder at least 48 hours before welding is scheduled to start. No welding shall be done until such certificates are received.

C. Mill Certificates: Furnish certified mill tests of chemical and physical properties of steel used in fabrication.

D. Submit items for review in a PDF electronic file. Submittals shall be clear and bear the stamp of approval of Contractor. Incomplete submittals will not be reviewed.

E. Corrections or comments made on submittals shall not relieve Contractor from compliance with requirements of Drawings and Specifications and shall not be considered an order for extra work.

1.3 QUALITY ASSURANCE

A. Establish and maintain a quality control program to assure compliance with these specifications and the drawings. Maintain records of quality control tests and inspections. Contractor shall be responsible for 100% visual inspection and necessary correction of all weld deficiencies.

B. Arrange and pay for services of an accredited testing laboratory approved by the Owner representative to inspect weld quality. All defects revealed as a result of tests shall be rectified by Contractor to the satisfaction of the Owner representative and at no additional cost to Owner.

C. Nondestructive Examination of Welds: Completed welds and weld profiles shall be 100 percent visually examined and shall be in accordance with requirements of AWSD1.1.

D. Magnetic Particle Examination: Magnetic particle examination shall be made on a random 10 percent of fillet welds in accordance with AWS standards.

PART 2 PRODUCTS

2.1 STEEL

A. Wide flange shapes shall be ASTM A992 or ASTM A572, Grade 50.

B. Pipe shall be ASTM A53, Grade B, Type E or S, Schedule 80. Alternatively, an equivalent thickness round tube (HSS) shall be ASTM A500, Grade B or Grade C.

C. Plate shall be ASTM A36 or ASTM A572, Grade 50.

2.2 FASTENERS

A. Unfinished Steel Fasteners: Regular hexagon-head bolts, ASTM F3125, Grade A325; with hex nuts, ASTM A563; and, where indicated, oversized flat washers.

2.3 EPOXY ADHESIVE ANCHORS

A. Description: Epoxy adhesive anchors with threaded rods, nuts, and washers.

B. Performance Requirements: Diameter and embedment depth of anchors shall be as indicated on the Drawings.

C. Adhesive: Adhesive shall be Hilti "HIT-RE 500-V3".

D. Rods, Nuts, and Washers: Anchor rods shall be stainless steel, ASTM F593, Alloy Group 1 or Alloy Group 2, Condition CW, with a minimum tensile strength of 100 ksi. Anchor rods shall be furnished with one chamfered end for hole insertion. Nuts shall conform to ASTM F594, Alloy Group 1 or Alloy Group 2. Oversized washers shall be stainless steel of the same composition as bolt and nut.

2.4 WELDING ELECTRODES

A. Welding shall be performed using 70 ksi tensile strength electrodes.

2.5 FABRICATION

A. Use new products and materials of designated type, size, and thickness or, if not shown, of required strength, stiffness, and durability. Work to shop drawings, using proven details of fabrication and support. Comply with AISC "Specification for Structural Steel Buildings" and AISC "Code of Standard Practice for Steel Buildings and Bridges".

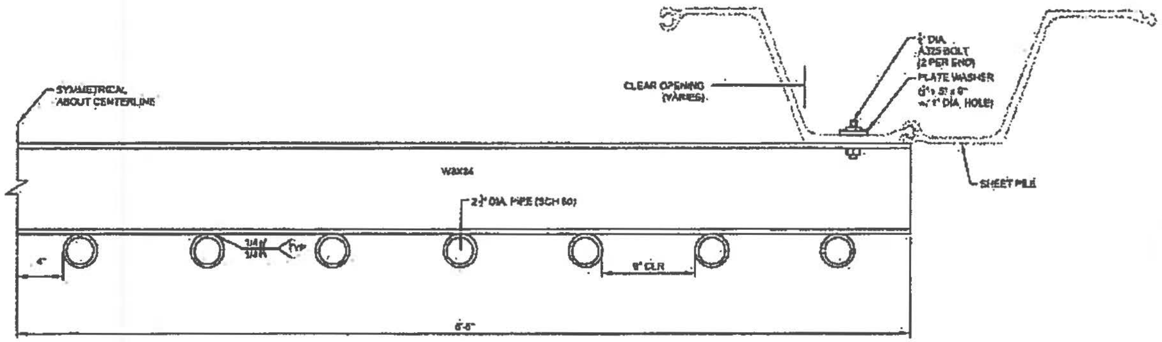
B. Form work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32 in. unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or other impairment. Shearings and punchings shall be clean and true.

C. Weld corners and seams continuously; comply with AWS recommendations. Grind exposed welds smooth and flush; match and blend with adjoining surfaces. Weld discoloration of exposed surfaces is not acceptable.

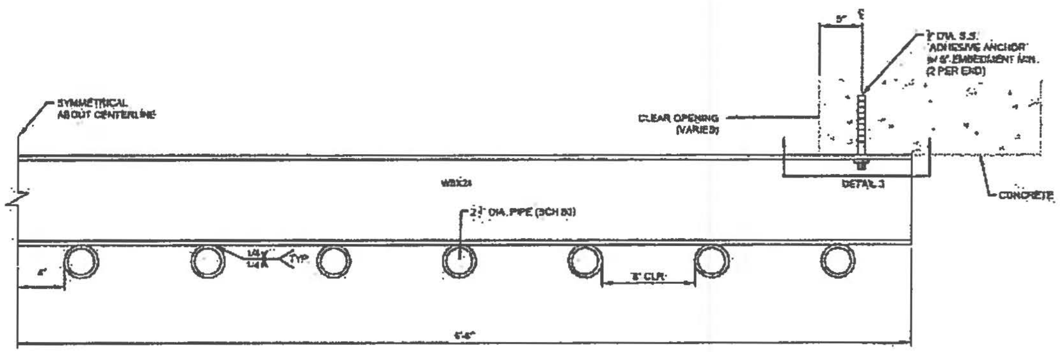
NOTES:
1. DRAWINGS NOT TO SCALE.
2. SEE TABLE BELOW FOR UNIT PROPERTIES.

