

Westinghouse Columbia Fuel Fabrication Facility (CFFF)
Proposed 40-Year License Renewal

Responses to National Marine Fisheries Service's (NMFS) Dec 12, 2017, Questions

NMFS Consultation No. SER-2017-18839

- 1. Has the Nuclear Regulatory Commission (NRC) ever consulted with National Marine Fisheries Service (NMFS) or with the U.S. Fish and Wildlife Service on this site or on a similar project nationally? Can NRC provide us with pertinent consultation perspectives on this request?**

Westinghouse Electric Company (WEC) has been operating the Columbia Fuel Fabrication Facility (CFFF) since 1969. Since that time, the U.S. Nuclear Regulatory Commission (NRC) has issued multiple renewed licenses to WEC for continued operation of the CFFF. The NRC prepared environmental assessments (EAs) pursuant to the National Environmental Policy Act (NEPA) related to CFFF relicensing in 1985, in 1995, and, most recently, in 2007. The NRC evaluated potential impacts to federally listed species in the 1985 and 1995 EAs ([ML17219A167](#) and [ML17219A168](#), respectively), but the NRC staff did not consult with the NMFS or the U.S. Fish and Wildlife Service (FWS) as part of these reviews because the staff concluded that facility operations would not affect any federally listed species, including the shortnose sturgeon. For the 2007 relicensing, the NRC consulted with the FWS, which is described in the 2007 EA ([ML070510647](#)). In May 2015, as part of its review of WEC's 2014 license renewal application, the NRC staff requested the FWS's concurrence on the staff's determination that the CFFF license renewal was not likely to adversely affect threatened and endangered species ([ML15104A238](#)). The FWS concurred with the staff's determination ([ML15161A543](#)). During that review, the NRC staff did not identify the shortnose sturgeon as a species potentially occurring in Richland County at that time, and therefore, the NRC staff did not consult with the NMFS.

Pertaining to other NRC consultations, by email dated December 13, 2017, Briana Grange, NRC Aquatic Biologist, conveyed examples of other consultations completed by the NRC with the NMFS specifically pertaining to shortnose and Atlantic sturgeon at other NRC-licensed facilities ([ML17356A209](#)).

- 2. Why does NRC only consider ammonia, fluorides, and uranium in the Biological Evaluation, when there are other discharge limits in the National Pollutant Discharge Elimination System (NPDES) permit (e.g., minimum dissolved oxygen [DO])?**

- a. Why now and why these compounds?**

In its Biological Evaluation ([ML17227A378](#)), the NRC staff describes the liquid wastes generated during CFFF operations and explains that WEC treats liquid effluents leaving the main plant area to remove uranium, ammonia, and fluorides through filtration, flocculation, lime addition, distillation, and precipitation in a series of holding lagoons. The staff specifically focuses on these effluents (uranium, ammonia, and fluorides) because ammonium fluoride and uranium are the main constituents in the process liquid waste streams. The average annual concentrations of other contaminants in CFFF's liquid effluent

discharge are listed in Table 2.1–4 in Section 2.1.4 of WEC’s Environmental Report ([ML14353A238](#)).

b. Why just NPDES parameters?

As described above, the NRC staff did not focus its discussion of liquid wastes in the Biological Evaluation on National Pollutant Discharge Elimination System (NPDES) permit parameters but, rather, on the primary chemical constituents of the CFFF process liquid waste streams. However, in general, when evaluating the impacts of facility effluent discharges on the aquatic environment or federally listed species, the NRC staff uses the facility’s NPDES permit limits as a means of conservatively bounding its effect analysis. The staff makes the reasonable assumption that the licensee will comply with and the State will enforce the NPDES permit limitations during the proposed license renewal term. The NRC staff then uses the permit limits to assess the upper limit (maximum) of expected impacts to listed species. Actual impacts will vary based on the actual concentrations of effluents discharged from the facility but can be assumed to be less than or equal to the level of impact were the facility to discharge chemical effluents at the permit limit for the entirety of the renewal period.

c. Are there aspects of this project that NRC made a ‘no effect’ determination for besides Atlantic sturgeon species and Atlantic sturgeon critical habitat?

