UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
ONE CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES PURSUANT TO THE CLEAN WATER ACT (CWA)

NPDES PERMIT NUMBER: MA0040371

PUBLIC NOTICE START AND END DATES: July 10, 2009 – August 18, 2009

NAME AND MAILING ADDRESS OF APPLICANT:

Russell Biomass, LLC
101 Hampton Road
Pomfret Center, CT 06259

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Russell Biomass, LLC
Station Road
Russell, MA 01071

RECEIVING WATER(S): Westfield River (Segment MA32-05) (01080206)

RECEIVING WATER CLASSIFICATION(S): Class B Warm Water Fishery

SIC CODE: 4911 **NAICS Code(s):** 221119

CURRENT PERMIT EXPIRES: NA - New Facility

APPLICATION RECEIVED: August 24, 2006

SUPPLEMENTS TO APPLICATION: July 13, 2007; February 28, 2008; May 19, 2008; June 20, 2008; September 8, 2008; November 7, 2008; February 27, 2009; April 24, 2009; June 11, 2009; and June 22, 2009

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ATTACHMENTS

1.0 Proposed Action, Type of Facility, and Discharge Location

Russell Biomass, LLC (referred to hereinafter either as Russell Biomass, the Applicant, the Permittee, or the Company), has applied to the Region I office of the United States Environmental Protection Agency (EPA) for a National Pollutant Discharge Elimination System (NPDES) permit under the Federal Clean Water Act, 33 U.S.C. §§ 1251 *et seq.* (CWA). The company has also applied to the Massachusetts Department of Environmental Protection (MassDEP) for a state discharge permit under the Massachusetts Clean Waters Act.

The Applicant requires the federal and state discharge permits for its proposed 50 MW (nominal net output) biomass-fired power plant (the facility, the plant, or the station), to be located on the site of the former Westfield River Paper Company mill complex in Russell, Massachusetts. A USGS Site Locus figure is provided as Attachment A of this Fact Sheet (also included in Appendix A of the Company's NPDES permit application (the Application)). Site plans for the project, including a general site layout and site drainage plans, are included as Attachment B of this Fact Sheet (also in Appendix A of the Application).

The facility is expected to consist of a complete fuel receiving and handling system, one wood biomass fuel boiler, a single condensing steam turbine, a mechanical draft evaporative cooling tower, a cooling water intake structure (CWIS) for withdrawing makeup water from the adjacent Westfield River, air and water quality control systems, an oil-fired boiler start up system (biodiesel), and the essential auxiliaries typical of a stand alone power generating station. For its CWIS, the facility will utilize an already existing intake structure located at the site. Russell Biomass proposes to withdraw, through the CWIS, an average of 662,000 gallons per day (gpd) and a maximum of 885,015 gpd of water from the river primarily for cooling and boiler makeup.

Treated industrial process wastewater from the facility, including cooling water, will be discharged to the Westfield River. Projected process discharge flows include a maximum of 133,000 gpd, and an average of 101,000 gpd, of discharge water primarily from cooling tower and boiler blowdown. The discharges to the Westfield River from the facility are limited to the following:

- Boiler blowdown;
- Wastewater from equipment cooling, laboratory wastewater, miscellaneous floor drains and floor washing;
- Cooling tower blowdown; and
- Stormwater.

A description of the discharges associated with each outfall location is provided in Section 4.3 of this Fact Sheet, and a schematic drawing of the flow of water at the facility and the various discharges from the facility is presented in Attachment C.

Russell Biomass proposes to relocate the discharge point a few hundred feet downstream of the point previously used by the Westfield River Paper Company. The new location will afford better mixing in the receiving stream and avoid potential conflict with the rehabilitation of the Indian River hydroelectric

facility. The new point of discharge will also be utilized for discharging stormwater to the river. A storm drain and stormwater management system will be constructed at the facility to collect, detain and treat (*i.e.*, settle solids) storm water flows. Storm water and process wastewater will be piped and monitored separately, before being combined prior to the point of discharge.

Russell Biomass is proposing a new wastewater discharge to the Westfield River. Under CWA §§ 301(a), 316(b) and 402, the facility's proposed pollutant discharges and cooling water withdrawals must receive authorization from a federal NPDES permit issued by EPA and a state permit issued by the MassDEP. In August 2006, Russell Biomass submitted the Application for the required NPDES permit(s) to EPA and the MassDEP. In response to questions from EPA, Russell Biomass supplemented the Application with submittals on the following dates: July 13, 2007; February 28, 2008; May 19, 2008; June 20, 2008; September 8, 2008; November 7, 2008; February 27, 2009; April 24, 2009; June 11, 2009 and June 22, 2009.

Section 4.1 of the Application discusses water intake impacts. Section 4.1.3 of the Application addresses issues of potential impingement and entrainment associated with the proposed water withdrawal from the Westfield River by the facility. Section 316(b) of the CWA, 33 U.S.C. § 1326(b), sets requirements for CWISs. Specifically, § 316(b) requires that the design, location, construction and capacity of CWISs reflect the "best technology available for minimizing adverse environmental impacts" (BTA). In 2001, EPA promulgated the "Phase I" regulations under CWA § 316(b). *See* 40 C.F.R. Part 125, Subpart I (the Phase I regulations). The Phase I regulations set national BTA requirements for CWISs at new facilities that, among other things, have CWISs designed to withdraw more than two million gallons of water per day (MGD) from a water of the United States for cooling. The Phase I regulations provisions do not, however, apply to the Russell Biomass facility because its proposed maximum design intake flow is 1.08 MGD, which is less than the regulatory threshold of 2 MGD. Nevertheless, the Applicant has proposed to design and operate its CWIS to meet the requirements of the Phase I regulations and EPA and MassDEP are proposing permit conditions accordingly.

Russell Biomass also submitted a Water Management Act permit application to the MassDEP to authorize the withdrawal of water from the Westfield River. In February 2008, MassDEP issued a draft permit for public review and comment, proposing to approve the withdrawal. On July 2, 2008, MassDEP issued the final Water Management Act permit to the Company, determining that the requested withdrawal volume would not have "significant or detrimental effects on the Westfield River streamflow…." Several groups have appealed the permit. As of the date of this Draft Permit, no ruling has been issued.

