EXHIBIT 2

Comments of

General Electric Aviation on Draft NPDES Permit No. MA0003905 for Discharges from GE's Facility at 1000 Western Avenue, Lynn, Massachusetts

June 1, 2011

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I. Executive Summary

General Electric Aviation ("GE") appreciates the opportunity to submit these comments on draft NPDES Permit No. MA0003905 for GE's River Works facility in Lynn, Massachusetts (the "Facility"), released by the U.S. Environmental Protection Agency ("EPA") and the Massachusetts Department of Environmental Protection ("MADEP") for public comment on February 2, 2011 (the "Draft Permit"). GE has grave concerns about the manner in which the Draft Permit would affect Facility operations, most notably the Consolidated Drains Treatment System ("CDTS"), cooling water intake structures ("CWIS") and thermal discharges. GE believes that the Draft Permit is predicated on a fundamental misunderstanding of the nature and impact of GE's operations and discharges, including, without limitation, how those discharges affect water quality in the Saugus River. GE seeks to correct this misunderstanding in the comments that follow.

Beyond the CDTS, CWIS and thermal issues, GE is concerned about the extensive new requirements, including monitoring and management practices, proposed by the Agencies.[1] GE does not believe that these requirements are justified or appropriate, and GE urges the Agencies to make fundamental revisions and corrections to the Draft Permit before proceeding any further.

II. Facility Background

A. Lynn Facility History and Operations.

The Facility covers approximately 220 acres and is located on the east bank of the Saugus River in the City of Lynn, Essex County, Massachusetts. The Facility consists of a 45-building complex with associated storage areas, parking areas, and roadways. The Massachusetts Bay Transit Authority owns a railroad line which separates the site into two sections, referred to as River Works North facility and River Works South facility (also known as the Gear Plant).

Industrial manufacturing operations have been conducted at the Facility for approximately 112 years. Since the 1940s, the major industrial functions of the Facility have been the manufacture and testing of aircraft engines, the manufacture of turbine engines, generators, gear parts, and marine propulsion units. Current activities at the Facility include the design, manufacture, assembly and testing of aircraft engines and components. Manufacture of gearing for marine propulsion systems at the Gear Plant was discontinued as of December 2010.

Principal processes include machining, cleaning, descaling, coating, assembly and testing of engines and engine components. GE also operates a power plant to support its manufacturing

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[1] GE understands that the Draft Permit includes two separate and independent permit authorizations, one from EPA and the other from MADEP. However, recognizing that EPA has primary authority under the Clean Water Act for NPDES permitting actions in Massachusetts, GE commonly refers to EPA, instead of the Agencies, in these comments. Wherever relevant, GE intends for these references to EPA to include both permitting agencies.

operations that generates steam and electricity as well as compressed air. The GE Power Plant burns only natural gas; burning of oil was essentially discontinued in October 2009.[2]

The Saugus River is a tidally influenced, estuarine river from which GE withdraws water to use for cooling purposes. The Facility has three CWIS, designated as the Gear Plant CWIS, the Power Plant CWIS and the Test Cell CWIS. The Gear Plant CWIS has not been used in several years, and the Test Cell CWIS operates for an average of 25.2 hours per month or approximately 300 hours per year. The current permit limits for the Power Plant are 35.6 MGD and 45.0 MGD for the Test Cell. To reduce the Test Cell operation's withdrawals from the Saugus River, GE recently spent $878,000 installing a mechanical draft cooling tower. EPA published a proposed rule on April 20, 2011 that when finalized in 2012 will apply national performance standards and other requirements to GE's operation of its CWIS, which may be different than those proposed by EPA in the Draft Permit.

B. Economic Considerations.

The Facility is a critical Department of Defense facility that provides the T700 turboshaft engine powering the Apache and Black Hawk helicopters and the F414 that powers the F/A-18E/F Super Hornet fighter jet. These aircraft are among the most vital and prominent in Operation Iraqi Freedom and Operation Enduring Freedom. The Facility also produces the CF34 regional/business jet engine and other power plant components that support the commercial aviation sector. GE employs 3,250 full-time workers with an average annual salary of nearly $82,000 (not including overtime and benefits). The site generates a payroll tax base in excess of $250 million. The workforce is comprised of production workers, engineers, planners, draftsmen, tradesmen, sales and marketing, and support roles. In addition, the Facility hired 125 college/university co-op students in 2010 plus dozens of part-time and contract hires. The Facility is GE's most sizeable Massachusetts operation, and is one of the largest private employers on the North Shore and one of the Commonwealth's leading manufacturing sites. GE procures millions of dollars in raw material, products and services, much of it from more than 25 Massachusetts vendors that support nearly 2,500 workers. Numerous second-tier vendors (restaurants, retail stores, gas stations/convenience stores, etc.) also benefit from the operation of the Facility and the activities of its employees.

GE in Lynn and its employees contributed approximately $500,000 to charitable causes in 2010 through its Good Neighbor Fund, GE Volunteers Council, matching gifts program and community relations grants. In addition, thousands of employee volunteer hours (an estimated $800,000 of company-sponsored volunteer time) directly supported 75 projects that benefitted a variety of local nonprofits. GE has also donated land parcels (for Habitat for Humanity),

[2] Since October 2009, the GE Power Plant operated on oil for less than 12 hours; this operation was performed for maintenance purposes. GE currently maintains the ability to burn oil for emergency use in the remote instance that natural gas supplies are interrupted. In the near future, it is likely GE will not be able to burn any oil in order to satisfy anticipated CAA requirements, such as the MACT Boiler rule.

provided various other gifts-in-kind and partnered with Lynn schools to promote educational initiatives and several local agencies on a wide variety of environmental projects.

C. Environmental Good Citizen.

The Facility's NPDES compliance record is excellent and its current estimated annual expenditure on environmental protection and enhancement programs is approximately $2.1 million.

In 1999, GE voluntarily entered into an Administrative Consent Order with the MADEP and in consultation with EPA to construct the CDTS to collect and treat dry weather flows with a state-of-the art granular activated carbon treatment system. Dry weather flows ("DWF") include non-contact cooling water, ion exchange regeneration and backwash, steam conduit water, as well as any residual stormwater remaining in and/or groundwater infiltrating the drain pipes. Since its startup in 2000, the CDTS system has treated approximately 1,314 million gallons of dry weather flow prior to discharge to the Saugus River.

The facility has achieved Phase V Remedy Operation Status ("ROS") under the Massachusetts Contingency Plan through various source removal activities and completed a Risk Characterization based on comprehensive groundwater, soil, surface water and sediment sampling that concluded a condition of "no significant risk of harm to the environment" exists under current conditions. Source removal activities include, but are not limited to: installation and operation of remedial systems that have removed over 27,000 gallons of LNAPL from the subsurface; removal of over 150 underground storage tanks and 5.7 miles of inactive underground fuel piping and another 1.3 miles cleaned and closed-in-place; and excavation and removal of well over 8,000 cubic yards of petroleum impacted soil during numerous excavation activities. GE has also achieved a Temporary Closure (i.e., Response Action Outcome Class C) under the MCP for two areas of the facility including the Building 33/35 Area through construction of a 200-foot long and 20-feet deep slurry cut-off wall to eliminate petroleum migration to the river together with manual LNAPL recovery and the Building 64 Area through installation of a LNAPL recovery system. GE will continue to conduct remedial activities until the LNAPL has been reduced to a level of 0.5-inch as measured in groundwater monitoring wells that will support permanent closure under the MCP. While there were substantial expenditures on tank removals and Phase I activities prior to 1997, since 1997, GE has spent more than $20 million on site assessment and remediation/risk reduction measures and will continue to spend approximately $500,000 (including $100,000/year by GE Energy on Bldg. 64 area) annually on the operation and maintenance of active remediation systems and monitoring groundwater in selected areas for the next three to five years, depending upon when remedial objectives have been achieved. In addition, GE plans on investigating and remediating conditions (if necessary) beneath the 500,000 square foot Gear Plant building slated for demolition in 2011.

As discussed in more detail below, beginning in 2010 and with the approval of EPA, GE converted 500,000 sq. feet of paved area into green space to promote rainwater infiltration. GE also constructed a two-acre stormwater retention pond and made drainage improvements that will allow solids suspended by turbulence during storm events to settle out before the stormwater is discharged to the Saugus River, reducing sedimentation and potential pollutant loading to the river. This green space construction project was completed as of January 2011 at an estimated overall cost of $ 2.9 million.

D. Permitting History.

The Facility's National Pollutant Discharge Elimination System (NPDES) permit (No. MA0003905) expired on September 29, 1998, and has been administratively continued by virtue of a timely and complete renewal application submitted on June 29, 1998 (following a 90-day extension granted by EPA). After submitting the 1998 application, GE made changes to the Facility and its discharges with the approval of the EPA and MADEP. In order to reflect these changes and address questions from EPA, GE has submitted revisions/updates to its renewal application and other responsive information. A chronological list of documents submitted to EPA following the 1998 renewal application is included as Technical Exhibit 1.

Despite nearly 13 years of cooperative dialogue on the details underlying GE's NPDES-related activities, EPA provided no advance notice to GE of its decision to develop or release a Draft Permit. Instead, EPA simply released the draft for public review and comment, initially providing only 30 days for this vitally important public process. The Draft Permit, if finalized in its present form, would force GE to substantially alter if not completely shut down many, if not all, of its manufacturing and testing operations at the Facility, with profound adverse consequences to both GE and the larger community.

E. Recent Changes to Drainage at the Facility.

As described in a Letter to Nicole Kowalski of EPA dated October 7, 2010, GE reconfigured the Drainage System to separate the northern part of the Facility from the southern part of the Facility to facilitate the sale and redevelopment of the Gear Plant property.

Three stormwater outfalls are located in the Gear Plant area: Outfalls 028, 030, and 031. Outfalls 028 and 030 discharge stormwater runoff and groundwater infiltration from the Gear Plant area. GE re-routed stormwater from the northern part of the Facility flowing to Outfall 031 to Outfall 027. As part of this project GE converted 500,000 sq. ft. of existing paved area that drained to Outfall 031 into green space.

In addition, GE installed a two-acre stormwater detention pond that collects stormwater runoff from the green space and a parking lot. The new stormwater detention basin is designed to detain a 25 year, 24-hour storm with 0.5 feet of freeboard. The basin is designed with a low-level outlet control structure that drains the pond within 48 hours after a storm event. The reduction in impervious area and the addition of the stormwater detention basin results in a decrease in the net stormwater discharge to the Saugus River and any associated pollutant loading from the Facility.

The flow of non-stormwater from the northern part of the Facility was also rerouted from Outfall 031 to Outfall 027. Under dry weather conditions, non-contact cooling water and other types of dry weather flow from the northern part of the Facility continue to be discharged from Outfall 027 after treatment through the CDTS.

All operations at the Gear Plant ceased in December, 2010. As described previously to EPA, GE plans to remove infrastructure (e.g. pumps, overhead piping, and gates) associated with dry weather flow treatment for Outfalls 028, 030 and 031 as these outfalls only receive stormwater and possibly some incidental groundwater infiltration. This infrastructure must be removed as part of the demolition of the Gear Plant building because the building structure serves as support for the overhead piping that runs to the CDTS. Outfall 029 (salt water discharge) will be closed in accordance with Brown and Caldwell's letter to EPA, on behalf of GE, dated June 1, 2010. The end-of-line separators will remain in place during demolition activities and activities, and all ground disturbance conducted in accordance with the required EPA Construction General Permit and Stormwater Pollution Prevention Plan ("SWPPP"). GE is currently evaluating whether the contribution of stormwater and potential groundwater infiltration from a catch basin located outside the fuel farm containment area can be rerouted to Outfall 027 as well, since GE intends to retain the portion of the property encompassing the fuel farm.

After demolition of the buildings, GE plans to conduct response actions as necessary to achieve a Response Action Outcome in accordance with the Massachusetts Contingency Plan at 310 CMR 40.0000, and potentially sell the Gear Plant property for redevelopment.

The Draft Permit is inconsistent with GE's plans for the Gear Plant. In particular, the prohibition on dry weather flows and other provisions based on a presumption that gates will remain in place at the vaults associated with Outfalls 028, 030 and 031 should be deleted from the Permit. GE informed the Agency of its plans in email and letter correspondence and in a meeting held with EPA on July 30, 2010. The Agency offered no objections to these plans.

III. EPA's Assumptions about Groundwater Contamination are not Accurate; as a Result, EPA's Limits and Conditions Derived from these Assumptions are not Appropriate.

A. EPA's Assumptions.

EPA assumed that (1) contaminated groundwater infiltrates all of GE's drains and outfalls; (2) the contaminated groundwater contains any and all pollutants ever detected through the Facility's remedial activities at levels that present water quality problems; and (3) a significant but indeterminate amount of contaminated groundwater commingles and is discharged with stormwater. EPA relied on these assumptions to derive a host of different limits and conditions in the Draft Permit, including:

a) Monitoring requirements for numerous parameters, including 14 VOCs, 7 PAHs, BTEX, PCBs, whole effluent toxicity (WET) and metals;

b) Numeric and narrative limitations and conditions including those based on application of the RGP (VOCs, BTEX, TSS) and WQS (PAHs, metals);

c) Prohibitions, limitations and prescriptive BMPs to control discharges of dry weather flows; and

d) Bioaccumulation studies for PCBs and PAHs on blue mussels.

As described below, EPA's assumptions about contaminated groundwater are not accurate. Once these assumptions are corrected, the limits and conditions on which they are based are no longer supported or appropriate, and, in turn, should be removed.

B. EPA's Assumptions Overlook GE's Extensive Pipe Relining and Replacement Effort.

In describing its assumptions about the infiltration of contaminated groundwater, EPA mentions but then disregards the extensive drainage pipe relining and replacement efforts undertaken by GE. GE has relined or replaced 3.25 miles (26%) of the 12 miles of drainage pipe under its Facility at a cost of $5.1 million. GE focused this effort in areas where the piping was located below the groundwater table or subject to tidal influences, and where groundwater had been adversely impacted by historic operations based on characterization data from a network of over 150 monitoring wells and prior to extensive remediation activities under the MCP. More specifically, GE focused its lining efforts on drains to Outfalls 001, 007, 010, 027, 028 and 031. As a result of these extensive efforts, EPA cannot legitimately assume -- and the data simply will not support the conclusion that -- significant amounts of contaminated groundwater infiltrate and discharge through GE's drainage systems and outfalls.

C. EPA's Assumption about Contaminated Groundwater at Outfalls 014, 018 and 020 do not Reflect Key Changes to the Facility.

EPA assumes that groundwater commingles with the discharge from Outfalls 014, 018 and 020 (apparently based on statements ascribed to GE but for which neither EPA nor GE has any record). Based on this assumption, EPA has developed conditions that would force GE to inspect, reline and/or replace all of the pipes leading to these outfalls in order to eliminate the possibility of groundwater infiltration (and thereafter certify the elimination of all groundwater, even if uncontaminated). However, EPA's assumption ignores key changes by GE that obviate the need for any new conditions at these outfalls.

Outfall 014 was lined in 2002, as GE previously described in its July 2009 submittal. The outfall was internally sand blasted and "then completely sealed with applied liquid sealant, sheets of fiberglass type material were secured and a final layer of liquid finish coating was applied over that."

Outfall 018 is a salt water discharge structure/tunnel conduit constructed of concrete (10-12 inches thick) and roughly square. The top of the tunnel is just below the ground surface and extends to about 10 feet below grade. During high tide, water from the river raises the level of water in the tunnel because there is no gate valve. During low tide the river water level is below the bottom of the tunnel at the discharge. Water flows through the tunnel continuously (except for one day out of the year for maintenance) at a typical rate of about 13,000 gallons per minute to support power plant operations. At low tide with two turbines running, the water level at the outfall is approximately 3 feet deep and higher further upstream in the tunnel. Approximately 155 feet of the structure (~75%) runs parallel and immediately adjacent to the river. Therefore, the structure is impacted greatly by river water and minimally (if at all) by groundwater given tidal effects on the structure and the high flow of cooling water discharged through the system.

Outfall 020 conveys only unused river water from the cooling water reservoir for the Power Plant. This reservoir is drained, cleaned and inspected annually by licensed power plant operators and shows no signs of cracking or deterioration that would allow groundwater infiltration. In addition, the reservoir is always full of river (salt) water and as a result, the static pressure within the reservoir is higher than the hydraulic pressure from groundwater on the outside wall of the containment structure. Therefore, if the integrity of the reservoir were ever compromised, the pressure would cause river water to enter into the ground as opposed to groundwater infiltrating the reservoir. The "pipe" to Outfall 020 is essentially a concrete trough that returns the overflow water to the river. Any integrity problems would be readily visible because it is located aboveground. No such problems have been observed. The same hydrostatic pressure phenomena would apply to the trough to prevent groundwater infiltration if its integrity were compromised.

For these reasons, EPA's assumptions about groundwater infiltration into Outfalls 014, 018 and 020 cannot hold. The proposed conditions would, in effect, require GE to eliminate what has already been eliminated. Those conditions must be removed.

D. EPA's Assumptions about Groundwater Quality Overlook GE's Extensive Site Remediation Activities.

GE has been engaged in remediation activities for 28 years pursuant to Massachusetts General Law 21E and the Massachusetts Contingency Plan [MCP; 310 CMR 40.0000] promulgated in 1993, one of the most stringent state remediation programs in the country. Please refer to Technical Exhibit 2 for a chronology of these activities.

The majority of treated groundwater from the remediation systems is directed to the LWSC municipal sewer system for further treatment. Groundwater extracted from one remedial area (Building 29G/T) and any residual groundwater that infiltrates into the drainage system is directed to the CDTS for treatment via overhead piping. Any groundwater infiltration that escapes treatment in the CDTS during a storm event is *de minimis* in volume; is substantially buffered by the commingled stormwater in the drainage system; and is even further diluted once it mixes with the receiving water. Moreover, GE's ongoing remediation work has resulted in and will continue to cause continuous improvement of groundwater quality such that contaminant concentrations are expected to diminish over time to inconsequential levels under the MCP program.

Technical Exhibit 3 depicts the groundwater concentration trend graphs for key remedial areas of the site and show generally declining concentrations of contaminants from 2000 to present. With specific reference to the contaminants listed by EPA as requiring monitoring and/or numeric limits, the results of GE's extensive site groundwater monitoring and remediation confirm that the following constituents either have not been detected in site groundwater, have been detected at a low frequency and/or at low concentrations below relevant water quality criteria (such as Acute Ambient Water Quality Criteria or Tier II Secondary Acute Values), or are not considered constituents of concern (for example, because they are naturally occurring constituents in groundwater):

> benzene, toluene, ethylbenzene, total xylenes, BTEX, Methyl tertiary butyl ether (MTBE), carbon tetrachloride, 1,4 dichlorobenzene, 1, 2 dichlorobenzene, 1,3 dichlorobenzene, 1,2 dichloroethane, 1,1 dichloroethylene, methylene chloride (dichloromethane), tetrachloroethylene, 1,1,2 trichloroethane, vinyl chloride, total VOCs, aluminum, antimony, arsenic, beryllium, cadmium, calcium, chromium, cobalt, copper, ferrous iron, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, sodium, thallium, titanium, and Group I and II PAH compounds.

In April 2001, GE conducted an Ecological Risk Assessment of the Saugus River as part of the MCP Phase II Comprehensive Site Assessment and concluded that a condition of *no significant risk of harm to the environment* existed. This assessment took into account historical facility operations and current site conditions including the potential for, and impact of, groundwater infiltration. In 2011, GE reevaluated and reconfirmed this *no significant risk* conclusion using the additional surface water data collected between 2000 and the present. (Technical Exhibit 4). In short, groundwater conditions are not causing harm and continue to improve.

Even assuming some lingering potential for groundwater infiltration into certain drainage pipes, the amount of infiltration would be insignificant when compared to total flows in those pipes. The commingling of these flows would mitigate any water quality concerns at the point of discharge. And further mixing in the receiving river would render this a non-issue from a NPDES perspective. *See* Sections VI and IX.

For these reasons, GE disputes EPA's assumptions about contaminated groundwater and urges EPA to remove the monitoring requirements, limits and other conditions derived from them. Not only is EPA's approach inaccurate, it is also unreasonable.

For example, in Part I.B.9, EPA proposes that GE develop and implement a plan for controlling infiltration of groundwater…within six (6) months of the effective date of this permit, and thereafter submit a summary report annually. As described above, GE has already undertaken extensive effort to address groundwater where it has historically been a concern. Controlling the infiltration of *all* groundwater (even if uncontaminated) is simply untenable.

Historic drawings, circa 1910 indicate that there was a network of concrete roadways at the Facility that have been paved over. The roadways are 12-inches thick with two mats of rebar. In order to replace the drainage lines, the original concrete roadways would need to be removed. Taking into account site specific factors, the project to evaluate and replace just the lateral piping situated below the water table would be approximately $30.75 million. (*See* Technical Exhibit 5).

Even if the goal of eliminating all groundwater infiltration was appropriate and achievable (which we dispute), the requirement to produce a plan for doing so within 6 months of permit reissuance clearly is not. It would take years for GE to establish baseline conditions, assess areas of impact (if any), and then design and install controls to address those areas (if necessary).

Moreover, EPA's annual reporting requirement would force GE to provide data that GE cannot meaningfully collect. It appears that EPA wants GE to calculate the annual average infiltration and inflow, as well as maximum monthly infiltration and inflow, of groundwater alone for each reporting year. However, it is not possible to make such a calculation. While GE can estimate its dry weather flows collected for treatment at the CDTS, it is not technically feasible to distinguish between groundwater infiltration, other flows generated by facility operations, residual rain water, and tidal influence that are discharged to the plant-wide drainage system. The Facility is not configured to support such a monitoring effort and there is no valid method for calculating infiltration alone.

Finally, even assuming for the sake of argument that GE should or could control and/or eliminate all groundwater infiltration, we note that groundwater will continue its natural flow to the Saugus River directly by groundwater transport through soil and via tidal influences. So even if EPA's assumptions about the threat posed by groundwater contamination were correct, its approach in the Draft Permit would result in less collection and treatment of contaminated groundwater by GE and more natural recharge between groundwater and the Saugus River via processes not regulated or monitored under the NPDES program. Such a result would be inconsistent with our shared goal of eliminating pollution in the Saugus River, and would not result in any environmental benefit.

IV. Numeric Limits Applied to Wet Weather Flows are not Appropriate.

EPA proposes to impose numeric limits on wet weather flows from a number of GE outfalls. *See* Part I.A.1 (pH, Oil & Grease, TSS, BTEX, Benzene and Cyanide); Part I.A.5 (pH, Oil & Grease, TSS). EPA attempts to justify these limits on the basis of both water quality and technology considerations. *See* Fact Sheet at pp. 28-48 (Drainage System Outfalls); pp. 63-70 (Outfall 018B). But EPA's justification is infirm. On the water quality side, numeric limits are not feasible or necessary and, in any event, are premature. On the technology side, EPA's references to standards in other sectors and settings (i.e., steam electric effluent guidelines and remediation general permit) are inapposite. And EPA has not otherwise considered the factors necessary to support a BPJ determination.

A. Numeric Water Quality-based Limits are not Feasible or Necessary and in any Event are not Justified Here.

Before imposing new, water quality-based effluent limits, EPA must first perform a "reasonable potential" analysis, and then determine and document the need for such limitations on the basis of this analysis. EPA's record does not reflect any such analysis or determination.

The mandate to perform a "reasonable potential" analysis derives from 40 CFR §122.44(d)(1)(i), which requires EPA to determine whether a discharge "will cause, have the reasonable potential to cause, or contribute to, an excursion above any State water quality standard." In making this determination, EPA must "use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water. 40 CFR §122.44(d)(1)(ii).

In this proceeding, the factors that EPA must consider include: (1) control of point source discharges through the CDTS, (2) control of nonpoint source discharges through the remedial activities under the MCP, (3) the extensive buffering of the effluent with stormwater or noncontact cooling water, and (4) the mixing capacity of the receiving waterbody. As described elsewhere in these comments and supporting technical exhibits, EPA has failed to consider these factors.

As part of this NPDES renewal, GE provided EPA with effluent data that preceded the installation of the CDTS and, therefore, are no longer representative. *See* Section V. GE also provided, at EPA's request, data from sampling dry weather flows entering the drainage system prior to treatment. These limited data are also not representative, because they do not reflect (1) treatment, (2) reconfiguration of portions of the drainage system, (3) dilution and mixing, or (4) continuing reduction in concentrations as a result of the MCP-related activities. *See* Sections II.C and III.D. Absent representative data for the commingled flows from GE's outfalls, EPA cannot legitimately conduct a reasonable potential analysis or assign water quality-based limits. Rather, EPA must allow GE to perform reasonable and representative monitoring so that EPA has an adequate basis to conduct a reasonable potential analysis in the next permit renewal or as part of a re-opener.

Even if EPA determines that a water quality-based limit is required as a result of a reasonable potential analysis (which arguably is premature), the Agency must document this determination. *See In the Matter of Broward County, Florida*, 4 EAD 705, 713 (EAB 1993) ("[EPA] must provide a detailed explanation of the factual basis for concluding that [the permittee's] effluent has the reasonable potential for causing or contributing to a violation of [water quality standards], thus requiring regulation in accordance with 40 CFR §122.44(d)(1)."). The lack of a documented reasonable potential analysis (including the evaluation of effluent variability) is in itself "clear error and grounds for a remand." In *re Wash. Aqueduct Water Supply Sys*., 11 EAD 565, 585 (EAB 2004).

1. Numeric Water Quality-based Limits are not Feasible.

Site-specific constraints render numeric limits infeasible given the size, nature and cost of a treatment system capable of capturing, collecting and treating all stormwater discharges to achieve end-of-pipe numeric targets. *See* Section IX.E and the accompanying Technical Exhibit.

2. Numeric Water Quality-based Limits are not Necessary. Non-numeric Limits (i.e., BMPs) are Adequate to meet Water Quality Requirements. EPA Lacks any Basis in Fact, or in the Permit Record, to Refute this.

As required by its existing NPDES permit, GE has developed a Stormwater Pollution Prevention Plan ("SWPPP") and implemented a range of best management practices designed to minimize the impacts of its wet weather discharges. These practices are complimented by others maintained under GE's remedial program and other voluntary environmental management systems. GE respectfully submits that its BMP-based approach is successful in achieving compliance with existing permit requirements, as well as meeting any future water quality- or technology-based expectations. Technical Exhibit 6 describes GE's current suite of BMPs.

The use of BMPs in lieu of numeric limits is explicitly authorized by federal law and is consistent with EPA's long-standing approach to water quality based effluent limitations in stormwater permits. Section 502 of the Clean Water Act defines "effluent limitations" generally as a "restriction," thereby offering permit writers the flexibility to impose non-numerical limitations like BMPs. EPA has long endorsed this flexibility, both as a matter of regulation and policy. *See* Questions and Answers Regarding Implementation of An Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits, Guidance for Fiscal Year 1997, 61 Fed. Reg. 57,425, 57,426 (Nov. 6, 1996):

> Section 502 defines "effluent limitation" to mean any restriction on quantities, rates, and concentrations of constituents discharged from point sources. The CWA does not say that effluent limitations need be numeric. As a result, EPA and States have flexibility in terms of how to express effluent limitations. EPA has, through regulation, interpreted the statute to allow for non-numeric limitations (e.g., "best management practices" or BMPs, see 40 C.F.R. § 122.2) to supplement or replace numeric limitations in specific instances that meet the criteria specified at 40 C.F.R. § 122.44(k)…. [Also] EPA has defended use of BMPs as a substitute for numeric limitations in litigation involving stormwater discharges….