In its August 2017 Biological Evaluation, the NRC staff concluded that the proposed CFFF license renewal may affect, but is not likely to adversely affect the shortnose sturgeon. In its responses to the NMFS’s October 12, 2017, requests for additional information ([ML17292A089](#)), the NRC indicated that the Atlantic sturgeon and its critical habitat do not occur in the action area, and that, therefore, the staff made a “no effect” determination for both the species and its critical habitat. The NRC staff did not identify any other federally listed, proposed, or candidate species or proposed or designated critical habitat in the action area and under the jurisdiction of the NMFS, and therefore, the staff has made no other “no effect” determinations relevant to the proposed CFFF license renewal.

3. The Biological Evaluation states that sturgeon could swim around the effluent plume to avoid chemicals and other pollutants. What is the scientific basis for making such a statement?

a. What is the effluent temperature relative to the Congaree River temperature? The ambient temperature in the lagoon and outfall pipe may be hot as compared to the river temperature at the discharge point. Is there a thermal plume? Can the size and the shape of the thermal plume be approximated and graphically depicted over time using isobar concentration figures from actual data?

As indicated in the NRC staff’s responses to the NMFS’s September 22, 2017, requests for additional information ([ML17276A077](#)), the CFFF effluent is not heated. Because the travel time for process water is typically a week or more through the CFFF Waste Water Treatment Plant’s lagoon system prior to discharge, effluent enters the Congaree River at ambient temperature. The NRC staff has confirmed this information with staff of the South Carolina Department of Health and Environmental Control (SCDHEC).

b. Is there a (shortnose) sturgeon spawning area nearby?

The NRC's Biological Evaluation states the following with regards to shortnose sturgeon spawning in the vicinity of the action area:

Through telemetry data and egg collections, the South Carolina Department of Natural Resources (SCDNR) has identified spawning sites in both the Cooper River and Congaree River. Data collected by Collins et al. (2003) indicates that individuals can pass the Granby Lock and Dam, so spawning likely also occurs upriver of the City of Columbia. In spring 2007, Kleinschmidt (2007) conducted a survey for adult, juvenile, larvae, and eggs at locations both upstream and downstream of the Granby Lock and Dam. However, no shortnose sturgeon were collected. Kleinschmidt (2007) suggested that the lack of collections may have been linked to temperatures, which were not high enough to support spawning despite survey collections occurring during peak spawning periods. The results of this survey suggest that the Congaree River in the vicinity of Columbia may not provide adequate conditions to support successful spawning each year. Nonetheless, spawning may still occur near the Granby Lock and Dam based on the previously described surveys.

In a December 13, 2017, teleconference between the NRC staff and the NMFS ([ML17356A222](#)), the NMFS indicated that it would provide the NRC with copies of the most recently available scientific literature on shortnose sturgeon spawning in the Santee–Cooper Reservoir System. Following the teleconference, Andrew Herndon, NMFS, transmitted a paper entitled: *Shortnose Sturgeon in the Santee–Cooper Reservoir System, South Carolina*. The NRC staff had reviewed this report and referenced it in its Biological Evaluation. The report is cited as “Collins et al. 2003” in the above excerpt. The NRC staff has not identified any additional data or reports that would provide more recent or detailed information on shortnose sturgeon spawning in the action area. Thus, the information included in the staff's Biological Evaluation remains the most currently available information pertaining to shortnose sturgeon spawning in the Congaree River.

c. What is the benthic habitat and water depth in the action area?