The Draft NPDES Permit issued today by EPA and MassDEP proposes to authorize the proposed Russell Biomass facility's discharge of cooling water, process wastewater and stormwater, and its withdrawal of water from the Westfield River through a CWIS, all subject to the conditions and limits specified in the Draft Permit. These conditions and limits are designed to limit the facility's effects on the river and are based on the requirements of applicable law and the specific measures proposed by Russell Biomass in its permit application and the subsequent supplements to that application identified above.

2.0 Description of Discharge

Refer to Section 6.2 of this Fact Sheet for a description of the discharges associated with each outfall location. A schematic drawing of the flow of water at the facility and the various discharges from the facility is presented in Attachment C.

3.0 Receiving Water Description

The Russell Biomass power plant will discharge to Reach MA 32-05 of the Westfield River. Reach MA 32-05 is a 17.8-mile segment of the Westfield River that runs from the confluence with the Middle Branch of the Westfield River in Huntington, downstream to the Route 20 bridge in Westfield.

The Westfield River is classified as a Class B water body and warm water fishery by the Massachusetts Surface Water Quality Standards (MA WQS). *See* 314 C.M.R. 4.06(5). Class B waters have the following designated uses:

> These waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.

314 C.M.R. 4.05(3)(b). Warm water fisheries are defined as those waters in which the maximum mean monthly temperature generally exceeds 68 degrees F (ºF)(20 degrees C) during the summer months. The Westfield River (Reach MA32-05) section of the *Westfield River Watershed 2001 Water Quality Assessment* report[1] provides a summary of relevant water quality data and information and assesses the status of the state's designated uses for the Westfield River and its watershed.

This report notes that there may be several tributaries to this segment of the Westfield River that are categorized as cold water fisheries. These include Bradley Brook, which flows into the Westfield River just prior to the old Westfield River Paper Company Dam, across the river from the proposed Russell Biomass facility. In addition, the Massachusetts Division of Fisheries and Wildlife (Mass Wildlife) has designated the Main Branch of the Westfield River as a "cold water fishery resource." *See* http://www.mass.gov/dfwele/dfw/fisheries/conservation/cfr/cfr_westfield_river.htm

The MA WQS stipulate that:

> Cold Water – in these waters dissolved oxygen and temperature criteria for cold water fisheries apply. Certain waters not designated as cold water in 314 CMR 4.00 may

[1] This report is coauthored by the following Massachusetts regulatory authorities: Executive Office of Environmental Affairs, Department of Environmental Protection, Bureau of Resource Protection, and Division of Watershed Management.

> contain habitat that supports a cold water fish population and, in such cases, the cold water fish population and habitat shall be protected and maintained as existing uses. The Massachusetts Division of Fisheries and Wildlife is responsible for identifying cold water fish populations that meet their protocol regardless of whether or not the water meets the cold water criteria in 314 CMR 4.00. **Where a cold water fish population has been identified by the Division of Fisheries and Wildlife as meeting their protocol, but the water has not been documented to meet the cold water criteria in 314 CMR 4.00, the Department will protect the existing cold water fish population and its habitat as an existing use.**

314 C.M.R. 4.06(1)(d)(7) (emphasis added). Therefore, the segment of the Westfield River into which the proposed Russell Biomass facility will discharge its wastewater, and from which the facility will withdraw water for cooling, is both a designated warm water fishery and a cold water fishery resource, meaning that cold water species are present through stocking and restoration programs. Section 6.3.1 of this Fact Sheet provides a discussion about the temperature limits and thermal monitoring requirements in the Draft Permit that are designed to protect the existing cold water fish population.

Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those water-bodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDL). A TMDL study determines the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and the allocations of that pollutant that should be granted to each of the pollutant's sources. The MA32-05 segment of the Westfield River is on the *Massachusetts Year 2008 Integrated List of Waters*, CWA 303(d) list as a Category 5 Water requiring TMDL development for unknown causes of taste, odor, color, noxious aquatic plants and turbidity. As discussed below, however, these problems are an issue significantly downstream of the proposed Russell Biomass facility, not in the vicinity of the proposed discharge.

It is also worth noting that on November 2, 1993 and October 29, 2004, certain segments of the Westfield River were designated as "Wild and Scenic" under the Wild and Scenic Rivers Act. The segments of the river so designated, however, are all *upstream* of the location of the proposed Russell Biomass facility and its wastewater discharges and cooling water withdrawals.

> In 1968, the United States Congress established a National Wild and Scenic Rivers system to protect outstanding rivers from the harmful effects of new federal projects, such as dams, hydroelectric facilities, bank stabilization and bridges. To be considered "Wild and Scenic" a river must have at least one "outstandingly remarkable" natural, cultural or recreational value pursuant to federal law (Wild and Scenic Rivers Act, 16 U.S.C. 1271-1287).

http://www.mass.gov/dfwele/river/pdf/westfieldwildscenic.pdf. The Wild and Scenic designation applies to 78.1 miles of the Westfield River, primarily along the East Branch, Middle Branch and West Branch. The farthest downstream stretch of the river to receive the Wild and Scenic designation includes 0.8 miles of the Main Stem in Huntington, upstream of the proposed Russell Biomass facility.

4.0 Limitations and Conditions

Proposed effluent discharge and cooling water intake limits, monitoring requirements, and implementation schedules may be found in Part I (Effluent Limitations and Monitoring Requirements) of the Draft Permit.

5.0 Permit Basis: Statutory and Regulatory Authority

The Clean Water Act (CWA) prohibits the discharge of pollutants to waters of the United States unless authorized by an NPDES permit or otherwise authorized by the CWA. *See* 33 U.S.C. §§ 1311(a) and 1342(a). The NPDES permit is the mechanism used to implement, on a facility-specific basis, technology and water quality-based effluent limitations and other requirements, including monitoring and reporting, imposed by the CWA. The Draft NPDES Permit in this case was developed in accordance with various statutory and regulatory requirements under the CWA and applicable State regulations. The regulations governing the EPA NPDES permit program are generally found at 40 CFR Parts 122, 124, 125, and 136. In this permit, EPA considered technology-based requirements and water quality-based requirements when developing the permit limits.