The validity of the BMP-based approach has also been confirmed by case law. *See, e.g.*, *NDRC v. Costle*, 568 F.2d 1369 (D.C. Cir. 1977) (prompting EPA's promulgation of 40 CFR 122.44(k)); *In re: Arizona Municipal Stormwater NPDES Permits for City of Tucson, Pima County, City of Phoenix, City of Mesa, and City of Tempe*, NPDES Appeal No. 97-3 (EAB 1998) (upholding permit writer's decision not to impose numeric limits on grounds of infeasibility, in particular due to the unique nature of stormwater discharges) (subsequently appealed and decided on other grounds).

GE is aware of EPA's recent revisions to a 2002 Agency memorandum entitled, *"Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Stormwater Sources and NPDES Permit Requirements Based on Those TMDLs."* GE notes that the revisions are in flux as a result of a recent public comment process and EPA's commitment to take action by August 15, 2011, to either retain the memorandum without change, to reissue it with revisions, or to withdraw it. Until then, it would be premature for EPA to apply the memorandum, as revised. In any event, GE does not believe that the memorandum is directly relevant to this proceeding. Nor does GE believe that the memorandum disrupts EPA's longstanding approach to, and support for, BMPs where numeric limits are shown to be infeasible. That is clearly the case here, where numeric limits are infeasible due to site constraints and GE's BMP-based approach is demonstrated to be effective in lieu of such numeric limits.

3. Numeric Water Quality-based Limits are Premature.

EPA cannot calculate or confirm the need for numeric stormwater limits until "background" conditions are established, and those conditions will not be known until the ongoing remediation work is completed. As described in Section II.C and III.D, this work proceeds apace with continuing progress toward the applicable remedial goals and endpoints, all of which have the potential to affect water quality conditions. Until the remediation is complete, any decision on numeric limits is premature. Deferring this decision is consistent with other relevant NPDES permit decisions involving ongoing remediation work within EPA Region 1.

B. EPA Lacks a Legitimate Technical Basis to Derive or Impose Numeric Technology-Based Limits.

Where, as here, a limit is not required by EPA's national effluent guidelines, then a case-by-case technology-based limit, based on best professional judgment ("BPJ"), may be imposed only if the permit writer performs the analysis required in 40 C.F.R. § 125.3. Under that regulatory provision, the permit writer must consider the factors in § 125.3(c):

(i) The appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and

(ii) Any unique factors related to the applicant.

The permit writer also must consider the factors in § 125.3(d), which are different for BPT, BCT or BAT requirements. For example, the factors for BPT requirements are:

(i) The total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application;

(ii) The age of the equipment and facilities involved;

(iii) The process employed;

(iv) The engineering aspects of the application of various types of control techniques;

(v) Process changes; and

(vi) Non-water quality environmental impact (including energy requirements).[3]

When conducting the required § 125.3 analysis, the permit writer must look at both the industry as a whole and the particular facility.[4] In other words, before imposing a BPJ limit on GE, EPA must conduct a reasoned analysis of control technologies available for pollutant removal at jet engine manufacturing facilities in general, and at the Lynn Facility in particular. Moreover, that analysis must be included in the fact sheet for the Draft Permit. Here, it was not. Rather, EPA simply assumed, without any supporting analysis, that the proposed technology-based limits would be technically and economically feasible.

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[3] 40 C.F.R. § 125.3(d)(1).

[4] *See U.S. Steel Corp. v. Train*, 556 F.2d 822, 844 (7th Cir. 1977); *Alabama v. EPA*, 557 F.2d 1101, 1110 (5th Cir. 1977).

Notwithstanding the absence of the required BPJ analysis, EPA proposes to impose a number of new technology-based numeric effluent limits on wet weather discharges from the Facility. For example, EPA says that "consistent with the RGP and individual permit effluent limits for contaminated groundwater discharges and combined discharges at similar facilities in Massachusetts, EPA has on a BPJ basis established BAT limits for benzene of 5.0 ug/L and total BTEX of 100 ug/L in wet weather discharges from the Drainage System outfalls." EPA claims that these technology limits are "based on treatability using carbon adsorption, a proven technology capable of removing benzene and other petroleum hydrocarbons from water." The fundamental flaw in EPA's analysis is that the technology basis for the proposed limits is active treatment, which does not currently exist for wet weather discharges from the Facility. As EPA states in its Fact Sheet, such a system is infeasible/cost prohibitive to install.

1. EPA is Required to Regulate Similar Facilities Similarly but has Failed to do so Here.

EPA indicates that GE's Drainage System Outfalls are in many ways similar to Conoco Phillips Stormwater Outfall 001 and ExxonMobil Outfall 01A; however, monitoring requirements for the GE Drainage System Outfalls are in many ways more stringent. Examples include:

- Monitoring frequency for most GE parameters is monthly as compared to quarterly for Conoco Phillips and ExxonMobil;
- Total BTEX (100 ug/L) and benzene (5 ug/L) limits in the Draft Permit are more stringent than those for the other two facilities;
- Draft Permit requires quarterly chronic WET testing, whereas no WET testing is required for either Conoco Phillips 001 or ExxonMobil 01A;
- Draft Permit requires monitoring for PCBs, Total VOCs, 14 specific VOC parameters and 8 specific metals parameters, whereas there are no similar monitoring requirements for Conoco Phillips 001 and ExxonMobil 01A.

With regard to total BTEX and benzene, we note that in the ExxonMobil proceeding, EPA initially proposed technology limits on commingled discharges dominated by stormwater using a treatment technology developed to treat low-flow discharges of contaminated groundwater (i.e., similar to what EPA proposes here). However, ExxonMobil appealed those limits on grounds that EPA failed to determine that the technology was feasible at its facility for the particular commingled flows at issue. Based on this appeal, EPA later withdrew the contested limits.

We urge EPA to be consistent in its approach to similar facilities and discharges. Toward that end, EPA should remove the proposed limits for both total BTEX and benzene. Furthermore, we urge EPA to revisit the need for, types of, and frequency of the monitoring requirements for the other parameters noted above to ensure consistency among similar facilities.

2. In the Absence of any Directly Applicable Effluent Guidelines, EPA Borrows from the Steam Electric Industry Sector based on a Comparison that is not Borne out by the Facts.

GE is a jet engine manufacturer. None of the wastewater streams at issue in this permit proceeding are subject to national effluent limitations guidelines (NELGs). Absent any directly applicable NELGs, EPA proposes to borrow from the steam electric NELGs. EPA's proposal extends beyond GE's Power Plant to other outfalls that have nothing to do with power generation. Even at the Power Plant, application of the steam electric NELGs would be inappropriate.

At the time EPA developed the steam electric NELGs, the Agency was aware that many manufacturing plants generated power for their operations, but EPA specifically decided to exclude them from coverage under the rule by focusing on facilities primarily engaged in the generation of electricity for distribution and sale. As a result, EPA did not develop any kind of record of evaluation for manufacturers like GE.

GE's Power Plant is distinguishable from commercial power production facilities because electricity generation is not its primary mission. The GE Power Plant is more aptly termed the "GE Steam Plant" because it was designed primarily to produce various levels of steam pressure for site operations, including 650 psig steam needed for specialized and intermittent aircraft engine and component testing. Due to the critical nature of process steam at the site as well as operational issues relating to starting boilers and time to reach required pressure/temperature, the GE Power Plant operates a minimum of two boilers at all times.

The boilers produce significantly more steam than is required to support site steam consumption external to the GE Power Plant, and in order to avoid venting excess steam, the GE Power Plant uses the excess steam to produce electricity. Thus, electrical generation at the GE Power Plant frequently is driven by the need to condense steam generated by boilers operating at minimum turndown. It does not produce all the electrical power needed at the Facility, and GE purchases the other electrical power it needs from the local grid at a lower cost.

The GE Power Plant serves an ancillary and support function for the manufacturing operations; it covers only 1.4 % of the space at the Facility. For the last two years, GE has received essentially zero revenue from selling or exporting electric power to the local grid.

In the steam electric NELGs, EPA predicated the numeric limits for total suspended solids (TSS) and oil and grease on data from many facilities in the industry that burn coal and oil to produce steam, which in turn produces fly ash and bottom ash that may contaminate various wastewaters. By contrast and as noted previously, the GE Power Plant essentially burns only natural gas.

Low volume waste streams considered in the steam electric NELGs included boiler blowdown, wet air scrubber pollution control systems, ion exchange water treatment system discharges, water treatment evaporation blowdown, laboratory and sampling waste streams, floor drains, cooling tower basin cleaning wastes, and discharges from house service water systems. By contrast at GE, many of these wastestreams are not present or, alternatively, discharge to the LWSC, which is the local POTW.

The only wastewater streams discharged by the GE Power Plant that fit the stream electric NELGs profile are boiler blowdown and ion exchange regeneration water that discharge through Outfall 018 and Outfall 019, respectively. Outfall 019 also receives a stormwater component, so it and all of GE's other wastewater and stormwater streams are fundamentally dissimilar discharges from those contemplated by EPA in adopting the NELGs.

In EPA's 2009 detailed study of the steam electric industry, the Agency found that the steam electric NELGs are rarely applied as BPJ to facilities such as the GE Power Plant. *Steam Electric Point Source Category: Final Detailed Study Report* (EPA 821-R.-09-008), p. 7-19 Oct. 2009. As a part of its study, EPA reviewed a category of facilities it terms "industrial non-utilities" which includes "cogenerators, small power plants, and other non-utility generators [that] generally do not produce electric power for distribution and/or sale." *Id.* at 7-10. This group of facilities included NAICs 336 (Transportation Equipment Manufacturing) among many other types of manufacturing categories. *Id.*, Table 7-3, p. 7-14. Thus, EPA's consideration of industrial non-utilities likely included the GE Power Plant.

In summary, there is no requirement to -- and no justification for -- applying the steam electric NELGs through BPJ to the GE Power Plant (let alone any of the other outfalls at the Facility).[5] Any BPJ application of the guidelines would be grossly inappropriate because the nature and kind of discharges from this facility are not at all analogous to the discharges contemplated by the Part 423 guidelines, as demonstrated above. Additionally, EPA has determined that a similar group of plants rarely has BPJ steam electric limits applied, which demonstrates that it would be unfair to apply them to the Facility.

Finally, EPA is planning to revise the existing steam electric NELGs, and has agreed to propose its revisions by July 2012. As a part of that rule, EPA may clarify regulation of small power plants at industrial non-utilities. EPA's focus on industrial non-utilities in the 2009 detailed study shows that EPA is aware of the issue and is very likely to address it. In the meantime, it would be premature to apply the existing steam electric NELGs.

3. Application of the RGP to the Facility's Discharges is Inappropriate.

EPA cites to the Remediation General Permit (RGP) as a basis for limits and monitoring conditions at a number of the Facility's wet weather outfalls based on the assumption that these outfalls "may discharge contaminated groundwater under certain circumstances." EPA used the RGP as justification to assign monitoring requirements and/or effluent limits for such parameters as TSS, BTEX (and specifically benzene), VOCs and PAHs.

The RGP provides NPDES permit coverage to sites discharging contaminated water (most often treated prior to discharge) associated with site remediation activities, construction dewatering of contaminated construction sites and "other miscellaneous contaminated discharges." Although remediation continues to occur at the Facility, as described in Sections II.C and III.D, the

[5] This conclusion applies in equal measure to the steam electric BMPs that EPA borrowed from the MSGP for this proceeding.

majority of wastewater from GE's remedial activities is routed to the LWSC municipal sewer system. Groundwater infiltration into the Facility's Drainage System is collected as dry weather flow and routed to the CDTS for treatment prior to discharge; therefore Outfall 027A is the only outfall that could be said to have a significant component of treated groundwater.

In spite of this, EPA chose to regulate other outfalls based on the RGP because minor quantities of dry weather flow are commingled with stormwater and discharged during storm events when the Drainage System gates are open. GE estimates that an inconsequential percentage of the wet weather discharge from the Drainage System Outfalls consists of dry weather flows over the course of any given wet weather event. These flows include not just groundwater but other authorized dry weather contributions. As a result, the percentage of groundwater is smaller than the percentage of dry weather flows, and the percentage of actually contaminated groundwater is even smaller (due to all of the pipe relining and replacement, as well as other remedial activities). In effect, EPA would require GE to achieve the technology standard for a 100% remedial wastewater stream at outfalls that receive a minimal amount of impacted groundwater. This is neither feasible nor appropriate.

Furthermore, any application of the RGP to outfalls such as Outfall 014 or other drains where groundwater infiltration has been excluded by pipe rehabilitation or relining would be even less appropriate. These outfalls exhibit none of the flows or characteristics that would make the RGP relevant.

In summary, the quantity and quality of GE's discharge is not consistent with the characteristics of discharges from a remediation site typically associated with coverage under the RGP. Therefore, it is inappropriate to use the RGP parameter lists and associated effluent limits as a BPJ basis for assigning monitoring parameters and/or effluent limits for GE's wet weather outfalls.

V. Monitoring Requirements are Burdensome and Unreasonable.

Although GE is willing to conduct reasonable monitoring to demonstrate the quality of its discharges and the effectiveness of its treatment systems and controls, the monitoring regime proposed by EPA is unreasonable and should be revised. With respect to chemical parameters, EPA has assigned monitoring requirements that are not based on representative data, are not necessary, are impracticable or otherwise infeasible, are costly in comparison to any perceived benefits, and are not consistent with other relevant NPDES permits. Similarly, with respect to whole effluent toxicity, EPA's proposed testing parameters will not yield representative results, especially when based on wet weather flows; are otherwise unnecessary, impracticable and infeasible with disproportionate costs; and reflect dissimilar treatment of otherwise similar facilities. Finally, with respect to bioaccumulation, EPA's proposed study of blue mussels is inappropriate.

A. Chemical Monitoring.

1. EPA Relied on Non-Representative Data in Selecting the Parameters to be Monitored, Specifically, VOCs, Metals, PAHs, PCBs, TRC, BTEX and MTBE.

EPA assigned monitoring requirements based primarily on water quality data for dry weather and wet weather flows collected in February 1998; however, EPA failed to account for the fact that the operation and configuration of the dry weather and wet weather outfalls have changed significantly since these data were collected.

Most significantly, the February 1998 data set preceded the installation of the CDTS and Drainage System, vaults and gates. As a result, these data do not reflect the proven collection and treatment capabilities of the CDTS and related infrastructure.

In addition, several significant soil and groundwater remediation projects have been implemented at various locations across the GE property since 1998, resulting in significant improvements in groundwater quality, not to mention reductions in the quantity of contaminated groundwater infiltrating into the drainage system. As a result of these changes, the February 1998 wet weather and dry weather water quality data reflect much higher concentrations of constituents of concern than currently exist and are not representative of current conditions.

The February 1998 water quality data are also not representative of current conditions at the non-wet weather outfalls (014, 018 and 020). The infrastructure serving Outfall 014 (concrete vault and pipeline to the river) was lined and sealed in December 2002, and, in turn, receives minimal (if any) groundwater infiltration. In 1998, Outfall 020 received wet weather flow from a local storm drain; however, flow from this drain was re-routed to Outfall 027 after 1998. At present, the Outfall 020 discharge consists solely of excess river water not used by the power plant cooling system. Outfall 018 currently does not receive wet weather flows. All of these changes affect the quality of the discharges from Outfalls 014, 018 and 020, and render the earlier February 1998 data non-representative of current conditions..

In addition to changes at the Facility since 1998, GE questions the quality of the 1998 dataset and the possibility that the analytical results may be biased high as a result of analytical interference or other possible sampling/analytical errors or anomalies.

A separate set of dry weather samples was collected at Outfalls 010, 018 and 019 in September 1998 as part of an “ultra clean” outfall monitoring study (this study was provided in Appendix C of GE’s May 2000 NPDES renewal application). Samples were analyzed for a subset of metals, with one group analyzed using the same conventional (EPA 200.7) method that was used in the February 1998 sample set. As indicated in Technical Exhibit 7 (dry weather samples), analytical results for metals in September 1998 were consistently and significantly less (typically by an order of magnitude) than the February 1998 results. A similar trend would have been expected for wet weather data. After reviewing the two data sets, GE believes that the differences may derive from errors in the February 1998 sampling or analysis.

There are also potential issues associated with “false positive” results due to interferences associated with analysis of certain parameters in a salt water sample. For example, copper and selenium are demonstrated to have the potential for "false positive" and/or elevated results due to matrix interference.[6] GE is concerned that both parameters were assigned limits at Outfall 018 in the Draft Permit, even though the basis for those limits may be "false positive" results in the application record.

"False positive" detection of cyanide is also a common occurrence, and GE believes that such a false positive detection occurred in the February 1998 Outfall 001 wet weather sample. As noted in EPA's "*Final Report: Low-Level Speciation of Cyanide in Waters*" (EPA 2001), "EPA-approved methods for the determination of weak associated cyanide (and total cyanide) typically are not sensitive enough in routine operation to yield reliable analytical results in the low ug/l concentration range." A presentation by William Telliard (retired from EPA) entitled "*Past and Present Approaches in Dealing with Cyanide*" (Telliard 2009) cites a 1994 report on cyanide analysis that stated that there is "no sound" measurement technique for cyanide measurement. With consideration of these and other relevant factors, the February 1998 detection of cyanide at Outfall 001 was a false positive, potentially due to limitations of the analytical method used and/or laboratory error.

In addition, interferences due to the presence of bromine and manganese in a brackish water environment may cause "false positives" in total residual chlorine ("TRC") samples. EPA noted levels of TRC in 2009 sample data provided by GE at various outfalls, including some to which potable water is not discharged.[7]

Finally, GE questions EPA's use of untreated dry weather flow data from July 2009 as the basis for selecting monitoring requirements for wet and commingled wet/dry weather flows. The majority of the dry weather flow that was monitored in July 2009 would be collected and conveyed to the CDTS for treatment prior to discharge from Outfall 027A. Moreover, as

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[6] Selenium and copper are considered "problem elements" whether done by furnace or hydride generation AA or traditional ICP and ICP MS techniques, and salt or brackish water can be a challenging matrix for the determination of metals. Elevated levels of sodium can make it difficult to accurately quantify metals present in trace quantities. However, chloride, sulfur, and calcium, in particular, can combine with the argon gas used in ICP determinations to form polyatomic ions with the same mass to charge ratio as various selenium isotopes to produce false positives. A similar effect can be seen with copper due to the combination of sodium with argon gas. EPA's "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment and Tissue Samples" (EPA 1997) and Thermo Fisher Scientific's "Rapid, Simple, Interference-free Analysis of Environmental Samples Using the XSERIES 2 ICP-MS with 3rd Generation CCTED (Thermo Fisher Scientific 2007), provided in Technical Exhibit 8 of these comments, provide supporting discussion of potential matrix interference issues associated with analysis of certain metals in a salt water matrix.

[7] Oxidizing agents such as bromine in estuary and marine samples, oxidized forms of manganese as well as some other metals, peroxides, turbidity, and color are often found in wastewaters at levels that will interfere with residual chlorine analyses. http://www.lagoonsonline.com/laboratory-articles/total-chlorine-residual-2.htm.

described in more detail in Section IX.F, based on a conservative analysis of commingled volumes and pollutant concentrations in the vaults, considerable mixing occurs in the drainage system prior to discharge, leaving all but one parameter (copper) below applicable criteria at the initial point of discharge, and all parameters below applicable criteria within a few minutes of the initial point of discharge. In short, GE's existing data confirm that there are no water quality issues associated with discharges from the Drainage System Outfalls during wet weather. As a result, further monitoring of these discharges -- at the level and frequency proposed by EPA -- is neither necessary nor appropriate. Representative monitoring of a few indicator parameters at a few representative outfalls at regular quarterly or semi-annual intervals would be adequate to properly characterize and demonstrate the quality of these discharges.

2. EPA's Proposed Monitoring Regime is Unnecessary.

There are no sources of cyanide at the Facility. As a result, the requirement to monitor for cyanide is unnecessary and inappropriate. Cyanide was detected in wet weather flow at one outfall (Outfall 001) at a level of 15 ug/l during the February 1998 sampling event; however, cyanide was not detected in any of the other February 1998 results for any of the other wet weather or dry weather discharges. Cyanide was also not detected in either of the dry weather samples collected in September 1998 (Outfall 010 and 018) or in any of the samples collected in 1990. As noted above, GE believes that the one "hit" from February 1998 was a false positive and should be rejected from the data set used by EPA to assess the need for limits and monitoring conditions in the permit.

Like cyanide, the proposed monitoring for TRC in GE's wet weather discharges is unnecessary and inappropriate. Some of GE's outfalls receive dry weather flow that originates from a municipal water supply system that may contain minor concentrations of chlorine. However, once commingled with other flows, chlorine is not a legitimate water quality concern at any of GE's outfalls. Moreover, not all of GE's outfalls receive municipal source water containing chlorine. Outfalls 001 and 030 fall into this category, as well as Outfalls 028 and 031 with the end of operations at the Gear Plant.

GE also questions EPA's decision to list the following, specific parameters for monitoring based on extremely limited or otherwise inappropriate data.

BTEX: The only recent analytical data for BTEX were collected in July 2009 and were non-detect (with detection limits in the range of 0.45 to 1.1 ug/l) at 7 of the 8 wet weather outfalls. The only exception was at Outfall 001, where BTEX was detected at a concentration of 3.1 ug/l (2.2 ug/l ethylbenzene and 0.96 ug/l benzene). The sample was collected from flow that would be diverted to the CDTS for treatment prior to discharge. Moreover, Outfall 001 drains a small area (~3.03 acres) comprised of storm catch basins and a small parking lot. The Outfall 001 sample had the highest concentration of TSS of all of the outfall samples collected (41.6 mg/l vs. <4 to 15.2 mg/l at the other outfalls), which suggests that the elevated BTEX concentration may have been anomalous. BTEX was not detected in any of the earlier sampling events at the Facility.[8]

MTBE: The only recent analytical data for MTBE were also collected in July 2009 at the same 8 wet weather outfalls. All results were non-detect (with a detection limit of 0.68 ug/l). MTBE is not a component of jet fuel, the primary petroleum product used and stored at the Facility, and there is no known source of MTBE elsewhere at the Facility, other than a small fuel station with one 10,000-gallon tank of diesel, and one 10,000-gallon tank of unleaded gasoline. The installation is a double-walled, poly tank, underground, and protected by continuous monitoring equipment, that signals an alarm in the event of any liquid detected within the interstitial spaces between the two walls. GE has uncovered no evidence of leakage, no loss of mass or volume, and nothing else to suggest a leak of any kind from this installation.

Metals: The Draft Permit would require GE to monitor for metals at the wet weather outfalls based on elevated metals concentrations reported in February 1998 (pre-CDTS) wet weather flow data and in the July 2009 dry weather data. Neither of these sets of data is representative of current wet weather flow conditions. The February 1998 data were collected prior to the implementation of the CDTS system and, therefore, over-represents the influence of dry weather flow (since this flow is now collected and treated at the CDTS). Likewise, the July 2009 data were collected prior to mixing with other wet weather flows and, in turn, over-represents the influence of dry weather flow at the point of discharge. Even if it were representative, examination of the original laboratory data shows EPA's analysis of the July 2009 metals data and associated conclusions about elevated metals levels to be inaccurate or overstated. *See* Technical Exhibit 9. In addition, as noted above, GE's comparison of February 1998 and September 1998 data suggests that analytical results for February 1998 may be biased high.

PCBs: The Draft Permit includes monitoring and reporting requirements for total PCBs based on a single detection of a single PCB congener in the July 2009 dry weather flow data for Outfall 001. This detection represents the sole exception at any outfall over the last 21 years (if not more). GE respectfully submits that EPA should not require monitoring and reporting in the face of this one exception.

Many of the parameters selected for monitoring in the Draft Permit were monitored in previous permit cycles and then discontinued due to consistent non-detects or other Facility changes. For example, EPA previously agreed to discontinue monitoring of BTEX, MTBE and PCBs based on GE's redirection of certain flows to the LWSC and a review of analytical results from hundreds of older samples. Technical Exhibit 10 recounts the sampling and analysis required in earlier permits but then discontinued for good cause.

[8] The only historical contamination issue with BTEX at the Facility involved Building 64, west end. *See* Technical Exhibit 10.

3. Monitoring is Impracticable and Infeasible.

GE is concerned that the monitoring regime proposed by EPA will be impossible to implement due to the frequency of monitoring and the sheer number of outfalls to be monitored after each and every qualifying wet weather event. These concerns are grounded in issues of staffing, access and safety, and sample holding times. The Draft Permit would require monthly wet weather sampling at all eight wet weather outfalls. This stands in stark contrast to the MSGP, which EPA cites as a relevant reference, and which only requires quarterly wet weather sampling at selected, representative outfalls.

If monthly wet weather sampling is required at all eight wet weather outfalls, then GE will need to enlist large crews to prepare, mobilize, execute, demobilize and document each and every sampling event over the course of the year.

EPA's *Industrial Stormwater Monitoring and Sampling* Guide (EPA 2009) encourages the use of representative outfalls where two or more outfalls are "substantially identical." EPA defines this phrase to mean "two or more outfalls that you believe discharge substantially identical effluents, based on the similarities of the general industrial activities and control measures, exposed materials that may significantly contribute pollutants to stormwater, and runoff coefficients of their drainage areas…." (Part 6.1.1 of MSGP-2008). Based on an evaluation of the types of flows that drain to each Drainage System Outfall (as shown in Technical Exhibit 14, Table 1-1) and even assuming a worst case scenario, GE respectfully submits that Outfalls 019, 027B, 007 and 030 are representative of all of the other wet weather outfalls, and are suitable for quarterly monitoring to characterize the wet weather discharges from the Facility.

4. The Costs of Monitoring far Outweigh any Perceived Benefits.

The number of samples requiring laboratory analysis under the Draft Permit is more than 18 times higher than the existing permit. The sample count would increase from 96 to 1,748 samples per year and the analytical cost alone would increase from $4,020 to $224,110 per year. An itemized analytical cost table is presented in Technical Exhibit 11.

In addition, to simultaneously complete the required monthly wet weather sampling within 30-minutes of discharge at eight wet weather outfalls, as well as to conduct the increased dry weather sampling and WET testing sampling requirements, GE would be required to hire contract staff at an annual cost of $161,460. The itemized manpower estimate is presented in Technical Exhibit 12.

Several of the proposed analytical requirements require instantaneous field measurement, including pH, specific conductance, temperature, and dissolved oxygen. To properly perform the wet weather sampling would, therefore, require purchase of handheld instruments for each of the eight wet weather outfalls. Furthermore, to collect the required composite samples for the proposed WET testing sampling would require purchase of 11 automatic samplers with refrigerated enclosures. The total cost to purchase the additional field instruments and the automatic samplers is itemized in Technical Exhibit 13 and is estimated to be $70,650.

GE submits that the extent and cost of sampling, as proposed by EPA, is not at all in line with the nature of the Facility or discharges as GE estimates that the total annual cost of sampling would be $385,570 along with a one-time cost of $70,650 for additional equipment.

5. EPA's Proposed Monitoring Regime for GE Deviates from Monitoring Regimes Allowed for Similar Facilities.

The Draft Permit is much more stringent in terms of both monitoring parameters and monitoring frequency than the ConocoPhillips Everett Terminal and the ExxonMobil East Boston Terminal, both of which are referenced by EPA as relevant comparisons. GE urges EPA to treat similar facilities similarly by reducing the number of monitoring parameters to those reasonably expected to be present at detectable levels in GE's discharges and reducing the typical sampling frequency to quarterly.