UNIT PROPERTIES

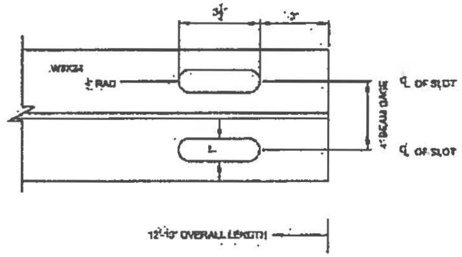
UNIT	CLEAR SPAN	SUBSTRATE
3 - A & B	11'-2"	CONCRETE
4 - A	11'-2"	CONCRETE
4 - B	11'-2"	STEEL SHEET PILING
5 - A & B	11'-4"	STEEL SHEET PILING
6 - A & B & C	11'-4"	STEEL SHEET PILING
8 - A & B	11'-0"	CONCRETE



1 TRASH RACK PLAN ON SHEET PILING



2 TRASH RACK PLAN ON CONCRETE



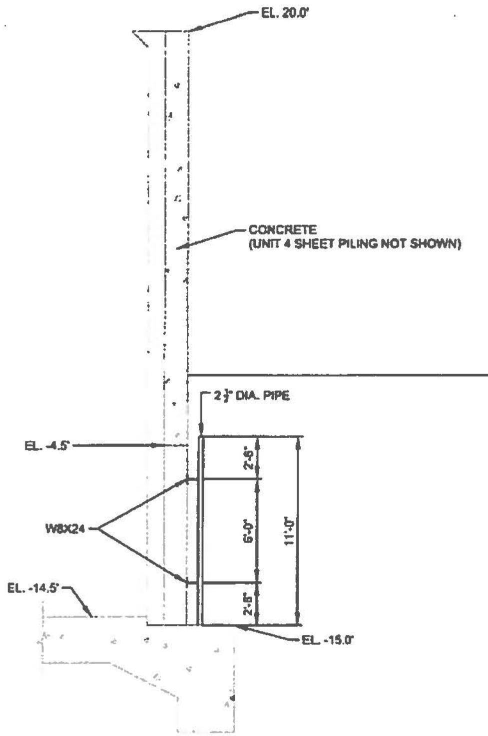
3 END BEAM ELEVATION @ D/S FLANGE

JAMES RIVER INTAKE TRASH RACK DOMINION ENERGY CHESTERFIELD COUNTY, VIRGINIA	AYRES ASSOCIATES	UNITS 3, 4, 5, 6 & 8 PLAN & DETAIL	3

NOTES:
1. DRAWINGS NOT TO SCALE.
2. STRUCTURE GEOMETRY TAKEN FROM PROJECT DRAWINGS AND CROFTON DIVING DRAWING ANNOTATIONS.
3. THE FOLLOWING PROJECT DRAWINGS WERE USED:

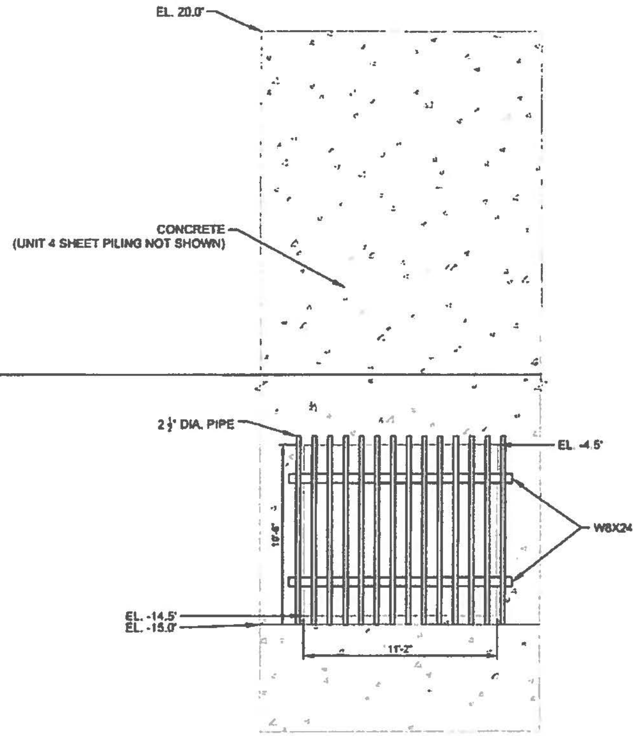
UNIT 3:
A) SCREEN WELL & PUMP HOUSE - REINFORCING - SHEET 1, 8461-FC-36, 1952 EXT. - CHESTERFIELD POWER STATION - CHESTER, VA, VIRGINIA ELECTRIC & POWER CO., STONE & WEBSTER ENGINEERING CORPORATION.
B) PUMP & SCREEN WELL HOUSE - ARRANGEMENT, 8461-FM-25, 1952 EXT. - CHESTERFIELD POWER STATION - CHESTER, VA, VIRGINIA ELECTRIC & POWER CO., STONE & WEBSTER ENGINEERING CORPORATION.