When developing permit limits, EPA considers technology-based treatment and water quality-based requirements. Subpart A of 40 C.F.R. 125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA. EPA considers technology and water quality-based requirements, as well as all limitations and requirements when developing permit limits.

Technology-based effluent discharge limits reflect the minimum level of control that must be imposed under Sections 301and 402 of the CWA to meet treatment requirements based on applicable technology standards, including best practicable control technology currently available (BPT), best conventional control technology (BCT) for conventional pollutants, and best available technology economically achievable (BAT) for toxic and non-conventional pollutants. *See* 33 U.S.C. §§ 1311(b)(1) and (2)(A) – (F). In the absence of EPA-promulgated technology-based national effluent guidelines (ELGs), the permit writer is authorized under Section 402(a)(1)(B) of the CWA to establish effluent limitations on a site-specific, case-by-case basis using best professional judgment (BPJ). *See also* 40 C.F.R. § 125.3. Subpart A of 40 CFR Part 125 establishes criteria and standards for developing technology-based permit requirements under Section 301(b) of the CWA, including the application of EPA-promulgated ELGs and case-by-case, BPJ determinations of effluent limits. *See* 40 C.F.R. § 125.3. In general, all of the above-mentioned technology-based effluent limitations are required to have been complied with by March 31, 1989 (see 40 CFR §125.3(a)(2)). Compliance schedules and deadlines not in accordance with the statutory provisions of the CWA cannot be authorized by a NPDES permit.

The proposed Russell Biomass facility does not meet the applicability criteria for the ELGs for the Steam Electric Power Generating Point Source Category, which are found at 40 CFR Part 423 (the Steam Electric ELGs), because the fuel source at Russell Biomass is wood (biomass) rather than a fossil-type or nuclear fuel. *See* 40 C.F.R. § 423.10. The Steam Electric ELGs have been used on a BPJ

basis, however, to assist in developing appropriate limits for the Draft Permit, as described in Section 6 of this Fact Sheet.

Water quality-based limits are required in NPDES permits when effluent limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water quality standards. *See* 33 U.S.C. §§ 1311(b)(1)(C), 1341(a) and (d), 1370. State water quality standards classify each water body in the state and specify the "designated uses" and numeric and narrative water quality criteria that water bodies in each classification must achieve. For example, under the MA WQS, a water body given the "B" classification is supposed to, among other things, provide a good quality fish habitat (a designated use), maintain natural seasonal and daily variations in water temperature (a narrative criterion), and not experience an increase in ambient water temperatures of more than 5ºF as a result of a discharge (a numeric criterion). State water quality standards also contain certain "antidegradation" requirements designed to limit the degree and circumstances under which a level of water quality, once attained, will be permitted to be degraded.

NPDES permit's limit any pollutant discharge or cooling water withdrawal that causes, or has the "reasonable potential" to cause or contribute to, an excursion above any narrative or numeric water-quality criteria or a failure to maintain a designated use. *See* 40 C.F.R. § 122.44(d)(1). An excursion would occur if the projected or actual in-stream concentration exceeds the applicable criterion. In determining "reasonable potential," EPA considers: (1) existing controls on point and non-point sources of pollution; (2) pollutant concentrations and variability in the effluent and receiving water as determined from the permit application, a permittee's monthly Discharge Monitoring Reports (DMRs), and State and Federal Water Quality Reports; (3) the sensitivity of the test species to toxicity testing (when considering whole effluent toxicity); (4) the known water quality impacts of processes on wastewater; and, where appropriate, (5) the dilution of the effluent that would be provided by the receiving water.

When using chemical-specific numeric criteria to develop permit limits, both the acute and chronic aquatic-life criteria, expressed in terms of maximum allowable in-stream pollutant concentrations, are used. Acute aquatic-life criteria are considered applicable to daily time periods (maximum daily limit) and chronic aquatic-life criteria are considered applicable to monthly time periods (average monthly limit). Chemical-specific limits are allowed under 40 C.F.R. § 122.44(d)(1) and are implemented under 40 C.F.R. § 122.45(d). In the Draft Permit for Russell Biomass, the Region has established, pursuant to 40 C.F.R. § 122.45(d)(1), maximum daily and average monthly discharge limits for specific chemical pollutants to satisfy the MA WQS.

For this and other power plants, the facility's design flow is used when deriving water quality-based constituent limits for daily and monthly time periods, as well as weekly periods where appropriate. These limits could also be imposed on a seasonal basis. Also, the dilution provided by the receiving water is factored into this process. Narrative criteria from the MA WQS often provide a basis for limiting toxicity in discharges where: (1) a specific pollutant can be identified as causing or contributing to the toxicity but the state has no numeric standard; or (2) toxicity cannot be traced to a specific pollutant. See 40 C.F.R. § 122.44(d)(1).

Under CWA § 401(a)(1), 33 U.S.C. § 1341(a)(1), EPA may not issue an NPDES permit unless it first obtains a certification from the state confirming that all water quality standards will be satisfied or the state waives its certification rights. If the state issues a certification specifying more stringent conditions as being necessary to comply with state water quality standards, then the permit must conform to the conditions. *See* 33 U.S.C. § 1341(d); 40 C.F.R. §§ 124.53 and 124.55.

As stated above, water quality standards include: (1) designated uses for a water body or a segment of a water body; (2) numeric and/or narrative water quality criteria to protect the designated use(s); and (3) antidegradation requirements to control when and to what extent a level of water quality, once attained, may be degraded. The MA WQS, found at 314 C.M.R. 4.00, include these elements. The State will limit or prohibit discharges of pollutants and associated cooling water withdrawals to assure that the applicable MA WQS for the receiving waters are satisfied. These standards also include requirements for the control of toxic constituents and require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless site-specific criteria are established. EPA has determined that the conditions of the proposed Draft Permit will satisfy the MA WQS.

The Draft Permit's effluent monitoring requirements have been established under the authority of CWA §§ 308(a) and 402(a)(2) and in accordance with 40 C.F.R. §§ 122.41(j), 122.44(i) and 122.48. The monitoring program in the permit specifies routine sampling and analysis which will provide ongoing, representative information on the levels of regulated constituents in the wastewater discharge streams, as well as representative information regarding the facility's water withdrawals for cooling. The approved analytical procedures are to be found in 40 C.F.R. Part 136 unless other procedures are explicitly required in the permit.