B. WET Testing.

1. The Wet Weather Toxicity Testing Proposed by EPA will not Yield Representative Results.

Whole Effluent Toxicity ("WET") tests are conducted by exposing test organisms to effluent for 48 hours or longer (for example, the chronic testing specified by EPA in the Draft Permit for inland silverside has a 7-day exposure time). However, storm events typically last only a few hours. In turn, any adverse effects observed in WET tests conducted on stormwater "effluent" are not representative of the effects that actually occur in the receiving waters over the course of the actual discharge event. In short, WET testing conducted on a composite stormwater sample (albeit commingled with dry weather flow over the first few minutes of discharge) collected over the few hours that stormwater discharges generally occur is not representative of instream aquatic life exposure for 48 hours or longer.

In storm events, the composite sample that is collected is representative of the average discharge quality experience over the limited duration (e.g., typically 2 to 12 hours) storm event. Even if organisms in the receiving water are exposed to elevated pollutant concentrations for only a few minutes or hours, organisms used in the WET test will be exposed to those concentrations for 2 or more days. Any adverse effects observed in such a test are not relevant to predicting instream effects. In other words, no valid inference can be drawn by exposing test organisms to the worst case stormwater quality for 48 hours (or longer), when the actual duration of a particular Drainage System discharge is not likely to exceed a few minutes, or a few hours at most.

Requiring 7-day chronic WET testing for a stormwater discharge is expected to result in a violation of the sample holding times required by EPA as described in "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms" (EPA 2002). For the chronic test with inland silverside (*Menidia beryllina*), fresh samples are required on days 1, 3, and 5 for renewal of test solutions, and samples must be first used within 36 hours of collection. A single stormwater event would not likely allow for collection of three samples. If, for example, a stormwater event was sampled on a Monday and used to initiate the toxicity test on Tuesday, unless the rain event continued well into that week, the initial sample would be needed in the final renewal on day 6 (168 hours after collection and

144 hours after first use). Although EPA allows permittees to request a variance from sample holding times, according to the methods document, "in no case should more than 72 hours elapse between collection and first use of the sample" (EPA 2002).

2. Stormwater may be too Pure to Sustain WET Test Organisms.

Stormwater samples used for WET testing may not contain the basic metabolites (e.g., ionic balance) necessary for the survival of the test organisms (in other words, the samples may be too "pure"). As such, any adverse effects observed in the WET tests are not representative of the effects that actually occur when organisms are exposed to stormwater after mixing with the receiving waters.

The sea urchin (Arbaciapunctulata) fertilization test proposed by EPA is a very sensitive test and negative outcomes would not necessarily be related to toxicity in the discharge but rather the turbid nature of stormwater. Recommended test salinities for inland silverside and sea urchin are 5-32 ppt and 30 ppt, respectively. While the wide range of salinities recommended for the inland silverside would likely capture the salinity of the stormwater discharge, it is unlikely that the 30 ppt recommended for sea urchin exposures would or could be achieved.

3. WET Testing is not Appropriate for Discharges from Outfalls 014, 018A or 018B.

We note, at the outset, that there is no wet weather component at Outfall 018; therefore, there is no need for an Outfall 018B. In the fact sheet, EPA determines that WET testing is appropriate at Outfalls 014 and 018A "*based on the possibility of toxicity in the discharge…resulting from groundwater*." However, as discussed elsewhere in these comments, EPA's determination is not accurate.

The Outfall 014 infrastructure was lined in 2002 and, in addition, the length of pipeline from Building 29G to the river is relatively short (approximately 120 ft). For these reasons, groundwater infiltration to Outfall 014 is expected to be negligible.

Outfall 018 is a salt water discharge structure/tunnel conduit constructed of concrete (10-12 inches thick) and roughly square. The structure is impacted greatly by river water and minimally (if at all) by groundwater given tidal effects on the structure and the high flow of water through the system.

4. WET Testing is not Appropriate for Discharges from the Drainage System Outfalls.

In this permit proceeding, EPA has assumed that stormwater from the Facility *"can contribute toxic pollutants to receiving water"* based on commingling with contaminated groundwater and, in turn, EPA proposes to require WET testing at GE's Drainage System Outfalls. As noted elsewhere in these comments, the data on which EPA relies are not representative of discharges from these outfalls because they predate the installation of the CDTS or otherwise fail to account for mixing that occurs within the Drainage System and the receiving waterbody.

While some quantity of dry weather flow commingled with stormwater is discharged during storm events when the gates to the Drainage System Outfalls are open, the volume of this commingled flow in the vault and drainage system is relatively small (estimated to range from 7,000 to 126,000 gallons) and the duration of discharge is brief (estimated to range from approximately 2 to 24 minutes). In proper context, it is evident (and demonstrated in GE's Technical Exhibits) that discharges from these outfalls do not cause or contribute to toxicity in the receiving water body. Consequently, consistent with EPA's approach in other relevant permit proceedings, WET testing should not be required for discharges from the Drainage System Outfalls.

5. EPA's WET Testing Requirements may be Infeasible to Implement.

Collecting samples for WET testing at eight stormwater and two non-stormwater outfalls may be infeasible due to the nature of stormwater sampling (i.e., the need to collect a first-flush sample early in the event), the large volumes of water needed for analysis and renewal, and the large size of the sampling crew required to execute such an effort. Consistent with GE's comments on EPA's chemical monitoring requirements, the Agency should recognize the representative status of certain outfalls and otherwise moderate its test requirements and frequencies to ensure that they can be implemented.

6. The Costs of WET Testing far Outweigh any Perceived Benefits.

Analytical costs for the WET testing specified in the Draft Permit would be significant. These costs would be approximately $2,350 per outfall. Analytical costs for WET testing of 11 outfalls (eight wet weather plus Outfalls 014, 018A and 027A) four times per year would total more than $100,000 per year (these costs are included in the estimate shown in Technical Exhibit 11). Note that these represent analytical costs only and do not include labor and other direct costs associated with the actual execution of the quarterly sampling proposed by EPA (these costs are included in Technical Exhibits 12 and 13). These costs are excessive in comparison to the limited utility/applicability of the test results and GE's demonstrated concerns about their representativeness to the discharges and impacts at issue in this proceeding.

C. Bioaccumulation Study.

The Draft Permit would require GE to conduct a "bioaccumulation study to examine the bioaccumulation of metals, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) in blue mussels (Mytilusedulis) resulting from the discharge of stormwater commingled with infiltrated groundwater."

EPA cites to GE's July 2009 data set to justify this study, but the data do not support EPA's proposal. The July 2009 data were derived from sampling dry weather flows that were later sent to the CDTS for treatment prior to discharge. The data did not include any wet weather component. As a result, they are not representative of the commingled flows actually discharged from the Drainage System Outfalls during wet weather conditions.

In any event, the available data for PAHs and PCBs do not support EPA's concerns. PCBs have been detected in only one sample over time, and then at low levels. Elevated PAHs have not been detected in any of GE's wet weather samples. Absent a record of detections and exceedances, it is inappropriate for EPA to require further study, especially when the pollutants of interest are ubiquitous in the environment and likely derive, if at all, from background sources like asphalt paved roads and atmospheric deposition.

EPA's NPDES Permit Writers' Manual (EPA, 2010) addresses if and when to require bioaccumulation studies as special conditions in NPDES permits. However, none of the grounds for such studies are present in this proceeding. Moreover, there is no precedent for such studies in relevant EPA Region 1 NPDES permitting actions. In the MWRA NPDES proceeding, EPA Region 1 required a bioaccumulation study of discharges from the Deer Island Wastewater Treatment Plant. The flows from this plant are 450 million gallons per day on average with peak flows approaching a billion gallons per day. This plant is in no way comparable to the Facility. EPA also required a bioaccumulation study as part of the Brayton Point Power Plant NPDES proceeding. Brayton Point is the largest fossil fuel plant in New England and is in no way comparable to the Facility. EPA has not imposed bioaccumulation study requirements in proceedings more similar to this one, such as the NPDES proceedings for Logan Airport, Mirant Canal Station, Mirant Kendall Station, or the bulk petroleum storage facilities in Chelsea, Massachusetts.

Moreover, due to the tidal nature of the Saugus River, it is not possible to attribute bioaccumulation, if any, to a specific GE outfall for the following reasons:

a) Wet weather discharges are by nature episodic events, and measurement of bioaccumulation by nature requires long-term, continuous exposure such that biological tissue reaches a dynamic equilibrium with the ambient water quality. This cannot happen with a wet weather discharge.

b) The receiving waters are tidal with a large reversing flow. Thus any in situ testing exposes animals to flows from both up-stream and down-stream sources. This exposure is much greater than any episodic wet weather exposure. Thus, measurement of bioaccumulation at a wet weather outfall and not at an upstream control does not demonstrate that the wet weather outfall is the source (it could be coming from a different downstream source). The same is true for a downstream control.

c) There are numerous other potential sources of contamination in the immediate vicinity of the GE outfalls, including runoff from industrial and urbanized paved surfaces (which typically include PAHs and metals) and RESCO, which is located directly across the river. Thus it is not possible to attribute elevated concentrations in mussels to any single source.

d) The Saugus River has a history of over 100 years of industrial activity (U.S. National Park Service, *Environmental assessment/Environmental Impact Report for Restore Saugus River Turning Basin and Dock* (October 2006)); Massachusetts Division of Marine Fisheries, *Technical Report TR-30, Rainbow smelt (Osmerusmordax) spawning habitat on the Gulf of Maine coast of Massachusetts* (Chase, 1992); New England Natural Resources Center and Massachusetts Public Interest Research Group, *Baseline Assessment of the Saugus River Basin Massachusetts* (Tashiro et al., 1991). The footprint of this activity is likely preserved in the sediments, and the residue would be expected to periodically re-suspend in the water column. This would occur with the top few centimeters at peak monthly tidal flows, during storm events, and due to boat prop-wash. Mussels feed by filtering particles from the water column, thus they ingest the re-suspended historic sediment particles and any contaminants associated with those particles. It would be impossible to distinguish between a particular wet weather discharge and re-suspended sediment as the source of any accumulation in the mussel tissue.

VI. EPA's Assumption that There is no Available Dilution in the Receiving Water is Overly Conservative and not Supported Factually.

In determining the need for water quality-based limits, EPA "conservatively assumed no dilution" based on "the tidal nature of the receiving water and the dearth of flow available at low tide, the value of the resource, and the assumption that non-allowable, non-stormwater discharges receive internal dilution via commingling with stormwater in the Drainage System." *See* Fact Sheet at p. 24. GE respectfully submits that EPA's assumption is overly conservative. Dilution occurs as a matter of physical fact in the river. Accounting for this dilution is authorized by applicable federal law and is not prohibited by applicable state law. From both a qualitative and quantitative perspective, such an accounting is appropriate in this proceeding.

EPA's regulations specifically allow for dilution to be considered in the reasonable potential analysis and, as a matter of Agency practice, it is commonplace for EPA to do so. EPA's Technical Support Document for Water Quality-Based Toxics Control (March 1991) (TSD) provides in-depth Agency perspective on dilution and mixing zones. The TSD sets forth specific conditions under which denial of mixing zones would be appropriate, but none of these conditions has been articulated by EPA here. Moreover, the TSD specifically acknowledges that dilution in marine and estuarine systems may be greater due to large and/or complex mixing than most freshwater systems. This potential for greater mixing and dilution is borne out by AECOM's evaluation, which is included as Technical Exhibit 14.

MADEP follows an older Implementation Policy for Mixing Zones (MADEP 1993). This policy describes circumstances where mixing zones may or may not be appropriate.[9] Two of these circumstances may be relevant here. The first is for shellfish harvest waters (Class SA and SB), where mixing zones are not authorized "unless it is affirmatively demonstrated that the mixing zone does not encompass important shellfish harvest areas and will not adversely diminish the established pollution of shellfish in this segment." GE's affirmative demonstration is presented below and in the accompanying Technical Exhibit. The second is for Areas of Critical

[9] MADEP defines a "mixing zone" as "an area or volume of a waterbody in the immediate vicinity of a discharge where the initial dilution of the discharge occurs. Within a mixing zone excursions from certain water quality criteria may be tolerable, provided they do not interfere with the existing or designated uses of the segment. Water quality criteria apply at the boundary of the mixing zone. Where mixing zones are not permitted, water quality criteria apply at the outfall structure."

Environmental Concern (ACECs) and other refuges, sanctuaries and special habitats, where mixing zones are not authorized without a case-specific determination. Again, GE's affirmative demonstration is presented below and in the accompanying Technical Exhibit.[10]

With this demonstration, GE encourages EPA to account for the dilution that is, in fact, occurring in the receiving water without any adverse impact to shellfish waters or other ACECs.

A. Qualitative Assessment Supports Allowance for Dilution and Mixing.

Wet and dry weather discharges from the Facility are subject to physical mixing and dilution within the Saugus River. The entire stretch of river is designated by MassDMF as a shellfish growing area (part of area N26.0) and has been assigned a "shellfish" qualifier as part of its MADEP Class SB water quality classification for segment MA93-44. However, the only local area where commercial shellfish harvesting is allowed (albeit conditionally restricted) is along the Pines River. While tidal reversals do bring Saugus River water into the Pines River, due to the location of the outfalls, pollutants potentially present in the Facility's discharges will be subject to significant physical mixing such that any "mixing zone" associated with those discharges would not be expected to "encompass" the Pines River shellfish harvest area or "adversely diminish the established population of shellfish in the segment."

Moreover, the most significant concern related to shellfish contamination and the closure of local shellfish harvest areas has been bacterial contamination (e.g., fecal coliform) associated with stormwater runoff and, to a greater degree, local CSO discharges. A 2006 sanitary survey report for area N26.1 (MassDMF, 2006) indicated that historic bacterial contamination in this area was due to degraded water quality from rain runoff transported to the area by the Saugus River, Town Line Brook and Diamond Creek. The report indicated that the Saugus River Watershed Council had documented that "the most significant contributors of this pollution to the Saugus River are Shute Brook in Saugus, the Town of Saugus Pump Station at Lincoln Street and [LWSC] CSO #003 (Summer Street Overflow in Lynn). The 2006 sanitary survey indicated that metals and PCBs concentrations in shellfish in area N26.1 had been evaluated in 2005 and that significant levels were not encountered. The report indicated that both MassDMF and the Massachusetts Department of Public Health reviewed the analytical results of these studies and determined that "results were below US Food and Drug Administration's Action and/or Guidance Levels for Poisonous or Deleterious Substances in Seafood."

As EPA is well aware, GE is not a source of fecal coliform or other bacterial contaminants, and its discharges have not been shown to adversely affect the relevant shellfish harvest area. As a result, GE would not be precluded from a mixing zone under the state's implementation policy.

[10] It is important to note that MADEP interprets its policy to apply to the relevant portion of a critical use area. "For the purpose of this policy a critical use may include all or a discrete portion of a segment. For example, a bathing beach in a Class B segment or a shellfish bed in a Class SA segment may be deemed critical while other areas of the same segment are eligible for mixing zones."

GE is also not precluded from a mixing zone due to the presence of the Rumney Marshes ACEC. These marshes are located in Saugus and Revere, beginning south of the Saugus side of the river (opposite the Facility) and extending to the south and southwest. The Pines River runs through the Rumney Marshes and supports shellfish beds. In establishing the ACEC, MADEP extended the northern boundary across the Saugus to the north bank (on the Lynn side). Although the river has tidal flats that could possibly serve as suitable habitat for shellfish, GE believes that the extension of the ACEC to the full width of the river was likely made in recognition of the tidal nature of the river and the fact that tidal flows infringe on the Pines River and Rumney Marshes. The Gear Plant portion of the Facility abuts salt marshes that are included in the ACEC; however, the Gear Plant is shut down and GE's other, remaining discharges are not expected to impact the marshes because of their characteristics, fate, transport and physical mixing in the river. GE submits that EPA should account for this mixing and dilution based on the affirmative demonstration presented below and in the accompanying Technical Exhibit, supported by the qualitative assumption that GE's outfalls are sufficiently far removed from the critical portions of the ACEC (thus allowing for segmentation as provided in MADEP's policy).

B. Quantitative Evaluation Supports Allowance for Dilution and Mixing.

GE retained AECOM to evaluate the dilution of commingled dry weather flow and stormwater from the Drainage System Outfalls. AECOM's evaluation is presented as Technical Exhibit 14. This evaluation demonstrates that discharges from the outfalls are both brief in duration and subject to significant mixing-based dilution within the river. Predicted "effective dilution" factors are substantial -- for worst case surface discharges in a low current velocity environment they range from 4.2:1 (at Outfall 031) to 20.5:1 (at Outfall 001). Effective dilutions are even greater during higher current velocity environments and submerged outfall scenarios.

The "effective dilution" concept takes into account the limited volume and associated limited time duration of the commingled water discharge. When vault gates open, commingled water is discharged from the Drainage System to the Saugus River over a 2 to 24 minute period (varies by outfall and discharge scenario). EPA's Technical Support Document for Water Quality-Based Toxics Control (EPA 1991) indicates that acute ambient water quality criteria are based on a 1-hour average exposure time. The effective dilution factors noted above represent the dilution of commingled water in the discharge as it relates to a 1-hour average instream exposure time, in order to enable direct comparison to acute ambient water quality criteria.

When these dilution factors above are applied to estimated water quality data from the commingled flows within the vaults (as presented in Technical Exhibit 15), it is clear that any potential for an exceedance of the 1-hour average acute ambient water quality criteria is very small (in fact, it is predicted that such exceedances do not occur). While GE believes that chronic instream criteria are not applicable to the discrete, brief duration commingled water discharges, it is clear that the combination of commingling-based dilution within the Drainage System and instream dilution upon discharge to the Saugus River obviate any potential for exceedance of the 4-day average chronic criteria.

GE's affirmative demonstration affects the manner in which EPA assessed the need for, and in fact derived limits, conditions and prohibitions in the Draft Permit, all of which need to be revisited in order to properly account for the demonstrated effects of mixing and dilution in the receiving water. In addition, GE's demonstration directly affects EPA's narrative prohibition on discharges that "cause a violation of applicable Massachusetts Surface Water Quality Standards." (Part I.A.1.b; Part I.A.2; Part I.A.3; Part I.A.4; Part I.A.5; Part I.A.6; Part I.A.7). EPA cannot legitimately impose such a prohibition end-of-pipe but rather must allow for a mixing zone.

VII. EPA must Correct Errors in its Approach to Assigning Limits and Monitoring Conditions on GE's Noncontact Cooling Water and Unused River Water Discharges.

1. Outfall 018 does not Discharge Stormwater and, in Turn, Should not be Assigned Wet Weather Limits or Conditions.

EPA relied on outdated information suggesting that Outfall 018 has a stormwater component, which it does not. Consequently, there is no need for "wet weather" discharge Outfall 018B.

In addition to noncontact cooling water (NCCW), EPA assumed that Outfall 018 receives dry weather flows such as boiler filter backwash and ion exchange regeneration and backwash, which it does not. The only flows other than NCCW to Outfall 018 are turbine condensate (intermittent), boiler startup/soot blower drains/boiler draining for maintenance (intermittent), discharges from deaerator storage tanks (intermittent), steam condensate return from steam users (seasonal) and boiler blowdown. Except for boiler blowdown, all of these flows are either intermittent (related to a specific maintenance activity) or seasonal. Assigning a single internal outfall (018C) is both unnecessary (due to the intermittent and infrequent nature of the discharges) and impracticable (no single monitoring point exists that would capture these various wastestreams). Monitoring of Outfall 018 (combined NCCW and other wastestreams) will effectively capture the quality of the discharge to the river.

2. Any Groundwater Infiltration into Outfalls 014, 018 and 020 is *de minimis*.

Even assuming that contaminated groundwater could be present at Outfalls 014, 018 and 020 (which we dispute), the amount of infiltration would be *de minimis* in comparison to the main source of flow. The pipes leading to these outfalls are lined, sealed, inspected or otherwise used in a manner that precludes the potential for significant infiltration. In addition, there are no stormwater connections into these pipes. GE submits that it was inappropriate for EPA to impose numeric limits and monitoring requirements in the absence of any data or analysis to suggest that discharges from these outfalls in fact cause or contribute to an exceedance of applicable water quality standards.

The situation at Outfall 020 is perhaps the most extreme. Outfall 020 discharges unused river water that is collected in a reservoir that is drained, cleaned and inspected annually by licensed power plant operators. The reservoir shows no signs of cracking or deterioration, and GE does nothing to the water other than pump it in and then allow the water to overflow back to the Saugus River. No limits or monitoring requirements should be imposed on this activity.

3. The Copper and Selenium Limits at Outfall 018 limits are not Appropriate.

GE presented information in Section V.A above that calls into question earlier sampling results for copper and selenium. Even if these results were accurate (which we dispute), EPA cannot derive limits without factoring in the presence of these pollutants in the Facility's intake water.

The table in Technical Exhibit 16 provides river water quality samples collected in September 1998 (west of the Route 1A bridge) and September 2000 (approximately midway between the power plant and test cell intakes), as well as samples collected in September 1998 at Outfall 018. The copper concentration observed in the river in September 2000 was almost half of the acute criterion.

Per the discussion above, even if imposition of these numeric limits could be justified, EPA failed to provide a "credit" for pollutants not added by the Facility, which EPA should have done by expressing the limits on a net basis. As EPA is well aware, under the Clean Water Act, the permit writer may regulate only "discharges of pollutants," which are defined as "any <u>*addition*</u> of any pollutant to navigable water." CWA §§301(a) and 502(12). Moreover, courts have held that constituents occurring naturally in navigable waters or occurring as a result of other permittees' discharges do not constitute an addition of pollutants. *See National Wildlife Federation v. Gorsuch*, 693 F.2d 156, 173-75 (D.C. Cir. 1982); *Appalachian Power Co. v. Train*, 545 F.2d 1351, 1377 (D.C. Cir. 1976). EPA's regulations specifically allow credit for intake pollutants in setting technology-based effluent limits. 40 CFR 122.45(g). And EPA has opined that permit writers "may take into account the presence of intake water pollutants" in setting water quality-based effluent limits, as well. 49 Fed. Reg. 38,050, 38,027 (Sept. 26, 1984). This opinion underlies EPA's Water Quality Guidance for the Great Lakes System, and has served as a model for permit decisions all around the country. *See generally* 40 CFR Part 132, App. F. Importantly, EPA has allowed the consideration of intake pollutants both in determining the need for limits and deriving those limits. EPA should do no less here.

VIII. Antidegradation Authorization is Neither Necessary nor Appropriate for this NPDES Renewal Proceeding.

EPA references the State's antidegradation policy in support of several of the proposed limits and conditions in the Draft Permit, and provides a detailed analysis of the State's policy and implementation procedures in the Fact Sheet. *See* Fact Sheet at pp. 24-26, 29 (relating to the prohibition on dry weather discharges), and 33 (relating to the combination of permit conditions targeting non-allowable, non-stormwater flows). However, it is not clear from the record whether EPA is in fact recommending that the discharges undergo the State's antidegradation authorization process.

GE notes that EPA specifically requested an antidegradation study in connection with the last NPDES renewal proceeding in 1992-93. The resulting study concluded that the thermal discharges associated with the Facility do not result in an impairment of existing water quality and are protective of indigenous aquatic life. Thermal discharges have decreased since the time of the study due to the inactivity of the Gear Plant intake and associated discharge at Outfall 029.

Based on the prior record and the fact that the Facility is an existing source that has been in place for over 100 years with no changes in operations or discharges that would lead to degradation, GE submits that additional antidegradation authorization at this time is neither necessary nor appropriate. Moreover, even if antidegradation authorization was purely a discretionary decision under the State's antidegradation implementation procedures, that decision would nevertheless need to be justified and explained in the permit record. Nothing of the sort has been done here.

IX. The Draft Permit would Result in Redundant and Internally Inconsistent Requirements that do not Reflect best Professional Judgment, are not Necessary in Order to Achieve Water Quality Objectives, and are Infeasible to Implement.

EPA's approach to the Drainage System Outfalls is predicated on:

- a prohibition on discharges during dry weather conditions;
- a prohibition on discharges during the first 30 minutes of wet weather conditions; <u>and</u>
- a limited authorization to discharge stormwater and "allowable non-stormwater" (commingled with "minimal non-stormwater flows of other types") after the first 30 minutes of wet weather conditions, qualified by a requirement to eliminate "non-allowable non-stormwater discharges" to the "maximum extent practicable" (MEP).

EPA repeats these prohibitions at least three times in the Draft Permit (Part I.A.1.a, Part I.A.11 and Part I.B.10). EPA also repeats the MEP requirement at least four times in the Draft Permit (Part I.A.1.b, Part I.A.15, Part I.B.9 and Part I.B.10.b).

Both the prohibitions and the MEP requirement are predicated on definitions and assumptions that EPA contrived for this particular proceeding, but that are flatly inconsistent with conditions at the Facility, not to mention relevant precedent. The fundamental problem with EPA's approach is that it cannot be implemented and, even if it could be, it is not necessary.

A. Wet and Dry Weather Flows.

EPA defines *"<u>wet weather</u>" in Part I.A.1 footnote 1 as "any time period that begins with an hour that received 0.1 inches or more of rainfall (or equivalent precipitation) and continues until two hours past the last hour that <u>precipitation</u> is recorded."* EPA defines *"<u>dry weather</u>"* as *"any time which is not wet weather."*

GE urges EPA to revise these definitions to more accurately and fairly reflect the nature of stormwater controls that are already in place at the site. Those controls affect both "how" and "how long" wet weather discharges occur.

For Outfall 027B, runoff from the newly installed retention pond can continue for up to 48 hours after a measurable storm event. Moreover, for all of the Drainage System Outfalls, the design and operation of the stormwater outfall gates dictate the occurrence and duration of wet weather discharges.

As a matter of both design and operation, an outfall gate begins to open when the accumulation of stormwater flow in the vault causes the water to reach a designated "gate open" level. The gate slowly rises (opens) over a 5-minute period, gradually releasing accumulated water so as not to create excessive turbulence and stir up water in the vault during the release. After 5 minutes, the gate is completely open and remains this way for a 1-hour period. After an hour, the gate rapidly closes and remains closed until the "gate open" level is again triggered. If the vault begins to refill with stormwater, the transfer pumps will turn on and will route the accumulated water to the CDTS until such a time as water level either drops to the "pump off" level or rises to the "gate open" level.

Based on the manner in which the stormwater outfall gates operate, discharges from the vaults are related to runoff flow rates into the vaults instead of when precipitation begins or ends. For this reason, it would be more appropriate to define "*wet weather*" in Part I.A.1 footnote 1 as "*any time period that begins with an hour that received 0.1 inches or more of measurable rainfall (or equivalent precipitation, including snowmelt) and continues until two hours past the closing of the last of the outfall gates (excluding Outfall 027B due to the upgradient stormwater detention pond, which can take up to 48 hours to fully drain)*."

