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Waterford 3

W3F1-2016-0073

November 23, 2016

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

SUBJECT: Responses to Request for Additional Information for Environmental Review  
Regarding the License Renewal Application for Waterford Steam Electric  
Station, Unit 3 (Waterford 3)  
Docket No. 50-382  
License No. NPF-38

- REFERENCES:
1. Entergy letter W3F1-2016-0012 "License Renewal Application, Waterford Steam Electric Station, Unit 3" dated March 23, 2016.
  2. NRC letter to Entergy "Requests for Additional Information for the Environmental Review of the Waterford Steam Electric Station, Unit 3, dated October 28, 2016.

Dear Sir or Madam:

By letter dated March 23, 2016, Entergy Operations, Inc. (Entergy) submitted a license renewal application (Reference 1).

In letter dated October 28, 2016 (Reference 2), the NRC staff made a Request for Additional Information (RAI) needed to complete its Environmental review. Enclosure 1 provides the responses to the Environmental RAIs. Enclosure 2 contains the listing of requested documents that are being submitted on digital media as Enclosure 3.

There are no new regulatory commitments contained in this submittal. If you require additional information, please contact the Regulatory Assurance Manager, John Jarrell, at 504-739-6685.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 23, 2016.

Sincerely,

A handwritten signature in black ink, appearing to read "M Chisum", with a small dot at the end.

MRC/AJH

- Enclosures:
1. Environmental RAI Responses – Waterford 3 License Renewal Application
  2. Listing of Requested Documents
  3. Digital Media Containing Requested Documents

cc:	<p>Kriss Kennedy Regional Administrator U. S. Nuclear Regulatory Commission Region IV 1600 E. Lamar Blvd. Arlington, TX 76011-4511</p> <p>NRC Senior Resident Inspector Waterford Steam Electric Station Unit 3 P.O. Box 822 Killona, LA 70066-0751</p> <p>U. S. Nuclear Regulatory Commission Attn: Elaine Keegan Division of License Renewal Washington, DC 20555-0001</p> <p>U. S. Nuclear Regulatory Commission Attn: Phyllis Clark Division of License Renewal Washington, DC 20555-0001</p> <p>U. S. Nuclear Regulatory Commission Attn: Dr. April Pulvirenti Washington, DC 20555-0001</p> <p>Louisiana Department of Environmental Quality Office of Environmental Compliance Surveillance Division P.O. Box 4312 Baton Rouge, LA 70821-4312</p>	<p>RidsRgn4MailCenter@nrc.gov</p> <p>Frances.Ramirez@nrc.gov Chris.Speer@nrc.gov</p> <p>Elaine.Keegan@nrc.gov</p> <p>Phyllis.Clark@nrc.gov</p> <p>April.Pulvirenti@nrc.gov</p> <p>Ji.Wiley@LA.gov</p>
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**Enclosure 1 to**

**W3F1-2016-0073**

**Environmental RAI Responses  
Waterford 3 License Renewal Application**

## **1. AIR QUALITY (AQ)**

### **RAI AQ-1**

Table 3.2-3 of the environmental report, (ER) shows that the annual air emissions inventory summary is based on fuel usage (which is also presented in ER Table 3.2-3). Clarify if particulate matter (PM<sub>10</sub>) emissions provided in Table 3.2-3 include particulate emissions from the two auxiliary component cooling water wet mechanical draft cooling towers. If PM<sub>10</sub> emissions in Table 3.2-3 do not include particulate emissions from the wet mechanical draft cooling towers, provide a justification.

### **Waterford 3 Response**

PM<sub>10</sub> emissions from the two Auxiliary Component Cooling Water (ACCW) wet mechanical draft cooling towers were not included in Table 3.2-3 of the Waterford 3 (WF3) ER since the water flowing through the ACCW Wet Cooling Towers A and B is filtered water; therefore, PM<sub>10</sub> emissions, if any, would be insignificant.

Waterford 3's air emission calculation package requested in "Item a" to RAI AQ-5 was also revised to provide justification for not including the two ACCW cooling towers in the annual air emissions inventory.

### **RAI AQ-2**

In support of NRC's greenhouse gas, climate change, and cumulative impacts analysis provide the following:

- a. Long-term meteorological information from the data recorded at Waterford Steam Electric Station, Unit 3's (WF3's) meteorological facility. If the data from WF3's meteorological facility is not available, provide an explanation for this. The meteorological data should include the most recent 30 years for which the data are available:
  1. mean monthly and annual temperatures
  2. mean monthly precipitation and annual precipitation
- b. Has a river warming trend been observed in the Mississippi River during the period of plant operations? Please provide any study(s), relevant information, or historical and current data that covers the last 20 years that support the conclusions reached (e.g., mean annual, seasonal, and/or or monthly water temperature trend for the period of record).

### **Waterford 3 Response**

- a. The Waterford 3 meteorological monitoring system is designed to meet the requirements of Regulatory Guide 1.23. Section 3.3.3.4 of the Waterford 3 Technical Requirements Manual, which implements the requirements of Regulatory Guide 1.23, requires the following meteorological monitoring instrumentation channels to be operable:

- Wind Speed
- Wind Direction
- Temperature Difference

While an on-site rain gauge is available to determine average hourly or 15-minute rainfall, cumulative rainfall is not recorded; therefore, valid precipitation data for the site is not available.

Mean monthly and annual temperature data from May 1995 through December 2015 obtained via the Plant Monitoring Computer and meteorological tower storage module data are attached. As there is no requirement to retain site meteorological tower temperature data, data prior to May 1995 is not available. Temperature data from May 1995–2015 is provided on the enclosed DVD. File name is “WF3 Meteorological Temperature Measurements\_1995-2015.”

- b. Based on Entergy’s research, temperature monitoring in the Mississippi River in the vicinity of Waterford 3 is limited, except for short durations. Entergy did locate some longer term data just south of Baton Rouge at Plaquemine, Louisiana for the years of 1991–2005 on the Louisiana Department of Environmental Quality’s (LDEQ) website. This data can be accessed at: <http://www.deq.louisiana.gov/portal/ONLINESERVICES/EnvironmentalDatacenterLEDC/WaterData/AmbientData/AmbientWaterQualityData.aspx>.

Utilizing the data from the LDEQ website, Entergy combined the U.S. Geological Survey Gage in Baton Rouge (07374000) data to come up with a mean monthly set of data from 1991 through June 2016. Based on the graph and data from this analysis, it does not show an increasing temperature trend over the past 20 years, either by direct charting (continuous month to month) or when comparing each month from year to year. The document supporting this analysis is provided on the enclosed DVD. File name is “Temperature Analysis Mississippi River.”

LDEQ’s and USGS individual data files are also provided on the enclosed DVD. File names are “LDEQ Gauge 0319 at Plaquemine” and “USGS Gage 07374000 at Baton Rouge,” respectively.

### **RAI AQ-3**

Has WF3 received notices of violation associated with *Air Permit 2520-00091-00*? If so, provide copies of relevant correspondence to and from the responsible regulatory agencies.

### **Waterford 3 Response**

There have been no notices of violations associated with Air Permit 2520-00091-00 for the period of January 2011 through July 2016.

### **RAI AQ-4**

As observed and discussed with Entergy Operations, Inc. (Entergy) personnel during the environmental site audit, identify FLEX equipment at WF3 and discuss how often this equipment is used and if an air permit will be required from the Louisiana Department of Environmental Quality (LDEQ) for these air emission sources.

### **Waterford 3 Response**

FLEX equipment maintained at the Waterford 3 site and associated annual operational testing is listed below. Based on the permitted air emission points listed in Waterford 3's current Air Permit 2520-0091-00, the emission sources listed below would most likely be classified as insignificant activities and would not be included in the overall site air emissions inventory. In addition, these sources, if not deemed insignificant activities, could be operated under Waterford 3's current permitted air Emission Point 22-02 (Portable Outage/Maintenance Diesel Engines). However, Waterford 3 plans to list these emission sources for further evaluation in any future permitting activities at the site.