UNIT 4:
A) SCREEN WELL OUTLINE SH. 1, 9840-FC-3A, 1960 EXT. - CHESTERFIELD POWER STATION - CHESTER, VA, VIRGINIA ELECTRIC AND POWER CO., STONE & WEBSTER ENGINEERING CORPORATION.
B) SCREEN WELL OUTLINE SH. 2, 9840-FC-3B, 1960 EXT. - CHESTERFIELD POWER STATION - CHESTER, VA, VIRGINIA ELECTRIC AND POWER CO., STONE & WEBSTER ENGINEERING CORPORATION.



UNITS 3 & 4 SECTION

WATER LEVEL EL. 0.0'



UNITS 3 & 4 ELEVATION

JAMES RIVER INTAKE TRASH RACK
DOMINION ENERGY
CHESTERFIELD COUNTY, VIRGINIA

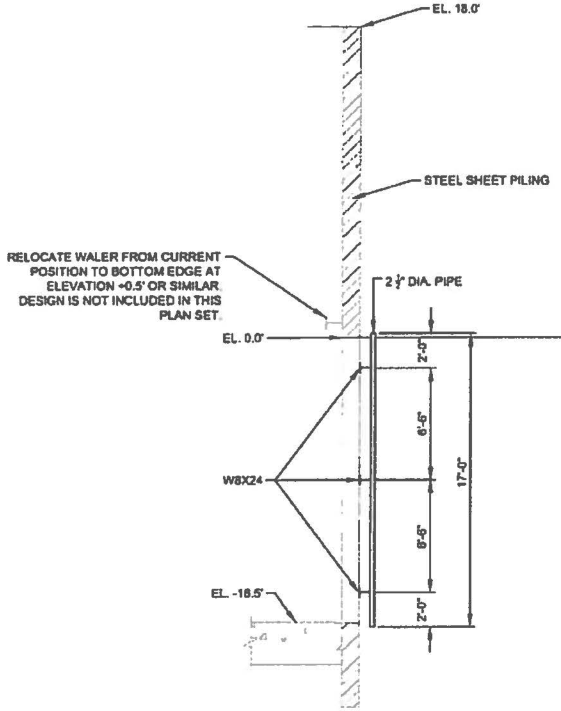
AYRES ASSOCIATES

UNITS 3 & 4

4

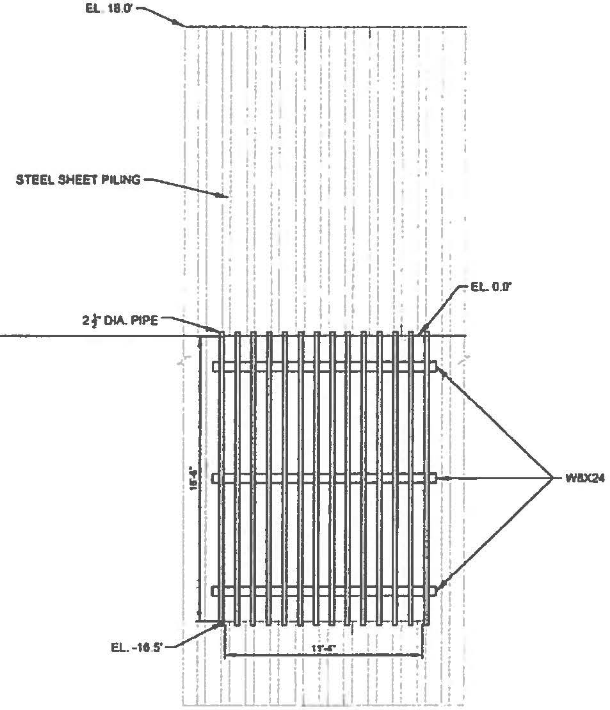
NOTES:
1. DRAWINGS NOT TO SCALE.
2. STRUCTURE GEOMETRY TAKEN FROM PROJECT DRAWINGS AND CROFTON DIVING DRAWING ANNOTATIONS.
3. THE FOLLOWING PROJECT DRAWINGS WERE USED:

UNIT 5:
A) SCREEN WELL OUTLINE SH. 1, 10539-FC-15A, 1964 EXT. - CHESTERFIELD POWER STA. - CHESTER, VA, VIRGINIA ELECTRIC AND POWER COMPANY, STONE & WEBSTER ENGINEERING CORPORATION.
B) SCREEN WELL OUTLINE SH. 2, 10539-FC-15B, 1964 EXT. - CHESTERFIELD POWER STA. - CHESTER, VA, VIRGINIA ELECTRIC AND POWER COMPANY, STONE & WEBSTER ENGINEERING CORPORATION.



UNIT 5 SECTION

WATER LEVEL EL. 0.0'



UNIT 5 ELEVATION

DES BY TWR		1		REVIEW SET			NOT FOR CONSTRUCTION	JAMES RIVER INTAKE TRASH RACK
DR BY RJW	PROJ NO 25-1099.00	2		REVIEW SET				DOMINION ENERGY
CHK BY TWR	DATE JANUARY 2019	NO	DATE	REVISION	NO	DATE	REVISION	CHESTERFIELD COUNTY, VIRGINIA

AYRES ASSOCIATES

UNIT 5

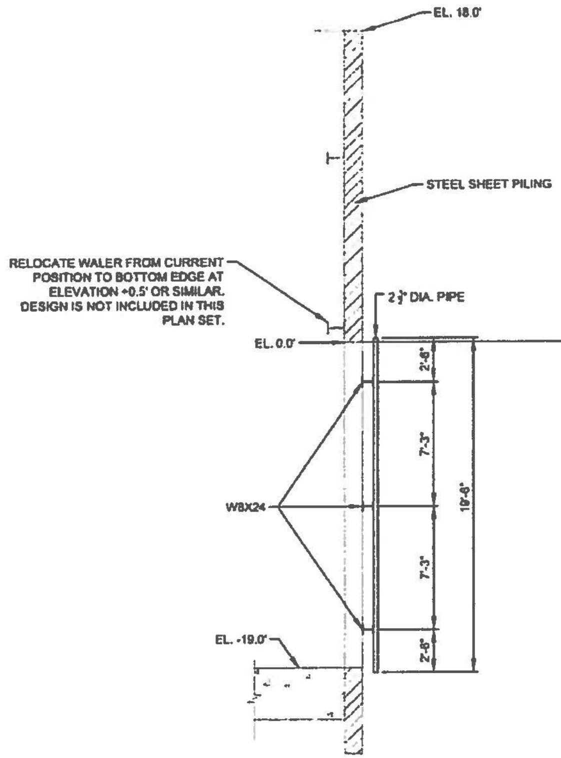
SHEET NO 5

NOTES:

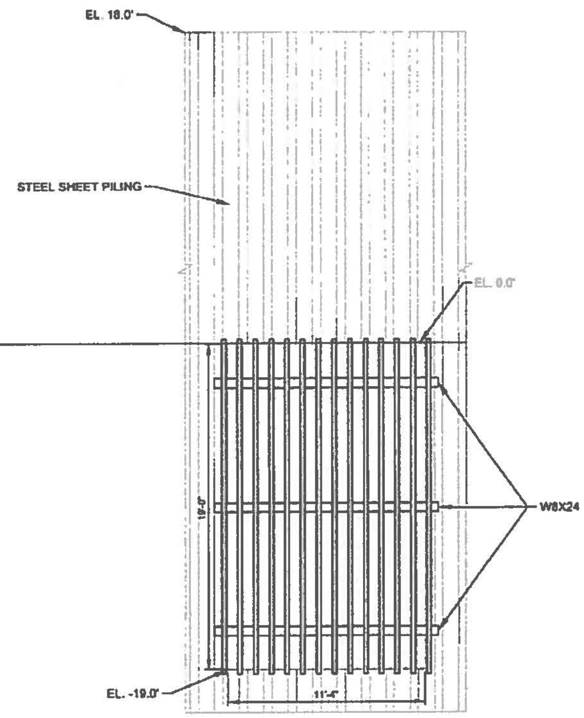
1. DRAWINGS NOT TO SCALE.
2. STRUCTURE GEOMETRY TAKEN FROM PROJECT DRAWINGS AND CROFTON DIVING DRAWING ANNOTATIONS.
3. THE FOLLOWING PROJECT DRAWINGS WERE USED:

UNIT 6:

A) SCREEN WELL OUTLINE SH2, 11260-FC-9B, 1969 EXT. - CHESTERFIELD POWER STA. - CHESTER, VA, VIRGINIA ELECTRIC AND POWER COMPANY, STONE & WEBSTER ENGINEERING CORPORATION.
B) SCREEN WELL GUARD, FSH25, CHESTERFIELD POWER STATION - CHESTER, VA, VIRGINIA ELECTRIC AND POWER COMPANY, STONE & WEBSTER ENGINEERING CORPORATION, 1967.



UNIT 6 SECTION



UNIT 6 ELEVATION

DES BY TMR		1		REVIEW SET			NOT FOR CONSTRUCTION
DR BY RJW	PROJ NO 26-1096.00	2		REVIEW SET			
CHK BY TMR	DATE JANUARY 2019	NO	DATE	REVISION	NO	DATE	REVISION

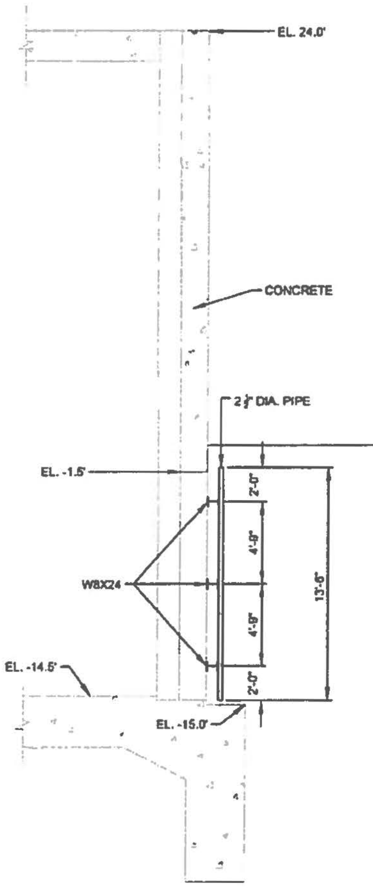
JAMES RIVER INTAKE TRASH RACK
DOMINION ENERGY
CHESTERFIELD COUNTY, VIRGINIA

AYRES ASSOCIATES

UNIT 6

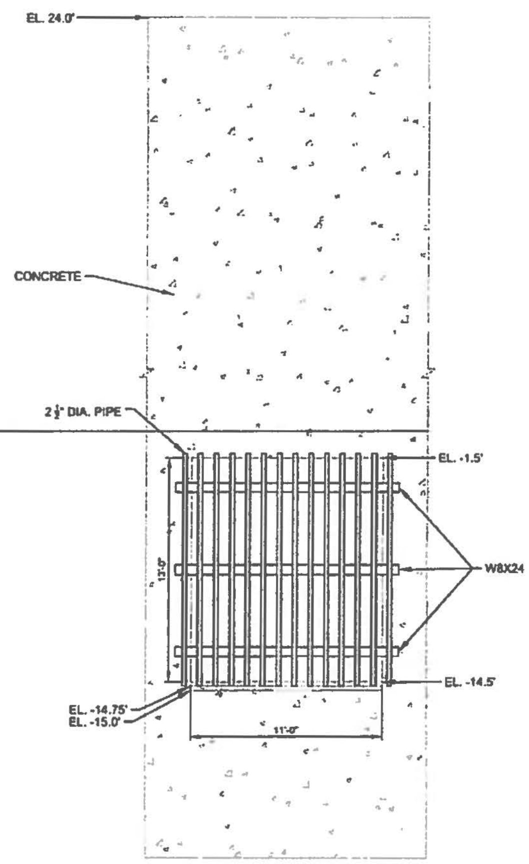
NOTES:
1. DRAWINGS NOT TO SCALE.
2. STRUCTURE GEOMETRY TAKEN FROM PROJECT DRAWINGS AND CROFTON DIVING DRAWING ANNOTATIONS.
3. THE FOLLOWING PROJECT DRAWINGS WERE USED:

UNIT 8:
INTAKE STRUCTURE EQUIPMENT ARRANGEMENT PLANS AND ELEVATION, 734898-M-211, CHESTERFIELD UNIT - 8, VIRGINIA POWER, LOCKWOOD GREENE ENGINEERS, 1992.



UNIT 8 SECTION

WATER LEVEL EL. 0.0'



UNIT 8 ELEVATION

TMR		1	REVIEW SET	NOT FOR CONSTRUCTION
RJW	PROJ NO 26-1099.00	2	REVIEW SET	
TMR	DATE JANUARY 2019	NO / DATE	REVISION	

JAMES RIVER INTAKE TRASH RACK
DOMINION ENERGY
CHESTERFIELD COUNTY, VIRGINIA

AYRES ASSOCIATES

UNIT 8

7

Attachment 4

THREATENED AND ENDANGERED SPECIES

IPaC OFFICIAL SPECIES LIST

DEPARTMENT OF GAME AND INLAND FISHERIES INITIAL PROJECT ASSESSMENT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032
http://www.fws.gov/northeast/virginiafield/

In Reply Refer To: January 30, 2019
Consultation Code: 05E2VA00-2019-SLI-1661
Event Code: 05E2VA00-2019-E-03773
Project Name: Chesterfield Power Station- Intake Guards

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
(804) 693-6694

Project Summary

Consultation Code: 05E2VA00-2019-SLI-1661

Event Code: 05E2VA00-2019-E-03773

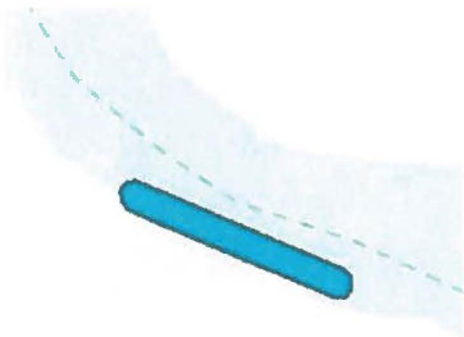
Project Name: Chesterfield Power Station- Intake Guards

Project Type: ** OTHER **

Project Description: Maintenance of Intake Guards

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/37.38370249573951N77.38211631774902W



Counties: Henrico, VA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

VaFWIS Search Report Compiled on 1/30/2019, 3:33:35 PM

Help

Known or likely to occur within a **3 mile radius around point 37.3836100 -77.3822198 in 041 Chesterfield County, 087 Henrico County, VA**

View Map of Site Location

535 Known or Likely Species ordered by Status Concern for Conservation (displaying first 27) (27 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
060017	FESE	Ia	Spinymussel, James	Parvaspina collina
060003	FESE	Ia	Wedgemussel, dwarf	Alasmidonta heterodon
010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus
050022	FTST	Ia	Bat, northern long-eared	Myotis septentrionalis
060029	FT	IIa	Lance, yellow	Elliptio lanceolata
050020	SE	Ia	Bat, little brown	Myotis lucifugus
050034	SE	Ia	Bat, Rafinesque's eastern big-eared	Corynorhinus rafinesquii macrotis
050027	SE	Ia	Bat, tri-colored	Perimyotis subflavus
040096	ST	Ia	Falcon, peregrine	Falco peregrinus
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus
060173	FPST	Ia	Pigtoe, Atlantic	Fusconaia masoni
020002	ST	IIa	Treefrog, barking	Hyla gratiosa
060081	ST	IIa	Floater, green	Lasmigona subviridis
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
030063	CC	IIIa	Turtle, spotted	Clemmys guttata
010077		Ia	Shiner, bridle	Notropis bifrenatus
040092		Ia	Eagle, golden	Aquila chrysaetos
040040		Ia	Ibis, glossy	Plegadis falcinellus
060084		Ib	Pigtoe, Virginia	Lexingtonia subplana
040213		Ic	Owl, northern saw-whet	Aegolius acadicus
040052		IIa	Duck, American black	Anas rubripes
040029		IIa	Heron, little blue	Egretta caerulea caerulea
040036		IIa	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040181		IIa	Tern, common	Sterna hirundo
040320		IIa	Warbler, cerulean	Setophaga cerulea
040140		IIa	Woodcock, American	Scolopax minor
040105		IIb	Rail, king	Rallus elegans

To view **All 535 species** View 535

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need;
II=VA Wildlife Action Plan - Tier II - Very High Conservation Need;
III=VA Wildlife Action Plan - Tier III - High Conservation Need;
IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.;
b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Anadromous Fish Use Streams (1 records)

View Map of All Anadromous Fish Use Streams

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE*	Highest Tier**	
C92	James River 1	Confirmed	6		IV	Yes

Impediments to Fish Passage (3 records)

View Map of All Fish Impediments

ID	Name	River	View Map
1040	CHESTERFIELD POWER STATION	TR-JAMES RIVER	Yes
1302	I-95	PROCTORS CREEK	Yes
807	PRIVATE ROAD CULVERT	KINGSLAND CREEK	Yes