B. Allowable and Non-Allowable Stormwater.

EPA defines "*allowable non-stormwater discharges*" as "uncontaminated groundwater, steam condensate, turbine condensate, and condensate from air receivers." By contrast, EPA defines "*non-allowable non-stormwater flows*" as "contaminated groundwater, cooling water, condensate blowdown, steam conduit blowdown, boiler startup/soot blower drains/boiler draining for maintenance (intermittent), boiler filter backwash, ion exchange regeneration and backwash, de-aerator storage tanks (intermittent), boiler blowdown, building 64-A sump (intermittent), steam conduit water, cooling tower blowdown, stormwater collected in the secondary containment dikes and truck loading areas, test cell washdown water (intermittent), hydrant testing, sprinkler system testing water, potable water used upon NCCW system failure, drain cleanouts (including drainage system cleaning), roof mounted air conditioner wash water (no detergent), excavation dewatering, and stormwater dye tracing." For "non-allowable non-stormwater flows," EPA has proposed (a) a number of additional control measures, (b) a novel MEP standard for eliminating the discharge of these flows, and (c) numeric effluent limits and monitoring requirements for any non-allowable non-stormwater discharges that cannot be fully eliminated.

EPA justifies these definitions in the Fact Sheet on the basis of the MSGP. However, the MSGP is not a valid point of differentiation. The MSGP was developed as a "general permit" to accommodate thousands of permittees in different regions of the country operating in a range of different industrial sectors. The "allowable non-stormwater" discharges identified in the MSGP simply reflect the most common and recurring types of non-stormwater discharges within that large class of general permittees deemed to be acceptable by EPA. Many facilities elect individual permit coverage over the MSGP and hold permits that authorize different and/or additional "allowable non-stormwater" discharges. In short, the MSGP does not set a floor or ceiling for these types of discharges. Rather, it provides a convenient permitting vehicle with terms and conditions designed to accommodate common conditions among thousands of permittees. GE has not sought coverage under the MSGP here and, in turn, there is no basis to differentiate GE's discharges pursuant to the MSGP.

Moreover, as applied to this particular proceeding, EPA's definitions would have the effect of prohibiting certain non-allowable non-stormwater flows that GE cannot feasibly eliminate and, in any event, do not result in any water quality impacts that would necessitate elimination. These flows are addressed in more detail in Section XIII of these comments.

C. MEP.

EPA's MEP requirement is entirely novel in this permitting context. It is true that Section 402(p) of the Clean Water Act sets out a similarly worded MEP standard for discharges from municipal separate storm sewer systems. However, this standard is not carried forward to industrial discharges, like GE, in either the statute or EPA's regulations. EPA has not defined MEP as it would apply to the Facility, and in fact has conceded that it "is presently unable to determine all the specific steps that should be taken to reduce [let alone eliminate] the non-allowable non-stormwater flows of concern commingled with stormwater."

Instead of imposing a new, *ad hoc* and entirely subjective standard to address a perceived problem for which EPA has no known or ready solution, EPA must provide GE with the opportunity to investigate the source(s) of any flows of concern, monitor the impacts of those flows, and implement reduction/mitigation measures where feasible. This, in fact, is already occurring through the clean-up and restoration work being conducted under authority of the Massachusetts Contingency Plan, as described in Sections II.C and III.D above. Moreover, as demonstrated elsewhere in these comments, the flows subject to the prohibitions and MEP requirement do not present water quality concerns at the point of discharge, let alone when mixed with the receiving waterbody. In short, EPA would have GE chase a problem that does not exist.

D. During Dry Weather Conditions, the CDTS Reflects Best Available Technology and is Protective of Water Quality.

Following the opportunity for review by EPA and approval by MADEP, GE installed the CDTS in 1999 at a cost of $3.1 million. The CDTS collects and treats dry weather flows with a state-of-the-art granular activated carbon treatment system. The vaults and gates associated with the collection system help to minimize the potential for untreated dry weather discharges. However, the gates are not hermetically sealed. As a result, some incidental dry weather discharge (i.e., weeping) is possible.

In other relevant permit proceedings, EPA has cited to the CDTS as a "model" for other permittees to follow. For example, in the 2008 NPDES renewal proceeding for ExxonMobil, EPA reported as follows:

> Other industrial facilities in the area are in the process of, or have completed renovations to their stormwater collection and treatment systems to prevent untreated contaminated groundwater from co-mingling with stormwater, as shown by the following examples…At General Electric in Lynn… dry weather flows, which include groundwater

> infiltration and process (cooling) water are collected and treated in the consolidated drains treatment system, which includes carbon adsorption capability. In addition, various sections of storm drain and other buried gravity discharge pipes have been lined to prevent contaminated groundwater infiltration.

The CDTS continues to reflect the best available technology. It has proven to be effective at collecting and treating dry weather flows, as well as any residual stormwater and groundwater captured in the drainage system. However, since the gates are not hermetically sealed and some incidental dry weather discharge is possible, EPA cannot simply prohibit all dry weather discharges. To do so would set GE up for failure based on a design that EPA has held out as a model for others.

Given the manner in which the CDTS was designed, EPA's prohibition cannot stand. Instead, EPA should focus on that which GE can meaningfully control -- operation of the gates. Toward that end, we recommend that EPA revise the prohibition in Part IA.1.a. to read: *"The gates for the Drainage System Outfalls (except outfalls 028, 030, and 031) shall remain closed during dry weather conditions."* We also urge EPA to remove the redundant prohibitions in Part I.A.11 and Part I.B.10.

E. The CDTS is not Designed to Handle Wet Weather Flows.

The CDTS was designed to treat dry weather flows up to a capacity of 300 gpm, and is currently operated to treat a maximum average of 250 gpm. In order to capture and treat the first 30 minutes of wet weather flows (and, in turn, comply with the prohibition against discharging such flows from the Drainage System Outfalls), GE would need to fundamentally redesign and expand the system. The capital costs of such an undertaking would range from $5.7 and 37.9 million, and the schedule for doing so would extend from 3 to 4 years, all as more particularly described in Technical Exhibits 17 and 22.

F. Neither the Prohibition nor the MEP Requirement is Necessary to Achieve Water Quality Objectives.

EPA's approach to the Drainage System Outfalls assumes that dry weather flows will adversely affect water quality if discharged during dry weather conditions or the first 30 minutes of wet weather conditions. This assumption is not accurate. Based on a conservative analysis of commingled volumes and pollutant concentrations in the vaults just prior to discharge, as set forth in Exhibit 15, only copper could be expected to exceed the acute saltwater criterion at the initial point of discharge from four of the outfalls; concentrations of all pollutants, including copper, would be expected to decrease substantially during the first 30 minutes of a wet weather event; and after the first hour, no pollutants in the discharge would be expected to exceed any of the applicable water quality standards at any of the outfalls. We note, as well, that this analysis does not account for any mixing in the receiving water, which as described in Exhibit 14, is expected to be substantial (i.e., ranging from approximately 4.2:1 to 33.2:1 for various outfalls and discharge scenarios).

X. EPA's Proposed Thermal Limits for Outfalls 018 and 014 are more Stringent than Warranted by Applicable Law.

A. Overview of EPA's Approach to Deriving the Proposed Thermal Limits.

According to the Fact Sheet, pp. 74-80 , EPA arrived at the proposed thermal limits in three steps. First, using its "best professional judgment" ("BPJ") the Agency made a "technology-based" determination that retrofitting wet closed-cycle cooling represents the "best available technology" ("BAT") for reducing the thermal discharge.[11] As discussed in Section XI, that determination must be reconsidered because EPA did not collect adequate information with which to support its evaluation of the technical feasibility, affordability, or cost-effectiveness of closed-cycle cooling for the Facility,[12] nor did it adequately evaluate site-specific information bearing on any of the other statutorily required factors, such as the age of the Facility or energy and non-water quality impacts. Instead, the Fact Sheet indicates that EPA reached its conclusion based primarily on the fact that some other facilities, including the Brayton Point Station (a 1,500-MW steam electric power plant located on Mount Hope Bay for which EPA performed exhaustive site-specific analyses) have retrofitted closed-cycle cooling. Relying on the results projected for the Brayton Point Station, EPA concluded that retrofitting a closed-cycle cooling system for both the Power Plant and Test Cell would reduce the heat load at the Facility by 95% or more. Fact Sheet, p. 75.

Second, EPA examined the Massachusetts Water Quality Standards applicable to the Saugus River in the vicinity of the Facility's discharge. Because the Agency concluded that its proposed technology-based limits would be more stringent than those required by applicable water quality standards for temperature, EPA chose not to derive water quality-based limits that account for an appropriate mixing zone. Fact Sheet, p. 76.

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[11] As EPA notes, there are no "applicable" technology-based requirements for the Facility, but the statute authorizes permit writers to establish technology-based limits on a case-by-case basis, using best professional judgment. Notably, however, neither the statute nor EPA's regulations require a permit writer to make a BPJ determination for each pollutant that is discharged but not subject to effluent guidelines. *See, e.g*., CWA § 402(a)(1) (authorizing the Administrator to establish BPJ limits that she "determines are necessary"); 45 Fed. Reg. 68,329, citing *NRDC v. Train*, 8 ERC 2120 (DDC 1976), modified at 12 ERC 1833 (DDC 1979). Rather, the decision to make a BPJ determination is a matter of discretion. This is the first time that EPA has deemed it appropriate to make such a determination for the Facility, and EPA nowhere explains the reason for this change.

[12] EPA did consider some of the relevant site-specific factors in evaluating whether retrofitting closed-cycle cooling would qualify as the "best technology available" ("BTA") for purposes of § 316(b) of the Clean Water Act, which pertains to cooling water intake structures. For the reasons discussed in Section XI of these comments, however, EPA's analysis of site-specific factors in that context is inadequate and cannot be used to support the Agency's proposed conclusion that closed-cycle cooling would be BAT for the thermal discharge.

Third, recognizing (correctly) that GE intended to request renewal of the alternate thermal limits included in the Facility's current permit, which were established pursuant to the thermal variance provision in § 316(a) of the Clean Water Act, EPA developed alternate thermal limits. Instead of renewing the thermal limits included in the current permit, however, EPA developed more stringent limits based on "additional monitoring and modeling studies pertaining to GE's thermal discharges." Fact Sheet, pp. 77-79.

As the following discussion demonstrates, EPA's threshold determination that closed-cycle cooling represents BAT for the Facility's thermal discharge is unsupported and incorrect. Equally important, the Agency's determination that a 5°F reduction in the current thermal limit (reducing the maximum discharge limit from 95°F to 90°F) is necessary to satisfy § 316(a) is based on a flawed analysis and must be reconsidered

B. EPA's Proposed Determination that Retrofitting Closed-Cycle Cooling Reflects BAT for the Facility is Fundamentally Flawed.

EPA based its proposed determination that retrofitting closed-cycle cooling is BAT for the Facility on the flawed analogy it drew between the Facility, which manufactures and tests jet engines, and steam electric power plants, which are engaged primarily in the generation and distribution of electricity for sale to others (*see* 40 C.F.R. § 423.10 (2010)). That analogy cannot withstand scrutiny.

To understand why that analogy is inapposite, it is important to understand why the Facility produces steam and electricity. The Power Plant (Building 99) provides steam and electrical power for the entire GE site, which includes 3.4 million square feet of buildings on 220 acres. The Power Plant was designed specifically to produce steam at 650 pounds-force per square inch gauge (psig) and 850°F for a variety of Test Cell users. All five existing boilers produce superheated steam at 650 psig, and steam is distributed to meet site needs at three different pressure levels – 650 psig, 200 psig, and 3 psig. Steam is reduced via pressure-reducing stations or extraction from steam turbines to provide steam for medium- and low-pressure applications. Site thermal loads met by the existing steam generation system include heating, process, and test steam. Site steam demand is greatest from late October to mid-April.

The Power Plant's ability to reliably provide superheated test steam at 650 psig pressure to drive steam turbines at the Test Cell (Building 29G) is critical to the readiness, simulation precision, and cost-competitive performance of GE's aircraft engine and engine component testing business. Steam turbines provide the rotational power source for testing engine components. The Test Cell is a specialized "boutique style" engine and component testing and diagnostic facility. GE's customers for this unique facility include military, regulatory, commercial, and research and development entities, each having its own exacting specifications and requirements for the final outcome of testing. Target flight conditions must be precisely simulated on the ground to achieve certain flight ambient conditions (*e.g.*, extreme temperatures), strength or endurance parameters, or lift, power, and thrust targets. All of these conditions must be achieved within the Test Cell via flight simulation protocol. Achieving and accommodating these simulated conditions create the need for:

- Critical volumes of steam at exact temperature, pressure, and humidity conditions that are precisely metered and monitored to achieve the requisite conditions for successful flight simulation, and

- Critical volumes of non-contact cooling water at carefully controlled temperatures that are essential for lowering the temperatures of dynamometers, intake air, bearings, rotating shafts, exhaust, and other test equipment.

Based on the outcomes of testing, GE customers determine whether aircraft engines and components can safely be returned to service to fulfill the needs of military and commercial customers. All water, steam, and air sources must be available when needed in evaluating the potential success of a simulated flight.

Over the past several decades, the electrical and thermal loads of the Facility have declined. Due to the critical nature of process steam at the site as well as operational issues relating to starting boilers and time to reach required pressure/temperature, the Power Plant operates a minimum of two boilers at all times. The boilers produce significantly more steam than is required to support site steam consumption external to the Power Plant, and in order to avoid venting excess steam, the Power Plant uses the excess steam to produce electricity. Thus, electrical generation at the Power Plant frequently is driven by the need to condense steam generated by boilers operating at minimum turndown.

Imposing the high costs of retrofitting the Power Plant with closed-cycle cooling would drive up the costs of steam and electric power production for the entire Facility, impair the economic competitiveness of the specialized Test Cell operations, and reduce the incentive for using the excess steam for power generation instead of venting it. As evaluated in GE's cooling tower analysis, imposing a closed-cycle cooling system for the Power Plant would be economically unreasonable and would impose a significant burden on GE operations.

Even if this were not the case, EPA's analogy is inapposite given the vast differences in scale of these two facilities and the seasonal nature of thermal discharges from the Test Cell, both of which bear on the cost-effectiveness of using closed-cycle cooling to reduce the thermal discharge.[13] Cost estimates developed by EPA indicate that retrofitting closed-cycle cooling at the GE Power Plant would be far less cost-effective in reducing cooling water flow and any associated heat load than retrofitting a closed-cycle cooling system at a large stream electric plant like Brayton Point Station. EPA estimated that costs of constructing closed-cycle cooling at the GE Power Plant as of 2010 would be $36,491,000 (Fact Sheet, Attachment J, pp. 22-23).

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[13] EPA has declined to weigh the costs and benefits of imposing closed-cycle cooling as BAT for the Facility, arguing that cost-benefit considerations are not contemplated by the BAT provisions of the statute (Fact Sheet, p. 76). But the Agency also failed to perform any analysis of the cost-effectiveness of closed-cycle cooling. Such an analysis involves evaluating the cost-per-unit of pollutant removed. As a matter of longstanding policy and practice, EPA has considered cost-effectiveness in selecting BAT. *See, e.g., Riverkeeper, Inc.*, 358 F.3d 174, 195 (2004). EPA provided no explanation for its failure to consider cost-effectiveness in this instance.

Based on a design cooling tower duty of 257.4 million British thermal units (MBTU) per hour (MBTU/hr) ("Cooling Tower Analysis Technology and Biological Assessment Information, Items 5(a) and 6" (CH2M HILL, 2008)), the cost of closed-cycle cooling at the GE Power Plant would be on the order of $141,768 per MBTU/hr. In contrast, the unit cost of closed-cycle cooling at Brayton Point Station, the largest fossil-fuel burning power plant in New England, would be much smaller. Based on a maximum station heat load of 7,360 MBTU/hr at Brayton Point (Brayton Point Fact Sheet, p. 29) and EPA's 2002 cost estimate of $68.385 million for closed-cycle cooling for the entire station (*Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA*, EPA, 2002; Table 7.4-11, Column 3 [EPA/Abt 20 years 0% plume], p. 7-101), the cost of closed-cycle cooling at Brayton Point would be on the order of about $9,291 per MBTU/hr. Thus, the costs per MBTU/hr of retrofitting closed-cycle cooling at the GE Power Plant are an order of magnitude higher than the costs per MBTU/hr at Brayton Point.

In short, the fact that a few large steam electric plants[14] have converted or are converting from once-through to closed-cycle cooling does not demonstrate that retrofitting closed-cycle cooling would be feasible and affordable for a manufacturing facility like this one, with a small power plant designed specifically to produce steam for aircraft engine testing and other site purposes. In fact, our prior submission and these comments provide ample evidence to the contrary. *See* Section XI.

In addition, EPA's determination that retrofitting closed-cycle cooling is technically feasible for the Test Cell and the Power Plant is at odds with the facts. As GE's "Cooling Tower Analysis Technology and Biological Assessment Information, Items 5(a) and 6" (CH2M HILL, February 2008) demonstrates, retrofitting the Test Cell with closed-cycle cooling would be infeasible, in light of given space limitations due to existing infrastructure. EPA has not questioned this conclusion, nor has it performed any independent evaluation to show that these limitations can be overcome. With respect to the Power Plant, as we discuss in Section XI of these comments, EPA did not resolve crucial uncertainties before reaching the conclusion that closed-cycle

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[14] The Fact Sheet, p. 75, refers to several large steam electric power plants, including Brayton Point, that have retrofitted closed-cycle cooling. None of these facilities serves a primary purpose other than generating electric power for transmission or sale to another entity for transmission. None supports specialized, on-site, seasonal testing operations like the GE Power Plant, and none operate at a generation capacity nearly as low as the GE Power Plant (35 MW that use once-through cooling water system). It is inappropriate to treat power plants with generating capacities 7 to 44 times larger than GE's as proof of the efficacy, practicability, and affordability of retrofitting closed-cycle at the GE Power Plant, when clearly their differences in critical respects do not support such a conclusion. And, as recent announcements by the owners of the Salem Harbor Station in Massachusetts and the Oyster Creek Station in New Jersey illustrate, even large power plants often cannot absorb the substantial costs of retrofitting closed-cycle cooling. *See* "Dominion sets Schedule to Close Salem Harbor Power Station, Dominion News, May 11, 2011, http://dom.mediaroom.com/index.php?s=43&item=988)"; http://dailycaller.com/2010/12/09/epa-regulations-force-power-plant-out-of-business-more-to-follow/.

cooling is BAT. GE respectfully requests that EPA withhold its determination until these uncertainties have been resolved.

As EPA itself appears to recognize, the fact that the Agency has made a BPJ determination requiring a different facility in a different industry category with different economics and different site-specific circumstances to retrofit closed-cycle cooling does not relieve the Agency of responsibility for making a BPJ determination for the Facility based on adequate, site-specific information. Although EPA says it has made such a determination for the Facility (albeit in the context of evaluating cooling water intake structure technologies),[15] for the reasons discussed below, its evaluation and the resulting determination are not adequately supported. Indeed, as discussed Section XI.G of these comments, EPA bases its conclusions more on what is absent from the record than on specific facts adequate to support reasonable conclusions. Thus, before EPA can justify a determination that closed-cycle cooling is BAT, it must develop facts sufficient to resolve important uncertainties. GE believes that those uncertainties weigh conclusively against such a determination.

In any case, GE submits that it is unnecessary for EPA to undertake (or require GE to undertake) the substantial studies needed to make a well-supported determination regarding the technological feasibility, performance, cost, and affordability of closed-cycle cooling for the Facility. As noted above, in the absence of applicable effluent limitations guidelines, the permit writer has discretion to decide whether or not to establish BPJ limits for a given constituent. In this case, GE is requesting, and EPA already has proposed to establish, an alternative limit under § 316(a). Although GE disagrees with the alternative limit EPA has proposed, we submit that further analysis should focus on refinement of that limit.

C. EPA's Determination that Alternative Thermal Limits of 90°F for Outfalls 018 and 014 are Necessary to Assure the Protection and Propagation of a Balanced, Indigenous Population in the Saugus River is Flawed.

1. Overview of EPA's Rationale for the Reducing the Maximum Daily Thermal Limit.

EPA justifies its proposal to reduce the current thermal limits for Outfalls 018 and 014 by 5°F by citing (1) additional monitoring and modeling studies pertaining to GE's thermal discharges, and (2) changes in the status of several resident and anadromous fish species in the Saugus River (specifically, striped bass, alewife, and winter flounder). Fact Sheet, pp. 77-79. Specifically, EPA claims:

> (1) Thermal tolerance data for those three species indicate that juvenile winter flounder, alewife, and striped bass may experience thermally induced sublethal and lethal adverse impacts at temperatures between 86° and 90°F, and temperatures above 90°F would "create completely unsuitable habitat" (Fact Sheet, p. 78 and Attachment K).

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[15] *See* Fact Sheet, p. 76 (incorporating results of site-specific BTA analysis in Appendix J for purposes of BAT rationale).

(2) Thermal monitoring performed for purposes of setting thermal limits for the Wheelabrator Saugus facility on the opposite shore of the River suggests to EPA that river temperatures “in the vicinity of” GE Outfalls 018 and 014 can exceed 86°F around low slack tide during the hottest months of the year (Fact Sheet p. 78).

(3) The maximum daily discharge temperature from GE’s Outfall 018 in August, 2001 was 95°F, and that discharge overlapped with measured instream temperatures of 86°F or higher during August 7 to 25, 2001, suggesting that the currently permitted maximum discharge may contribute to river temperatures above some target level below 86°F (*id*.).[16]

(4) Based on a review of DMR data, the Outfall 018 effluent has not exceeded 90°F since August 2002. Therefore, EPA does not anticipate that major operational changes would result from the more stringent thermal limits included in the Draft Permit (Fact Sheet p. 79).

With respect to its proposed alternative, EPA says that it concluded that a limit of between 90°F (the highest temperature at which EPA says the Facility has discharged since August 2002) and 91°F (the temperature used for purposes of GE’s 1993 near-field thermal modeling of the Power Plant) would produce more protective instream temperatures, and only a small portion of the river would reach maximum temperatures of potential concern for very short periods of time (Fact Sheet, pp. 78-79).

As the following discussion shows, the analyses supporting EPA’s proposal to ratchet down the alternative thermal limit for discharges from the Power Plant and Test Cell are fundamentally flawed for several reasons.

2. EPA Failed to Account for, or Provide GE an Opportunity to Account for, Facility Changes that may Affect the Facility’s Thermal Plume.

EPA’s analysis also fails to account for changes that have occurred, and that have reduced the size and temperature profile of GE’s thermal plume. Moreover, the Agency’s preemptive determination affords GE no reasonable opportunity to evaluate the effect of those changes. For example, EPA has not taken into account the reduction in flow and heat load associated with GE’s proposal to permanently close the Gear Plant, which was covered by the 1993

[16] EPA also notes in the Fact Sheet that this segment of the Saugus is listed as thermally impaired. However, a review of the listing document (Massachusetts 2010 Integrated List of Waters**)** reveals that the Facility was not listed as causing or contributing to the impairment, nor was any other specific cause identified. Based on the ASA 2004 report entitled “Temperature Mapping and Hydrothermal Model Calibration of the Lower Saugus River Estuary,” the largest components of the temperature changes seen in the Saugus River system appear to be the result of cool offshore water entering the estuary and being warmed in the extensive, shallow, marshy, upper reaches of the estuary.

thermography study, or the addition of an auxiliary closed-loop cooling system for the Test Cell in 2008.

Moreover, EPA apparently did not consider the potential change in discharge temperatures likely to result from the Agency's proposal to require GE to reduce intake flow by an annual average of 20% for § 316(b) purposes. In its § 308 letter dated October 25, 2007, requesting information on the cooling water intake structure, the Agency gave no hint that it was considering changes to the applicable thermal limit; thus, GE has had no opportunity to collect data or perform modeling to assess the likely impact of flow reductions on its ability to meet the significantly reduced thermal limit EPA now proposes. To the extent EPA now proposes to reduce the discharge temperature, that change may make it impossible for the Facility to achieve the flow reductions imposed by other permit provisions. In its permit determination for Wheelabrator Saugus, EPA recognized this important trade-off and ensured that the limits it imposed were not fundamentally incompatible. *See* Fact Sheet, Attachment K, pp. 16-17. EPA should conduct the same analysis here.

3. The Biological Data on which EPA Relies do not Support the Agency's Decision to Reduce the Maximum Temperature Limit.

Equally important, the biological data on which EPA relies do not support the conclusion that resident species, including juvenile fish of the three species EPA says are of greatest concern (striped bass, winter flounder, and alewife), are likely to be harmed by the instream temperatures resulting from discharges by GE at the currently permitted levels.

Although the results of laboratory temperature testing provide some insight into thermal lethal and sublethal effects, laboratory testing usually involves immediate exposure of fish to temperatures much greater than the temperature to which they are acclimated. As the review and analysis provided in Technical Exhibit 18 to these comments show, the thermal studies relied upon by EPA reflect lethal and sublethal effects associated with tests in which juvenile organisms were acclimated to temperatures ranging from 9 to 30°F cooler than the temperatures at which the observed effects occurred. In addition, laboratory testing also does not usually allow the fish to avoid or swim away from the higher temperatures. In contrast, the temperature differential between ambient levels and temperatures within the thermal plume predicted by the 1993 ENSR modeling is at most 9.5°F at low water slack tide. Thus, fish in the Saugus River in the vicinity of the discharge would not be exposed to rapid temperature changes equivalent to those in the laboratory experiments. Instead, their exposure to the thermal plume would be more gradual, occurring over a greater surface area and depth. Although EPA says in its analysis of the Wheelabrator Saugus limits that "it is not possible to predict acclimation temperature or exposure time," it is possible to say with some assurance that resident organisms are unlikely to experience the wide temperature differential and rapid exposure evaluated by those studies.

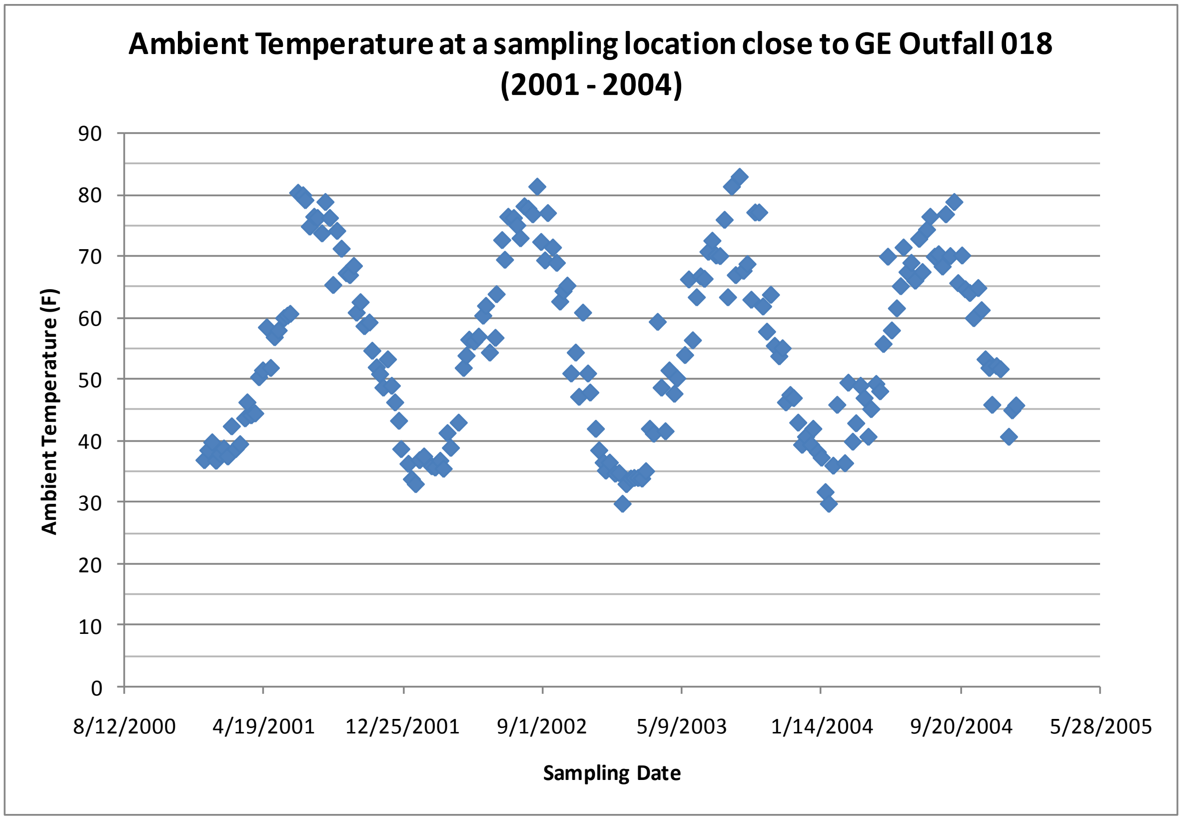
In addition, all of the studies on which EPA relies involved continuous exposures of juvenile organisms under conditions in which they were unable to avoid the undesirable temperatures and seek cooler refuge. Here, by contrast, the available modeling demonstrates that the entire thermal plume resulting from the Facility discharge, as defined by the cross-sectional area in which temperatures differ by 2°F or more from ambient, is less than 37.5% of the cross section of the Saugus River. *See* "Thermography Study General Electric River Works Facility" (ENSR, 1993), pp. 4-12. (As updated by CH2M HILL using the latest bathymetry data for the Saugus River collected by USACE in 2006.) Equally important, in only 9.5 % of that already small plume are temperatures likely to equal or exceed 4°F over ambient, and in only 1.8% of the plume are temperatures likely to equal or exceed 8°F over ambient. Furthermore, the available modeling demonstrates that the entire thermal plume resulting from the GE Power Plant discharge, as defined by the surface area in which temperatures differ by 9.5°F or more from ambient (or 84.5°F), is less than 3% of the surface area encompassed by the temperature isotherms of Outfall 018.