<b>Equipment</b>	<b>Annual Operational Hours</b>
Diesel generator N building (.463 gpm)	3
Diesel generator N+1 building (.463 gpm)	3
Diesel water transfer pump (5.8 gallons per hour [gph] @ 2200 revolutions per minute)	1
Diesel water transfer pump N building(5.8 gph @ 2200 revolutions per minute)	1
Diesel fuel transfer pump (0.113 gpm)	1
Diesel fuel transfer pump N building (0.113 gpm)	1
Portable light towers (0.7 gph @100%)	2
Portable light towers (0.7 gph @100%)	2
Portable light towers (0.7 gph @100%)	2
Portable light towers (0.7 gph @100%)	2
Three diesel generators (6 kilowatts each)	0
One 12 kilowatt diesel generator	0
One diesel air compressor (6.45 gph)	< 1 hour

**RAI AQ-5**

Provide a copy of the following references cited in the Environmental Report:

- a. Entergy. 2015i. WF3 Air Emissions Calculations—Criteria Pollutants, Hazardous Air Pollutants, and Greenhouse Gases. Correspondence CEO 2015-00017. April 6, 2015.
- b. WF3. 2004a. Waterford 3 Air Permit 2520-00091-00. April 19, 2004.

**Waterford 3 Response**

The requested documents below are provided on the enclosed DVD.

- a. Entergy 2015i ER reference is provided on the enclosed DVD. File name is “Entergy 2015i\_WF3 Air Emission Calculations\_CEO 2015-00017.” During the site audit, a discrepancy was noted with the calculation package (Entergy 2015i ER reference) which has been corrected. As a result of the discrepancy, Tables 3.2-3 and 3.2-4 of the Waterford 3 ER have been revised. Correction to these tables is provided on the enclosed DVD. File name is “WF3 LRA Appendix E\_Tables 3.2-3 and 3.2-4.”
- b. WF3 2004a ER reference is provided on the enclosed DVD. File name is “WF3 2004a\_WF3 Air Permit 2520-00091-00.”

## **2. ALTERNATIVES (AL)**

### **RAI AL-1**

Identify the available acreage and location(s) on the Entergy Louisiana, LLC property that would be suitable for siting replacement power generation.

### **Waterford 3 Response**

As discussed in Section 3.1.1 of the Waterford 3 ER, approximately 23 percent (819 acres) of the site land cover is designated as agriculture. Approximately 660 acres of this acreage is currently leased to Raceland Raw Sugar LLC for growing sugar cane, milo, or soybeans. As discussed in Section 7.1.3.3.1 of the Waterford 3 ER, the Entergy Louisiana, LLC property was previously the subject of a feasibility evaluation by the Idaho National Laboratory for locating a new nuclear plant. The evaluation determined four locations adjacent to Waterford 3 to be feasible pending a more intensive investigation. Therefore, Entergy assumes that one of these locations would be suitable for siting replacement power generation. A figure identifying these four locations is provided on the enclosed DVD. File name is "Power Replacement Suitable Sites."

### **RAI AL-2**

Provide the basis for estimated cooling water withdrawal and consumption requirements associated with the replacement power alternatives to support the statement that water withdrawals "would be a fraction of that required by WF3's once-through cooling system, and water consumption as a result of cooling tower evaporative losses would be insignificant compared to the volume of water flowing in the Mississippi River."

### **Waterford 3 Response:**

Although the National Energy Technology Laboratory has a publication that provides water withdrawal and consumption rates for fossil plants (Cost and Performance Baseline for Fossil Energy Plants Volume 1: Bituminous Coal and Natural Gas to Electricity, September 2013), Entergy based this information on a comparison with River Bend Station's (RBS) Mississippi River water withdrawal and consumption rates as discussed below.

### ***Water Withdrawal Rates***

As discussed in Section 2.2.2.1 of the Waterford 3 ER, once-through cooling water brought into the intake structure is withdrawn from the Mississippi River at a design flow rate of 1,555.2 million gallons per day (MGD), or approximately 1.3 MGD per megawatt generated ( $1,555.2 \text{ MGD} \div 1,188 \text{ megawatts generated by Waterford 3}$ ).

In comparison, Entergy's RBS plant which utilizes a closed-cycle cooling system with mechanical draft cooling towers withdraws water from the Mississippi River at a maximum design flow rate of 23 MGD (Section 2.4.11.5 of RBS USAR), or approximately 0.02 MGD per megawatt generated



(23 MGD ÷ 967 megawatts generated by RBS). Therefore, assuming 0.02 MGD for the 1,188 megawatt alternative, approximately 23.8 MGD of cooling water would be withdrawn (1,188 megawatts × 0.02 MGD), which would be approximately 1.5 percent of that withdrawn in comparison to Waterford 3's current once-through cooling system (23.8 MGD ÷ 1,555.2 MGD × 100 percent).

### ***Water Consumption Rates***

As discussed in Section 2.2.2.1 of the Waterford 3 ER, the average flow in the Mississippi River in the vicinity of the Waterford 3 plant (River Mile 129.6) is estimated to be approximately 500,000 cubic feet per second (cfs).

In comparison, the probable minimum flow rate of the Mississippi River at RBS during the operating life of the station is not anticipated to be less than 100,000 cfs (Section 2.4.11.1 of the RBS USAR). As previously stated above, RBS withdraws cooling water from the Mississippi River at a maximum design flow rate of 23 MGD. The drift/evaporation rate from the RBS circulating water system and service water cooling system cooling towers is 17.7 MGD (27.4 cfs) and 0.38 MGD (0.6 cfs), respectively, based on design maximum. Therefore, of the volume of water withdrawn, 4.9 MGD (7.6 cfs) would be returned to the Mississippi River, and 18.1 MGD (28.0 cfs) would be lost to the atmosphere from drift and evaporation or approximately 0.03 cfs per megawatt generated (28.0 cfs ÷ 967 megawatts generated by RBS).

Assuming 0.03 cfs of water consumption per megawatt generated and the average Mississippi River flow at Waterford 3 of 500,000 cfs, the 1,188 megawatt closed-cycle cooling plant with mechanical draft cooling towers would represent only approximately 0.01 percent of the Mississippi River flow (1,188 megawatts generated × 0.03 cfs water consumption ÷ 500,000 cfs × 100 percent). Therefore, evaporative losses would be insignificant compared to the volume of water flowing in the Mississippi River.

**RAI AL-3**

Provide a copy of the following ER references for docketing:

- a. ENERCON 2015b
- b. Entergy 2015g
- c. Lanning 2014

**Waterford 3 Response:**

The requested documents below are provided on the enclosed DVD.

- a. ENERCON 2015b ER reference is provided on the enclosed DVD. File name is "ENERCON 2015b\_Calc Supporting Section 07\_01 Alternatives."
- b. Entergy 2015g ER reference is provided on the enclosed DVD. File name is "Entergy 2015g\_Integrated Resource Plan 2015--Final Report."
- c. Lanning 2014 ER reference is provided on the enclosed DVD. File name is "Lanning 2014\_Correspondence Lanning-Entergy to Buckley-Entergy."

### **3. AQUATIC RESOURCES (AR)**

#### **RAI AR-1**

In Section 3.6.6.2, on page 3-119 of the ER, Entergy states that, "no comprehensive ichthyofaunal surveys have been conducted on the LMR [Lower Mississippi River] in at least the past 30 years (Schramm 2004, page 307)." Clarify whether Entergy is aware of any ichthyofaunal or entrainment surveys that have been conducted on the LMR (Lower Mississippi River) since 2004.

#### **Waterford 3 Response:**

Additional searching yielded no more recent ichthyofaunal studies than those reported in the Waterford 3 ER. Because the Lower Mississippi River is so large, has swift currents, and carries a significant amount of barge traffic, it is very dangerous to collect fish samples of any type. In particular, ichthyofaunal sampling would be both very difficult and dangerous. In more recent times there has been little interest in undertaking such dangerous fisheries sampling.