In addition, limits for thermal discharges may potentially be based on a variance under CWA § 316(a) from technology-based and water quality-based requirements, although this permit is not based on such a variance. Furthermore, permit limits on cooling water withdrawals through CWISs are imposed in an NDPES permit under CWA § 316(b). The requirements of CWA § 316(b) are discussed in further detail in Section 7 of this Fact Sheet.

The permit must also satisfy the requirements of the essential fish habitat (EFH) provisions of the 1996 Amendments (PL 104-297) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801, *et seq.* (1998), and the Endangered Species Act (ESA). These requirements are discussed further in Sections 8.0 and 9.0, respectively.

The CWA's anti-backsliding requirements prohibit a NPDES permit from being renewed, reissued or modified with less stringent limitations or conditions than those contained in the previous permit unless an exception to the anti-backsliding requirements applies. *See* CWA §§ 402(o) and 303(d)(4) and 40 C.F.R. §122.44(l)(1) and (2). EPA's anti-backsliding provisions do not apply to the Draft Permit, however, because the Russell Biomass facility is a new discharger and, if the permit is ultimately finalized, it will be the facility's first NPDES permit.

6.0 Explanation of the Permit's Effluent Limitation(s)

6.1 Facility Information

The proposed facility will be located in Russell, Massachusetts, adjacent to the existing Indian River Hydroelectric Dam on the Westfield River. The intake for the proposed Russell Biomass facility will be located upstream of the Indian River Dam and the proposed discharge location will be down stream of the dam. The plant will consist of a complete fuel receiving and handling system, a single boiler (either stoker or bubbling fluidized bed)[2], a single condensing turbine, a (3-cell) mechanical draft evaporative cooling tower supplied with makeup water from the Westfield River via an existing intake structure, air and water quality control systems, a biodiesel fuel oil boiler start up system, and essential auxiliaries typical of a stand alone power generating station.

Approximately 510,000 tons of biomass wood fuel chips will be consumed annually to produce heat to make steam to drive the turbine to generate electricity. The energy generated from the facility will be transmitted to the existing electrical grid and the net annual energy production will be approximately 380,000,000 kWh. The energy generated by the plant will be conveyed via a new transmission line running from the site for approximately 5.1 miles along an existing transmission line easement prior to connecting with an existing 115 kV electrical transmission distribution line.

Approximately 20 acres of cleared, flat ground is available for the siting of the power plant and related facilities. As stated above, the site also has an existing CWIS for the withdrawal of an average of 662,000 gpd and maximum of 885,015 gpd of makeup water for cooling operations. A new discharge location will be established for process and stormwater discharges. The maximum projected process wastewater discharge volume is 133,000 gpd, with an average of 101,000 gpd. Five separate on-site outfall monitoring locations will be used, three for process wastewater and two for stormwater, to allow separate monitoring before flows are combined and routed to a common pipeline crossing under the existing railway and the point of discharge to the Westfield River. A storm drain and stormwater management system will be constructed on site to collect stormwater flows and allow solids to settle prior to discharge.

An existing municipal water main supplies potable water to the site. Municipal water will be used for drinking water and plant domestic wastewater needs. The municipal sewer, however, terminates on the opposite side of the river. Therefore, an on-site subsurface sewage disposal system (also known as septic system) will be utilized to treat sanitary wastewater, in compliance with 310 C.M.R. 15.000.

The facility includes the following components as identified on the facility site plans:

- **Fuel Delivery and Unloading** – Fuel (wood chips) deliveries will be weighed in and either unloaded via a truck dumper to a conveyor system supplying fuel to processing and a covered storage building, or unloaded to the outdoor fuel storage area via a pair of truck dumpers.

[2] Water withdrawals and wastewater discharge will not be significantly affected by the selection of boiler.

- **Covered Fuel Storage Building** – A covered fuel storage building will be used to accumulate a limited three- to four-day supply of processed fuel.
- **Boiler Building** – The boiler building will contain the boiler, its fuel feed system, feed water treatment (filter and demineralization) and steam system, and bottom ash removal system. Bottom ash management will depend on the type of boiler selected. The Bubbling Fluidized Bed (BFB) type boiler will produce a small amount of solid material called "clinkers" or "slag" that will be collected for disposal. The Stoker type boiler withdraws bottom ash using a water quench and chain conveyor to a storage bin or hopper. Behind the boiler, a baghouse (for BFB boiler) or a cyclone with an electrostatic precipitator (for stoker boiler) will be used to collect particulates or "fly ash" from air emissions and a selective catalytic reduction (SCR) system will be used for control of nitrogen oxides (NOx). Fly ash will be collected in an enclosed storage bin. All ash that passes a beneficial use determination will be used as a liming agent and soil amendment for land applications such as agricultural and forests. Otherwise, the ash will be disposed of in a landfill.
- **Steam Turbine Building** – Adjacent to the boiler building will be a steam turbine building which houses the steam turbine generator and its auxiliary systems, including the condenser, condensate pumps and electrical equipment.
- **Administration and Shop Building** – Also adjacent and attached to the steam turbine and boiler buildings will be the administrative offices, shop and warehousing facilities.
- **Electrical Switchyard** – Directly to the south of the steam turbine building will be an electrical switchyard which will contain the main step up transformer and switchgear used to connect to the high voltage transmission line. Electrical power will be generated at 13.8 kV and stepped up to 125 kV transmission voltage by the transformer.
- **Fuel Oil Storage Tank** –Biodiesel fuel will be used to assist the boiler during start up. The tank will have a design storage capacity of about 65,000 gallons. A projected maximum of four cold starts per year will require up to approximately 36,000 gallons of fuel oil. The fuel unloading and tank facilities will be properly designed for spill containment and fire protection as required by the National Fire Protection Association (NFPA) and local codes.
- **River Water Intake and Pumps** – The existing water intake structure at the Westfield River, formerly used by the Westfield Paper mill, will be used to withdraw water for boiler, cooling and fire protection use. New 9.5 millimeter (mm) mesh intake screens will be installed for protection of fish and aquatic life. A new pump house and two 750 gpm raw water pumps will be installed, with the intent to use existing piping between the intake structure and the pump house if possible. Only one pump will be used at a time. The second pump is for back-up purposes only.
- **Raw Water Clarifier** – A settling tank will be installed as part of the raw water clarification system. In the clarifier, suspended solids present in the incoming river water will be removed by the addition of coagulant/flocculant and settling of the solids.
- **Raw Water Storage Tank** – A raw water storage tank will hold a reserve of about 1.4 million gallons of water for fire protection emergency reserve and cooling tower makeup. Water is supplied from the Westfield River via the raw water clarification system.
- **Cooling Tower** – A fiberglass constructed, three-cell mechanical draft cooling tower will be used to provide non-contact cooling water to the steam turbine condenser heat exchanger. The condenser heat exchanger condenses steam for reuse in the boiler. The heat from the steam is