As demonstrated by the plan-view and cross-sectional figures of the modeled thermal plume in Technical Exhibit 18 to these comments, the Power Plant thermal plume projects away from the shoreline out into the deeper main channel of the river (Technical Exhibit 18, Figure 2.7). The lateral distance of the plume from Outfall 018 (following its trajectory as shown in Technical Exhibit 18, Figure 2.7) and its depth below the surface during low-water slack tide (Technical Exhibit 18, Figure 2-3) show that (1) the plume does not extend across the river to the shallow-water and saltmarsh habitats near the southern shore of the river, and (2) a substantial zone of the river (in terms of both width and depth) is unaffected by the 2°F isotherm. Thus, even at low-water slack tide, a substantial zone of passage remains in the Saugus River in the vicinity of Outfall 018 for juvenile fish to avoid rapid exposure to and swim away from the relatively gradual change in temperature associated with the thermal plume. Moreover, these conditions represent the maximum extent of the plume under low-water slack tide. That condition persists for less than 30 minutes, further limiting the exposure of young fish to elevated temperatures.

Although EPA suggests that GE's 1993 modeling may not accurately reflect the temperature profile of the Facility's plume, there are good reasons to believe that the model provides a reasonably accurate representation of its dimensions. See "Thermal/Biological Impact Analysis – Outfall 014 General Electric River Works Facility" (ENSR, 1993b). The effluent temperature of 95°F was used as a model input for discharges for the Test Cell at Outfall 014. Based on the modeling results, the predicted thermal plume from Outfall 014 exceeding 84.4°F is about 20.5% of the total cross sectional area and 10% of the total surface area encompassed by temperature isotherms (when effluent temperature is 95°F). *See* "Thermal/Biological Impact Analysis – Outfall 014 General Electric River Works Facility" (ENSR, 1993), pp. 4-15 and 4-16. By way of analogy and extrapolation, it could reasonably be expected that Outfall 018 would observe a similar percentage increase when the effluent temperature is 95°F. It is important to note that 20.5% of total cross sectional area and 10% of the total surface area encompassed by temperature isotherms are still relatively small areas. Therefore, the incremental impact of the thermal plume on the BIP of fish in the Saugus River also would be relatively small.

Available ambient data support this conclusion. In its § 316(a) determination for the Wheelabrator Saugus facility, on which EPA relies heavily, the Agency concluded that available data indicate that no appreciable harm to balanced indigenous populations ("BIP") of fish has occurred from existing thermal discharges at Wheelabrator Saugus under conditions which included the existing thermal discharge from GE. Fact Sheet Attachment K, p. 16. Indeed, according to EPA, those conditions include at least some discharges by GE during August, 2001, at currently permitted discharge levels (Fact Sheet, p. 78).

Below is a summary of weekly ambient temperature for 2001-2004 at a sampling location close to GE Outfall 018 but outside the projected thermal plume impact zone, which includes data for the August 2001 time period cited by EPA. These ambient temperature records showed that EPA's *ad hoc* 85°F threshold was not exceeded in 2001 - 2004.



Based on DMR data in Attachment G to the Fact Sheet, the daily maximum effluent temperature reached 95 °F in August, 2001 However, the weekly ambient temperature records at this sampling location close to Outfall 018 were 73.7 °F (on 8/1/01), 78.8 °F (on 8/7/01), 76.2 °F (on 8/15/01), 65.3 °F (on 8/21/01) and 74.1 °F (on 8/28/01), respectively. Thus the ambient temperature records were below 85 °F, and in this particular time period below 80 °F, even when the effluent discharge temperature reached to 95 °F during the same month of the year. Although these ambient temperature data were collected outside the potential impact zone predicted by the 1993 model-generated thermal plume isotherms, they show that the size of the thermal plume was confined to a small surface area of the Saugus River projecting beyond the shoreline to the deeper portion of the channel, and did not extend along the shoreline downstream of Outfall 018.

Nor is it the case that the small area likely to be affected by GE's thermal discharge provides habitat of a type or amount likely to be necessary to or preferred by juvenile organisms of the species about which EPA has expressed concern. In contrast to the waters adjacent to the Wheelabrator Saugus discharge, which are located in shallow, tidal flats with abundant vegetation providing important nursery habitats for many estuarine species, the habitats located along the deeper northern shore next to the GE discharge are distinctly deeper and more open-water in character. The habitat in the vicinity of the GE Outfalls 018 and 014 discharges does not encompass intertidal or saltmarsh habitats preferred by many estuarine species, and they include a substantial zone of bottom habitat extending into the deeper main channel of the Saugus River that is unaffected by the thermal plume, even at low-water slack tide (*see* Technical Exhibit 18, Figures 2-3 and 2.7). The species about which EPA has expressed concern – alewife, rainbow smelt, striped bass, and winter flounder – do not appear to inhabit these waters during the period of highest plume temperatures (July-August during low tide) or are unlikely to be exposed to the relatively small area with the highest temperatures for a duration that could result in lethal or sublethal effects (*see* Technical Exhibit 18).

Thus, there is no basis for suggesting that the thermal plume associated with maximum daily discharges of 95°F would have any material impact on available habitat or otherwise prevent juvenile organisms from avoiding temperatures outside their preferred range.

XI. Several Important Aspects of EPA's Proposed BTA Determination for the Facility's CWIS Require Reconsideration.

A. Background.

Although NPDES permits typically cover only discharges of pollutants to waters of the United States, the Clean Water Act also includes a unique provision, § 316(b), that applies to "cooling water intake structures." Section 316(b), 33 U.S.C. § 1326(b), provides:

> Any standards established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall require that the location, design, construction and capacity of cooling water intake structures [CWIS] reflect the best technology available [BTA] for minimizing adverse environmental impact.

EPA first issued regulations implementing § 316(b) in 1976. Those regulations required selection of BTA case-by-case, following guidance provided separately by the Agency. The regulations were suspended by the United States Court of Appeals for the Fourth Circuit in 1977 on procedural grounds, after which they were withdrawn. From 1977 on, EPA and the states implemented § 316(b) on a best professional judgment (BPJ) basis, guided by case-specific decisions of the Administrator and reviewing courts, opinions issued by EPA's Office of General Counsel, and an EPA draft guidance document entitled "Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500" (May 1, 1977) ("1977 Draft Guidance"). As EPA has recognized, those sources of guidance emphasize the importance of considering impingement and entrainment losses in context, rather than in the abstract. For example, the 1977 Draft Guidance counsels that "[r]egulatory agencies should clearly recognize that some level of intake damage can be acceptable if that damage represents a minimization of environmental impact" (p. 3). Further, in evaluating whether "damage" from entrainment and impingement occurs, "the critical question is the magnitude of any adverse impact" (p. 11). Thus, the 1977 Draft Guidance (p. 34) instructs permit writers to relate individual losses to effects on local populations, taking into account life history information and species fecundity.

In 1995, EPA entered into a settlement agreement committing the Agency to conduct a phased § 316(b) rulemaking. The first phase, covering CWIS at new facilities, was completed in 2001.

66 Fed. Reg. 65,256 (Dec. 18, 2001), codified at 40 C.F.R. Pt. 125, subpart I. For purposes of those regulations, known as the "Phase I" rules, EPA chose a new, more uniform, more administratively streamlined approach to § 316(b) regulation that emphasize reducing individual organism losses. In doing so, however, EPA stressed that its decision to adopt this approach for new facilities was not binding with regard to existing facilities, which the Agency recognized faced more limited alternatives and higher costs. *See, e.g.,* 66 Fed. Reg. 65,285.

As EPA notes, in 2004 the Agency adopted so-called "Phase II" § 316(b) regulations for existing steam electric power generators designed to withdraw more that 50 MGD, and in 2006 EPA adopted § 316(b) regulations for "Phase III" facilities, including existing manufacturing facilities like the Facility. Fact Sheet, Attachment J, p. 2. For Phase II facilities, EPA determined that closed-cycle cooling was not BTA for a variety of reasons, including its high costs, potential incompatibility with existing site limitations, and adverse environmental implications for other environmental media. 69 Fed. Reg. 41,605-41,606 (July 9, 2001). Instead, the Phase II rule established performance standard ranges based on the Agency's estimate of what other technology alternatives could achieve. The Phase II rule anticipated that permittees would select the most cost-effective technology capable of achieving reductions within the range, but authorized permittees to obtain less stringent alternative standards if they could show that the costs of complying with the otherwise applicable standards would be significantly greater than the benefits. 69 Fed. Reg. 41,595-601. For Phase III facilities, EPA determined that no uniform standards were warranted, finding that the cost of any such standards would be "wholly disproportionate" to the likely benefits. 71 Fed. Reg. 35,006-015 (June 16, 2006).

As EPA correctly notes (Fact Sheet, Attachment J, p. 2), the Phase II rule was suspended in July, 2007, after various portions of the rule (including the provision for alternative standards based on cost-benefit analysis) were remanded by the United States Court of Appeals for the Second Circuit. In 2009, the United States Supreme Court reversed the lower court's decision on this score, upholding EPA's authority to weigh costs and benefits in implementing § 316(b). Indeed, in the words of Justice Breyer, "every real choice requires a decision maker to weigh advantages against disadvantages, and disadvantages can be seen in terms of (often quantifiable) costs." *Entergy Corp. v. Riverkeeper, Inc.*, 129 S. Ct. 1498, 1513 (2009) (Breyer, J., concurring in part). Because the Supreme Court's decision resolved only one of several issues on which the Phase II rule was remanded, EPA has chosen to continue developing an alternative rule covering existing steam electric generating plants. Until that rulemaking is concluded, Phase II facilities are subject to § 316(b) implementation on a case-by-case basis.

Although the Phase III rule also was challenged by environmental interest groups, no court has ever opined on its validity. Rather, as it acknowledges (Fact Sheet, Attachment J, p. 2), EPA chose to seek a remand so that it could reconsider the Phase III rule in conjunction with its Phase II rulemaking. Because the Phase III rule contemplated case-by-case decision-making using BPJ, the remand of the Phase III did not affect the Agency's approach to implementing § 316(b) for existing manufacturing facilities like the Facility.

EPA recently published proposed § 316(b) regulations for CWIS for all existing facilities, including manufacturing and steam electric plants, designed to withdraw more than 2 MGD of water, of which 25% or more is cooling water, from surface waters of the United States. *See* 76

Fed. Reg. 22,174, 22,280-81 (April 20, 2011). Those proposed regulations, if adopted, would require all covered facilities either to meet monthly average and annual average limits on mortality to impingeable-sized organisms, or to achieve a design or actual intake velocity of 0.5 fps or less. Although the impingement mortality standards apply to "all life stages of fish," the rule also allows the permittee to propose, and the permit writer to approve, the selection of "species of concern" for purposes of compliance. 76 Fed. Reg. 22,287. For entrainment, the proposal requires permit writers to identify BTA on a case-by-case basis, taking into account a variety of factors, including whether the social benefits of alternative technologies justify the social costs. 76 Fed. Reg. 22,277-278. Only facilities with actual intake flows[17] greater than 125 MGD are required to submit extensive information in connection with entrainment standards selection, however. *Id.* Facilities below that threshold, like the Facility, are presumed to present far less risk and thus to warrant less onerous evaluation and regulation. EPA considered, but decided against proposing closed-cycle cooling as BTA for a number of reasons, including physical constraints, air emissions, energy impacts, and adverse implications for reliability. 76 Fed. Reg. 22,208-210. The proposal also expressly recognizes that permit writers may conclude that the existing CWIS is BTA. 76 Fed. Reg. 22,288.

EPA's proposal is just that – a proposal, having no regulatory effect. But the fact that EPA has once again declined to require closed-cycle cooling as BTA for entrainment is telling, as are its proposals to require consideration of whether the social benefits of entrainment reduction technologies justify their social costs, and to exempt facilities with relatively low flows from all or some portions of the regulation. Although some changes in the proposal can be expected , these aspects of EPA's proposal deserve weight because they are consistent with the Agency's longstanding guidance and with its previous determinations in the Phase II and III rulemaking. Thus, while GE does not believe that the Agency is either authorized or obliged to apply the rule before it becomes final, we believe that EPA's proposal in this regards is telling.

Nevertheless, we recognize that there is substantial uncertainty regarding the precise requirements of any final rule. In light of that uncertainty, and the fact that EPA has committed to finalize the rule by July 27, 2012,[18] GE submits that it should not be subject to a BPJ determination that may prove to be inconsistent with the final rule. Given the very short window of uncertainty remaining, GE requests that the Region either stay this permit renewal proceeding until § 316(b) rule for existing facilities becomes final, or reissue the permit without any new § 316(b) requirements, subject to permit modification when § 316(b) rulemaking is complete.

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[17] EPA proposes to define "actual intake flow" as the "average volume of water withdrawn on an annual basis by the cooling water intake structures over the past three calendar years." 76 Fed. Reg. 22,281 (April 20, 2011).

[18] *See* Settlement Agreement Among the United States Environmental Protection Agency, Plaintiffs in *Cronin et al. v. Reilly*, 93 CIV. 314 (LTS) (SDNY) and Plaintiffs in *Riverkeeper, et al. v. EPA*, 06 CIV. 12987 (PKC) (SDNY).

B. GE's Proposed Operational Measures .

1. Operational measures for the Power Plant CWIS.

Although GE does not believe that impingement and entrainment losses caused by the existing CWIS are sufficient to result in "adverse environmental impact" to the aquatic populations in the Saugus River, GE nevertheless has volunteered to pursue operational measures to reduce losses. In the Cooling Water Intake Structure Information Document (CH2M HILL, 2008), GE proposed operational measures for reducing cooling water flow. These measures would consist of operating the seawater pumps and condenser cooling water pumps with variable-frequency drives (VFDs) to reduce intake flow by an estimated average of 20 percent over the course of a year. The VFDs also would reduce through-screen velocities to 0.5 fps or less, on average, when they are operating. These operational measures would substantially reduce both the impingement and entrainment of fish at the Power Plant CWIS.

As demonstrated by the site-specific impingement monitoring study (MRI, 1997), the existing fish collection and return system for the Power Plant CWIS already is highly effective in minimizing impingement mortality. The addition of operational measures that would allow the facility to reduce flows when conditions permit, thereby reducing through-screen velocities at the same time, would reduce the potential for both entrainment and impingement by a substantial amount.

As for entrainment, the Power Plant already has reduced its cooling water flow by 39%, compared to the total design capacity of the six condenser cooling pumps of 58.3 MGD. By instituting operational measures to reduce the total volume of water withdrawn annually by the Power Plant by an average of 20 % of the current permitted level annually, the Power Plant will in effect have reduced its flow by 51%, compared to the design capacity of its condenser cooling pumps. Moreover, by permanently retiring the Gear Plant CWIS, which has a current maximum daily discharge flow limit of 54.7 MGD, GE has committed to reducing total facility flow by as much as 46 % from currently permitted levels.[19] In short, the overall facility reduction in entrainment would be substantial, further minimizing any potential for adverse environmental impacts to the Saugus River estuary and its commercial and recreational fisheries resources. These operational and facility flow reduction measures offer the most practical and cost-effective combination of options constituting BTA for minimizing adverse environmental effects of entrainment.

These proposed operational measures are subject to one important caveat: their feasibility is based on continuation of the facility's current permitted thermal discharge limit of 95ºF. GE has

[19] Notably, EPA determined in the Final NPDES Permit for the Wheelabrator Saugus facility across the Saugus River that 28 percent flow reduction from its previously permitted levels from October 1 to May 31 (60 MGD to 43.2 MGD) minimized potential adverse impacts from entrainment and constituted BTA at that facility. It reached this conclusion even though the Wheelabrator Saugus CWIS is much closer to the shallow marsh nursery habitats of the Rumney Marshes Area of Critical Environmental Concern (ACEC) than the GE Power Plant CWIS.

not had an opportunity to evaluate the technical feasibility, process changes, and costs associated with requirements both to reduce cooling water flow by 20% on average and meet a reduced thermal discharge limit of 90ºF, as EPA has proposed. The record shows that EPA has not performed such an evaluation. Thus, before imposing requirements for annual average flow reductions achieved by using VFDs and lower thermal limits, EPA would need to determine, or provide GE an opportunity to determine, whether such reductions are technically and economically feasible.

2. Operational Measures for the Test Cell CWIS.

For the Test Cell CWIS, GE proposes a combination of operational measures and technology improvements as BTA for minimizing adverse environmental impact. The current infrequent, seasonal operation of the Test Cell reduces the potential for adverse environmental effects of fish entrainment and impingement at the Test Cell CWIS. GE believes that the most reasonable and cost-effective options for minimizing adverse impacts at the Test Cell CWIS would include operating the newly constructed closed-loop recirculating cooling tower to eliminate the use of spray pump water for minor cooling purposes and replacing and improving the existing debris/fish return system.

The newly installed closed-loop recirculating cooling tower system reduces intake flow by 1,500 gpm, incrementally reducing further fish entrainment as a result of seasonal Test Cell operation. GE also proposes to replace the existing debris/fish return system to improve the survival of impinged fish and prevent their entrapment as they are collected and transported back to the river. This proposal would include spray wash modifications, provisions for conveyance of water, a new return pipe, and pipe supports in the river to enable the safe return of fish at low tide, as evaluated in the Cooling Water Intake Structure Information Document (CH2M HILL, 2008). The new return trough would avoid high elevation drops and 90-degree turns to the extent practical in consideration of site-specific space constraints.

C. EPA's Proposed BTA Determination.

1. Overview of EPA's Approach.

EPA says that it has concluded that "the current location, design, construction, and capacity of the Power Plant's CWIS do not reflect the BTA for minimizing adverse environmental impact." Fact Sheet, Attachment J, p. 38. The Agency apparently based this conclusion on its evaluation of (1) current levels of entrainment and impingement; (2) the Power Plant's existing CWIS technology; and (3) the availability of other technologies capable of reducing impingement and entrainment. *Id.* Having concluded that the existing Power Plant CWIS is not BTA, the Agency selected a combination of variable frequency drives (which GE had proposed to install on the two condenser cooling water pumps not already so equipped) and installation of fine mesh wedgewire screens.

The Agency's analysis of current entrainment and impingement levels involved counting the total number of organisms impinged or entrained and identifying the range of species covered, without evaluating whether those individual losses have had or are likely to have any material impact on the quality or sustainability of any particular species or on the aquatic community as a whole in the Saugus. Instead of following longstanding Agency guidance advocating assessment of the environmental significance of impingement and entrainment losses in terms of their likely effect on aquatic populations, it chose a different approach. Noting that "EPA has read CWA § 316(b) to intend that entrainment and impingement be regarded as 'adverse impacts' that must be minimized by application of BTA" (*id.*, p. 3), the Agency appears to have presumed that any impingement and entrainment occurring is adverse. In essence, EPA has elected to follow the approach the Agency employed in developing national standards for new sources. Having concluded that impingement and entrainment occurs, and that some individuals represent species that are experiencing population declines or are recreationally or commercially important, EPA made no further effort to assess whether the level of impingement and entrainment loss is material for any species.

GE requests that EPA reconsider this approach, which is neither required nor well-adapted to this proceeding. Here, the Agency is making a BPJ decision for a 100 plus-year old facility with relatively low withdrawals. Equally important, as discussed below, there is no evidence that the Facility's cooling water withdrawals have had any adverse impact on the species about which EPA expresses concern, or that further limiting impingement and entrainment would materially improve the health or sustainability of those species.

2. EPA's Proposed BTA Determination for the Power Plant CWIS.

EPA's evaluation of the Power Plant's existing CWIS technology cites three deficiencies in the existing structure.

First, the Agency says that the current through-screen velocity ("TSV") range of 1.0 to 1.61 feet per second ("fps") is too high to prevent impingement of juvenile and adult fish. Fact Sheet, Attachment J, p. 19. Although EPA acknowledges that "many species and life stages were able to swim against a TSV as high as 1.0 fps," it notes that EPA Headquarters selected a more conservative standard of 0.5 fps in setting a national standard for new facilities. *Id.* The Agency did not make any assessment of the species-specific swim speeds of the species in the Saugus. Such an assessment would be necessary to determine whether the species potentially vulnerable to the Power Plant CWIS are capable of avoiding it, assuming they are otherwise healthy.

Second, EPA concluded that "the traveling screens do not effectively protect fish that are impinged during transport." *Id.*, pp. 16, 19. EPA cited as deficiencies the use of a high pressure spray and the use of a single trough to return both impinged fish and debris to the waterbody, which the Agency said "could cause physical harm." *Id.*, p. 19. Although EPA recognized that facility-specific impingement studies for the Power Plant showed extremely high initial survival rates for impinged fish (ranging from 100% - 82.6%), it chose to discount those data, because the studies did not examine latent (*i.e.* ≥ 24 hour) survival. Instead of requiring further assessment to determine latent survival, the Agency assumed that latent impingement mortality would be high and on that basis concluded the screens were inadequate.

Third, EPA asserts that the once-through cooling system with 9.5-mm mesh on the existing CWIS is not adequate to minimize entrainment of fish eggs and larvae. *Id.* Here too, EPA did not consider whether the number of eggs and small larvae entrained is likely to be biologically significant, given the high natural fecundity of the species to which they belong, and the equally high natural mortality rates those very early life stages typically experience.[20] Instead, it appears to have assumed entrainment of a large number of individuals is equal to a high impact. As the discussion below shows, however, this is not the case.

EPA also offers its evaluation of alternative technologies as support for its conclusion that the existing CWIS is not BTA. EPA considered whether the alternative was available for use at the site (in the sense that site conditions are suitable for use of the technology); estimated the extent to which an alternative would further reduce impingement mortality and/or entrainment; in some cases, identified potential operating and maintenance issues; and estimated the technology's cost.

In addition, EPA provided a very general, qualitative assessment of the benefits of reducing impingement and entrainment. Lacking any basis for evaluating whether any particular level of reduction is likely to materially enhance the health or sustainability of the affected populations, EPA relied on two assumptions: (1) reducing impingement and entrainment will directly increase the number of organisms in the river, and (2) the more entrainment is reduced, the more likely it is that those reductions will contribute to increased populations of juvenile and adult fish. *Id.,* p. 35.

Based on these assumptions, and after evaluation of a number of alternative technologies, EPA concluded that BTA for the Power Plant includes both (1) reducing the monthly average intake flow by 20% and (2) retrofitting fine-mesh wedgewire screens with a slot or mesh size no greater than 0.5 mm and a pressurized system to clear debris from the screens.[21]

3. EPA's Proposed BTA Determination for the Test Cell CWIS.

The approach EPA used in selecting BTA for the Test Cell CWIS (which withdraws flow only a few days a month, resulting in a monthly average flow rate of 1.5 MGD) largely followed the model used for the Power Plant CWIS. Because it lacked any impingement data for this CWIS, EPA chose to extrapolate using Test Cell flows and the impingement rates for the Power Plant CWIS. *Id.*, p. 47. Lacking entrainment data, EPA simply assumed that it would be appreciable during those months when eggs and larvae are most prevalent.

Because EPA recognized that it had no way of estimating how many more eggs might be saved by implementing further technology, the Agency instead decided to limit operation of the Test Cell CWIS, imposing an average monthly limit of 5 MGD from March 1 to July 21, and an average monthly limit of 27 MGD from August 1 to February 28. For impingement, EPA determined that improving the existing coarse mesh traveling screens with new fiberglass fish buckets, a low pressure spray wash, and a new fish return system is BTA. The Draft Permit

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[20] *See Seacoast Anti-Pollution League v. Costle,* 597 F.2d 306, 309-11 (1st Cir. 1979) (citing the fecundity of fish in upholding EPA's use of population-level considerations in the Agency's administrative decisions).

[21] GE agrees with EPA's conclusion that moving the location of the CWIS, installing fine mesh traveling screens, and/or installing an aquatic filter barrier are not BTA. None of those technologies or measures are necessary or feasible for this Facility.

gives the facility the option of installing fine mesh wedgewire screens, which it said would also satisfy § 316(b).

D. EPA's Analysis Mischaracterizes the Impacts of the Existing Power Plant and Test Cell CWISs.

As the following discussion demonstrates, EPA's analysis of the available impingement and entrainment studies for the Facility's CWISs overstates the levels of impingement and entrainment morality that those CWIS can reasonably be anticipated to cause based on current operations.

1. EPA's Impingement Mortality Characterization.

In Attachment J to Fact Sheet (p. 15), EPA estimates that Power Plant CWIS impinges approximately 64,000 adult and juvenile fish annually. Although EPA says that it based this estimate on the impingement data collected by MRI in 1994-1996 (MRI 1997) and average monthly flows at the Power Plant CWIS (*id.*, pp. 15-16; spreadsheet provided in May 16, 2011 email from N. Kowalaski/EPA to S. Lewis/GE), EPA's estimate is far higher than the MRI impingement study, properly applied, suggests is likely to occur. This is the case because EPA used arithmetic means, which exaggerated the effect of a single, unusually high sample value, rather than deriving annual impingement from monthly samples using geometric means, as indicated by the data distribution and justified by MRI (1997).