#### **RAI AR-2**

Describe the cleaning and maintenance procedures at the intake and discharge structures on the Mississippi River, including the frequency of dredging, physical cleaning, and other maintenance procedures.

#### **Waterford 3 Response:**

As discussed in Section 2.2.2.1 of the Waterford 3 ER, plant personnel clean the trash racks with a mechanical trash rack cleaner. The trash racks are operated once per week unless increased loading and increased differential pressure requires cleaning more frequently. Debris and any associated fish contained in the debris are cleaned from the trash racks and placed in a dumpster for offsite disposal.

The traveling water screens are cleaned once per shift, unless loading is excessive, by spray-wash nozzles that spray both the ascending and descending sides of the traveling screen panels. Although automatic capability exists for the spray-wash system, they are currently being run manually. Debris and occasional impinged fish are cleaned from the screens and returned to the Mississippi River away from the influence of the intake canal and cooling water discharge zone via a combined concrete trough system.

No dredging activities have occurred at the intake or discharge structures since the plant began commercial operations in 1985.

### **RAI AR-3**

#### **Background**

Several references characterize the thermal plume at WF3, including Louisiana Power and Light's 316(a) demonstration study in 1979, Louisiana Pollutant Discharge Elimination System (LPDES) Fact Sheet and Rational for the WF3 Draft LPDES Permit in 1998, and the analyses associated with the Construction Permit and Operating License Environmental Reports and Final Environmental Statements for WF3.

#### **Request:**

- a) Clarify whether any additional thermal plume modeling or field studies have been conducted to characterize the size and temperature of the WF3 thermal plume in the Mississippi River.
- b) Describe any changes to operational conditions or engineering features since 1998 that would have increased the size or temperature of the WF3's thermal plume.
- c) Describe any thermal modeling or field studies that have occurred to characterize the thermal plume at Waterford Power Plant, Units 1 and 2 (WF 1&2).

#### **Waterford 3 Response:**

- a) Although thermal plume modeling was conducted by Louisiana Power & Light (LP&L) in association with Waterford 3's 1979 demonstration under Section 316(a) of the Clean Water Act and LDEQ evaluated Waterford 3's thermal plume in 1998 as a result of a request for an increase in temperature and heat discharge limits due to a power uprate, Entergy has not conducted any additional thermal plume modeling or field studies.
- b) There have been no operational or engineering feature changes since 1998 that would have increased the size or temperature of Waterford 3's thermal plume
- c) No thermal modeling or field studies specifically for Waterford 1 & 2 were found, only combined thermal discharges with Little Gypsy and Waterford 3. As discussed in Section 5.3.2 of the 1981 Waterford 3 Final Environmental Statement (FES), in 1970-1973, LP&L conducted analyses of the thermal plume distribution in the Mississippi River resulting from heated water release by the Waterford 1 & 2, Little Gypsy, and Waterford 3 plants for the Construction Permit - Environmental Report. The results of the hydrothermal analyses were presented in the March 1973 Waterford 3 FES-Construction Phase (CP). However, LP&L re-evaluated the Waterford 3 thermal plume predictions because of (a) the revision of its plan for cooling water use and the modification of the discharge-structure design, (b) the availability of additional hydrothermal field data obtained near the site, and (c) the advances in thermal field predictive techniques. The results of the hydrothermal analyses were presented in the LP&L's 1979 demonstration under Section 316(a) for Waterford 3. Section 5.3.2 of the 1981 Waterford 3 FES provides an overview of LP&L's revised hydrothermal analyses for the site and NRC's independent analysis and assessment of the thermal impacts and conclusions.

**RAI AR-4**

**Background:**

In Section 2.2.2.1 of the ER, Entergy states that "the traveling screens associated with the intake structure are being replaced with MultiDisc screens in an effort to minimize condenser biofouling."

**Request:**

- a) Describe the timeline for replacing the screens, including an estimate for when the replacement project will be complete.
- b) Describe whether Entergy expects any differences in impingement and entrainment rates based on the use of the MultiDisc screens during the period of extended operations, as compared to the historically used traveling screens. For example, describe any differences in mesh size, through screen flow, or any other operational or engineered design features that would differ between the traveling screens and the MultiDisc screens.
- c) Describe any additional changes to the intake system Entergy considered or implemented to reduce impingement and entrainment rates at WF3. Provide any related documentation or analyses, such as the expected efficiency rates in reducing impingement and entrainment.
- d) Provide any responses or documented coordination with the U.S. Environmental Protection Agency or State agencies regarding operational changes or engineering features to reduce impingement and entrainment at WF3.

**Waterford 3 Response:**

- a) At the end of the intake canal (at the shoreline), the CWIS comprises eight intake bays that are defined by concrete wingwalls. These intake bays are identified as Alpha 1 and 2, Bravo 1 and 2, Charley 1 and 2, and Delta 1 and 2. There is one traveling screen per intake bay. Screens for the Alpha 1 and 2, Bravo 1 and 2, and Charley 1 and 2 intake bays are installed and in-service. Screens for the Delta 1 and 2 intake bays were installed and became in-service in October 2016.
- b) A comparison of the historical and Multidisc screens as it relates to mesh size, screen approach velocity and screen material is shown below.

Comparison	Historical Screens	MultiDisc Screens
Mesh Size	1/4 inches / 10% 3/8 inches	0.37 inches
Screen Approach Velocity	1.0 feet per second	1.0 feet per second
Screen Material	Stainless Steel	Polyethylene

Entergy does not anticipate any differences in impingement and entrainment rates based on the use of the MultiDisc screens as compared to the historically used traveling screens, other than the MultiDisc screen material may improve the survivability of fish impinged. However based on the current Cooling Water Intake 316(b) Rule, the cooling water intake structure could potentially be equipped with a fish return system prior to the beginning of the period of extended operations. Although a low pressure washer system would need to be installed and the concrete return trough to the Mississippi River replaced, the MultiDisc screens are designed to be equipped with fish buckets. Therefore, the impingement mortality rate as compared to use of the historical screens would be reduced in the event that a fish return system is installed.

Although entrainment would also be addressed under the Final 316(b) Rule, Entergy does not anticipate that entrainment rates are that significant since (1) the intake structure is located offshore, (2) there is a general lack of appropriate spawning habitat in the vicinity of Waterford 3, (3) Waterford 3 only utilizes a small portion of the river flow, and (4) the Lower Mississippi River is a large waterbody that is very turbulent.

- c) The 2005 Waterford 3 316(b) Proposal for Information Collection (PIC) submitted to LDEQ reviewed several technologies and operational measures related to reducing impingement and entrainment rates. Technologies and operational measures reviewed and evaluated are discussed in Sections 3.2.1 and 3.2.2 of the Waterford 3 316(b) PIC, respectively. Appendix A of the Waterford 3 316(b) PIC provides a more comprehensive discussion of technologies evaluated. Although Appendix A describes technologies that could reduce both impingement and entrainment rates, Waterford 3 was only required to address impingement mortality rates in the PIC since entrainment was not applicable to the Waterford 3 facility as the 316(b) Rule was then written.

Technologies reviewed and evaluated in Appendix A of the 2005 Waterford 3 316(b) PIC included modifications to the traveling screens (dual flow screens, ristroph screens, fine mesh traveling screens, and angled and modular inclined screens), fixed screens (wedgewire screens, perforated pipes, barrier nets, aquatic filter barrier system, and porous dams/leaky dikes), submerged offshore intake structure, and fish diversion and avoidance (louvers and bar racks, velocity cap, strobe lights, acoustic deterrent, bubbles, and chains). Operational measures reviewed and evaluated are discussed in Section 3.3.2 of the Waterford 3 316(b) PIC and included more frequent rotation of the traveling water screens and flow reduction (variable speed pumps, evaporative cooling towers, and dry cooling). Appendix A of the Waterford 3 316(b) PIC discusses expected efficiency rates associated with these technologies and operational measures for reducing impingement and entrainment. Table 1 provides an overview of some of these technologies and operational measures evaluated.