transferred to the cooling water in the heat exchanger. The cooling tower then dissipates the condenser waste heat from the cooling water through the process of water evaporation (i.e., the water is cooled by passing it through a counterflowing air stream where a portion is evaporated). A continuous supply of replacement makeup water is required due to the amount of water lost through the evaporation process and from the blowdown as described below. This makeup will be supplied from the Westfield River via the cooling water intake structure and treated within a clarifier and raw water storage tank. Boiler blowdown will also be discharged to the cooling tower for the removal of heat and water conservation. A continuous discharge (except during nightly shock chlorination) from the cooling tower will be required to flush the cooling tower basin of accumulating suspended and dissolved solids in the water. These materials accumulate in the basin as a result of the evaporative cooling process, and additional foreign materials such as pollen are also scrubbed from the ambient air that is drawn through the tower in the cooling process. The blowdown waste water from the cooling tower will be neutralized (and dechlorinated, if necessary), as required, and discharged to the Westfield River via the Draft Permit's outfall location 001.

- **Process Wastewater Treatment System** – Discharge from the cooling tower will be routed through a pH adjustment system to monitor and adjust waste discharge as required to meet the Draft Permit pH limits. The system will include pH adjustment (neutralization) and dechlorination when necessary. Flow monitoring and effluent sampling equipment will also be installed. In addition, miscellaneous plant and equipment drains will be routed through an oil-water separator (outfall 002) prior to the pH adjustment system. Treated wastewater will then be piped to a manhole on the east side of the abutting railway which also receives stormwater. A common pipe will then run under the rails to the east bank of the Westfield River to a location approximately 500 feet downstream of the dam. This location is at the beginning of a straight stretch of the river that has a strong riffle which will facilitate mixing with the receiving stream.
- **Stormwater Collection and Treatment System** – Stormwater will be collected separately and treated for solids removal through detention/infiltration basins equipped with sediment forebays prior to discharge. Two detention basins will be provided, one handling flows from the northern portion of the site and one handling flows from the southern portion of the site.

6.2 Permitted Outfalls

Outfall 001

Outfall location 001 is the discharge pipe of the process wastewater treatment system. Process effluent includes cooling tower blowdown, which is mixed with boiler blowdown from internal outfall 003 and low volume wastes from internal outfall 002, including equipment cooling water, laboratory wastewater and miscellaneous floor drain wastes. *See* Attachment C for the process flow diagram. Sampling of the neutralized process wastewater at outfall 001 is required prior to entering the Westfield River and prior to mixing with storm water from outfall 004. As previously stated, the discharge flow at this location is expected to average 101,000 gpd and maximum flow is expected to be 133,000 gpd.

All metal cleaning waste streams and demineralization regeneration will be collected and removed for off-site disposal. Incoming boiler water treatment filter backwashing waste, along with the cooling

tower side-stream filter backwash will be directed to the incoming river water clarifier that will be used for the removal of the solids, including the solids expected from these two wastestreams. Solid particles from the river water are expected to be filtered prior to the waters use in the boiler. Solids from the cooling tower filtering system will primarily consist of algae and pollen, as well as some precipitates from the treatment chemicals used in the tower.

Outfall 002

Outfall location 002 is the discharge pipe of the oil/water separator prior to mixing with any other streams. This is an internal process waste sampling location. Effluent from equipment cooling, laboratory wastewater miscellaneous floor drains and floor washing will be treated within an oil/water separator prior to additional treatment in the process wastewater collection and neutralization system (outfall 001). The flow from these sources will be intermittent; estimated at 500 gallons per day. *See* Supplemental Information for NPDES Individual Permit Application Proposed Russell Biomass Facility, dated April 24, 2009, for specific areas that will typically include drainage provisions and equipment that will typically use cooling water. Laboratory wastewater will consist of the facility streams being tested and reagents used to perform the tests that are typical for maintaining operations at a power facility. Which tests will be done on and off-site will be decided by plant operators as the facility is being built. The Draft Permit includes a requirement to submit the names and uses of laboratory substances prior to their discharge from this outfall location.

In addition, if a Stoker type boiler is chosen, the water troughs used to collect and transport bottom ash may need to be drained for periodic maintenance as needed. In this case, the ash-containing effluent will be treated through the oil/water separator and neutralization system prior to discharge.

Outfall 003

Outfall 003 is the discharge pipe from the boiler to the cooling tower. This outfall is also an internal process waste sampling location. Continuous boiler and intermittent bottom-boiler blowdown totaling an estimated 12,960 gallons per day is directed to the cooling tower through internal outfall 003.

Outfalls 004 and 005

There will be two storm water outfall locations at this site. Outfall location 004 will be a discharge pipe from the stormwater detention basin servicing the north of the facility that will discharge to the Westfield River, prior to combining in the same discharge pipe with the process wastewater from outfall 001. Outfall location 005 will be the discharge pipe of the detention basin servicing the south side of the facility, which discharges over land following the natural drainage pattern to the Westfield River, which is thousands of feet away. Although EPA does not expect the discharge from outfall 005 to reach the Westfield River, the Draft Permit includes monitoring requirements in case(s) where the discharge does occur.