The Congaree River in the vicinity of the CFFF discharge contains sand and mud substrate typical of Piedmont streams. Section 3.7.2 of the NRC's 1985 EA ([ML17219A167](#)) describes the benthic environment in more detail. Based on data from the past 10 years (2008–2017) at the U.S. Geological Survey's gauging station closest to the CFFF (Lake Murray near Columbia, SC; Station No. 02168500), Congaree River water depth averages 4.12 feet and ranges from 1.5 to 31.83 feet.¹

4. Is water quality in the action area within the Congaree River safe for the Atlantic sturgeon and shortnose sturgeon? Provide the NPDES permit, too, please.

The NRC provided the NMFS with a copy of WEC's current NPDES permit ([ML17283A098](#)) and the SCDHEC's permit rationale ([ML17356A222](#)) by email from Jessie Quintero, NRC, to Sarah Furtak, NMFS, dated December 14, 2017. The SCDHEC's rationale explains that the shortnose sturgeon is the only federally listed species with the potential to occur in the area, that the SCDHEC

¹ https://nwis.waterdata.usgs.gov/nwis/wys_rpt/?site_no=02168500

considered impacts to this species when establishing NPDES permit limits, and that the permit limits are protective of sturgeon. Specifically, the permit rationale states the following:

The one species that lives in the Congaree River, which is listed by both the federal and states authorities as legally Endangered is the shortnose sturgeon. It should be noted that while the Department [South Carolina Department of Natural Resources (SC DNR)] has identified shortnose sturgeon as potentially living in the entire stretch of the Congaree River in South Carolina, it has only been observed below the confluence of the Congaree and Wateree Rivers, which is more than 20 miles downstream of this facilities discharge.

...In previous discussions with SC DNR concerning the shortnose sturgeon, it was noted that shortnose sturgeons, particularly juveniles, are sensitive to low dissolved oxygen [DO] levels. As stated earlier in this rationale the permit DO limit will ensure the instream state standard is met, therefore DO should not impact the sturgeon in the Congaree River. Aside from DO, there is no information showing that the shortnose sturgeon is more sensitive than the established criteria used to evaluate the permit limitations. Therefore based on known information this permit is protective of the shortnose sturgeon.

Ammonia -- Based upon calculations of un-ionized ammonia levels with discharge monitoring report (DMR) data for ammonia, pH, and year-round river temperatures (temperatures found in national water quality database <https://www.waterqualitydata.us/portal/>), effluent concentrations of “Nitrogen, ammonia total (as N)” appear to correspond with un-ionized ammonia in concentrations that exceed the 0.05 mg/L level, a level of toxic to fish, (<http://edis.ifas.ufl.edu/pdf/files/FA/FA03100.pdf>); at 2.0 mg/L, fish will die.

- a. **What are the un-ionized ammonia concentrations in the action area? Is there an un-ionized ammonia concentration plume in the river? Can the size and the shape of the un-ionized ammonia plume be approximated and graphically depicted over time using isobar concentration figures from actual data?**

The CFFF produces ammonia liquid waste in the form of ammonium fluoride (NH₄F). Following the addition of lime and caustic to precipitate out fluoride, most of the ammonia is recovered by distillation and returned as ammonium hydroxide (NH₄OH) to facility's ammonium diuranate (ADU) process, the process through which uranium fuel pellets are fabricated. Remaining liquid waste moves through a series of holding lagoons prior to discharge to the Congaree River.

WEC's current NPDES permit limits the discharge of ammonia-nitrogen (total as N) to a monthly average of 50 pounds per day (lbs/day) and a daily maximum of 100 lbs/day. In its Environmental Report, WEC states that the annual average concentration of ammonia in the CFFF's combined (process plus sanitary) liquid effluent is well below the NPDES limit at 27.0 lbs/day or 20.1 milligrams per cubic liter (mg/L²) (see Table 2.1–4 in Section 2.1.4, [ML14353A238](#)).

Fluorides -- Effluent concentrations DMR data for fluorides appear NLAA for sturgeon based upon available, limited toxicology data (for Siberian sturgeon).