None of the technologies or operational measures reviewed and evaluated in the Waterford 3 316(b) PIC was implemented since Waterford 3 met the impingement performance standards as the 316(b) Rule was then written, and technologies evaluated were found to be of limited feasibility and effectiveness or of "significantly greater" cost than the benefits gained from meeting the performance standards. The Waterford 3

316(b) PIC reference document is provided on the enclosed DVD. File name is "Entergy 2005\_WF3 316(b) Proposal for Information Collection."

#### ***Future Considerations***

Although Entergy has not yet considered any future changes to reduce impingement and entrainment rates, based on the most current 316(b) Rule which was effective October 14, 2014, Waterford 3 may be required in the future to consider technologies and/or operational measures to reduce impingement and entrainment rates, dependent on results of biological studies not yet completed.

As previously discussed in response to Item b) of RAI AR-4 and under the current 316(b) Rule, the intake structure could hypothetically be equipped with a fish return system in the future to reduce impingement mortality. This system would consist of installing fish buckets on the existing Multidisc screens, installing a low pressure wash system and installing a fish friendly return line to the river.

Although Entergy does not anticipate that entrainment rates are that significant as previously discussed in the response to Item b) of RAI AR-4, and biological studies have yet to be completed, Entergy can only hypothetically assume that technologies and/or operational measures considered would probably be consistent with those discussed in Appendix A of the 2005 Waterford 3 PIC in the event that LDEQ required it.

- d) As discussed in the response to Item c) of RAI AR-4, the 2005 Waterford 3 316(b) PIC, which was submitted to LDEQ, reviewed and evaluated several technologies and operational measures related to reducing impingement and entrainment rates. Other than the Waterford 3 316(b) PIC, there has been no coordination with regulatory agencies regarding actual or planned operational changes or engineering features to reduce impingement and entrainment rates at Waterford 3.

#### ***Future Coordination***

Based on the most current 316(b) Rule which was effective October 14, 2014, Waterford 3 anticipates coordinating with LDEQ to address the requirements of the Rule. These requirements will be included in the next renewed permit which is anticipated to be issued in 2016. After the various studies contained in the LPDES permit are completed, this information will be submitted in the next LPDES permit renewal application. Based on LDEQ's consideration of the study results contained in the renewal application, future permits would likely include plans for best technology achievable improvements.

<b>Table 1</b> <b>Impingement and Entrainment Efficiency Rates</b>		
<b>Technology</b>	<b>Efficiency Rate</b>	<b>Comment</b>
Dual flow screens	High if through screen velocity is less than 0.5 feet per second	Potential increase in flow-through velocity and impingement.
Ristroph screens	> 80 percent with frequent rotation, low pressure wash and fish return system	Post impingement fish survival for fragile species is low.
Angled or modular inclined screens	May meet standard for certain species.	Potential reduction in impingement is unknown.
Wedgewire screens	> 80 percent if through screen velocity is low	Potential for clogging and interference with navigation.
Barrier net	> 80 percent	Little potential for standard deployment due to high velocities and debris loading in the river.
Porous dike	> 80 percent if behavioral measures performed	Potential clogging due to algae and debris, and subject to damage during floods.
Louvers and bar racks	Uncertain	Effective for some species but not others. Severe debris loading is likely to reduce effectiveness.
Velocity cap on offshore location	Possibly 90 percent but uncertain	Density of fish population unlikely to change substantially with greater distance.
Strobe lights, acoustic deterrent, bubbles, and chains	Uncertain	Effectiveness highly uncertain and species-specific. Likely subject to debris damage.
Variable speed pumps	Low depending on frequency of flow reduction	Increase in temperature in the discharge could increase thermal plume effects. Effectiveness likely to be low given the nature of plant operations.
Evaporative cooling towers	> 90 percent	Reduction in plant efficiency. Increase in water consumption.
Dry cooling towers	> 90 percent	Significant reduction in plant efficiency. Adverse visual impacts from large towers.



## **RAI AR-5**

### **Background:**

In Section 4.6.1.1.3 of the ER, Entergy estimates impingement rates at WF3 by extrapolating the impingement rates determined during field studies at Waterford 1 & 2.

### **Request:**

- a) Describe any differences in the through screen flow, traveling screens, or any other operational or engineering differences between the units that could influence impingement rates.
- b) Clarify why impingement rates at Waterford 1 & 2 is an appropriate proxy to extrapolate impingement rates at WF3. Provide any documentation from State or Federal agencies that concur with this approach.

### **Waterford 3 Response**

- a) The average flow in the Mississippi River in the vicinity of the Waterford 1, 2 and 3 is estimated to be approximately 500,000 cfs. Cooling water for Waterford 1 & 2 (River Mile 129.7) is withdrawn from the Mississippi River at a design flow rate of 617.8 million gallons per day (MGD) or 956 cubic feet per second (cfs), which represents approximately 0.19 percent of the flow in the Mississippi River. Cooling water for Waterford 3 (River Mile 129.6) is withdrawn from the Mississippi River at a design flow rate of 1,555.2 MGD or 2,406 cfs, which represents approximately 0.48 percent of the flow in the Mississippi River. Therefore, the volume of Mississippi River water withdrawn and amount of river flow affected by Waterford 3 is more than that of Waterford 1 & 2.

### ***Intake Structures***

The intake structure for the Waterford 1 & 2 plant is located approximately 250 feet offshore, whereas the Waterford 3 intake structure is located approximately 162 feet offshore. Based on hydraulic information describing the Mississippi River in the vicinity of the plants, the zone of hydraulic influence associated with Waterford 1 & 2 would be approximately 262 square feet, whereas the hydraulic zone of influence associated with Waterford 3 would be approximately 659 square feet.

Waterford 1 & 2 has a two unit intake structure. Two intake pipes which are bell-mouthed, down-turned, and enclosed by a single rectangular bar rack that is submerged approximately 250 feet offshore at a depth of 36 feet, supply cooling water to the two traveling screens for each of the units. The traveling screens, which consists of ¼ inch stainless steel, are located upstream of the fixed screens. Approach velocity at the screens is approximately 1.5 feet per second (fps). The screens are not rotated continuously but operate based on differential pressure. The offshore intake structures have rectangular bar rack enclosures with seven inch center spacing composed of 3/8 inch bars.

The Waterford 3 intake structure has an intake canal extending approximately 162 feet out from the face of the intake structure. The canal has a skimmer wall across its entrance. At the end of the canal are eight intake bays. The traveling water screens are located downstream from the trash racks and upstream from the circulating water pumps. The traveling screens are composed of polyethylene perforated panels with 0.37-inch diameter screen mesh openings. The traveling screens are once-through flow MultiDisc screens, oriented perpendicular to the walls of the intake bays, in which sickle-shaped discs capture debris on the front face of the screen. These sickle-shaped discs rotate about an axis that is perpendicular to the flow of river water through the screen. The screens are not rotated continuously but operate based on differential pressure. As discussed in Section 2.2.2.1 of the Waterford 3 ER, at maximum design flow rate, the screen approach velocity would be approximately 1.0 fps.

Therefore, the intake structures at Waterford 1, 2 and 3 are designed to prevent fish from becoming impinged. However, the traveling screen velocity at Waterford 3 is less than that of Waterford 1 & 2, thereby increasing the potential that fish can avoid the effects of the intake structure. In addition, the MultiDisc traveling screens at Waterford 3 are more fish friendly, consisting of polyethylene mesh size that is smaller than that at Waterford 1 & 2.