6.3 Derivation of Effluent Limits using Federal CWA Technology Standards and Massachusetts Water Quality Standards

6.3.1 Outfall Location 001 (Cooling Tower Blowdown/ Low Volume Waste)

Flow

The Draft Permit limits for discharge flow (or volume) are based on Russell Biomass estimates of the volume of wastewater the facility will generate for discharge. The average monthly discharge flow from outfall 001 is estimated at 101,000 gpd, and the maximum daily flow is estimated at 133,000 gpd. In addition, consistent with the MassDEP Water Management Act Permit, this Draft Permit requires that the maximum instantaneous discharge rate shall not exceed 110 gallons per minute.

Available Dilution

Water quality-based limits are established based on the calculated available dilution, which is the receiving water flow available to dilute the wastewater effluent upon mixing. Under 314 C.M.R. 4.03(3)(a), effluent dilution for rivers and streams is calculated based on the receiving water's "7Q10" flow level. The 7Q10 is the lowest observed mean river flow for seven (7) consecutive days occurring over a 10-year recurrence interval. Use of the 7Q10 flow allows for the calculation of the available dilution under critical flow (*i.e.,* reasonably worst-case) conditions, which in turn results in the derivation of reasonably conservative water quality-based effluent limitations.

Estimates for the Westfield River 7Q10 at the discharge location of the Russell Biomass site are derived by adding the 7Q10 values from the gaged upstream flows to the additional expected increase in flow from the watershed area at the site. All daily flow data of record for three upstream USGS gages (Station numbers 01179500, 01180500, and 01181000) were used to establish a conservative 7Q10 of 21.9 cfs for the gaged sites. While statistical analysis showed good linearity using either an assumption of normally or log-normally distributed data, the log-normal assumption was used because it resulted in a more conservative 7Q10 (21.9 cfs versus 24.97 cfs).

To determine the incremental additional 7Q10 flow from the contributory flow area downstream of the three monitored gages, an area method was used. The total drainage area of the gaged flows is estimated by USGS to be 308 square miles. The total drainage area at Indian River dam upstream of the discharge location is estimated by StreamStats[3] to be 342 square miles, a difference of 34 square miles or 10.9

[3] "StreamStats is an integrated GIS application developed through a cooperative effort of the USGS and ESRI, Inc[1]. StreamStats makes the process of computing streamflow statistics for ungaged sites much faster, more accurate, and more consistent than previously used manual methods. It also makes streamflow statistics for gaged sites available without the need to locate, obtain, and read the publications in which they were originally provided. Examples of streamflow statistics that can be provided by StreamStats include the 100-year flood, the mean annual flow, and the 7-day, 10-year low flow. Examples of basin characteristics include the drainage area, stream slope, mean annual precipitation and percentage of forested area. Basin characteristics are the physical factors that control delivery of water to a point on a stream." http://water.usgs.gov/osw/streamstats/ssinfo.html

percent. An approximate 7Q10 flow for the discharge site was estimated to be 24.29 cfs, calculated by increasing the 7Q10 flow estimated from a conservative approximation of gaged upstream stations (21.9 cfs) by a factor of 1.109 to account for the increase in drainage area. To account for the intake water withdrawal losses resulting primarily from the use of the proposed closed-cycle cooling system, 1.37 cfs (maximum daily withdrawal) is subtracted from the estimated 7Q10 flow (24.29 cfs). Thus, the 7Q10 at the bank discharge location for permitting purposes is 22.92 cfs.

Using the projected maximum discharge from outfall 001 (133,000 gpd = 0.206 cfs) and the estimated 7Q10 of the receiving water at the point of discharge (22.92 cfs), a dilution factor for outfall 001 of 112 was calculated as follows:

Dilution Factor = (22.92 cfs + 0.206 cfs)/(0.206 cfs) = 112

Chlorine

Under the CWA, the proposed Russell Biomass facility would be a "new discharger," not a "new source." The term "new source" under the CWA is a term of art referring only to facilities meeting a number of specific criteria. *See* 40 C.F.R. §§ 122.2 (definition of "new source") and 122.29. To be a new source, a facility must, among other things, be subject to EPA-promulgated New Source Performance Standards (NSPS). *Id.* EPA has not, however, promulgated NSPS, or ELGs of any kind, for biomass-fired power plants like the proposed Russell Biomass facility. Moreover, as explained earlier, the facility is not covered by EPA's ELGs for the Steam Electric Power Generating Point Source Category because those ELGs apply only to steam electric power plants using a fossil or nuclear fuel source, whereas the Russell Biomass facility proposes to use biomass for fuel. *See* 40 C.F.R. Part 423. Therefore, the facility is not a new source and its proposed discharges of chlorine are not subject to CWA NSPS. The facility is a new discharger, however, and its proposed chlorine discharges will be subject to the CWA's Best Available Technology (BAT) standard. *See* 33 U.S.C. §§ 1311(b)(2)(A).

Under the BAT standard, discharges are subject to:

> . . . effluent limitations for categories and classes of point sources, . . . which ... shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the [EPA] . . ..

33 U.S.C. § 1311(b)(2)(A). Since EPA has not promulgated ELGs for biomass-fired power plants, EPA is developing a permit limit for the proposed facility's chlorine discharges by applying the BAT standard on a case-by-case, BPJ basis. *See, e.g.,* 40 C.F.R. § 125.3(c)(2).

In setting a BAT limit on a BPJ basis, EPA considers the relative capability of available technological alternatives for reducing pollutant discharges while also taking the following factors into account: (1) the age of equipment and facilities involved; (2) the process employed; (3) the engineering aspects of the application of various control techniques; (4) process changes; (5) the cost of achieving such effluent

reduction; (6) non-water quality environmental impact (including energy requirements); (7) the appropriate technology for the category or class of point sources of which the applicant is a member based upon all available information; and (8) any unique factors relating to the applicant. *See* 40 C.F.R. §§ 125.3(c)(2)(i) and (ii), and 125.3(d)(3). *See also* 33 U.S.C. § 1314(b)(2)(B).