Threatened and Endangered Waters (17 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	Highest TE*	T&E Waters Species BOVA Code, Status*, Tier**, Common & Scientific Name					View Map
James River (0154539)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0159144)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0159825)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0161402)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0163242)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0163551)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
	FESE	010032	FESE	Ib			Yes

James River (0163753)					Sturgeon, Atlantic	Acipenser oxyrinchus	
James River (0167412)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0167586)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0169802)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0171573)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0174220)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0179815)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0179857)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0182777)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0185318)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes
James River (0186088)	FESE	010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus	Yes

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

are present. View Map of Bald Eagle Concentration Areas and Roosts

(2 records)

BECAR ID	Observation Year	Authority	Type	Comments	View Map
49	2006 - 2007	Center for Conservation Biology at the College of William and Mary/Virginia Commonwealth University	Summer Concentration Area	Eagle_use Moderate	Yes
52	2006 - 2007	Center for Conservation Biology at the College of William and Mary/Virginia Commonwealth University	Winter Concentration Area	Eagle_use Moderate	Yes

Bald Eagle Nests (8 records)

View Map of All Query Results
Bald Eagle Nests

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
CD0604	13	Apr 18 2011	Unknown	Yes
CD0701	10	Apr 18 2011	Unknown	Yes
CD0804	7	Apr 18 2011	Unknown	Yes
CD1103	2	Apr 18 2011	Unknown	Yes
CD9901	22	Apr 18 2011	UNKNOWN	Yes
HE0801	8	Apr 18 2011	Unknown	Yes
HE9701	11	Apr 24 2000	HISTORIC	Yes
HE9902	22	Apr 18 2011	Unknown	Yes

Displayed 8 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species

N/A

Habitat Predicted for Terrestrial WAP Tier I & II Species (2 Species)

View Map of Combined Terrestrial Habitat Predicted for 2 WAP Tier I & II Species Listed Below

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040105		IIb	Rail, king	Rallus elegans	Yes
040093			Eagle, bald	Haliaeetus leucocephalus	Yes

Virginia Breeding Bird Atlas Blocks (5 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
51072	Chester, NE	28		III	Yes
51084	Drewrys Bluff, CE	3		III	Yes
51086	Drewrys Bluff, SE	68		III	Yes
52085	Dutch Gap, SW	2		III	Yes
52071	Hopewell, NW	1			Yes

Public Holdings: (1 names)

Name	Agency	Level
Richmond National Battlefield Park	National Park Service	Federal

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
041	Chesterfield	397	FESE	I
087	Henrico	389	FESE	I

USGS 7.5' Quadrangles:
Chester
Drewrys Bluff
Hopewell
Dutch Gap

USGS NRCS Watersheds in Virginia:

N/A

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
JA45	Appomattox River-Ashton Creek	72	FESE	I
JL03	James River-Proctors Creek	64	ST	II
JL04	Fourmile Creek	58	SS	II
JL06	James River-Curles Creek	70	SE	I

Compiled on 1/30/2019, 3:33:35 PM V957128.0 report=V searchType= R dist= 4827 poi= 37.3836100 -77.3822198

Site Location

37,23,01.0 -77,22,55.9
is the Search Point

Show Position Rings
◉ Yes ○ No
1 mile and 1/4 mile at the Search Point

Show Search Area
◉ Yes ○ No
3 Search distance miles radius

Search Point is at map center

Base Map Choices
Topography

Map Overlay Choices
Current List: Position, Search, BECAR, BAEANests, TEWaters, TierII, Habitat, Trout, Anadromous