- b) Studies describing defined habitats located along the Mississippi River have documented fish populations and relative abundances of species occurring within those habitats. Thirteen such habitats have been documented for the Lower Mississippi River. Depending upon river stages, habitats at Waterford 3 and Waterford 1 & 2 include seasonally inundated flood plains, natural steep banks, revetment banking, and channel habitats. Waterford 3 and Waterford 1 & 2 cooling water intake structures (CWIS) are both located along the west bank and share the same stream reach of the Mississippi River and therefore similar habitats. The predominant channel habitat feature includes both channel and channel border components at each facility. As such, fish populations are expected to include the same temporal and spatial assemblage at both CWIS. Likewise, the Waterford 1 & 2 Impingement and Entrainment Characterization Study conducted in 2006-2007 characterized the fish and shellfish associated with the operation of the Waterford 1 & 2 CWIS by providing: 1) taxonomic identification of all fish and shellfish with potential to be impinged or entrained; 2) a characterization of the life stages of these species; and 3) an estimate of the current impingement and/or entrainment rates at the plant by collecting samples during operation and normalizing to design intake flow (DIF) for each of the pumps. Similarly, the impingement mortality data for Waterford 1 & 2 were then estimated based on the DIF for each pump at Waterford 3. Due to the close proximal location of Waterford 1 & 2 to Waterford 3 and their associated Mississippi River habitat similarities, impingement rates normalized for time and volume at both facilities are relative to one another regardless of either collection location.

Both state and federal agencies have concurred with this approach of extrapolating impingement rates for a number of years. The LDEQ has also concurred with this approach for many years in their LPDES permitting activities. In addition, the NRC accepted this

approach during the initial permitting for Waterford 3 as discussed in Section 5.6.1.1 of the Waterford 3 Final Environmental Statement.

#### **RAI AR-6**

##### **Background:**

In a letter dated August 17, 2006, LDEQ responded to Entergy's Proposal for Information Collection (PIC) for WF3. LDEQ provided comments on Entergy's PIC, including the following:

- a) "Entergy has not demonstrated that the data are representative of current conditions and has not demonstrated that the data were collected using appropriate QA/QC procedures."
- b) "We believe it would be beneficial to know current rates of impingement mortality and entrainment (where applicable), the current condition of the habitats in the relevant vicinities of the plants, and the current susceptibility to impingement and entrainment (where applicable) of the fish in the areas from which Entergy will base their baseline calculations. Having not seen the plants or been given a sufficient description of the plants and their surroundings, we cannot determine their sampling limitations (they did not state their sampling limitations sufficiently in their PICs) and, therefore, cannot determine if it is possible for Entergy to gather the information we suggested above. However, we suggest that Entergy consider these suggestions, and if it is not possible for Entergy to gather the information suggested above, Entergy should give justification why it is not possible. But if it is possible and Entergy chooses to collect new data, Entergy would need to submit a sampling plan as required in the regulations."

##### **Request:**

Provide a copy of Entergy's response provided to LDEQ and any additional correspondence with LDEQ regarding these requests.

##### **Waterford 3 Response:**

Entergy's response letter to LDEQ's comments on the Waterford 3 PIC is provided on the enclosed DVD. File name is "WF3 Response to LDEQ PIC Comments."

However, during this period of Entergy and LDEQ interactions regarding the Waterford 3 PIC, major portions of the 316(b) Rule were remanded on January 25, 2007 by the Second U.S. Circuit Court of Appeals, resulting in further litigation and EPA's re-development of the Phase II Rule, all of which could have significantly altered Waterford 3's strategy for compliance as outlined in the Waterford 3 PIC submitted in 2005. In addition, as a result of so many portions of the Phase II Rule affected by the remand, the Environmental Protection Agency issued a memorandum on March 20, 2007 stating that the rule should be considered suspended until further action by the agency.

Therefore, Entergy requested on April 7, 2007 that LDEQ remove or modify the 316(b) language located in Part II, Section X of the Waterford 3 LPDES permit issued February 1, 2005 that clearly defines compliance with those aspects of the 316(b) rule that LDEQ considers still

applicable or enforceable. On January 10, 2008, LDEQ issued a modification to the Waterford 3 LPDES permit. This modification addressed LDEQ's comments on the Waterford 3 PIC in Section X of the Waterford 3 LPDES Permit.

Entergy's request to remove or modify the 316(b) language in the Waterford 3 LPDES permit and the 2008 modification to the LPDES permit are provided on the enclosed DVD. File names are "Request to DEQ Regarding 316(b) Permit Modification" and "LPDES Permit Modification\_2008," respectively.

### **RAI AR-7**

Provide a copy of the following documents:

- 1) Louisiana Power & Light, April, 1979. Demonstration under Section 316(a) of the Clean Water Act. Waterford Steam Electric Station Unit No. 3.
- 2) Louisiana Power & Light, April, 1979. Demonstration under Section 316(b) of the Clean Water Act. Waterford Steam Electric Station Unit No. 3.
- 3) Espey, Huston and Associates, Inc. 1977. 316(b) Demonstration Study at Waterford Unit 1 & 2. Annual Data Report—Waterford Power Plant Units 1 and 2, Screen Impingement Studies, February 1976 through January 1977.
- 4) Louisiana Pollutant Discharge Elimination System (LPDES) Fact Sheet and Rational for the Waterford 3 Draft LPDES Permit to Discharge to Waters of Louisiana, LPDES Permit Number LA0007374, July, 22 1998.
- 5) ENSR International. 2005. Proposal for Information Collection, Entergy Louisiana, Inc. Waterford 1 & 2 Plant. Document Number 10785-001. June 2005.
- 6) 316(b) Comprehensive Demonstration Study - Waterford 3

### **Waterford 3 Response**

The requested documents below are provided on the enclosed DVD.

- 1) 1979 Louisiana Power & Light Demonstration under Section 316(a) of the Clean Water Act is provided on the enclosed DVD. File name is "LPL 1979\_WF3 Demonstration Under Section 316(a)." As a note, the cover page on this reference is marked "Draft." Entergy was unable to locate the final version of this document during the development of the Waterford 3 ER. As a result, information in this document was not cited in the Waterford 3 ER, although it was reviewed.
- 2) 1979 Louisiana Power & Light Demonstration under Section 316(b) of the Clean Water Act is provided on the enclosed DVD. File name is "LPL 1979\_WF3 Demonstration Under Section 316(b)."

- 3) 1977 Espey, Huston and Associates, Inc. 316(b) Demonstration Study at Waterford Unit 1 & 2 is provided on the enclosed DVD. File name is "Espey, Huston and Associates\_1977 316(b) Study."
- 4) 1998 LPDES Fact Sheet and Rational for the Waterford 3 Draft LPDES Permit to Discharge to Waters of Louisiana, LPDES Permit Number LA0007374 is provided on the enclosed DVD. File name is "WF3 1998\_WF3 LPDES Fact Sheet and Rationale for Draft LPDES Permit."
- 5) 2005 ENSR International Proposal for Information Collection, Entergy Louisiana, Inc. Waterford 1 & 2 Plant is provided on the enclosed DVD. File name is "ENSR 2005\_W1&2 PIC."
- 6) Waterford 3 316(b) Comprehensive Demonstration Study is provided on the enclosed DVD. File name is "Entergy 2007\_Impingement Mortality-Entrainment Characterization Study."

#### **4. CUMULATIVE IMPACTS (CU)**

##### **RAI CU-1**

Please provide name, description, location, and status of any additional past, present, or reasonably foreseeable projects or actions that have been identified since the applicants' ER was prepared. Please identify the distance and direction from WF3 to these projects.

##### **Waterford 3 Response:**

Additional past, present, or reasonably foreseeable projects or actions that have been identified since the Waterford 3 ER was prepared, and distance and direction from Waterford 3 to these projects is provided on the enclosed DVD. File name is "Reasonably Foreseeable Future Projects within WF3 Area."

During Entergy's review to identify additional past, present, or reasonably foreseeable projects or actions that have been identified since the Waterford 3 ER was prepared, it was noted that the USACE listed 18 additional large, multi-parish or regional projects located within a 50-mile radius of Waterford 3; however, of those only three occur in or affect portions of St. Charles Parish: Davis Pond Freshwater Conversion, Bonnet Carre Freshwater Diversion, and St. Charles Parish Urban Flood Control.

The Louisiana Department of Transportation and Development also has as many as 32 proposed highway projects within a 50-mile radius of Waterford 3, many of which are in the feasibility stage. However, only one project, the Houma-Thibodaux to LA-3127 Connection, would occur within St. Charles Parish.