- b. **What are the fluoride concentrations in the action area? Is there a fluoride concentration plume in the river? Can the size and the shape of the fluoride plume be**

approximated and graphically depicted over time using isobar concentration figures from actual data?

During treatment of the liquid waste streams, ammonium fluoride (NH_4F) is converted to insoluble calcium fluoride (CaF_2) with the addition of lime and caustic. The CaF_2 slurry is then discharged to the west lagoon to permit settling of the solids. Liquid is decanted from the top of the west lagoon on a batch basis to the north and south lagoons where additional settling takes place. Following settling, the remaining liquid is pumped and ultimately discharged to the Congaree River. In its Environmental Report, WEC states that the annual average concentration of fluoride in CFFF's combined (process plus sanitary) liquid effluent is 10.7 lbs/day or 8 mg/L² (see Table 2.1–4 in Section 2.1.4, [ML14353A238](#)).

Uranium — According to NRC (Jessie Quintero) on 12/6/2017, fish samples have shown no uranium and sediment samples measure <2 pCi/g.

- c. What are the uranium concentrations in the action area? Is there a uranium concentration plume in the river? Can the size and the shape of the uranium plume be approximated and graphically depicted over time using isobar concentration figures from actual data?**

The NRC staff has no information to indicate the presence of a uranium plume in the river.

- d. Were the readings Jessie mentioned taken in the action area?**

As part of its current NRC license, WEC collects one sediment sample and one fish sample annually from the Congaree River and analyzes those samples for gross alpha, gross beta, and uranium. Based on samples collected between 2011 and 2015, total uranium activity in the sediment was less than 2 picocuries per gram (pCi/g). Fish samples collected during the same time frame contained no uranium.

As required by its current NRC license, WEC annually samples three locations within the Congaree River for gross alpha: 500 feet upstream of the CFFF discharge, 500 feet downstream of the CFFF discharge, and upstream of CFFF at Blossom Bridge in Columbia, South Carolina. Data collected from June 2011 through December 2015 indicate gross alpha concentrations were less than 10 pCi/L, which is below the U.S. Environmental Protection Agency's (EPA) drinking water maximum contaminant level (MCL) for gross alpha of 15 pCi/L.

- e. In those readings, were fish an appropriate size for bioaccumulation extrapolation to sturgeon? What fish species were studied? Where?**

WEC stated that they do not attempt to catch certain fish species but do attempt to collect fish that are large enough to be filleted and sampled by the laboratory.

- f. **We have recent data on uranium concentrations in liquid effluent (e.g., ppm, uCi, pCi/L). How do these units compare/convert – if at all -- to the 1 rad/day DOE guideline that NRC uses to assess effects to aquatic biota (i.e., with 1 rad/day being the level at which DOE expects no negative population-level effects)?**

The DOE guideline of 1 rad per day (rad/d) is an absorbed dose rate and therefore cannot be converted to a concentration (e.g., picocuries per liter (pCi/L) or picocuries per kilogram (pCi/kg)).

- g. **Why does NRC use a guideline of 1 rad/day to assess impacts to sturgeon when 1 rad/day correlates with significant histological effects on the gonads of small tropical fish? We need to be able to compare units to make determinations.**

As described in the NRC's responses to the NMFS's September 22, 2017, requests for additional information ([ML17276A077](#)), the NRC relies on screening methodology developed by the U.S. Department of Energy (DOE) to evaluate radiological dose rates to biota from environmental sources. The DOE's screening methodology provides limiting radionuclide concentration values (called BCGs) for aquatic and terrestrial biota. The DOE's BCGs were developed on the basis of experimental evidence that negative effects would not occur at or below the guideline doses. For aquatic biota, the DOE's guideline is 1 radiation-absorbed dose per day (rad/d) (1 gray per day (Gy/d)), at which level the DOE expects no negative population-level effects. The NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants ([ML13107A023](#)) summarizes the DOE's guideline rationale as follows:

As described in Blaylock et al. (1993), this guideline was derived by reviewing the results of experimental data (NCRP 1991) that indicated there would not be any negative population-level effects on aquatic biota at doses up to 1 rad/d (0.01 Gy/d). That review reported that significant histological effects on the gonads of small tropical fish were detected at a dose of 1 rad/d (0.01 Gy/d), although the majority of controlled studies that examined the potential chronic effects of ionizing radiation on aquatic organisms did not find significant effects unless the dose was much greater than 1 rad/d (0.01 Gy/d) (NCRP 1991). Real et al. (2004) summarized several chronic irradiation studies on fish (mostly from gamma radiation at dose rates of 0.2 to 120 rad/d [0.02 to 1.2 Gy/d]) that reported effects, such as lowered fecundity, delayed spawning, reduced testis mass and sperm production, reduced immune response, reduced larval survival, and increased vertebral anomalies. They concluded that dose rates of less than approximately 10 rad/d (0.1 Gy/d) to any life stage are unlikely to affect survival (Real et al. 2004). Kryshev and Sazykina (1998) reported that ecological effects of ionizing radiation on aquatic biota occur at dose rates between 0.2 and 80,000 rad/d (0.002 and 800 Gy/d). For comparison, Brown et al. (2004) used models to estimate doses to aquatic biota from naturally occurring radionuclides as ranging from 0.00024 to 0.11 rad/d (2.4×10^{-6} to 1.1×10^{-3} Gy/d) for European freshwater ecosystems and 0.00024 to 0.06 rad/d (2.4×10^{-6} to 6.0×10^{-4} Gy/d) for European marine waters.

Accordingly, although one study reviewed by the DOE during its guideline derivation indicated that histological effects could be detected in the gonads of small tropical fish at 1 rad/day (0.1 Gy/d), a number of other studies found the threshold for detectable effects to be much higher. The DOE's guidelines are further described and explained in DOE-STD-

1153-2002, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*.²

DO — Effluent concentrations DMR data for DO appear NLAA for sturgeon (generally, DO concentrations below 4.5 mg/L are cause for worry and 6.0 mg/L or greater are good).

- h. Are the DMR data monthly averages? If so, what weekly DO data (required by the NPDES permit) do you have for the outfall?**

The NPDES permit limits dissolved oxygen to 1.0 milligrams per liter (mg/L) at all times. The permit requires WEC to take grab samples once per week. When reporting dissolved oxygen values, WEC reports the single lowest value during the calendar month. For instance, if WEC collects one grab sample per week, and in a typical month WEC would collect four samples, WEC would report the lowest of these four dissolved oxygen values to the SCDHEC. In cases where WEC collects more than one dissolved oxygen sample per day, which is not required, the SCDHEC permits WEC to average that day's results. Neither the NRC nor SCDHEC have weekly DO data. The minimum of 1 mg/L for DO was based on modeling done by the State to ensure the in-stream DO at critical stream flow would never go below the State's DO standards for freshwater.

E. coli -- Water quality in the Congaree River segment at the outfall 001 is impaired for E. coli.

- i. Is this likely to adversely affect sturgeon?**

The SCDHEC lists several segments of the Congaree River as impaired due to reported *Escherichia coli* (*E. coli*) concentrations. However, the impaired segments are impaired for recreational use support and not for aquatic life use support.³ South Carolina's current water quality standard for primary contact recreational use in freshwaters for *E. coli* is "not to exceed a geometric mean of 126/100 mL [126 colony-forming units per 100 milliliters] based on at least four samples collected in a given sampling site over a 30 day period, nor shall a single sample maximum exceed 349/100 mL."