Map Overlay Legend

T & E Waters
- Federal
- State

Predicted Habitat WAP Tier I & II
- Aquatic
- Terrestrial

Trout Waters
- Class I - IV
- Class V - VI

Anadromous Fish Reach
- Confirmed
- Potential

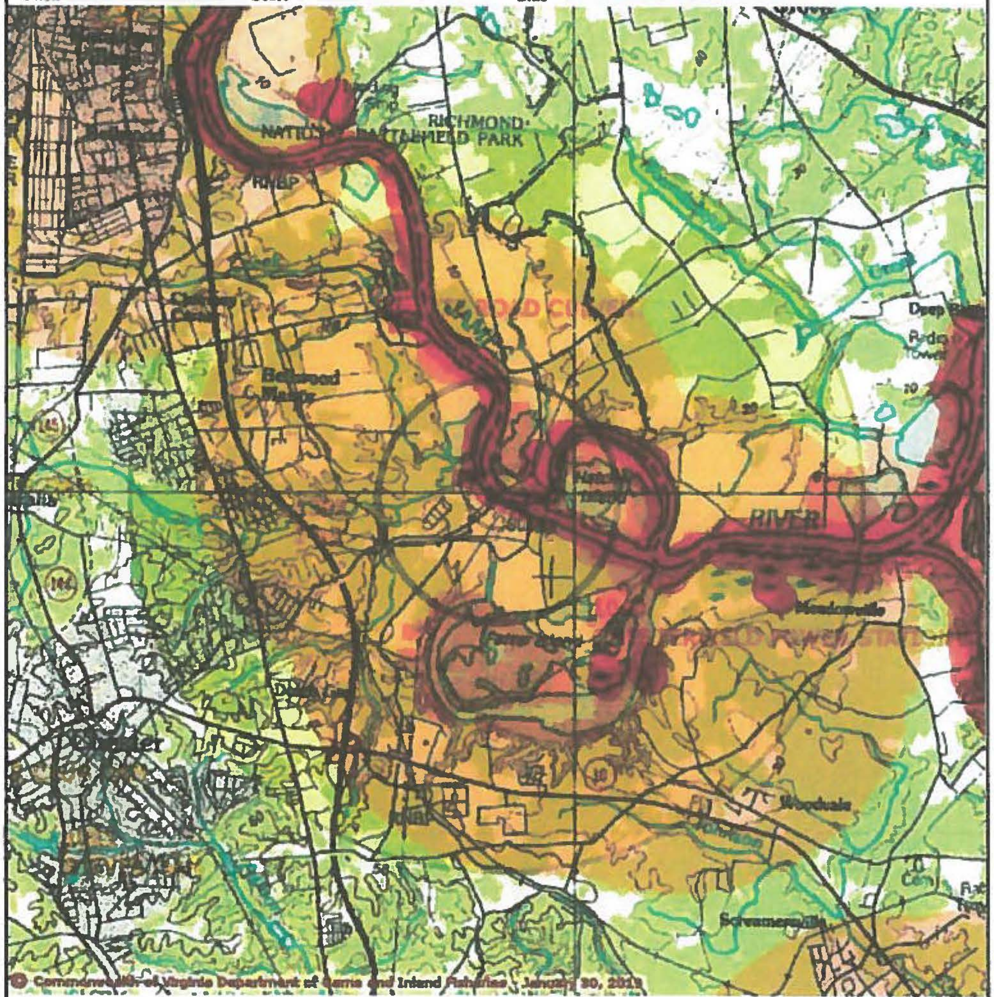
Impediment

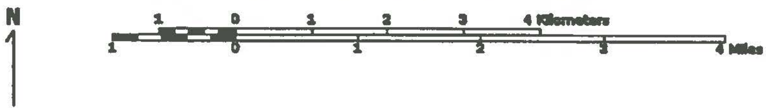
Position Rings 1 mile and 1/4 mile at the Search Point

3 mile radius Search Area

Bald Eagle Concentration Areas and Roosts

back | Map Click Pan | |Refresh Browser Page| Map Scale In Zoom Out | Screen Size Small Size Big | |Help|





Point of Search 37,23,01.0 -77,22,55.9
Map Location 37,23,01.0 -77,22,55.9

Select Coordinate System: ◉ Degrees,Minutes,Seconds Latitude - Longitude
○ Decimal Degrees Latitude - Longitude
○ Meters UTM NAD83 East North Zone
○ Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 18 NAD 1983 with left 282695 and top 4146492. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 800 columns by 800 rows for a total of 640000 pixles. The map display represents 12800 meters east to west by 12800 meters north to south for a total of 163.8 square kilometers. The map display represents 42001 feet east to west by 42001 feet north to south for a total of 63.2 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2019-01-30 15:30:31 (qa/qc March 21, 2016 12:20 - tn=957128.0 dist=4827 Visitor)
$poi=37.3836100 -77.3822198

Attachment 5

HISTORIC RESOURCES

Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Labels
- Architecture Points
- Historic Districts
- USGS GIS Place names
- County Boundaries

N

Feet

0 500 1000 1500 2000

1:18,056 / 1"=1,505 Feet

Title: Chesterfield Power Station **Date: 1/30/2019**

DISCLAIMER: Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions. The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

Notice if AE sites: Locations of archaeological sites may be sensitive the National Historic Preservation Act (NHPA), and the Archaeological Resources Protection Act (ARPA) and Code of Virginia §2.2-3705.7 (10). Release of precise locations may threaten archaeological sites and historic resources.

Attachment 6

BARGE LOCATION AND CHANNEL CLEARANCE

CROFTON
DIVING

757.397.1131 (24 hours)
757.397.8693 (fax)
16 Harper Avenue
PO Box 7756
Portsmouth, Virginia 23707