##### **RAI CU-2**

Please provide a description and estimated schedule for the possible intake canal improvement/modification project that was discussed with Entergy personnel during the environmental site audit. In addition, please describe any potential modifications to the intake structure itself, including to the debris trough/fish return trough and chute. Please describe how the new fish return system may affect survival for fish that become entrapped within the intake structure.

##### **Waterford 3 Response:**

##### **Intake Canal Improvement/Modification**

Waterford 3 is currently planning to implement the intake structure weir wall replacement project in three phases: study, design and implementation. The study phase is estimated to start in the fourth quarter of 2016 with an estimated completion sometimes in the first quarter of 2017. The design phase is estimated to start in the second quarter of 2017 or first quarter of 2018 based on the amount of time required for permitting and reviews by the U.S. Army Corps of Engineers. The implementation phase is estimated to start in 2018 but will be constrained to acceptable river level conditions.

## **Fish Survival**

Waterford 3 may be required in the future to consider technologies and/or operational measures to reduce impingement rates. Any such possible actions likely will be dependent on results of biological studies not yet completed. In the event that intake structure modifications were to occur, hypothetically, these modifications could involve installing fish buckets on the existing Multidisc screens; installing a low pressure wash system; and installing a fish friendly return line to the river. However discussion of this option does not rule out other possible scenarios that might be found to be even more beneficial to fish survival.

These modifications, if they did occur, would most likely increase the survivability of fish impinged against the screens since the fish would be collected in fish buckets and then transferred to a fish friendly return line to the river. However, any attempt at this point to predict the degree of survivability would be speculative as it depends on the type of fish species; other environmental conditions such as water temperature, flow rates, and duration time impinged on the screen; and whether a possible impinged species is considered to be commercially or recreationally important by LDEQ, among other considerations.

## **5. GROUNDWATER RESOURCES (GW)**

### **RAI GW-1**

Provide the following document for docketing: "Waterford-3 Groundwater Monitoring Program Five-Year Review" dated June 2014.

#### **Waterford 3 Response:**

The Waterford 3 Groundwater Monitoring Program Five-Year Review is provided on the enclosed DVD. File name is "WF3 Groundwater Monitoring Program\_Five-Year Review."

### **RAI GW-2**

Section 3.5.3.2 of the ER states that no groundwater is withdrawn at WF3 but other portions of the ER (e.g., Section 7.1.3.4.5) indicate that groundwater dewatering could be necessary at the site, such as associated with new construction. Clarify whether any operational groundwater dewatering is conducted at WF3, either via wells or drain sumps, at present. If so, identify the methods of dewatering, points of withdrawal, the average daily volumes, and the method of disposal of dewatering flows.

#### **Waterford 3 Response:**

There is no active operational groundwater dewatering occurring at the Waterford 3 site.



## **6. LAND USE AND VISUAL RESOURCES (LU)**

### **RAI LU-1**

Section 3.1.1 of the ER describes an agricultural lease to Raceland Raw Sugar LLC for approximately 660 acres of land within the Entergy property. Does Entergy anticipate continuing to lease this land for agricultural purposes during the proposed 20-year license renewal period?

### **Waterford 3 Response:**

Based on input from Entergy's Real Estate Department, Entergy anticipates that the 660 acres of land within the Entergy property will continue to be leased for agriculture purposes during the proposed 20-year license renewal period subject to the conditions of the lease agreement.

## **7. MICROBIAL HAZARDS (MO)**

### **RAI MO-1**

Provide a copy of the following ER reference:

ENERCON. 2014. Record of Phone Conference between Dr. Ratard, Louisiana Department of Health and Hospitals, and D. Bean, Enercon Services, Inc.—Primary Amebic Meningoencephalitis.

### **Waterford 3 Response:**

The record of phone conference between Dr. Ratard, Louisiana Department of Health and Hospitals, and D. Bean, Enercon Services, Inc.—Primary Amebic Meningoencephalitis is provided on the enclosed DVD. File name is "ENERCON 2014i\_ROC--Ratard Louisiana Dept Health and Hospitals."

## **8. SOCIOECONOMICS (SOC)**

### **RAI SOC-1**

Provide Entergy Louisiana, LLC property tax payment information for the year 2015, if available, similar to the data provided in Table 3.8-4 of the ER.

#### **Waterford 3 Response:**

Property taxes paid in 2015 are as follows:

<b>Year</b>	<b>Entergy Louisiana, LLC Property Taxes</b>	<b>St. Charles Parish Revenues</b>	<b>Percent of Parish Revenue</b>
2015	\$22,420,747	\$147,391,783	15

Property taxes paid in 2015 by Entergy Louisiana, LLC were obtained from Entergy's Tax Department. St. Charles Parish revenues were obtained from the Louisiana Tax Commission's 2015 Annual Report (pages 76 & 77) and can be accessed at [http://www.latax.state.la.us/Menu\\_AnnualReports/UploadedFiles/Annual%20Report%202015.pdf](http://www.latax.state.la.us/Menu_AnnualReports/UploadedFiles/Annual%20Report%202015.pdf).

## **9. SPECIAL STATUS SPECIES AND HABITATS (SS)**

### **RAI SS-1**

Provide a copy of the following ER reference:

Entergy. 2014e. Threatened and Endangered Species Survey, Waterford Steam Electric Station, Unit 3. December 30, 2014. Special Status Species & Habitat

#### **Waterford 3 Response:**

The requested document below is provided on the enclosed DVD.

The 2014 Threatened and Endangered Species Survey is provided on the enclosed DVD. File name is "Entergy 2014e\_WF3 TE Species Survey Report."

## **10. SURFACE WATER RESOURCES (SW)**

### **RAI SW-1**

Provide a summary of the volume of surface water withdrawn from the Mississippi River over the last 5 years as well as return flows to the Mississippi River through outfall 001, including monthly volumes and annual totals. Please indicate how withdrawals and return flows are determined or measured for reporting purposes (e.g., pump operating hours, weir, etc.).

#### **Waterford 3 Response:**

Surface water withdrawals and discharges to the Mississippi River for the period of 2011–2015 are provided on the enclosed DVD. " File name is "WF3 Surface Water Withdrawals\_Discharges\_2011-2015."

Waterford 3 water withdrawals and discharges are determined by monitoring the circulating water flow rate. This determination does not distinguish between the amount of water withdrawn and amount of water discharged; therefore, they are considered the same since Waterford 3 is a once-through cooling system. Typically the circulating water flow rate is obtained from the plant monitoring computer. However, in the event that one or more condenser water boxes is out of service, or if the plant monitoring computer is not operational, or reactor power is less than 20 percent, then circulating water flow rate is determined either by energy balance and local differential temperature measurements, or by estimating the flow rate by multiplying the number of circulating pumps running by 250,000 gallons per minute (gpm).

### **RAI SW-2**

Provide a copy of the following for docketing: (1) March 2015 Louisiana Pollutant Discharge Elimination System (LPDES) permit renewal application for Permit No. LA0007374, which was due to expire in October 2015; and (2) a letter or other acknowledgement from the LDEQ that the renewal application was accepted as administratively complete.

#### **Waterford 3 Response:**

The requested documents below are provided on the enclosed DVD.

- (1) The March 2015 LPDES permit renewal application is provided on the enclosed DVD. File name is "Entergy 2015p\_WF3 LPDES Permit Renewal Application--March 2015."
- (2) LDEQ's acknowledgement that the 2015 LPDES permit renewal application was accepted as administratively complete is provided on the enclosed DVD. File name is "LDEQ Administrative Completeness Determination."

**RAI SW-3**

Provide the WF3 Stormwater Pollution Prevention Plan (current version) for docketing.

**Waterford 3 Response:**

The current version of the Waterford 3 Stormwater Pollution Prevention Plan is provided on the enclosed DVD. File name is "WF3 2007b\_Stormwater Pollution Prevention Plan r1".