The site-specific impingement and entrainment monitoring study conducted by MRI (1997) estimated average annual impingement of 13,140 fish at the Power Plant CWIS. The estimate was based on a geometric mean impingement rate of 36 fish per 24 hours for the two-year study period (1994-1996) (36 fish per day x 365 days = 13,140 fish). MRI (1997) used the geometric mean because monthly means were highly skewed by an anomalously high number of fish impinged during a single impingement sampling event on October 25, 1996 (MRI, 1997; pages 9-10). In fact, National Weather Service historical data show that a major, record-setting storm event occurred in the days leading up to the sampling event on October 19-22, 1996, setting a single-day precipitation record in Boston on October 21[22] (Boston Weather, 2010; http://www.boston-weather.us/boston-october-weather.html). Cannon (2000) conducted a hydrometeorological assessment of the storm and characterized it as unique due to the extreme magnitude of precipitation and flooding, and rainfall totals on the order of a 500-year event at several locations in New England. The geometric mean is not as sensitive to a single large sample value as the arithmetic mean and is commonly used by fisheries managers, including the

[22] Pages 9 and 10 of the MRI (1997) report discuss the impingement sampling event as occurring on October 25, 1996 and yielding an unusually large volume of fish. However, Table 3 in the same report shows a sampling date of October 18, 1996 (same day in month sampled in previous year [Table 2]). Nevertheless, review of NOAA buoy data for Station 44013 located 16 nautical miles east of Boston indicates that the storm was beginning to form by October 18 as indicated by falling air temperatures, increasing wind speeds and gusts, and shifting wind and mean wave direction, and these conditions would have been present during sampling.

Atlantic States Marine Fisheries Commission, to calculate fish abundance. Based on the average monthly cooling water flow during the study (about 23 MGD), MRI (1997) estimated that 1.580 fish are impinged per million gallons of intake flow at the Power Plant CWIS.

Using the geometric mean of 1.580 fish per MGD derived by MRI (1997) and the maximum daily permitted cooling water flow limit of 35.6 MGD (Outfall 018), GE estimates that the Power Plant could impinge around 20,530 fish annually (35.6 MGD x 1.580 fish/MGD x 365 days = 20,530 fish).

Thus, EPA's estimate of Power Plant CWIS impingement (64,000 fish) is nearly five times higher than the MRI (1997) annual impingement estimate (13,140 fish) and three times higher than GE's impingement estimate based on the current permitted maximum daily flow volume (20,530 fish).

In addition, EPA has substantially overestimated impingement *mortality* by assuming 100% mortality of fish impinged at the existing Power Plant CWIS, even though that CWIS already uses a fish collection and return system. EPA states that a through-screen velocity of 0.5 fps or less could save more than 60,000 juvenile and adult fish annually (94 percent of EPA's impingement estimate of 64,000 fish) at the Facility; however, that estimate does not appear to account for current impingement survival. To support its "100% impingement mortality" assumption, EPA notes that the fish are removed from the screens using a high pressure wash and returned to the waterbody in a fish/debris trough. Fact Sheet, Attachment J, p. 19. But site-specific monitoring and the results of a literature review indicate that the vast majority of fish impinged at the Power Plant CWIS are likely to initially survive impingement and passage through the collection and return system, and at least 76% are likely to survive for an extended period after their return to the Saugus River.

Specifically, the impingement studies conducted by MRI (1997) at the Power Plant CWIS from 1994 through 1996 reported high immediate impingement survival of the numerically dominant species. Immediate survival of impinged fish after passage through the screenwash sluiceway was 99.7% for grubby and winter flounder (the two species that numerically dominated impingement samples); 100% for cunner, windowpane, and shorthorn sculpin; and 82.6% for all remaining species combined (Fact Sheet, Attachment J, p. 16). MRI (1997) surmised that the good condition of impinged fish was due to continuous rotation of the traveling screens at the Power Plant CWIS. Thus, available site-specific data demonstrate that the vast majority of impinged fish initially survive impingement and passage through the existing fish return system to the Saugus River.

Trends and data from other studied sites with similar intake configurations provide further evidence that the majority of impinged fish at the Power Plant CWIS are likely to survive for an extended period after their return to the Saugus River. Latent impingement survival data collected at other power plant CWISs using similar conventional traveling screens and fish return systems (EPRI, 2003) show high latent (extended) survival rates for the same species that numerically dominated impingement samples at the GE Power Plant CWIS. For instance, average latent impingement survival of grubby and winter flounder at other sites was 76 percent and 87 percent, respectively (EPRI, 2003).

Applying the EPRI (2003) average latent survival rates for six of the top seven species impinged at GE (grubby, winter flounder, cunner, rainbow smelt, threespine stickleback, and shorthorn sculpin) to the MRI (1997) impingement estimate (20,530 fish), and using winter flounder survival as a surrogate for windowpane, current annual impingement mortality at the GE Power Plant CWIS is likely on the order of only 5,026 fish. *See* Technical Exhibit 18.

In summary, EPA appears to have substantially over-estimated the amount of impingement mortality likely to occur at the existing Power Plant CWIS. As a result, EPA's assessment of the need for further reductions and the potential benefits of requiring intake technology changes is fundamentally flawed.

2. EPA's Entrainment Characterization.

EPA's impact assessment and evaluation of the benefits of various technologies also appears to have relied on an inflated estimate of entrainment occurring at the Power Plant CWIS. EPA calculated that the Power Plant CWIS has the potential to entrain over 69 million fish eggs and larvae annually (Attachment J, p. 14; spreadsheet provided in May 16, 2011 email from N. Kowalaski/EPA to S. Lewis/GE). EPA based its estimate on the permitted flow volume of 35.6 MGD and the geometric mean number of eggs and larvae for the numerically dominant species reported in the site-specific impingement and entrainment monitoring study conducted by MRI (1997) for the two-year study period (1994-1996). Although EPA used the geometric mean density data from MRI (1997) for this calculation, it selected for each species only the maximum annual entrainment rate observed between the two study years (for some species the maximum occurred in 1994-1995 and others it occurred in 1995-1996), resulting in a composite worst-case estimate of entrainment that was 9% higher than the annual entrainment estimated for either of the two study years.

GE estimated annual entrainment at the Power Plant CWIS using the 1994-1995 and 1995-1996 geometric mean egg and larvae densities reported by MRI (1997) for each representative species, and the maximum daily permitted cooling water flow limit of 35.6 MGD. In the absence of site-specific data demonstrating survival of entrained fish eggs and larvae passing through the cooling water system, GE presumed 100% mortality of all entrained organisms, consistent with EPA's approach.

GE calculated annual fish (eggs and larvae) entrainment of 36,114,268 using the 1994-1995 data and 63,224,570 using the 1995-1996 data (Technical Exhibit 18). Mean annual entrainment for the two study years was 49,669,419. Despite the fact that GE adopted EPA's presumption of 100% entrainment morality, the estimate derived was considerably lower than EPA's. Specifically, EPA's estimate of annual entrainment is 39% higher than average mean annual entrainment for the two study years and 9% higher than the maximum annual entrainment, calculated by GE.

As EPA is well aware, tiny eggs and larvae that are small enough to become entrained have very high natural mortality levels and, as a result, are highly unlikely to survive even absent an encounter with the Facility's intake.[23] For § 316(b) implementation purposes, the Agency has consistently recognized the importance of placing entrainment values in a more meaningful context by converting entrained individuals in age-1 equivalents. *Id.; see also infra at Section XI.E.2.a.* Indeed, in its most recent § 316(b) proposal, EPA reiterates the need to evaluate not just the number of individuals lost to entrainment, but their importance to the ecosystem, for purposes of assessing the value of entrainment reductions. *See, e.g.,* 76 Fed. Reg. 22,285. In this case, EPA has not attempted to estimate how many of the eggs and larvae entrained by the facility are likely to survive to age-1. GE's experts have made that calculation, however, and as the discussion in Section XI.E.2 below shows, that number is *de minimis*.

E. EPA Incorrectly Assumed that Impingement and Entrainment from the CWIS, at the Levels Estimated by the Agency, would cause Adverse Environmental Impact.

All of the available evidence (including the site-specific impingement and entrainment monitoring study (MRI, 1997), information on the occurrence of rare, threatened, and endangered species, and fishery management plans and monitoring data for commercially and recreationally important fisheries) indicates that operation of the CWISs at the Facility has not resulted in material adverse environmental impact to the Saugus River ecosystem. Furthermore, continued operation of the CWISs, with implementation of the existing CWIS technologies and the additional operational measures proposed by GE, is unlikely to adversely impact the balance or diversity of the ecosystem's overall assemblage of organisms into the future.

1. The CWISs do not Adversely Impact Rare, Threatened, or Endangered Species.

The Saugus River fish assemblage in the vicinity of the Facility includes a diverse mix of marine and estuarine species, euryhaline freshwater species, and anadromous and catadromous species. However, no federally threatened or endangered fish species are presently known to occur near the Facility or were collected in impingement or entrainments samples.

Anadromous species collected in impingement samples included rainbow smelt and two herring species collectively referred to as river herring – blueback herring and alewife. The National Oceanographic and Atmospheric Administration's ("NOAA's") National Marine Fisheries Service ("NMFS") has identified rainbow smelt and river herring as species of concern in the coastal waters of New England generally. Each species of river herring, which range widely along the Atlantic coast, was impinged during only a single impingement sampling event (out of

[23] *See, e.g., In re Pub. Serv. Co. of N .H. (Seabrook Station, Units 1 &2)*, 1 E.A.D. 332, 1977 EPA App. LEXIS 16, at *62 (EPA June 7, 1977) (determining that combined entrainment mortality of 100 billion clam larvae - less than 5 % of the adult population - would have an "insignificant effect on adult [clam] populations."); *In re Pub. Serv. Co. of N.H*, 1 E.A.D 455, 1978 EPA App. LEXIS 17, at *43 (Aug. 4, 1978) (explaining that, although "[fish] eggs and larvae may be . . . subject to . . . entrainment in substantial numbers," for most species "the impact of either intake entrainment or thermal discharge will be insignificant.")

39 total impingement sampling events) during the two-year study by MRI (1997). Neither river herring species was reported in entrainment samples or in ichthyoplankton samples taken from the river adjacent to the facility.

Rainbow smelt, which provide an important recreational fishery, were collected as juveniles or adults in only four of 39 total impingement sampling events (MRI, 1997). Only three rainbow smelt larvae were collected during the entire two-year study, two from ichthyoplankton samples taken in the river (out of 60 total sampling events) and one in an entrainment sample (out of 60 total entrainment sampling events). Thus, the site-specific studies show that rainbow smelt and river herring occur in negligible numbers and frequencies in fish impingement and entrainment samples at the Power Plant CWIS.

2. Losses to the Fishery from Impingement and Entrainment are *de minimis*.

Several commercially and recreationally important fishes occur in the Saugus River estuary near the Facility; however, EPA has not provided any evidence indicating that current operation of the CWISs is adversely affecting populations of any of these species, particularly given that, as EPA has recognized, the proportional area and volume of the Saugus River affected by the GE Power Plant CWIS are very small. As a result, the total numbers of fish impinged and entrained are negligible when converted to adult equivalents and production foregone and placed in the context of total fishery populations in the local area and region.

Although EPA concludes that its estimates of fish impingement mortality and entrainment represent “large numbers” (Fact Sheet, Attachment J, p. 15), EPA has made no attempt to place those numbers in any context by which their environmental significance can be fairly judged. Instead, the Agency “concludes that the greater the reduction in these impacts, the greater the benefits that will be achieved,” without citing any support for that proposition. *Id*., p. 39. Indeed, the Agency concedes that it lacks the data from which to judge whether there is a threshold for impact reduction “below which ecological gains will be forfeited, or above which there will be no difference.” *Id.* Equally important, the Agency did not attempt to quantify the incremental benefits of further reducing the relatively small numbers of fish lost by implementing the costly measures it proposes as “BTA.”

Further analysis shows that the total numbers of commercially and recreationally important fish species impinged or entrained at the Power Plant CWIS are relatively small in proportion to the total fishery resources in the source waterbody. This is the case because the hydraulic zone of influence (HZI) relative to the cross section of the river and the volume of cooling water withdrawn is small compared to the total volume of the water column in the Saugus River. As delineated in the Cooling Water Intake Structure Information Document (CH2M HILL, 2008), the maximum HZI for the Power Plant CWIS at its currently permitted flow rate is centered along the deeper northern shore of the Saugus River and does not extend beyond the middle of the river or to the shallow, intertidal habitats along the southern shore. Its maximum area is about 182,930 square feet, and its maximum hydraulic radius is about 343 feet. The HZI also does not intrude into the saltmarsh habitats of Rumney Marsh in the Bear Creek and Pines River estuaries. The volume of water pumped at the Power Plant CWIS under the maximum permitted flow represents only 3 percent of the tidal excursion volume over one tidal cycle of ebb and flow

(CH2M HILL, 2008). In addition, the site-specific impingement and entrainment monitoring data collected by MRI (1997) demonstrate that in practical terms, very few commercially and recreationally important fish are affected by operation of the Power Plant CWIS. As discussed *supra* at Section XI.D.2, annual impingement mortality is likely on the order of only 5,036 juvenile and adult fish (Technical Exhibit 18). These include annual impingement mortality losses on the order of only 608 rainbow smelt; 535 winter flounder; 175 cunner; 154 windowpane flounder; 63 yellowtail flounder; 33 river herring; 31 Atlantic cod; and 7 Atlantic herring. To place these small numbers into perspective, 608 rainbow smelt are equivalent to the number of fish that twelve recreational fishermen would be allowed to catch and possess in a single day along the coast of Massachusetts (322 CMR 6.00: Regulation of Catches).

To further characterize the potential impacts of fish impingement and entrainment at the Power Plant CWIS on important commercial and recreational fisheries, GE's experts quantified the estimated fish losses resulting from species-specific and life-stage specific impingement mortality and entrainment losses. These losses were quantified by calculating Age-1 equivalents (for entrained organisms), foregone fishery yield, and foregone biomass production (Technical Exhibit 18). The equations used in these biological models are described in detail in Chapter A5 of EPA's Regional Analysis (EPA, 2004). Life history parameters, including natural mortality, fishing mortality, and weight for each life stage that are inputs to the three models were taken from Appendix C1, Life History Parameter Values Used to Evaluate I&E in the North Atlantic Region (EPA, 2004).

a) Age-1 Equivalents

An Equivalent Adult Model ("EAM") was developed to express fish entrainment losses calculated from the MRI (1997) monitoring data as an equivalent number of Age-1 individuals (Technical Exhibit 18). An EAM was developed for each of the two monitoring years to assess the entrainment temporal variability. The total number of Age-1 equivalents from entrainment for both years ranged from 94,576 to 380,479 fish, with a mean of 237,528 individuals per year. Forage species dominated the Age-1 equivalents, accounting for 98 percent of the mean Age-1 equivalents lost due to entrainment at the Power Plant CWIS. Two forage species, grubby and rock gunnel, comprised 90 percent of the Age-1 equivalents. The larvae of these two species were collected in the highest abundances in mid-March and April (MRI, 1997). Because March and April are cooler months with lower steam generation needs, the VFD's that GE has proposed to install most likely would be available to further reduce flow during this period, thereby further reducing the potential for entrainment.

The total number of fish lost annually from both entrainment and impingement mortality at the Power Plant CWIS is on the order of 242,554 fish. Fish lost due to entrainment account for over 98 percent of the total. Three forage species – American sandlance, grubby, and rock gunnel – account for 94 percent of the losses. These three species have no commercial or recreational value, nor are they otherwise in scarce supply as forage for more valued species. Five commercial species, including Atlantic herring, Atlantic mackerel, cunner, windowpane, and winter flounder (in descending order of relative abundance), collectively accounted for less than 4 percent of the total fish lost from operation of the Power Plant CWIS.

b) Foregone Fishery Yield

Direct losses to the fishery due to fish impingement mortality and entrainment at the Power Plant CWIS were evaluated by calculating the primary foregone fishery yield for the five numerically dominant commercially important species: Atlantic herring; Atlantic mackerel; cunner; windowpane; and winter flounder (Technical Exhibit 18). Primary foregone fishery yield is a measure of the pounds of commercially or recreationally important fish that are not harvested because the fish are lost to impingement and entrainment (EPA, 2004). The total primary lost yield for the five species was 235.9 pounds (lb.). Atlantic herring had the highest lost yield of 90.6 lb., followed by winter flounder (66.4 lb.), cunner (41.8 lb.), Atlantic mackerel (32.2 lb.), and windowpane (4.8 lb.). To help place the small size of these losses in perspective, average annual Massachusetts landings from 2005 to 2009 were 75,432,948 lb. for Atlantic herring; 4,535,635 lb. for winter flounder; 50,352,856 lb. for Atlantic mackerel; and 117,638 lb. for windowpane (National Marine Fisheries Service, 2011).

c) Foregone Biomass Production

The expected total amount of future growth of forage species lost as a result of impingement and entrainment at the Power Plant CWIS was estimated by calculating the foregone biomass production (Technical Exhibit 18). Foregone production was calculated for the three numerically dominant forage species at the Facility: American sandlance, grubby, and rock gunnel. The total lost production all three species was 3,374 lb. Rock gunnel had the highest foregone production of 1,531 lb., followed by grubby (1,510 lb.) and American sandlance (332 lb.).

The foregone production of forage species was then used to estimate the subsequent reduction in harvested species yield that results from a decrease in the food supply (EPA, 2004). Secondary and tertiary foregone yields were calculated to estimate the reduction in harvested species that result from loss of their prey base (Technical Exhibit 18). Secondary production is the portion of total forage production that has high trophic transfer because it is directly consumed by the harvested species. Tertiary production has a low trophic transfer because it is not consumed directly by the harvested species but instead reaches harvest species indirectly after passage through other parts of the food web (EPA 2004). Total secondary and tertiary production foregone were 60.7 and 24.3 lb., respectively.

d) Summary of Fishery Losses

In summary, the total foregone annual fishery yield due to the operation of the GE Power Plant CWIS is on the order of 321 lb. (235.9 lb. + 60.7 lb. + 24.3 lb = 320.9 lb.). To help place the small size of these losses in perspective, 2009 commercial fishing landings of winter flounder were 1,972 metric tons in Massachusetts and 2,140 metric tons in all New England states (National Marine Fisheries Service, 2011). Thus, the annual loss of only 320 lb of fish across all species represents an insignificant impact. This *de minimis* loss is insufficient to justify the substantial changes EPA has proposed.

Another way of understanding the implications of these losses is by assessing their value in economic terms. EPA did not attempt any economic valuation, although the Agency guidance and the recently proposed § 316(b) rule for existing facilities suggest such an analysis is appropriate for § 316b) purposes. *See, e.g.*, EPA "Guidelines for Preparing Economic Analyses," EPA 240-R-00-003 (Sept. 2000) (" EPA Economic Guidelines"); 77 Fed. Reg. 22,279, 22,288. GE's experts have prepared a preliminary estimate of the economic value of the combined impingement and entrainment losses that the existing Power Plant CWIS reasonably may be expected to cause. Multiplying the total loss in of commercially or recreationally important fish pounds (320.9) by the most recent NMFS statistics on the average ex-vessel price for landings in Massachusetts of $1.12 per pound[24] yields a total of $ 359.41. As EPA has recognized in other contexts, this type of gross value reflects the upper boundary for the value of losses assuming that all of the fish lost would be caught by producers (*i.e.*, commercial fishermen), when in fact much will not. In the previous and current § 316(b) rulemakings, EPA has recognized that the actual change in "producer surplus" is likely to range from zero to 40% of the gross value of change in catch. Applying this range to the gross value of $ 359.41 results in an anticipated value of between $ 0 and $ 143.76.[25]

In addition, it is important to note that this value (and the underlying number of organisms lost and resulting fishery yield foregone) reflects current Facility operations, and does not account for the reductions that would be achieved by the operational and other measures GE has proposed will be achieved. When those reductions are factored in, there is even less reason to believe that the Facility CWISs are causing adverse environmental impact, or that the benefits of EPA's BTA proposal will justify their substantial costs.

F. EPA's Assumption that Achieving the Predicted Reductions in Impingement and Entrainment will Produce Appreciable Benefits for the Saugus River is Unfounded.

In addition to the concerns EPA expresses about direct effects of the CWISs in terms of individual losses, the Agency posits that such losses

> can substantially degrade the quality of the aquatic habitat by adding to the system a significant anthropogenic source of mortality to resident organisms. In addition to considering these adverse impacts directly, their effects as cumulative stressors in conjunction with other existing stressors

[24] NMFS, 2009. NMFS Landings Query Results. http://www.st.nmfs.noaa.gov/pls/webpls/MF_ANNUAL_LANDINGS.RESULTS accessed on May 6, 2010

[25] It also is possible that some portion of the estimated foregone fishery yield would be allocated to the recreational fishery. When changes in recreational catch are sufficiently large, they can affect the value of the fishing experience on a given trip and, in some instances, how many trips recreational fishers will take. In this case, given the very small number of organisms relative to the size of the fishery, the anticipated losses are likely too small to affect recreational catches or participation in the recreational fishery. Thus, GE allocated all of the economic value to the commercial fishery.

> on the species should also be considered. Furthermore, losses of particular species could contribute to a decrease in the balance and diversity of the ecosystems overall assemblage of organisms.

Fact Sheet, Attachment J, p.12.

But EPA never attempts to make any quantitative or qualitative linkages between the nature and amount of losses attributable to the Facility CWISs and any specific ecosystem services in the Saugus River, nor does it attempt any assessment of the extent to which reducing loses will improve or enhance any ecosystem services.

Instead, EPA cites a few sources related to aquatic habitat, food sources for migratory waterfowl, increasing or maintaining biodiversity, and other ecosystem services. But those sources provide no support for the proposition that the impingement and entrainment losses caused by the Facility constitute “a significant anthropogenic source of mortality to resident organism” capable of individually or cumulatively causing substantial degradation to the quality of aquatic habitat. EPA cites Holmlund and Hammer (1999) as support for the principle that fish populations are related to other ecosystem services, such as growth of algae and macrophytes, regulation of food web dynamics, recycling nutrients, and maintaining species and genetic diversity. This may be the case, but in the absence of any quantitative or qualitative assessment of how changes in impingement and entrainment at the Facility may contribute to changes in ecosystem services in the Saugus River, this general statement of principle is essentially meaningless.

EPA also notes that low phenotypic diversity, “which can be a result of loss of a percentage of the fish population (such as mortality associated with a CWIS) can decrease equilibrium catch and effort levels used by regulatory agencies to set quotas for commercial fishing stocks.” It further cautions that “overestimating the maximum sustainable yield based on a conventional growth model in populations with low phenotypic variance may lead to overharvesting and potentially collapse the stock. (Akpalu, 2009)” (Fact Sheet, Appendix J, p. 37). But EPA made no attempt to show that the relatively *de minimis* impingement and entrainment losses associated with the Facility’s CWISs are likely to have any effect on the phenotypic diversity of the Saugus River. Indeed, EPA made no attempt to assess what percentage of the population of any species would be lost, or to assess the implications of that loss to the resulting population, much less to overall phenotypic diversity. As discussed above, even looking at an upper bound estimate of losses and assuming all of those losses would have consequences for commercially and recreationally important species, the total pounds fish affect (320.9) is vanishingly small compared to the overall 2009 Massachusetts catch of approximately 356 million pounds. The suggestion that the very small loss associated with the Facility’s CWIS is likely to adversely affect the overall ecosystem is implausible at best.

In addition, EPA cites Worm, et al. (2006) as support for the general principle that biodiversity is related to the resilience of marine ecosystems, thus protecting against the collapse of important fish species over time. But Worm et al. (2006) address the impacts of large changes in fish populations and diversity at a landscape scale. Thus, this paper does not support the conclusion for which EPA offers it, *i.e.*, that relatively small losses comprised primarily abundant forage species would affect either biodiversity or the resilience of the marine ecosystem.

G. EPA's Erred in Concluding that Retrofitting the Power Plant with Closed-Cycle Cooling is Technologically and Economically Available Cooling Water Intake Structure Technology for the Facility.

GE identified significant uncertainties, including uncertainties regarding the soil conditions, potential sources of interference, and other safety and environmental issues that require further evaluation before any determination that closed cycle cooling ("CCC") is feasible for the Facility could be justified. Developing that information would require detailed studies that fall outside the scope of the Section 308 letter pursuant to which GE submitted the preliminary evaluation on which EPA relied. Instead of developing or requesting that GE develop the needed information, EPA assumed, without adequate support, that retrofitting CCC is technically feasible and economically reasonable. EPA's assumption is incorrect, for the following reasons.

1. Soil.

As identified in GE's cooling tower analysis (CH2M HILL, 2008), the conceptual site for new mechanical draft cooling towers in a recirculating cooling water system for the Power Plant would be located in a parking lot next to the river. This site formerly contained underground concrete bunker tanks, which GE properly decommissioned. The tanks were cleaned and filled with clean soil that was compacted. Holes were drilled in the concrete floors of the abandoned-in-place underground storage tanks (USTs) to allow equalization of groundwater pressure within the USTs. In accordance with the Massachusetts Contingency Plan at 310 Code of Massachusetts Regulations 40.1000, a release abatement measure (RAM) plan would need to be developed and implemented for any excavation activities associated with construction. Disposal or recycling of soils and groundwater management under the RAM would require further studies and measures that would at a minimum add substantially to the cost of the retrofit. EPA's estimate of the cost of retrofitting closed-cycle cooling (which is already over $36 million) did not consider these additional costs.

2. Sources of Interference.

EPA acknowledges the substantial site-specific technological and construction challenges and uncertainties, as well as the high costs of installing mechanical draft cooling towers at a 112-year old facility. Some of those challenges were identified by GE in the cooling tower analysis (CH2M HILL, 2008). These include interferences with critical existing facility infrastructure and disruptions to Power Plant operations, which increase risks to safety and the continuity of Power Plant and manufacturing/testing operations during construction. EPA recognized that data sufficient to resolve uncertainties and fully determine site-specific costs were lacking. But instead of collecting or providing GE an opportunity to collect the necessary information, EPA simply concluded, based on the absence of information, that the technology would be economically and technically achievable.

EPA may not so lightly avoid its responsibility to fully consider the potential costs and risks of constructing cooling towers where, as is the case here, those risks are obvious and significant. Clear and immediate sources of substantial risk include interference from overhead steam transmission lines, power transmission lines, and jet fuel distribution lines located adjacent to the cooling tower site. These lines are supported by stanchions to a height approximately 25 to 30 feet above the ground, and construction equipment would need to pass under these lines, while cranes and other heavy machinery would be operating adjacent to the lines, and increasing the risk of blackouts that could temporarily shut down manufacturing and testing processes. In addition, construction activities would need to be limited to summer months when steam is not needed to heat the Facility. It would be necessary to reduce steam from 650 psig to 200 psig and 3 psig to support processes throughout the Facility; however, in doing so there are some inherent risks. If GE lost the ability to de-superheat the steam, the expansion rate could be greater than the infrastructure (i.e. pipe support hangers) could handle potentially resulting in significant damage to downstream piping and related infrastructure as well as causing a risk to manufacturing operations and potentially life safety. Finally, engine and component test operations that utilize 650 psig steam could not be conducted. Even if these risks could be minimized, the cost of doing so would likely be substantial. That cost was not considered.

3. Environmental Issues.

EPA acknowledges that non-water quality related environmental impacts identified by GE, including vapor plumes, salt drift, and noise, would require careful evaluation and would likely necessitate abatement technologies to minimize impacts. But EPA has not collected, or asked GE to collect, information necessary to determine the significance of those impacts, the likelihood that they could be abated to acceptable levels, and the cost of such abatement.