As explained above, the proposed Russell Biomass facility does not fall within the Steam Electric Power Generating Point Source Category only because it relies on biomass for its fuel source rather than a fossil or nuclear fuel. Nevertheless, EPA concludes that it is reasonable and appropriate to consider the ELGs for the Steam Electric Power Generating Point Source Category (the Steam Electric ELGs) in developing BPJ-based BAT limits for the Russell Biomass facility given that it meets the other criteria for classification under this industrial category. *See* 40 C.F.R. § 423.10.[4]

The Steam Electric ELGs, *see* 40 C.F.R. § 423.13(d)(1), set BAT limitations for the maximum and average concentration of free available chlorine discharged in cooling tower blowdown as shown below. The quantity of pollutant (for a mass limit) is determined by multiplying the flow of cooling tower blowdown by the concentration listed in the table.

Pollutant	Maximum concentration (mg/L)	Average concentration (mg/L)
Free Available Chlorine	0.5	0.2

The Steam Electric ELGs also impose BAT limitations prohibiting the discharge of free available chlorine or total residual chlorine (TRC) from any unit for more that two hours in any one day. *See* 40 C.F.R. § 423.13(d)(2).

EPA also considered the NSPS included in the Steam Electric ELGs. Although the proposed Russell Biomass facility is a "new discharger" rather than a "new source" under the CWA, as explained above, EPA concludes that it is reasonable to consider the effluent limitations that EPA developed for new sources in the Steam Electric ELGs when developing a BAT standard on a BPJ basis for a biomass-burning power plant that is a new discharger. As it turns out, the Steam Electric ELGs' NSPS for chlorine in cooling tower blowdown are identical to the BAT limitations quoted above. *See* 40 C.F.R. §§ 423.15(j)(1) and (j)(2).

In developing the Steam Electric ELGs, EPA considered the statutory NSPS and BAT factors, as listed above, when it developed the BAT and NSPS effluent limitations, respectively. Having again considered these factors for this BPJ determination, EPA concludes on a BPJ basis that the BAT limits from the ELGs are appropriate to apply to the Russell Biomass facility. This conclusion is also supported by the fact that the NSPS in the Steam Electric ELGs are identical to the BAT limits. EPA concludes that the facility should be fully capable of meeting these limits and sees nothing unique about this facility that should preclude it from doing so. *See* 40 C.F.R. § 125.3(c)(2). Indeed, as a new

[4] The Steam Electric Power Generating Point Source Category includes facilities whose discharges result "from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium." 40 C.F.R. § 123.10.

facility, the Permittee should have even greater flexibility to design and plan for meeting these limits than existing facilities might have, though these limits have been applied to both new and existing facilities covered by the Steam Electric ELGs (given that the NSPS and BAT limitations are the same).

Russell Biomass will disinfect the cooling tower system by "shocking" the system with chlorine. Each night, the discharge valve will be closed and sodium hypochlorite (chlorine) will be added. The cooling system will be allowed to recirculate for approximately two to four hours until periodic testing determines that the free available chlorine concentration is either below detection or within permit limits. If blowdown (*i.e.*, discharging) must resume before free available chlorine levels are below detectable amounts, Russell Biomass must also demonstrate that there is no detectable amount of total residual chlorine (TRC) within two hours of initiating blowdown. This requirement is consistent with the Steam Electric ELGs by prohibiting the discharge of free available chlorine or total residual chlorine (TRC) from any unit for more that two hours in any one day. *See* 40 C.F.R. §§ 423.13(d)(2) and 423.15(j)(2). EPA concludes that the facility will be able to meet the proposed limits and, in fact, EPA expects that the facility will commonly have no detectable free available chlorine in its discharge given the treatment approach described above.

In light of the above analysis, EPA has included BAT limits for chlorine in the Draft Permit that track the BAT (and NSPS) limitations in the Steam Electric ELGs. The Draft Permit limits are, however, expressed as concentration (rather than mass) limits, as would be allowed under the ELGs. *See* 40 C.F.R. §§ 423.13(g) and 423.15(m).

These technology based limits have been determined to be more stringent than calculated water quality-based limits for chlorine based on available dilution. The in-stream criteria to protect aquatic life are 11 ug/L for chronic toxicity and 19 ug/L for acute toxicity. Allowing for available dilution, the water quality-based total residual chlorine permit limits are calculated as follows:

Average Concentration (chronic) Limit = 11 ug/L * 112 = 1232 ug/L = 1.23 mg/L
Maximum Concentration (acute) Limit = 19 ug/L * 112 = 2128 ug/L = 2.13 mg/L

These water quality-based limits would be less stringent than the technology-based limits and, therefore, the latter govern the permit.

The Draft Permit also provides that while chlorine may be used as a biocide, no other biocide shall be used without written approval from the Regional Administrator and the Director. Russell Biomass has stated, however, that it may need to use bromine in a limited capacity if it finds that chlorine alone is ineffective. Therefore, the Draft Permit also allows the Permittee to propose feasibility studies involving new chemicals not currently approved for water discharge. The Permittee may also be required to perform Whole Effluent Toxicity testing as part of any feasibility studies. *See* Section I.A.6.a of the Draft Permit.

EPA also notes that under the Steam Electric ELGs, the term "maximum concentration" means a limitation not to be exceeded at any time (i.e., "instantaneous maximum").[5] *See* 40 C.F.R. § 423.15(j)(1)). The term "average concentration" means the average of analyses made over a single period of chlorine release which does not exceed two hours. *See* 40 C.F.R. § 423.11(k). These definitions differ from NPDES permit requirements at 40 C.F.R. §122.2 and Part II of the Draft Permit, where "maximum daily discharge" and "daily discharge" concentrations are generally defined to pertain to 24-hour duration average values.

pH

The Draft Permit's pH limits are based on MA WQS, which require that the pH be within the range of 6.5 - 8.3 standard units (s.u.). These water quality-based limits are more stringent than the technology-based limits that would otherwise be imposed by EPA and, therefore, the water quality-based limits govern the permit.