WEC does not sample CFFF discharge specifically for *E. coli* but does measure for fecal coliform. Prior to 2013, South Carolina's fecal coliform water quality standard for primary contact recreational use in freshwaters was "not to exceed a geometric mean of 200/100 mL, based on five consecutive samples during any 30 day period; nor shall more than 10% of the total samples during any 30 day period exceed 400/100 mL." This standard has since been replaced with the *E. coli* standard previously described above. Nevertheless, the SCDHEC's most recent Section 303(d) List of Impaired Waters states that both the previous and current standards are protective of primary contact recreational use.³

In its Environmental Report, WEC states that the annual average concentration of fecal coliform in CFFF's combined (process plus sanitary) liquid effluent is <100/100 mL (see Table 2.1-4 in Section 2.1.4, [ML14353A238](#)). Given the low concentrations of fecal coliform CFFF discharges and the fact that water quality is not impaired within the action area itself,

² <https://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/doe%202002a.pdf>

³ http://www.scdhec.gov/HomeAndEnvironment/Docs/tmdl_14-303d.pdf

the proposed CFFF license renewal would not result in measurable effects on sturgeon and would, therefore, be discountable.

5. Is the outfall pipe (001) submerged, or going through open air? If in the water column, where? Can we get a map of the outfall (action area)?

The CFFF's liquid effluent travels through a 6-inch pipe that discharges at a point about 3.5 miles south of the facility. The pipe submerges into the river and effluent is passed through a diffuser prior to being discharged. The discharge is near the bottom of the River, approximately 20 feet from shore. The NRC will provide a figure of the discharge location and piping.

6. According to NRC's 10/2/2017 response to NMFS's 9/22/2017 questions, the effluent flow (0.161 cubic feet per second [cfs]) is <0.001 % of the river flow (8,652 cfs). NRC's Biological Evaluation states that "...eggs and larvae, if present, are not as mobile; however, the area and duration of exposure would be limited because the volume of liquid effluent discharged from CFFF represents a very small percentage of the overall flow of the river." How do monthly (or seasonal) variations in discharge flow and river flow change the concentrations of pollutants and potential toxicity to sturgeon (e.g., spawning and life history)? [Collect historical flow data and estimate concentrations based on DMR data matched to flow]

Given the extremely low percentage of river flow that CFFF liquid effluent represents under typical conditions (<0.0001 percent of average Congaree River flow), monthly and seasonal variations in discharge flow and river flow would not result in changes in the concentrations of chemical pollutants that would create measurable or detectable increases in potential toxicity to sturgeon within the action area.

7. What other contaminants might be affecting the marine environment (and ultimately threatened and endangered species)? Is this a Superfund site? RCRA correction action site?

Besides those constituents discussed in the Biological Evaluation, which are discharged to the Congaree River in accordance with the limits established by the SCDHEC in WEC's NDPEs permit, the NRC is not aware of other contaminants that could be affecting the marine environment.

The CFFF site is not a Superfund site. WEC has entered into a Voluntary Cleanup Contract with the SCDHEC because of volatile organic compound (VOC) groundwater contamination. Based on the plume size and concentration, it is likely that WEC will have to continue monitoring VOC concentrations versus performing active remediation. The groundwater VOC plume is within the site boundary and, therefore, there is no expected impact to the Congaree River.

- a. It appears there is legacy groundwater contamination by nitrates, fluorides, and volatile organic compounds (and a remediation system), according to the 2014 Tetra Tech environmental report. Can groundwater contamination from the facility be affecting the marine environment and our species?**

[Westinghouse Nuclear Fuel Fabrication Facility borders a Superfund site on the east. The Superfund site, SCRDI Bluff Road, "includes an area where storage, recycling and disposal operations took place until 1982. EPA placed the site on the Superfund program's National Priorities List (NPL) in 1983 because of contaminated groundwater and soil resulting from operations at the site."]

<https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanu>

[p&id=0403212#bkground](https://www.epa.gov/cleanups/cleanups-my-community)) Westinghouse does not appear to be a RCRA corrective action site (<https://www.epa.gov/cleanups/cleanups-my-community>.)]