In responding to EPA's information request pursuant to CWA § 308(a), GE provided a cooling tower analysis addressing the specific requirements for Technology and Biological Assessment Information, Items 5(a) and 6(a)-(h). EPA requested a detailed description of the non-water quality impacts (including energy, air pollution, noise, public safety), which GE provided. As an example, the cooling efficiency of CCC is limited by air temperature, and CCC is less effective than a once-through river water cooling system. Installation of the CCC will cause the Power Plant to be less energy efficient and increase greenhouse gas emissions. But EPA did not ask GE to determine which non-water quality impacts would require abatement, identify appropriate technologies for abating those impacts, determine that the available technologies would achieve sufficient abatement to qualify for necessary permits and approvals, or calculate the costs of abatement. And EPA itself has presented no new site-specific information regarding the technical efficacy of abatement measures for mitigating non-water quality environmental impacts in this highly urban setting with three major transportation corridors and sensitive viewsheds (including Rumney Marshes ACEC) in close proximity, and Boston Logan International Airport located only 6 air miles south of the facility.

EPA chose not to pursue development of the requisite information, nor did it ask GE to do further studies of the issues identified in the § 308 response. Instead, EPA assumed adverse impacts could be abated to acceptable levels, and that the added cost of abatement would be reasonable and affordable. It did not base this conclusion on any information in the record. Instead, it relied on the absence of record evidence, noting that while GE commented on the huge cost of cooling towers, the company did not conclude that this technology would be unaffordable.[26] Fact Sheet, Attachment J, p. 23. But it is no surprise that GE did not assess the affordability of towers, given that EPA's October 25, 2007 § 308 letter did not ask GE to provide one. Instead, EPA's § 308(a) letter specifically requested "an estimate for the cost for installing and operating each of these technologies" (item 6g), which GE provided. EPA neither requested nor provided GE an opportunity to assess the affordability of closed cycle cooling to the company.

That said, GE does not believe that further assessment of retrofitting closed-cycle cooling at the Facility is warranted, give that the analysis already provided demonstrates that this technology would be economically unreasonable, potentially detrimental to ongoing facility operations during construction, and would not achieve significant ecological benefits in a cost-effective manner. Should GE be required and provided the opportunity to assess the affordability of closed cycle cooling, such an assessment may indicate that certain manufacturing or testing operations would no longer be economically viable at the Facility. Until such an assessment is made, the true magnitude of the costs of cooling towers and the related impact on affordability are unknown.

4. Other Problems.

As GE's cooling tower analysis showed, vapor plumes originating from the cooling towers and drifting upriver toward the Test Cell could adversely affect jet engine testing, which is sensitive to ambient humidity levels. Excessive humidity, under certain atmospheric conditions, occasionally forces the cancellation of tests. Jet engines are tested using ambient air and must be tested according to Federal Aviation Administration and military specifications, including specific humidity. An increase in frequency of scrubbed tests would result in lost time and costs to the facility's testing business. EPA has not adequately considered this site-specific risk to the reliability of facility testing operations, especially considering that the Draft Permit would require the Test Cell to curtail its seasonal operations to minimize fish entrainment.

H. EPA's Proposal to Require the Power Plant CWIS to Retrofit fine Mesh Wedgewire Screens Ignored Technical Impediments and Significant Costs.

1. Technical Feasibility.

EPA lacks sufficient evidence to support its proposed determination that BTA for reducing entrainment by the Power Plant CWIS is a fine-mesh wedgewire screen with a slot or mesh size no greater than 0.5 mm and a pressurized system to clear debris from the screens. Fact Sheet, Attachment J, pp. 39-40. As the sole basis for this determination, EPA relied on a field study of 0.5-mm wedgewire screens in Narragansett Bay, Rhode Island, which the Agency concluded was representative of the performance of fine-mesh wedgewire screens in a similar tidal river setting

[26] Subsequent evaluations by GE of alternatives to replace its aging Power Plant indicate that GE would not retrofit CCC to its existing Power Plant as even the $37.5 million of costs of retrofitting CCC presented by EPA (which GE considers to be an underestimate), would be more than half the cost of replacing the entire Power Plant.

(EPRI, 2005). But the Narragansett Bay field evaluation was conducted using a barge-mounted test facility consisting of much smaller wedgewire screen assemblies deployed near the surface of a much deeper waterbody than the Saugus River. The depth of Narragansett Bay at the EPRI test site was 15.7 m (52 ft) compared to only 19 feet at the Facility. Also, the test barge was deployed at a distance about 100 m from the shoreline in a large bay, compared to the shoreline intake location at the bottom of the river at the GE Power Plant CWIS. Therefore, the Narragansett test facility encountered none of the water body conditions, including widely fluctuating depth, debris loading, sedimentation, biofouling, and other conditions leading to maintenance issues and potential performance limitations of fine-mesh screens in a bottom intake location, close to the shoreline, in a highly fluctuating tidal river similar to the Saugus River. The study did not evaluate or address the site-specific preparation and maintenance issues that would challenge the technical feasibility and performance of a fine-mesh wedgewire screen system at this Facility.

2. Cost.

EPA also did not adequately evaluate the extent to which site-specific factors identified by GE would substantially increase the costs associated with their installation and maintenance of fine-mesh wedgewire screens. As GE's evaluation of this technology showed (CH2M HILL, 2008), the installation of wedgewire screens in the Saugus River could require extensive site preparation and dredging of the riverbed in the vicinity of the existing CWIS to assure adequate clearance in the water column above the screens. As EPA itself has recognized in technical development documents for § 316(b) rulemaking purposes, localized conditions of siltation and biofouling of wedgewire screens can be key limitations to their performance due to clogging and the creation of hot spots of increased through-screen velocity, and increase their maintenance costs (EPA, 2004). Maintenance of fine-mesh wedgewire screens in the Saugus River would likely be labor - intensive and problematic as a result of biofouling and clogging of the screens, sedimentation, and debris. Actual field testing of fine mesh wedgewire screens in brackish water of a proposed intake canal required the screens to be removed and cleaned as often as once every 3 weeks (EPA, 2011). Additional pump energy also would be required due to the increased head losses associated with the screening system. While acknowledging potential problems of biofouling and related effects on technology efficacy, and the possible need for manual cleaning (e.g., by scuba divers or a rail system and crane), EPA did not adequately evaluate the additional costs associated with the likelihood of substantial dredging and other feasibility constraints in its draft BTA determination.

3. Performance.

EPA lacks sufficient data on the performance of fine-mesh wedgewire screens for reducing entrainment in a tidal river setting comparable to the Saugus River to justify its selection as BTA at the Power Plant CWIS. Most available performance data for wedgewire screens are based on coarse-mesh slot sizes as well as on data collected during barge and laboratory studies. As evaluated by GE in the Cooling Water Intake Structure Information Document (CH2M HILL, 2008), a 0.5-mm slot size is considered to be experimental, especially for a tidal river. As assessed by EPA (2011), limited biological data are available on the performance of fine mesh wedgewire screens in use at actual facilities, and these facilities tend to have lower intake flows than the GE Power Plant.

Equally important, the efficacy of fine-mesh wedgewire screen technology for reducing entrainment mortality (that is, losses (rather than exclusion) of entrainable-sized organisms) is highly uncertain. As mesh size decreases, there is a risk that eggs and larvae that would have been entrained instead become impinged by the fine-mesh screen. As EPA recognized in the preamble to its recently proposed § 316(b) rule for existing facilities, using screens with finer mesh can convert entrainment mortality to impingement mortality without necessarily protecting any more aquatic organisms because many larvae may die as a result of the impact and impingement on fine mesh screens. 76 Fed. Reg. 22,186-22,188. As it further noted, the Agency "does not have data on the performance of fine mesh wedgewire screens on entrainment survival; therefore, EPA has only considered wedgewire screens for impingement mortality." 76 Fed. Reg. 22,201.

4. Non-Water Quality Impacts.

Installation of fine-mesh wedgewire screens at the Power Plant CWIS also would introduce non-water quality impacts on the navigational channel of the Saugus River. EPA did not acknowledge or fully evaluate those impacts in making its BTA determination. This omission stands in marked contrast to the Agency's approach with respect to the BTA determination for the Wheelabrator Saugus facility. There, EPA concluded that that wedgewire screens in the Saugus River likely would interfere with the use of the navigation channel, citing policies of the Army Corps of Engineers (U.S. ACOE, July 1996, AR#64) and the state (310 C.M.R. 9.35(2)(a)) (Wheelabrator Saugus Fact Sheet, pp. 45-46 (EPA, 2010)). In this case, however, EPA cites these same policies as being restrictive but refers to e-mail communication with the Army Corps of Engineers as evidence that those restrictions would not prevent permitting of the screens. Specifically, EPA notes that the ACOE email indicates that the Corps "would not be opposed to permitting structures in the river that do not impact the channel or increase shoaling." Even a cursory review of the emails reveals that the emails on which EPA relies amount to nothing more than an acknowledgement that *if* impacts to the navigation channel can be avoided, the ACOE would be willing to consider permitting the screens. Indeed, the ACOE cautions that he would be concerned not just about direct effects on the navigation channel and possible shoaling, but with the "1 on 3 side slope area" as well. In short, the ACOE email provides no evidence that navigation effects can be avoided, nor does it suggest that a permit would be granted.

GE's analysis indicates that construction of wedgewire screens would require extensive site preparation and could require substantial dredging activity. EPA did not analyze the shoaling potential of wedgewire screens or fully consider other potential regulatory constraints to site preparation, including dredging, as part of its BTA determination. In addition, although the screens would not be visible from the surface, their footprint and presence along the deeper, more navigable northern side of the river could pose navigational hazards under low tide conditions to boating, commercial fishing, and other public uses of the river.

Dredging is prohibited under the Rumney Marshes ACEC designation unless specifically exempted from the designation (Rumney Marshes ACEC Designation, August 22, 1988). The Saugus River dredging project was specifically excluded from the designation based on its potential benefits to commercial fishing access. Installation of wedgewire screens in the river next to the Power Plant CWIS would potentially impact navigation, including commercial fishing access, through dredging for site preparation, regular manual cleaning operations to address biofouling or sedimentation of the screens, and displacement of benthic and pelagic fisheries habitat. Waivers to ACEC designations are not granted lightly and represent an added regulatory requirement to installing and maintaining wedgewire screens, one which would likely involve federal consistency review by the Massachusetts Office of Coastal Zone Management. EPA did not fully consider these issues and regulatory requirements or the associated permitting costs in its draft BTA determination.

In addition, site preparation and installation of fine-mesh wedgewire screens would displace benthic and pelagic aquatic habitat, thereby limiting potential benefits to the Saugus River ecosystem. EPA did not consider these impacts in its BTA determination.

I. EPA's Proposed BTA Determination for the Test Cell CWIS Requires Reconsideration.

EPA's proposed determination would require that the existing coarse-mesh traveling screen also be improved with new fish lifting buckets, a low pressure spraywash, and separate fish and debris return troughs. It also would require GE to reduce flow on a seasonal basis.

Although GE does not object to the proposed requirement to upgrade the fish return by replacing the current return trough with a new one, the remainder of the proposed requirements are unnecessary and unreasonable. As GE's evaluation (CH2M HILL, 2008) showed, the a modified Ristroph/Fletcher screening system in conjunction with the dual-flow screen configuration that currently exists at the Test Cell CWIS is unlikely to prove as effective at reducing impingement mortality as might be the case if applied to a traditional flow-through traveling screens. Fish and organisms impinged on the descending side of the screen would be exposed to intake velocities for twice as long they otherwise would be on a traditional screen and would not be held in water in the fish lifting buckets on the descending side because the buckets would be inverted. For this reason, the costs of improving the existing coarse-mesh dual-flow screen with fish lifting buckets, a low pressure spraywash, and separate fish and debris return troughs would not be justified by the limited potential impingement mortality reduction benefits. Therefore, GE requests that EPA modify its BTA determination to remove these requirements.

The seasonal flow reduction limits present business and operational problems for GE as the limitations would prevent or severely limit engine and component testing during March 1 through July 31st every year. The Test Cell serves two important purposes that support GE's business. First, it is a research and development facility that is used to develop new compressors for GE products. It is the only General Electric facility capable of performing certain types of tests, and by its nature, research and development does not progress according to a detailed or defined schedule. Test schedules may shift significantly during the compressor design and assembly phases. Once a compressor test rig arrives at the Facility, tests usually run 12 hrs/ day supplying engineering data on the design of the new compressor. Typical water usage during this period is approximately 25 MGD for durations up to 90 days and possibly longer. Reductions to the level proposed by EPA would restrict test operation to about 8 days per month during the March through July time period significantly increasing the time required to complete the test. These delays impact GE's ability to introduce and qualify new compressor designs and resolve problems for existing customers, including the U.S. Navy. Testing of the GeNX and F414 compressors expected in 2011 and 2012 could be adversely impacted by EPA's proposed limitations. The Test Cell's second mission is to supply RAM air for the F414 engine during qualification testing required by the US Navy. These tests run for two to three months, and are currently scheduled to occur annually over the next few years. These tests support redesigns for the F414 engine, which the US Navy has funded. The redesigns require qualification testing prior to deploying to the fleet. The tests could be delayed by EPA's proposed limitations, adversely affecting national security interests. In addition, GE did not account for EPA's seasonal limitations in negotiating its delivery contracts and schedule with the US Navy.

J. The Proposed Monitoring Requirements for Impingement and Entrainment are Unreasonably Burdensome and Unnecessary to Ensure Proper Operation and Maintenance of BTA Technologies.

1. Entrainment Monitoring for the Power Plant CWIS.

a) Detailed Entrainment Monitoring is Unwarranted.

EPA proposes to require entrainment monitoring during operation of the Power Plant CWIS beginning no later than 90 days after the effective date of the permit. Weekly monitoring would be required for eight months, from March through October, and twice per month during the four remaining months. GE would be required to collect samples representing morning, afternoon, and nighttime entrainment, across three different days, from a representative location within the intake structure.

EPA has provided no justification for imposing such intensive entrainment monitoring requirements for the duration of the permit, nor has it explained how the monitoring results would be used to measure compliance. Intensive monitoring of entrainment is unnecessary to demonstrate compliance with a performance standard, because EPA has not imposed any standard, nor could it based on the record on which it relied. Nor is such monitoring justified in order to ensure that the technology is properly designed, operated and maintained. According to EPA, the entrainment reduction efficacy of wedgewire screens already has been well established in the technical literature, and that performance depends primarily on the presence of sufficient ambient current (sweeping flows) to carry organisms to bypass the structure. Assuming for the sake of argument that EPA is correct, the primary factors determining performance of fine mesh wedgewire screens will be the site-specific placement of the screens in relation to ambient velocity vectors (which the Agency could review and approve before the screens were installed) and the effective routine maintenance and cleaning of the screens using either an airburst or brush-clean system. Assuming that the wedgewire screen system has been properly installed and is cleaned routinely according to specifications, there would be no performance-based justification for requiring any entrainment monitoring. Therefore, if, despite GE's requests for reconsideration, EPA retains the requirement for fine mesh wedgewire screens, the Agency should remove any requirement for entrainment monitoring of flow reduction measures or wedgewire screens from the final permit. Instead, appropriate monitoring would involve verifying that the screen system has been installed in accordance with the approved design and measures; measuring hydraulic conditions to ensure that the system meets these guidelines and criteria; and performing routine maintenance in accordance with manufacturer specifications.

b) In the Event EPA Determines that any Entrainment Monitoring is Warranted, EPA should Ensure that the Duration and Frequency of that Monitoring are Reasonable.

If EPA identifies a reasonable basis for imposing any entrainment monitoring requirements, those requirements should be reasonably tailored to the conditions at this site. EPA has not provided any justification for weekly entrainment monitoring for eight months of the year and twice-per-month monitoring the other four months of the year, nor has EPA justified the need for entrainment monitoring during non-consecutive periods or over periods of multiple days. The high costs of such an intensive monitoring program would not be warranted by the limited value of the monitoring data, especially considering the negligible impacts of current levels of entrainment to the fishery. GE requests that EPA consider reducing the frequency of any required entrainment monitoring to no more than once-per-month, with two entrainment samples collected each event to represent day and night.

GE also requests that any required entrainment monitoring be limited to a period of no more than two years following installation of the required BTA for reducing entrainment. Two years would provide an adequate period of time to characterize entrainment losses associated with the required BTA.

c) Entrainment Monitoring and Reporting should not be Required until GE has had a Reasonable Opportunity to Install the Technology and make sure it is Fully Operational.

Should any form of entrainment monitoring or reporting be required at the Power Plant CWIS, such requirements should become effective only after GE has had a reasonable opportunity to design, permit, install, and start-up the technology. As EPA has recognized in it prior Phase II rule and its recent § 316(b) proposed rule for existing facilities, nothing in the CWA prevents EPA from affording a reasonable compliance schedule for implementing § 316(b) requirements.[27]

Initiating entrainment monitoring prior to installation of any process changes or technologies required to operate and maintain the BTA for reducing impingement mortality would serve no meaningful purpose. Hence, impingement mortality monitoring should not be required until the required BTA is fully installed and operational.

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[27] *See* 69 Fed. Reg. 41,576, 41,596-97, 41,621 (July 9, 2004) (authorizing permittees to request up to 3.5 years to submit required information, including selection of compliance alternatives, leaving selection of deadline for installing compliance technology to discretion of permit writer, and authorizing permittees to submit a technology installation and operation plan for purposes of demonstrating compliance with standard); 76 Fed. Reg. 22,282 (proposing to establish compliance schedules of up to 8 years for impingement standards).

2. Impingement Monitoring of the Test Cell CWIS.

a) Impingement Monitoring of the Test Cell CWIS is Unwarranted.

EPA proposes to require impingement monitoring during operation of the Test Cell CWIS beginning no later than 90 days after the effective date of the permit. GE would be required to perform impingement monitoring a minimum of once per week when the Test Cell is operating. To the extent practicable, a sampling event would consist of three, non-consecutive 4-hour collections that represent morning, afternoon, and night. Fewer than three samples and/or consecutive 4-hour collections may be conducted if the Test Cell CWIS does not operate long enough for three non-consecutive collections to be sampled.

GE disagrees with the need for any impingement monitoring of improvements made to the existing coarse-mesh traveling or fish return system at the Test Cell CWIS. The impingement reduction efficacy of coarse-mesh traveling screens combined with the use of a fish-friendly return system is well established in the technical literature, and EPA has not provided any justification for such an intensive impingement monitoring program, especially given the sporadic, seasonal operation of the Test Cell CWIS. The intensive effort, difficult logistics, and high costs of the required impingement monitoring program would not be justified by the very limited capacity utilization of the design intake flow and the likely negative impacts these requirements would have on the ability of the Test Cell to competitively perform its aircraft engine testing mission. Therefore, GE requests that EPA remove the requirement for impingement monitoring from the final permit.

Instead, GE proposes to verify that the technology improvements are installed in accordance with the approved design and construction measures; that elevation drops and turns in the return trough satisfy the design requirements; that the traveling screens are being rotated continuously during Test Cell CWIS operation; and that routine maintenance of the screens and debris/fish return system is being performed in accordance with good engineering practice, thereby enabling the safe return of fish at low tide to the Saugus River.

b) In the Event EPA Determines that any Impingement Monitoring is Warranted, EPA should Ensure that the Duration and Frequency of that Monitoring are Reasonable.

Assuming that any impingement monitoring at all can be justified, EPA has not provided any rationale for weekly monitoring during Test Cell CWIS operation and for requiring non-consecutive sampling periods that serve to extend effort, complicate logistics, and increase monitoring costs. The high costs of such an intensive monitoring effort would not be warranted by the limited value of the monitoring data, especially considering the infrequent operation of the Test Cell and low capacity utilization of the CWIS design capacity, which already minimizes the potential of adverse impacts due to impingement mortality. GE requests that EPA consider reducing the frequency of any required impingement monitoring to no more than once per month when the Test Cell is operating, with no more than two 4-hour collections representing day and night, and allowing these two collections to made within a single 24-hour period. In addition, GE requests reducing the frequency of any latent survival testing to no more than three times per year.

GE also requests that any impingement monitoring requirements be less prescriptive in regard to the specific methods for collecting impingement samples to allow for due consideration of logistics, site access, safety, efficiency, and costs. For example, a practical alternative to placing stainless steel baskets into the return sluiceway could be diverting the return sluiceway flow through a flow-through holding pen with a 3/8-inch mesh net. GE would like to preserve such flexibility to adjust specific methods to site-specific conditions and allow opportunities for innovation and efficiency in achieving the monitoring objectives with the least amount of effort and costs.

GE further requests that any required impingement mortality monitoring be limited to a period of no more than two years following installation of the required BTA for reducing impingement mortality. Two years would provide an adequate period of time to characterize impingement mortality losses associated with the required BTA.

c) Impingement Monitoring and Reporting should not be Required until GE has had a Reasonable Opportunity to Install the Technology and make sure it is Fully Operational.

Should any form of entrainment monitoring or reporting be required at the Test Cell CWIS, such requirements should become effective only after GE has had a reasonable opportunity to design, permit, install, and start-up the technology. As EPA has recognized in it prior Phase II rule and its recent § 316(b) proposed rule for existing facilities, nothing in the CWA prevents EPA from affording a reasonable compliance schedule for implementing § 316(b) requirements. *See supra, n. 22.*

Initiating impingement monitoring prior to installation of any process changes or technologies required to operate and maintain the BTA for reducing impingement mortality would serve no meaningful purpose. Hence, impingement mortality monitoring should not be required until the required BTA is fully installed and operational.

XII. EPA Needs to Correct and/or Clarify Certain Aspects of the Draft Permit.

The phrase “periods leading up to forecasted wet weather” has significant compliance implications (e.g., an obligation to manually activate the pumps in the vaults during these periods to draw down water levels) but is not defined in the Draft Permit. To provide fair notice to GE of its compliance obligations, EPA must define this phrase. Absent a clear and rational definition, GE proposes that it be deleted from the Draft Permit.

In its WET testing requirements, EPA requires GE to report the concentrations of a number of chemical parameters, including total metals concentrations, in the effluent sample on the DMR. EPA states that “these samples, taken in accordance with WET testing requirements, may be used to satisfy other sampling requirements as specified in the table above.” However, EPA has specified monthly grab samples for metals at the outfalls and quarterly composite samples for WET testing at the same outfalls, so one cannot be used in lieu of the other. GE has already commented that the frequency and number of sampling requirements needs to be reduced. EPA should eliminate the requirement in the Draft Permit for separate metals grab sampling at outfalls that are periodically WET tested.

In its requirements for analysis of PAHs, EPA requires specific numeric MLs, defined as the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points, for PAH compounds. EPA has erroneously specified MLs that are below the method detection levels for benzo[a]anthracene, benzo[b]fluoranthene, and benzo[k]fluoranthene. PAH analysis is also commonly impacted by matrix interferences, such as TSS levels, that will affect the MLs for a particular sample. Instead of specifying MLs, EPA should require that samples be analyzed for PAHs using approved Method 8270LL (lower limit).

As noted elsewhere in these comments, Outfall 018 does not receive stormwater flows and, as a result, there is no need for EPA's proposed Outfall 018B wet weather designation.

The requirements in Part I.B.8, related to the pollution prevention team, stormwater pollutant sources and best management practices, are duplicative of Parts I.B.3 and 7 and should be removed.

EPA's prohibition on foam or sheen is unreasonable in that it does not (1) acknowledge or conform with previous determinations by the Agency relating to the Facility, or (2) account for natural organic matter in the tidal estuary and in the intake water returned to the estuary. GE's existing NPDES permit specifies that "there shall be no discharge or floating solids, oil sheen, or visible foam *in other than trace amounts*." (emphasis added.) After GE requested clarification as to the definition of "trace amounts," EPA confirmed and agreed that a trace sheen occurs where: 1) the source can be eliminated immediately and the extent of the sheen is clearly defined allowing it to be captured and removed immediately, or 2) conditions at the water surface quickly dissipate the sheen.[28]

EPA cites the Massachusetts Water Quality Standards (314 CMR 4.05(4)(b)(7)) as justification for changing this provision in the Draft Permit to read: "the discharge shall not contain a visible oil sheen, foam, or floating solids at any time." As EPA quotes in p. 15 of the Fact Sheet, the state standards provide that a Class SB water "shall be **free** from oil, grease, and petrochemicals that produce a visible film on the surface water, impart an oily taste to the water or an oily or other undesirable taste to the edible portions of aquatic life, coat the banks or bottom of the water course or are deleterious or become toxic to aquatic life." (emphasis added). EPA's previous interpretation of "free" as meaning that SB waters should be "unimpaired" or "unencumbered" by visible oil sheen, foam or solids took into account that trace amounts of sheen, film or foam that can be easily removed or that dissipate readily do not impair the designated uses of SB waters. Allowing trace amounts of sheen, film, or foam is reasonable, consistent with the intent of the regulations to protect designated uses, and practicable given GE's experience with discharging salt water back into a tidal estuary.

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[28] *See* Technical Exhibit 19 [December 5, 2000 David Johnson (GE) to George Harding (EPA, Reg #1)].

The Facility does experience biological films and sheens in the warm spring season. This phenomenon may be caused by natural events such as the presence of iron, decomposition of organic matter, or the presence of certain types of bacteria. Naturally occurring sheens are usually silver or relatively dull in color and if disturbed, will break up into a number of small patches of sheen. Oil of a petrochemical nature produces a sheen oriented in rainbow-like lines, or streaks floating on the water surface, and GE agrees that this type of sheen is impermissible and should be prohibited. However, EPA's language does not distinguish between this type of condition and vegetative scum and foam that are present in tidal convergence lines or "tidelines." Sometimes called streaks, stringers, or fingers, they are commonly found floating in near-shore and offshore waters. They are usually just a collection of sea grasses, seaweeds and protein scum or foam that are moved around by the tides and wind. In addition, discharges into these bio-scums can produce a brief bubbling or foaming effect that readily dissipates.

By changing its interpretation of "free" to mean "shall not contain," EPA appears to be requiring the immediate reporting of all such events, and each event would constitute a permit violation. GE has no wish to administratively burden EPA or other agencies with unnecessary reporting that results in no environmental benefit. GE is also concerned with the impossibility of complying with the provision as written, and the potential for penalties and enforcement based upon a natural occurrence in the tidal estuary. GE proposes that the current NPDES permit language allowing trace amounts of visible sheen, foam or film be retained.

XIII. Some of EPA's Expectations and Assumptions Related to Operations and Practices at the Facility are not Accurate and Need to be Corrected.

A. Treatment by GAC Alone is more Effective that Treatment using both the GAC and DAF.

EPA assumes that "pollutant discharges would be reduced the most by operating the CDTS in the mode utilizing both DAF and GAC treatment." Fact Sheet p. 8. However, this assumption is not correct. To fully understand this issue, it is critical to first address the original design philosophy of the CDTS, and to compare this design philosophy to GE's actual operating experience over the last ten years.