January 29, 2019

Dominion Energy
500 Coxendale Road
Chester, VA 23836

Attn: Matthew Woodzell, Supervisor Power Generation – Technical Support

Subject: Design Build, Intake Guard Replacement

Topic: Site Drawing, Barge location and channel clearance

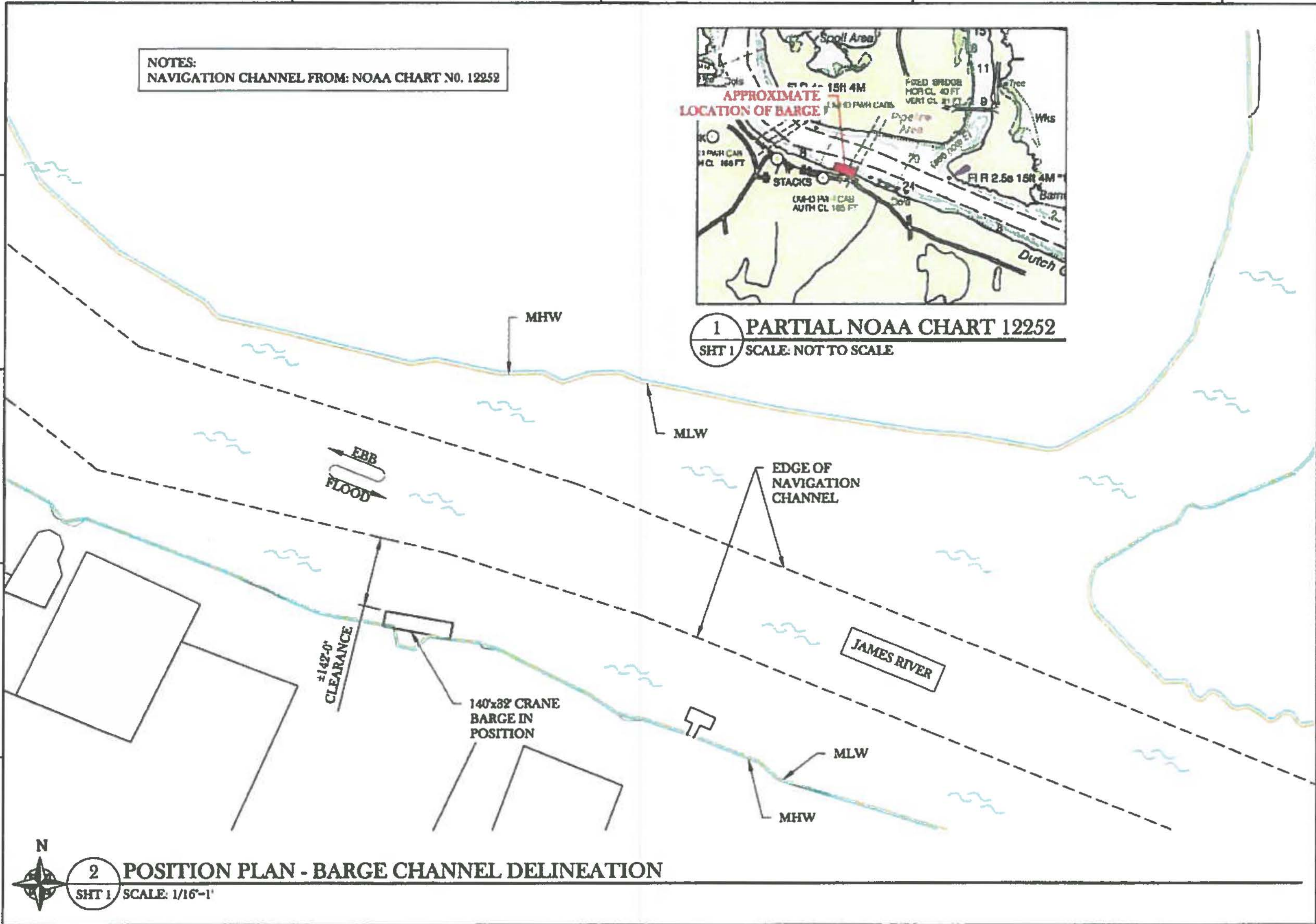
Dear Matt:

Thank you for the opportunity to work with you on the aforementioned project and we look forward to providing services compliant with the best approach to perform the above referenced design and construction. Per your request, please find attached a drawing depicting the work location of the crane barge that will be utilized for the Intake Guard Replacement project and the anticipated clearance to the edge of the navigation channel.

I hope this information meets your approval and should you have any questions or comments, please contact me at your convenience.

Sincerely,

David Mrowiec, P.E.
Project Engineer/Diving Supervisor
Crofton Diving Corporation
16 Harper Avenue
Portsmouth, VA 23707
757.397.1131(w)
757.319.2538(c)
757.397.8693(f)



1 PARTIAL NOAA CHART 12252
SHT 1 SCALE: NOT TO SCALE

2 POSITION PLAN - BARGE CHANNEL DELINEATION
SHT 1 SCALE: 1/16"=1'

REV: | ZONE: | REVISION NOTES: | REVISIONS

DESIGNED BY:
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Attachment 4: Garavelli et al. 2019, Using in situ digital holography to detect larvae of endangered species in cooling water intake systems.

White paper – Pilot study

Using in situ digital holography to detect larvae of endangered species in cooling water intake systems

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Accurate quantification of small organism distributions in the aquatic environment is challenging. Traditionally, nets are used to collect water samples that are analyzed using microscopy to identify and count organisms. This method is time consuming, prone to human error and inherently lethal to collected specimens. Recent advancements in underwater imaging technologies and automated classification help avoid these drawbacks and allow for rapid and accurate *in situ* sampling, enumeration, and classification of organisms in their natural environment.

Approach

The goal of this pilot study is to combine the AUTOHOLO, an autonomous, *in situ* holographic imaging system, with an automated processing algorithm to detect, count, and identify larvae of endangered species that can potentially be entrained in cooling water intake systems. We propose to use the AUTOHOLO to detect larvae present in water from the pump sampler. To assess the efficiency of the technology in imaging larvae, nets will be used to simultaneously sample the same volume of water imaged by the AUTOHOLO. Machine learning tools will be applied, allowing for the segmentation, detection, identification and enumeration of the target larval species present in each image. The combination of the AUTOHOLO and the automated processing routines will provide the ability to continuously monitor/detect the presence and concentration of endangered larval species in cooling water intake systems.

Description of the technology

Digital holography is a non-intrusive imaging technique that provides 3-D spatial distributions of all particles present in a sampling volume, thus facilitating characterization of particle/plankton size and distributions in their natural environment. The AUTOHOLO is a compact (70x50 cm, 36kg) holographic microscope that can be deployed for long durations (up to 4 weeks), sampling a relatively large volume of water compared to similar systems (72 mL per hologram, corresponding to 19 m^3/day, recording images continuously at 3.2 Hz). It has an adjustable resolution and can be deployed in diverse modes of operation (e.g. vertical profiling or on a benthic or surface platform). After application of an automated classification algorithm, all particles/organisms ranging from 10 µm to 3.5 cm in size can be completely characterized, identified and enumerated from holograms acquired by the AUTOHOLO.

Impact

Diversity of small organisms and particles reflects many aspects of the health of the ecosystem, and automated methods to monitor them would increase the value and cost effectiveness of monitoring applications. The combination of the AUTOHOLO with automated processing routines creates a powerful resource that could help detect and enumerate endangered larval species. This in turn facilitates quantification of ecosystem damages (if any) that could be induced by entrainment or impingement of these larval species in cooling intake systems of power plants.