Groundwater at the CFFF site has been contaminated with VOCs, ammonia, fluoride, nitrate, gross alpha, and gross beta, from past activities, spills, and leaks. At this time, groundwater contamination remains within the site boundaries and has not migrated offsite or beyond the shallow aquifer below the site. Well water sample data indicates that groundwater contamination lies primarily around the Wastewater Treatment Plant and Gator Pond area.

The presence of VOCs stems from a former oil house. WEC removed the oil house from the site and has entered into a clean-up contract with the SCDHEC. WEC determined that the holding lagoons were the source of the inorganic and radionuclide groundwater contamination. WEC has relined four of the six lagoons to prevent future leaks into the shallow groundwater aquifer. WEC will continue to monitor groundwater wells for gross alpha and gross beta and will perform isotopic analysis to determine the nature of the uranium present if investigation levels are triggered during monitoring.

As previously stated, groundwater contamination is currently confined to the shallow aquifer below the site. Based on an estimated groundwater flow rate of 153 feet per day, contaminants in the aquifer would not disperse to offsite areas for approximately 100 more years.

Due to the limited area of the groundwater contamination within the CFFF site boundary, WEC's clean-up contract with the SCDHEC for VOCs and increased monitoring for radionuclides for the NRC license, groundwater contamination would not affect the aquatic environment of the Congaree River or sturgeon.

8. The facility appears to be covered by a stormwater general permit (SCR003391).

a. Is this permit different than the NPDES Permit? If so, what and where are the outfalls?

WEC maintains an Industrial Storm Water General NPDES Permit (No. SCR000000), which is separate from WEC's NPDES Permit for Discharge to Surface Waters (Permit No. SC0001848). The General Permit can be viewed online at: <http://www.scdhec.gov/Environment/docs/stormwater/2016%20FINAL%20IGP.pdf>. The SCDHEC renewed the General Permit in 2016. As required by this permit, WEC has developed and implemented an approved Storm Water Pollution Prevention Plan.

Storm water from the CFFF site does not flow directly into the Congaree River. The CFFF site has one storm water outfall, which lies on the western site boundary where two ditches meet at a dirt road. The location can be seen on the enclosed figure, near the location of SW-2 and W-45. A network of storm drains and culverts throughout the site drain into another network of swales, drainage ditches, and culverts. These discharge through Storm Water Outfall Control Structure C and into upper Sunset Lake.

b. What are the monitoring requirements?

WEC performs monthly grab sample checks at the composite Road Storm Drain (001) location adjacent to the “C” control valve. This sampling includes chemical monitoring for pH, fluoride, and ammonia. WEC also performs radiological monitoring on a monthly basis. Because the CFFF is a Sector C facility, WEC is also required to complete quarterly benchmark monitoring for nitrogen (nitrates and nitrites). Additionally, because the Congaree River is an impaired waterway for copper, *E. coli*, phosphorus, and mercury, WEC must also conduct impairment sampling.

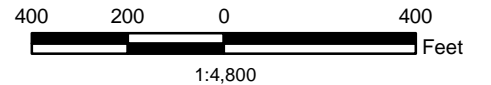
c. Can stormwater discharges (including nonpoint source discharges) affect sturgeon?

Because WEC is required to comply with the terms of the NPDES General Permit for Storm Water Discharges and to implement an approved Storm Water Pollution Prevention Plan and because the one storm water outfall does not flow directly into the Congaree River, potential effects to river water quality attributable to CFFF are minimal. Accordingly, the NRC staff does not believe that storm water discharges would result in a measurable impact to sturgeon, and would, therefore, be discountable.



Legend

- Shallow Aquifer Monitoring Well Location
- Black Mingo Aquifer Monitoring Well Location
- ▲ Surface Water/Sediment Sampling Locations
- ➔ Ditch
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon 1
- WL2 West Lagoon 2



Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet
 Datum: North American 1983



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SITE MAP

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
 HOPKINS, SOUTH CAROLINA

PROJECT NO. 60302740	PREPARED BY: RJS	DATE: December 2013	FIGURE 1-3
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Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community