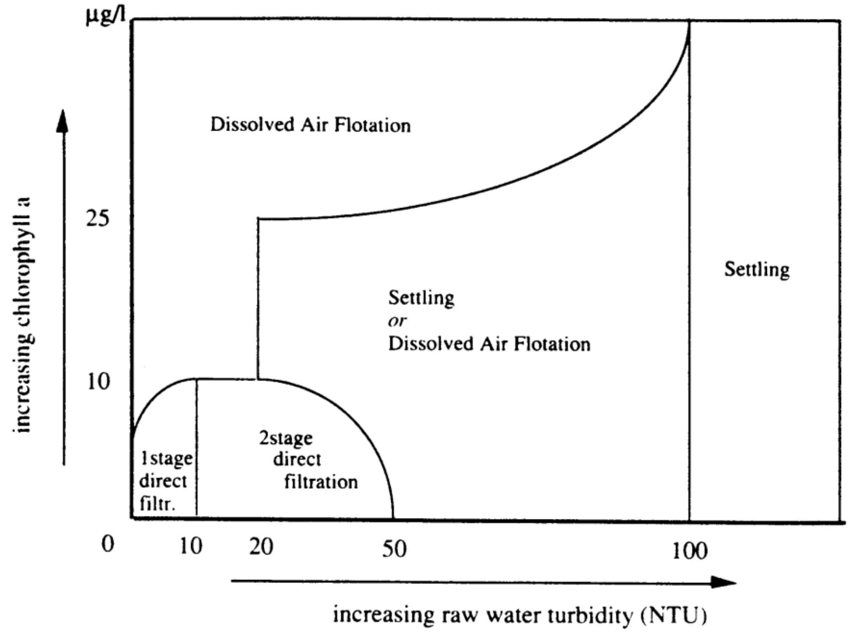
The design and installation of the CDTS was an element of GE's comprehensive sheen reduction program. During the design process, GE's understanding of the sheen issue was evolving. As a result, the CDTS design philosophy accommodated a wide range of influent characteristics and provided the operating flexibility necessary to achieve the discharge performance standards. In this regard, a key unknown was the amount of free product or floating oil and grease that would be present in the wastewater pumped from the respective drainage system vaults to the CDTS. To address this unknown, dissolved air flotation (DAF) technology was selected as an element of the treatment system to provide the capability for the removal of free product and floating oil and grease should these pollutants exist in sufficient quantity.

Other technologies (i.e., unit processes) utilized in the CDTS include influent equalization and skimming, and granular activated carbon (GAC) polishing. In addition, the system incorporated the existing skimmers and oil water separators associated with each respective drainage system vault. The system design was reviewed and approved by EPA and MADEP in the context that the proposed operating strategy would allow GE the flexibility to operate the desired unit processes as deemed necessary to achieve the discharge quality objectives.

Following start-up, operating experience quickly revealed that meaningful concentrations of floating product or oil and grease do not exist in the wastewater and therefore operation of the DAF system is unnecessary. Trace levels of floating materials are removed by the skimmers and oil water separators associated with each drainage system vault and the resulting influent wastewater received at the CDTS only requires polishing with the GAC system. Operation of the DAF, therefore, is not required.

To facilitate removal of colloidal suspended solids potentially present in the wastewater and flotation of free product and oil and grease, the DAF system was also equipped with chemical coagulation using polyaluminum chloride (PAC) and flocculation using an anionic emulsion polymer. However, it is important to understand that operation of the DAF system also creates adverse effects on the GAC system. That is, without the presence of sufficient colloidal solids (as discussed below), the coagulant and polymer will pass through the DAF system and impact the performance of the GAC system. Specifically, polymer that escapes the DAF system will tend to bind the carbon and potentially create short circuiting (i.e., rat holes), and polymer will also be adsorbed by the carbon thereby shortening the useful life of the carbon. PAC that escapes the DAF would not be adsorbed by the carbon and would be discharged to the Saugus River.

With respect to colloidal suspended solids, DAF technology would be an appropriate technology selection to remove solids created from the coagulation/flocculation process. The figure below provides a summary of when to utilize primary treatment processes to remove solids. As shown in the figure, at turbidities less than 20 NTU, a direct filtration process (e.g., GAC) is suitable for proper treatment without the need for primary treatment (e.g., DAF). DAF is typically used for moderate turbidity levels, high algal counts, and limited amounts of silty material. The primary clarification process provides better removal of larger sized coagulated particulates prior to filtration.



Source: "Treatment Process Selection for Particle Removal," AWWA Research Foundation. International Water Supply Association, 1998.

CDTS influent data do not show elevated suspended solids or turbidity, and turbidities are typically less than 20 NTU. In addition, the CDTS has been operating without the DAF system and additional or excessive headloss across the GAC system has not been observed – further proof that primary treatment (i.e., DAF) for solids removal and oil and grease removal is not necessary.

It is further noted that the two GAC columns are operated in series and are routinely monitored between the two columns in order to identify breakthrough of the first column prior to exhausting the removal capacity of the second column. Monitoring occurs on a weekly basis and, on average, contaminant breakthrough of the first column occurs once every two years. Proper operation and maintenance, including the need for adequate back-up systems, necessitates that GE run the two GAC columns in series rather than parallel.

In summary, GE's engineering experience confirms that utilizing the DAF system in combination with the GAC system will not improve discharge quality and, in fact, will adversely affect the GAC performance. Moreover, the ten year operating history of the CDTS clearly demonstrates that primary treatment using the DAF system for dry weather flow is not required and the discharge quality obtained using the GAC system alone is excellent.

B. GE has Concerns about the Feasibility, Effectiveness and Implementability of Specific SWPPP BMPs Proposed by EPA.

As mentioned previously, GE has already developed a SWPPP, which contains a comprehensive suite of site-specific BMPs to control and minimize the potential for pollutants in stormwater. GE shares EPA's position that successful stormwater management hinges on an ongoing and iterative process of developing, implementing, correcting, improving and replacing BMPs, consistent with site-specific needs, changes and constraints. However, GE is concerned that certain BMPs proposed by EPA are too prescriptive and may not be feasible, effective or implementable. GE's specific concerns are presented below.

Part I.B.10.a.i. "The CDTS outfall gates shall open only during wet weather after the first flush of pollutants has been transferred to the CDTS for treatment."

GE has raised its concerns with this provision in other sections of these comments, including the manner in which "wet weather" and "first flush" are defined or interpreted for compliance purposes. GE notes that the gates must open whenever necessary to prevent flooding so as to protect both personnel and equipment, which is a good engineering practice. As GE has demonstrated, the minimal dry weather flow remaining in the vaults along with the "first flush" of stormwater do not have any reasonable potential to cause or contribute to an exceedance of applicable water quality standards. Moreover, GE cannot feasibly capture and treat this commingled flow without extensive changes to the CDTS.

Part I.B.10.a.ii. "The CDTS outfall gates shall remain closed and without leaks, during all periods of dry weather."

GE disputes the inclusion of a dry weather BMP in a wet weather SWPPP. Even if such a BMP were relevant in the stormwater context, it does not meet the "good engineering" standard. As discussed above, it is technically impracticable to hermetically seal mechanized steel outfall gates that operate on metal tracks. With routine inspection and maintenance, leaks around the gates are minimized in accordance with good engineering practice. In addition, the small amount of weeping around the bottom edges of gates due to the hydrostatic pressure created by the water behind the gates has no reasonable potential to affect the quality of the commingled discharge.

Part I.B.10.b.iii. "Manually operate the transfer pumps from all eight vaults leading up to significant storm event to reduce the dry weather flows to a low level in the vaults, and as a result to help eliminate to the maximum extent practicable, the amount of non-allowable non-stormwater flows that are commingled with stormwater in the Drainage System vaults and discharged to the Saugus River."

The provision is replete with definitional problems that have already been discussed. It appears that EPA's goal is to minimize the accumulation of dry weather flow in the vaults so that this flow is not discharged when the vaults open during a storm. However, this goal is inconsistent with Part I.B.10.b.i, which would require GE to reconfigure the vault system to ensure that during dry weather all flow in the Drainage System is transferred to the CDTS for treatment prior to discharge, which would include all dry weather flow in the vaults leading up to a storm and would require more than just reducing the dry weather flow to a low level. Further, in Part I.B.10.f, EPA would require GE to "ensure the sonic sensor in each outfall vault is operated normally so that the water level in the skimming chamber is never lower than the baffle designed to retain floating material for skimming." Reading these three, seemingly inconsistent provisions together, GE is left to wonder what EPA wants, and what it would take to comply -- is GE supposed to (1) capture as much dry weather flow in the vaults as possible for treatment, or (2) reduce as much dry weather flow in the vaults as possible to minimize or eliminate the potential for a commingled discharge during wet weather, or (3) maintain dry weather flow levels in the vaults so that the skimmer and baffle can retain floating materials? GE respectfully submits that each of these is internally inconsistent with the other, and must be reconciled before the permit is finalized.

Part I.B.10.b.v. "Isolate each source of non-allowable non-stormwater flow, to the maximum extent practicable, and re-pipe it directly to the CDTS for treatment."

EPA's suggested BMP is impracticable and does not represent good engineering practice. The drainage system collection vaults and oil skimmers are an integral element of the CDTS system and were designed to provide collection of all DWF sources within each respective drainage basin and to provide preliminary treatment prior to pumping to the CDTS; thus bypassing them is generally not a good idea. First, the vaults are centralized collection points for a large complex drainage system in a manufacturing facility where things can change. Using this approach, even though GE might not know the exact location where a source of "non-allowable, non-stormwater" flow is entering the drainage system, the flow can still be captured. The vault system facilitates collection of non-stormwater flows generated by activities that occur in different areas of the site [e.g. drain cleanouts, A/C roof washwater not containing detergents, excavation dewatering (after appropriate testing), and stormwater drain dye tracer water]. Equipment generating non-stormwater flows may relocate or may consist of many sump pumps that are distributed around the Facility, such as the steam conduit sump pumps. The second purpose of the vaults is to provide initial buffering and preliminary treatment for oil and grease removal. Without this preliminary treatment step, the downstream granular activated carbon treatment system at the CDTS would be exhausted more frequently and operating costs would increase.

Eight vaults currently collect flows from miles of drainage lines, a setup that minimizes the amount of overhead piping that runs directly to the CDTS and the number of pumps that need to be operated to convey wastewater to the CDTS for treatment. Additional overhead piping must be insulated, is expensive to construct and maintain, and needs to be minimized to prevent interferences with other overhead utility lines, shop operations, and vehicles moving around the facility. Smaller DWF sources located near the existing CDTS conveyance header could possibly utilize the existing overhead piping; however, larger DWF sources and sources not located near the existing header would require construction of new dedicated overhead piping conveyance systems at costs ranging from $150 to $250 per linear foot. Furthermore, isolating each DWF source would require a collection and automated pumping system, and would increase operations and maintenance costs. Pumping through overhead piping instead of using gravity to drain line to the vaults also increases energy usage.

To assess the infrastructure needs and capital costs required to isolate and convey three major DWF sources to the CDTS, including the steam conduit drains, the power house boiler blowdown, and the boiler water treatment system backwash waters, GE developed a preliminary planning-level cost estimate as presented in Technical Exhibit 20. For example, the facility maintains 36 steam conduit collection sump pumps that are spread out across the facility. The existing pumps are only designed to lift the conduit drain water to the closest available drain and are not sized to pump the drain water across the site through an overhead conveyance piping network. Therefore the pumps would require upgrade and replacement. The estimated capital cost to collect, convey and treat the aforementioned sources to the CDTS is $6.8 million. The estimate does not include the capital costs associated with the isolation, collection, and conveyance of the remaining non-allowable, non-stormwater flows.

With respect to the boiler blowdown, the CDTS is not the appropriate treatment technology for this wastewater. The primary constituents of concern for boiler blowdown are pH and temperature. The CDTS does not include a pH adjustment process nor a temperature quenching or cooling process. Thus, routing the boiler blowdown to the existing CDTS would serve no environmental benefit. Segregation, collection, conveyance, and treatment of boiler blowdown would require design and construction of new systems – estimated at a cost of $2.4 million as shown in the Technical Exhibit. Treatment of boiler blowdown would require storage tanks to facilitate cooling, followed by pH adjustment including a chemical additional and control system.

Collection of the boiler water treatment backwash waters and conveyance to the CDTS for treatment is estimated at $0.3 million.

Finally, GE has been operating the CDTS for over 10 years, and during that time period, GE has only identified one non-stormwater source where GE decided based on location, the amount of flow, and the characteristics of the flow that it was prudent to pipe a source of non-stormwater directly to the CDTS (the 29G/T groundwater treatment system). Again GE is in the best position to decide how to manage different flows at its Facility in relation to treatment in the CDTS.

Part B.10.c. "During wet weather conditions, during periods leading up to forecasted wet weather conditions, and whenever any outfall gate is open, eliminate, to the maximum extent practicable, the generation of non-allowable non-stormwater flows that would be discharged from the Drainage System Outfalls. To satisfy this requirement the following discharges are prohibited…"

1. **"Intermittent Discharges Consisting of de-aerator Storage Tanks, Building 64-A Sump, Test Cell Washdown, Stormwater Collected in Secondary Containment Dikes and Truck Unloading Areas, Hydrant Testing, Sprinkler System Testing Water, Stormwater Dye Tracing." [Part B.10.c.i]**

The Building 64-A sump water and test cell washdown water discharge to the LWSC municipal sewer system, not to the Drainage System, so this requirement is not applicable and should be removed from the Permit.

Stormwater collected in the secondary containment dike and in the truck unloading areas is *not* "non-stormwater." GE cannot feasibly eliminate it during a storm event. And the prohibition would be the exception that swallows the rule, since in Part B.10.f, EPA has already prohibited the discharge of sheens (as opposed to all stormwater collected in the dikes and unloading area, most of which is uncontaminated).

GE has 361 sprinkler systems and drains that must be tested three times per year, along with 93 fire hydrants that must be tested once per year. Water is discharged onto the parking lots, and then flows to Drainage System. Hydrant testing and sprinkler system test water originates in the city's water supply and is potable. GE does not use chemical additives in this water. By the time it is discharged and due to storage time in the pipes and flushing, any chlorine residual will have dissipated. These flows do not present water quality concerns, which is why EPA allows tens of thousands of industrial permittees to discharge these flows under the MGSP.

GE needs to conduct periodic dye tracer testing to maintain the integrity of its old and complex system of drains and outfalls. GE does not perform dye tracer testing during wet weather because the dye is not visible during such an event. GE does not believe that non-toxic, biodegradable dyes run afoul of applicable state water quality standards or are "aesthetically objectionable." However, as drafted, the permit would prohibit the use of such dyes. Although GE has made a substantial progress over the last five years to map the entire Facility drain system, GE still must manage this system and remain vigilant to detect and prevent any unknown connections or failures in historic plugs or disconnects throughout the 112-year old Facility infrastructure. Tracing the location and drainage pathway of such pipes is necessary at times for maintenance and to verify the accuracy and availability of the Facility's drawings. If the purpose of the exercise is to find out where a pipe discharges because it is unknown, it is difficult to prevent discharge until the dye makes the drainage pathway visible. Minimization may be reasonable but prohibition is impractical and ignores good engineering practice in utilizing non-toxic biodegradable tracer dyes designed to dissipate quickly. Rather than an absolute prohibition, EPA should require that only non-toxic, biodegradable dyes be used; that use be minimized in accordance with good engineering practice, and that EPA and MADEP be notified prior to the use of dyes in the stormwater drainage system at the Facility.

2. "Any Discharge of 'Blowdown' during Wet Weather and during Periods Leading up to Forecasted Wet Weather Conditions, to the Maximum Extent Practicable. Blowdown consists of Condensate Blowdown, Steam Conduit Blowdown, Boiler Blowdown and Cooling Tower Blowdown." [Part B.10.c.iii]

The term "blowdown" is not applicable to GE's steam conduit or condensate system as neither system produces blowdown. "Blowdown" is generally an automated feature of equipment, such as boilers and cooling towers, which need to control water chemistry (e.g. pH, conductivity, mineral content) in order to function effectively. These systems maintain concentration using a "bleed and feed" system. The concentration is electronically monitored and if the concentration increases to an unacceptable level, the system dumps (or blows down) the concentrated water and initiates a feed of clean water. These two actions work together to bring the water solution into optimal range. Unbalanced water chemistry can result in equipment malfunction, acidic discharges, corrosion and pathogen buildup leading to potential boiler equipment failure. Boiler equipment failure and malfunctions can result in excessive air emissions and permit exceedances. Blowdown cannot be tied to the weather forecast without risking adverse consequences to the equipment that provide power and other utilities to the Facility. EPA's proposed BMP is technically infeasible, creates other potential environmental problems and does not reflect good engineering practice. Therefore, this BMP should be deleted in its entirety.

3. "Any Discharge from Routine Maintenance that Generates Wastewater Discharges during Wet Weather and Periods Leading up to Forecasted Wet Weather Conditions, to the Maximum Extent Practicable. Routine Maintenance Consists of: Boiler Startup/Soot Blower Drains/Boiler Draining for Maintenance (Intermittent), Boiler Filter Backwash, Ion Exchange Regeneration and Backwash." [Part I.B.10.c.iv]

All flows generated in the Power Plant either discharge to Outfall 018 or 019. Outfall 018 does not contain a stormwater component, and BMPs in a SWPPP are not applicable to non-stormwater flows. EPA inconsistently seeks to impose numeric limitations for Outfall 018 based on the Steam Electric ELGs, which allow these types of flows, and at the same time to prohibit such discharges during wet weather. Outfall 019 does contain a stormwater component. During dry weather, the flows from routine maintenance are diverted to the CDTS for treatment; during wet weather, GE has demonstrated that there is no reasonable potential for these flows to affect water quality. In addition, the need for routine maintenance is not tied to the weather forecast but to conditions of the equipment; EPA's prohibition does not reflect good engineering practice. This BMP should be deleted in its entirety.

4. Prohibition on "any Discharge from any remaining non-allowable non-stormwater discharge flows during wet weather and during periods leading up to forecasted wet weather conditions, to the maximum extent practicable. These non-allowable non-stormwater flows include at a minimum, potable water used upon NCCW system failure, steam conduit water, excavation dewatering, contaminated groundwater and cooling water (not including discharges of NCCW through Outfall 014 and 018.) [Part I.B.10.c.v]

EPA seeks to insert a catch-all BMP relating to the elimination of all "non-allowable non-stormwater flows" during wet weather even though the generation of many of these flows is often directly related to wet weather. EPA also fails to consider the age and complexity of the drainage system. GE has already corrected EPA's assumptions regarding contaminated groundwater in Section III above. GE's other concerns are set forth below.

Water generated from excavation dewatering is either stormwater or groundwater that has infiltrated into the excavation. Any prohibition associated with such a discharge should be based on its water quality impacts, not the weather conditions at the point of discharge. As an existing BMP, GE tests water generated from the dewatering of excavations. Based on the test results, the flow is either 1) discharged to the CDTS equalization tanks for treatment; 2) discharged to the LWSC municipal sewer system with permission; 3) shipped offsite for disposal or 4) if the water is uncontaminated, discharged to the storm sewer system. This BMP is consistent with regulatory requirements, reflects good engineering practice, and should be maintained.

Steam conduit water is produced when water accumulates in the sumps in the underground concrete vaults surrounding the steam piping, some of this water could be considered stormwater, some could be considered groundwater. Either way, accumulation is likely to occur more frequently during wet weather. The sump pumps trigger automatically based on the water level not the weather forecast. EPA's BMP would force GE to allow its steam conduit to potentially flood and damage equipment rather than allow the pumps to discharge. This is not a good engineering practice and should be removed from the permit.

To the extent EPA is prohibiting the discharge of non-contact cooling water that originates in the city water supply, EPA has no basis for requiring this BMP as EPA allows for the continual discharge of this type of non-stormwater flow under the MGSP. For the Facility, such flows would be occasional and intermittent as GE would only discharge this water in the event that a cooling tower failure occurs and immediate shutdown of equipment being cooled is impracticable. Potable water would replace the recirculating water from the cooling tower to keep the heat exchangers from overheating until repairs or shutdown of cooled equipment could be accomplished. Since GE pays for potable water, GE has a built-in financial incentive to avoid long-term reliance on once-through cooling supplied by the municipal system. GE does not dispute that contact cooling water should not be discharged during any period where its collection and treatment in the CDTS cannot be assured.

Part I.B.10.d. "In the event of any generation of non-allowable non-stormwater flows during wet weather conditions or during periods leading up to forecasted wet weather conditions, the permittee shall record the type of flow generated, the corresponding weather conditions, the reason the flow was generated during wet weather conditions and the fate of the non-stormwater flow in question. The permittee shall submit this information to EPA in an annual report, due by March 31st each year."

This recordkeeping BMP is arbitrary and capricious, unduly burdensome, and technically impracticable given the age of the Facility, the types of non-allowable non-stormwater flows of concern to EPA, and the complexity of the drainage system. There is no method for GE to detect and manage all non-allowable, non-stormwater flows of the types identified in Part I.B.10.c of the Draft Permit. For all the reasons stated above, EPA's focus on elimination of these flows is not justified. In turn, tracking and recordkeeping of this magnitude is unnecessary. To underscore this point, GE cannot detect -- during wet weather, periods leading up to forecasted wet weather, or at any other time -- when some contaminated groundwater might infiltrate through a crack in a pipe somewhere in the 12 miles of drainage lines. As explained above, the age and complexity of the drainage system was one factor considered by GE in designing the CDTS system with vaults to collect flows from various upstream locations in the drainage system.

Part I.B.10.f . "Inspect all stormwater collected with the secondary containment areas at the jet fuel farm, around tanks, in the truck unloading ramps, in the Outfall 032 drainage area and from other areas for evidence of an oil sheen or other contamination prior such water being routed to the CDTS. In the event a sheen is observed, the permittee shall eliminate the sheen prior to discharging the water from the containment area or dispose of the water offsite."

GE objects to this requirement on several grounds. GE's wastewater treatment operators are in the best position to decide which flows can be treated in the CDTS and which should be excluded. The CDTS was designed and has operated effectively for over a decade treating wastewater with oily sheens; in fact, the elimination of sheens from GE's discharge to the

Saugus River was one of the primary reasons for installation of the CDTS. EPA's exclusion has no technical basis. This BMP should be deleted in its entirety.

Part I.B.10.g. "Perform regular cleaning of the Drainage System pipelines."

It is unclear how EPA would interpret "regular cleaning" in a compliance or enforcement proceeding. Rather than subject GE to the risk of subjective interpretation and enforcement, EPA should allow GE to develop a site-specific BMP for drain cleaning as part of its updated SWPPP based on appropriate variables such as the extent of sand usage on roads during the winter season.

Part I.B.10.l. "Discharge of any water containing additives (except cooling water to 014 and 018) is prohibited."

The cooling water discharged through Outfalls 014 and 018 is river water to which GE only adds heat, so the exception language makes no sense. The types of equipment requiring additives include cooling towers, boilers and water treatment systems like the DAF. If GE is required to run the DAF (which we have disputed elsewhere in these comments), then GE will need to use additives, such as coagulant and flocculent, in the treatment process. In addition, GE uses additives to maintain balanced water chemistry in its cooling towers and boilers. A complete list of these additives is included in Technical Exhibit 21. Additives allow for the continued recirculation and conservation of water. By way of example, closed cycle cooling towers favored by EPA could not function without the use of additives. The additives reduce corrosion of the equipment and prevent the growth of microorganisms. Without additives, metals oxidize and become soluble in water, thus increasing the potential for discharges of pollutants to the receiving water. Additives protect the life of equipment and reduce failures in utility and boiler systems, including boiler malfunctions that could lead to excessive air emissions. In addition, the use of additives is expensive, so GE has a built-in financial incentive to ensure that concentrations are kept as low as possible while still achieving the goal of appropriately controlling water chemistry.

Part I.B.10.m. "Develop and implement BMPs consistent with the sector specific BMPs included in Sector AB (Transportation equipment, industrial and commercial machinery) and Sector O (Steam Electric Generating Facilities) of the MSGP."

GE has not sought coverage under the MGSP. GE's existing individual permit reflects site-specific SWPPP and BMP requirements, as does the proposed renewal permit. As a result, further cross-referencing of the MSGP is neither necessary nor appropriate.

XIV. Even Assuming that Certain New Limits and Conditions are Necessary and Appropriate, EPA cannot Impose those Limits and Conditions without First Determining whether Schedules are Needed for GE to Achieve Compliance.

To the extent that EPA continues to believe that it has the authority to impose the new limits, conditions and prohibitions set forth in the Draft Permit (including those disputed by GE in this comment document), it cannot do so without offering appropriate compliance schedules for each new provision. Such schedules are authorized by federal and state law, and are routinely granted by EPA in these circumstances.[29]

In this permit proceeding, EPA retains primary responsibility to "prescribe conditions … to assure compliance with the requirements of [§402(a)(1) of the Clean Water Act] and such other requirements as [it] deems appropriate." 33 U.S.C. §1342(a)(2). While EPA has some measure of discretion here, that discretion is not unfettered. At a minimum, EPA must consider the need for "other requirements" in the permit, especially where, as here, EPA's own guidance calls for such consideration. *See* EPA Permit Writers' Manual, EPA 833-B-96-003 (noting that one justification for a special condition in a permit is "[t]o incorporate compliance schedules in situations that include new/revised water quality standards application," as in the case here).

As EPA seems to acknowledge, GE simply cannot comply with many of the new limits, conditions and prohibitions on day one of the new permit cycle. For some of these limits and conditions, major capital investments, engineering, construction and/or process changes will be needed to achieve compliance. Examples include, without limitation, EPA's proposed changes to the Drainage System, CDTS and cooling water intake structures (see schedule for these projects in Technical Exhibit 22). EPA's failure to consider and allow schedules of compliance for GE to achieve compliance with substantial new requirements would amount to clear error.

XV. Conclusion

GE is fundamentally opposed to the Draft Permit and has grave concerns about the new limitations and conditions imposed therein. GE would welcome the opportunity to meet with the Agencies to review these comments and concerns, and to provide whatever additional information that the Agencies may request in order to properly revise and correct the Draft Permit.

XVI. List of GE Technical Exhibits

1. List of Key Documents and Correspondence

2. Chronological Summary of Response Actions

3. Groundwater Remediation Concentration Trend Graphs

4. 2011 Surface Water Sampling Map

5. Storm drain evaluation and replacement cost estimates

6. GE Facility Stormwater BMPs

7. Outfall DWF Metal Concentrations – 1998 Sampling Event Comparison (2/98 and 9/98)

[29] *See* 314 Mass. Code Regs. §4.03(1)(b)(2)(2008); *In the Matter of Star-Kist Caribe, Inc.*, 4 E.A.D. 33 (EPA Environmental Appeals Board, May 26, 1992).

8. EPA Region 10, Recommended Guidelines for Measuring Metals in Puget Sound, 1997, and Thermo Scientific, Rapid, Simple, Interference-free Analysis of Environmental Samples, 2007

9. Table - Examination of EPA Characterization of 2009 Metals Sampling Data

10. Explanation of Discontinued Sampling Requirements under 1993 NPDES Permit and April 16, 1999 GE Aviation letter to EPA

11. Analytical cost estimates for monitoring proposed by EPA

12 Manpower cost estimates for monitoring proposed by EPA

13. Instrument and sampler cost estimates for monitoring proposed by EPA

14. AECOM , GE Aviation River Works – Lynn, MA, Dilution Evaluation of Discharge Drainage System, Discharges to the Saugus River, dated May 25, 2011.

15. Technical Evaluation of Commingled Dry Weather Flow and Wet Weather Flow Discharges

16. Table- Comparison of Saugus River Water Sampling Data for Metals to Saltwater Water Quality Criteria

17. Technical Evaluation of the Requirement to Collect, Convey, and Treat First-Flush Stormwater Commingled with Dry Weather Flow

18. CH2M Hill, Technical Support for Comments on Proposed Thermal Discharge Limits and CWIS Requirements, dated May 2011.

19. December 5, 2000 Letter from David Johnson (GE) to George Harding (EPA Region I)

20. Planning-Level Cost Estimate for Isolation of DWF by Re-piping to CDTS

21. List of Chemical Additives

22. Example Compliance Schedule Table