**RAI SW-4**

Clarify and describe the nature of the "low-volume and chemical wastewaters," referenced in ER Section 3.5.1.1.1, which are pumped to the aboveground concrete holding basin and transferred to Waterford 1, 2, and 4 for processing. Specifically, clarify whether this wastewater is limited to steam generator blowdown and also whether this discharge corresponds to LPDES internal outfall 401. If this waste stream differs from the source attributed to outfall 401, describe the source of this wastewater, volume and frequency of the transfers, and whether chemical analysis is conducted.

**Waterford 3 Response:**

Steam generator blowdown (Internal Outfall 401) is not discharged to the aboveground concrete holding basin. The primary discharge path for the blowdown is to the circulating water system and then to the Mississippi River. Steam generator blowdown discharges are very infrequent as there have only been six discharges for the period of 2010–June 2016.

The reference to "low-volume and chemical wastewaters" in Item S to Part II of Waterford 3 LPDES Permit LA0007374 consists of nonradiological wastewaters from three sumps that are transferred to the aboveground concrete holding basin. These are wastewaters associated with the chiller building sump, regenerative waste sump, and the auxiliary boiler sump. The chiller building sump is pumped to the regenerative waste sump. The makeup demineralizer system ion exchanger resin regeneration chemical rinses are also directed to the regenerative waste sump. The auxiliary boiler sump is pumped directly to the aboveground concrete holding basin.

Wastewaters in the aboveground concrete holding basin are pumped to Waterford 1 & 2 where it is treated and then discharged to the Mississippi River. Waterford 3 is not required to conduct any chemical analyses, or record volume and frequency of transfers, on the wastewaters being transferred to Waterford 1 & 2.

**RAI SW-5**

As reference above in SW-4, provide a description of the concrete holding basin referenced in ER Sections 2.2.3.1.3 and 3.5.1.1.1, including dimensions of the basin, material of construction, and when constructed. Specify how often the basin is used and how long standing water is normally present.

**Waterford 3 Response:**

The concrete holding basin is a reservoir for non-radioactive wastewater with potentially unacceptable pH levels and/or high levels of metals and other chemicals, prior to being transferred to the Waterford 1 & 2 wastewater treatment facility for treatment and discharge to the Mississippi River. Dimensions of the concrete basin are 92 feet by 92 feet with a depth of 8 feet. The concrete holding basin is used on a daily basis, and standing water is always present. Entergy was unable to locate the date of construction for this basin.

**RAI SW-6**

Provide a summary of LPDES Discharge Monitoring Report (DMR) data, itemizing monitored parameters for each outfall, for the last 2 years (2014 and 2015), inclusive of 2016 year to date.

**Waterford 3 Response:**

A summary of LPDES DMR data for 2014 through June 2016 is provided on the enclosed DVD. File name is "WF3 LPDES DMR Data Summary."

**RAI SW-7**

Identify and describe any Notices of Violation (NOVs); nonconformance notifications; or related infractions received from regulatory agencies associated with LPDES permitted discharges, sanitary sewage systems, groundwater or soil contamination, as well as any involving spills, leaks, and other inadvertent releases (e.g., petroleum products, chemicals, or radionuclides) received since 2014. Include self-reported violations. Provide copies of relevant correspondence to and from the responsible regulatory agencies.

**Waterford 3 Response:**

Based on review of condition reports from January 2015 through June 2016 that would document instances such as this, there have been no additional NOVs; nonconformance notifications related infractions received from regulatory agencies associated with LPDES permitted discharges, sanitary sewage systems, groundwater or soil contamination, spills, leaks, and other inadvertent releases (e.g., petroleum products, chemicals, or radionuclides) or self-reported violations since 2014.

**RAI SW-8**

Section 2.2.2.1 of the ER states that the circulating water intake structure is designed to provide 1,080,000 gallon per minute (gpm) of circulating cooling water to the plant. However, the ER also states that the intake structure houses four circulating water pumps, each with a capacity of 250,000 gpm, in addition to three service water/screen wash pumps, each with a capacity of 3,000 gpm. Together, these pump capacities equate to a total maximum withdrawal rate of 1,009,000 gpm. Please clarify the apparent discrepancy.

**Waterford 3 Response:**

The 1,080,000 gpm value is derived from summing the maximum capacity of each intake bay (135,000 GPM). However, the four circulating water pumps each have a design capacity of 250,000 gpm resulting in the designed delivery to the plant of 1,000,000 gpm.

The three service water pumps (3,000 gpm each) are used for cleaning the traveling screens and do not provide cooling water to the plant. The water is immediately returned to the river at the intake, after cleaning the screens.

**RAI SW-9**

As discussed with Entergy personnel during the walkdown of the WF3 intake structure, please clarify how often all four circulating water pumps are operated and describe the general factors that govern four-pump operation.

**Waterford 3 Response:**

Typically during the time period from late spring to early fall, four circulating water pumps are operated due to the high river temperature. As river temperature drops during the remaining period, three-pump operation is used. This change in operation is dependent upon the ability to maintain proper backpressure in the condenser and allows for more efficient operation.

**RAI SW-10**

As discussed with Entergy personnel during the environmental site audit, describe any chemical treatment, including use of biocides to control biofouling or other chemicals such as corrosion inhibitors, which is currently performed to manage the chemistry of the river water used in the circulating water system. Clarify whether Entergy maintains any circulating water chemical injection equipment for use (portable or permanent). If so, identify the general nature and location of the equipment, the chemicals used and volumes stored, and frequency with which the circulating cooling water is or may be treated.

**Waterford 3 Response:**

Waterford 3's circulating cooling water system is currently not treated with any biocides or other chemicals since the Mississippi River is high in solids content, thereby resulting in a scouring effect that prevents biological growth within the cooling water system. Therefore, there is no chemical injection equipment as it relates to the circulating cooling water.

**RAI SW-11**

As observed and discussed with Entergy personnel during the environmental site audit, describe the purpose and scope of the protective piling (i.e., dolphin) replacement/ rehabilitation project underway along the Waterford 3 shoreline. Discuss how many of the existing nine dolphins will be affected, including when the project was initiated and the projected completion date. Identify the permits/approvals obtained for the project and provide the associated documentation.

**Waterford 3 Response:**

Two of the five dolphins (dolphins 3 and 9) protecting the intake weir wall approaches are currently being replaced due to damage incurred by barge strikes. Replacement activities for dolphins 9 and 3 began November 29, 2015 and July 11, 2016, respectively. Since the remaining implementation activities for these dolphins cannot be worked until the river level falls to +4 feet, the project is currently on hold due to river levels. Once the river level falls to +4 feet, there is approximately 72 hours of construction activities remaining to complete the dolphin 3 and 9 replacements, primarily associated with the lowest level horizontal bracing and access ladder for dolphins 3 and 9.

Permits and approvals for the dolphin replacement/rehabilitation project are provided on the enclosed DVD. File names are as follows:

- “Coastal Use Authorization-Consistency Determination”
- “Department of Army Letter of No Objection”
- “LDWF Letter of No Objection”
- “USACE NNOD-SP (Mississippi River) 796 Permit”
- “U.S. Coast Guard Permit CG-2554”

## **RAI SW-12**

As referenced in ER Section 2.2.2.5 and as discussed with Entergy personnel during the environmental site audit, provide an expanded functional description of the contractor-maintained demineralized/treated water (i.e., pure) makeup system used at Waterford 3. Include a general description of the treatment processes used and the plant systems served/supplied with treated water. Further, indicate when the current system was installed, its general physical location, and the production capacity of the system.

### **Waterford 3 Response:**

The vendor demineralizer system, located inside the protected area on the west side of the water treatment building was installed in October 2011. Potable water is filtered through granulated activated carbon to remove chlorine and chloramines, then passes through a reverse osmosis unit (100 -200 gpm based on plant demand), and then through electronic deionization units to produce ultrapure water. Water is polished through resin skids before being sent to the demineralized water storage tank for plant use.

The demineralized water storage tank provides water for the condensate makeup system, which provides water to the following plant systems:

- Condenser hotwell (supply makeup to and receive dump from)
- Auxiliary boiler deaerator and feed pump cooling and seal water
- Condensate storage pool
- Auxiliary component cooling water wet tower basins
- Chemical feed system (hydrazine tank)
- Decontamination facility and hot machine shop
- Stator cooling water system
- Stator cooling water alkalizer skid
- Reactor building hose connections
- Turbine closed cooling water system
- Spent fuel cask wash water
- Chemical cleaning line (liquid waste management)
- Post-accident sampling system
- Component cooling water makeup system (CCW)
- CCW expansion tank



- Condensate polisher system
- Radiation monitor flushing water
- Auxiliary feedwater pump suction
- Supplementary chilled water expansion tank
- Various pump seals (shut down cooling priming pump seal water, waste storage tank pump A and B seals, blowdown pump A and B seal water, air evacuation pump A, B, and C seal water, condensate pump seal/cooling water, instrument and service air compressor seal water)
- Various loop seals (waste storage tank loop seal, gland steam condenser loop seal, vacuum breaker loop seal)

## **11. TERRESTRIAL RESOURCES (TR)**

### **RAI TR-1**

Describe Entergy's landscape maintenance activities, including Entergy's procedures for maintaining in-scope transmission line rights-of-way as well as general grounds maintenance.

#### **Waterford 3 Response:**

Landscape maintenance practices at Waterford 3 consist mainly of grass cutting and weed control. Entergy does not maintain a specific site landscape maintenance procedure. Any herbicide applications associated with landscape activities would be controlled in accordance with Entergy's chemical control program procedure.

Although there is a limited amount of right-of-way (ROW) associated with the two in-scope transmission lines since the lines cross the Waterford 3 industrial area where vegetation is sparse, maintenance practices associated with this limited ROW is provided in Section 2.2.5.2 of the Waterford 3 ER.

### **RAI TR-2**

In Section 3.6.11.2.4, p. 3-159 of the ER, Entergy states that no known bald eagle nests occur on the Entergy property. However, in a June 18, 2015, letter from the Louisiana Department of Wildlife and Fisheries (LDWF) (reproduced beginning on p. B-16 of the ER), the LDWF states that "the proposed project may potentially impact a Bald Eagle (*Haliaeetus leucocphalus*) nesting site located within the project site." Please explain these seemingly contradictory statements and clarify if a bald eagle nest exists on the Entergy property. If such a nest exists, please describe any related coordination with State and Federal agencies, BMPs, or protection plans, as applicable.

#### **Waterford 3 Response:**

The statement in Section 3.6.11.2.4 (page 3-159) of the Waterford 3 ER is correct. Although bald eagles have been observed transiting the site, there is no bald eagle nesting occurring on the Entergy property occupied by Waterford 3. This was confirmed during the October 2014 threatened and endangered species survey.

Entergy does assume that since ideal habitat and foraging opportunities exists for the bald eagle in the area and since they are frequently observed within the vicinity (6-mile radius) of Waterford 3, that there could be potential bald eagle nesting occurring within the area. However, Entergy is unaware of any nesting sites within the area other than a bald eagle nesting site at Entergy's Ninemile Point Generating Station located in Westwego, Louisiana, approximately 20 miles from Waterford 3.

In addition, Entergy interprets LDWF's reference to "project site" to mean a 6-mile radius since Entergy requested the agency's input based on a 6-mile radius map that was included in the

consultation letter to the LDWF (see pages B-13 and B-15 of the Waterford 3 ER). So, it can be assumed that bald eagle nesting may exist within a 6-mile radius of Waterford 3. However, only LDWF would have knowledge of this nesting site, and this knowledge would not be disclosed to the public.

## **11. WASTE MANAGEMENT (WM)**

### **RAI WM-1**

Since WF3 is subject to the reporting provisions of 40 CFR Part 110 (as it relates to the discharge of oil in such quantities as may be harmful pursuant to Section 311(b)(4) of the Federal Water Pollution Control Act), any discharges of oil in such quantities that may be harmful to the public health or welfare or the environment must be reported to the National Response Center. In Section 9.5.1.5 of the ER, the applicant discusses reportable spills, and states that for the 5 year period of 2010-2014 there were no reportable spills: Provide the most current records to see if there have been any reportable spills which would trigger this notification requirement since the ER was written.

### **Waterford 3 Response:**

Based on review of condition reports from January 2015 through June 2016 that would document discharges of oil at the site, there have been no spills that has triggered the reporting provisions of 40 CFR Part 110.

**Enclosure 2 to**

**W3F1-2016-0073**

**Listing of Requested Documents  
Waterford 3 License Renewal Application**

## **Listing of Requested Documents**

### **1. AIR QUALITY (AQ)**

#### **RAI AQ-2**

- WF3 Meteorological Temperature Measurements\_1995-2015
- Temperature Analysis Mississippi River
- LDEQ Gauge 0319 at Plaquemine
- USGS Gage 07374000 at Baton Rouge

#### **RAI AQ-5**

- Entergy 2015i\_WF3 Air Emission Calculations\_CEO 2015-00017
- WF3 LRA Appendix E\_Tables 3.2-3 and 3.2-4
- WF3 2004\_WF3 Air Permit 2520-00091-00

### **2. ALTERNATIVES (AL)**

#### **RAI AL-1**

- Power Replacement Suitable Sites

#### **RAI AL-3**

- ENERCON 2015b\_Calc Supporting Section 07\_01 Alternatives
- Entergy 2015g\_Integrated Resource Plan 2015--Final Report
- Lanning 2014\_Correspondence Lanning-Entergy to Buckley-Entergy

### **3. AQUATIC RESOURCES (AR)**

#### **RAI AR-4**

- Entergy 2005\_WF3 316(b) Proposal for Information Collection

#### **RAI AR-6**

- WF3 Response to LDEQ PIC Comments
- Request to DEQ Regarding 316(b) Permit Modification
- LPDES Permit Modification\_2008

#### **RAI AR-7**

- LPL 1979\_WF3 Demonstration Under Section 316(a)
- LPL 1979\_WF3 Demonstration Under Section 316(b)
- Espey, Huston and Associates\_1977 316(b) Study
- WF3 1998\_WF3 LPDES Fact Sheet and Rationale for Draft LPDES Permit
- ENSR 2005\_W1&2 PIC
- Entergy 2007\_Impingement Mortality-Entrainment Characterization Study

### **4. CUMULATIVE IMPACTS (CU)**

#### **RAI CU-1**

- Reasonably Foreseeable Future Projects within WF3 Area

## **Listing of Requested Documents (cont'd)**

### **5. GROUNDWATER RESOURCES (GW)**

#### **RAI GW-1**

- WF3 Groundwater Monitoring Program\_Five-Year Review

### **6. LAND USE AND VISUAL RESOURCES (LU)**

NONE

### **7. MICROBIAL HAZARDS (MO)**

#### **RAI MO-1**

- ENERCON 2014i\_ROC--Ratard Louisiana Dept Health and Hospitals

### **8. SOCIOECONOMICS (SOC)**

NONE

### **9. SPECIAL STATUS SPECIES AND HABITATS (SS)**

#### **RAI SS-1**

- Entergy 2014e\_WF3 TE Species Survey Report

### **10. SURFACE WATER RESOURCES (SW)**

#### **RAI SW-1**

- WF3 Surface Water Withdrawals\_Discharges\_2011-2015

#### **RAI SW-2**

- Entergy 2015p\_WF3 LPDES Permit Renewal Application--March 2015
- LDEQ Administrative Completeness Determination

#### **RAI SW-3**

- WF3 2007b\_Stormwater Pollution Prevention Plan r1

#### **RAI SW-6**

- WF3 LPDES DMR Data Summary

#### **RAI SW-11**

- Coastal Use Authorization-Consistency Determination
- Department of Army Letter of No Objection
- LDWF Letter of No Objection
- USACE NNOD-SP (Mississippi River) 796 Permit
- U.S. Coast Guard Permit CG-2554

**Enclosure 3 to**

**W3F1-2016-0073**

**Digital Media Containing Requested Documents  
Waterford 3 License Renewal Application**