From the technology-based perspective, pH is considered a "conventional pollutant" and is generally subject to effluent limits based on application of the "best conventional pollutant control technology" (BCT) standard. *See* 33 U.S.C. § 1311(b)(2)(E); 40 C.F.R. §§ 125.3(a)(2)(ii) and (d)(2). Once again, EPA has not promulgated any BCT ELGs applicable to the Russell Biomass facility, so EPA would determine technology-based requirements on a BPJ basis. EPA again concludes that is reasonable to look to the Steam Electric ELGs for guidance on determining a BCT limit for pH for the proposed Russell Biomass facility. The Steam Electric ELGs do not, however, include BCT limitations. Instead, EPA has indicated that BCT limits are "reserved." 40 C.F.R. § 423.14. In the absence of a BCT limit, EPA would use any ELGs promulgated under the "best practicable control technology" (BPT) standard in setting the limit for an existing facility. *See* 33 U.S.C. § 1311(b)(2)(A); 40 C.F.R. §§ 125.3(a)(2)(i) and (d)(1). The Steam Electric ELGs specify a BPT-based standard for pH in discharges (other than once-through cooling water) of 6.0 to 9.0. 40 C.F.R. § 423.12(b)(1). The same standard is specified in the NSPS in the Steam Electric ELGs. *See* 40 C.F.R. § 423.15(a). Therefore, EPA believes that an appropriate technology-based limit for pH for the proposed Russell Biomass facility would be 6.0 to 9.0, but this would less stringent than the water quality-based limits specified above. As a result the water quality-based limit governs the permit.

Priority Pollutants

The Draft Permit limits 126 priority pollutants, including total chromium and zinc. Based on reasoning similar to that in the above analysis regarding chlorine limits, EPA has, on a BPJ basis, based the

[5] The Total Residual Chlorine (TRC) and Free Available Chlorine (FAC) effluent limitations guidelines for steam electric facilities (40 C.F.R. Part 423) are specified as "maximum concentration" and not as "daily maximum" limits. After promulgation of the Steam Electric Guidelines in 1982, EPA was asked to clarify the correct interpretation of the term "maximum concentration". EPA studied this issue and, in 1992, issued guidance in the form of a memorandum to all the Regional Water Management Division Directors. The 1992 guidance explains that the term "maximum concentration", as it applies to TRC, is intended to mean "instantaneous maximum". It is therefore reasonable that the same explanation applies to FAC since the same term is used.

priority pollutant limits in the Draft Permit on the BAT and NSPS requirements in the Steam Electric ELGs. *See* 40 C.F.R. §§ 423.14(d)(1) and 423.15(j)(1) (for cooling tower blowdown).

The 126 priority pollutants include contaminants potentially contained in chemicals added for cooling tower maintenance. *See id.* and 40 C.F.R. Part 423 Appendix A. However, since Russell Biomass also adds boiler blowdown waste to the cooling tower, the Draft Permit limits also apply to chemicals used in the boiler. No detectable amount of priority pollutants are allowed in the discharge. These technology based limits are more stringent than calculated water quality limits and therefore govern the permit.

The BAT and NSPS limitations in the Steam Electric ELGs specify separate limits for total chromium and total zinc. According to Russell Biomass's Application, however, these substances will not be used/added by the facility. Therefore, it is unnecessary to include higher limits in the permit for these constituents. Therefore, monitoring for the 126 priority pollutants includes chromium and zinc in the Draft Permit. In addition, monitoring for chromium and zinc is proposed as part of the Whole Effluent Toxicity Test in the Draft Permit in order to verify the absence of these pollutants if the Company submits engineering calculations to demonstrate compliance with the limitations for the 126 priority pollutants, as discussed below.

Both the BAT and the NSPS standards in the Steam Electric ELGs state that:

> At the permitting authority's discretion, instead of the monitoring in 40 CFR 122.11(b), compliance with the limitations for the 126 priority pollutants in paragraph[s (d)(1) and] (j)(1) of . . . [§§ 423,13 and 423.15, respectively], may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136.

40 C.F.R. §§ 423.13(d)(3) and 423.15(j)(3). This provision is included in the Draft Permit.

The Draft Permit also requires that both the cooling tower blowdown and boiler blowdown, are tested for priority pollutants at least once to confirm any engineering calculations, except that reliable information supplied by the manufacturer relative to the priority pollutants in a product may be substituted for actual tests. Dilution for such engineering calculations must be based on the lowest projected cooling tower/boiler blowdown flow. The chemical concentrations used in such engineering calculations shall be based on anticipated (or manufacturer's suggested) feed rates of cooling tower and boiler chemical additives and must take into consideration concentration within the cooling towers.

Whole Effluent Toxicity

EPA's Technical Support Document for Water Quality-Based Toxics Control (EPA/505/2-90-001, March 1991) recommends using an "integrated strategy" containing both pollutant (chemical) specific approaches and whole effluent (biological) toxicity approaches to limit toxic pollutants in effluent discharges from entering the nation's waterways. Both approaches are needed to protect aquatic life and human health adequately.

Pollutant specific approaches, such as those in the "Gold Book,"[6] and State regulations address individual chemicals, whereas whole effluent toxicity (WET) testing assesses the effects of interactions between pollutants, thus rendering an "overall" toxicity assessment of the effluent that can reveal any cumulative or synergistic effects of pollutants in the wastewater in question. In addition, WET analysis can reveal the presence of any unknown toxic pollutants so that they can be identified and addressed.

Section 101(a)(3) of the CWA specifically makes it national policy to prohibit the discharge of toxic pollutants in toxic amounts, and such discharges are also prohibited by the Massachusetts Water Quality Standards which state, in part, that, "all surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." The NPDES regulations, *see* 40 C.F.R. § 122.44(d)(1)(v), require whole effluent toxicity (WET) limits in a permit when the permitting agency determines that a discharge has a "reasonable potential" to cause or contribute to an excursion above the State's narrative criterion for toxicity.

EPA has evaluated specific chemicals that are proposed for discharge by Russell Biomass and set chemical-specific limits to prevent toxic impacts from those chemicals. From the whole effluent perspective, however, Russell Biomass's proposed wastewater has an *unknown* potential for causing toxicity to aquatic organisms. The proposed discharge cannot be tested because it does not yet exist, and EPA does not presently have sufficient information to determine whether it has a "reasonable potential" to cause or contribute to an excursion from compliance with the State's narrative water quality criterion for toxicity. Thus, including a WET effluent limit is not required by the regulations.

EPA does, however, conclude that a WET testing monitoring requirement should be included in the permit to gather whole effluent toxicity data in order to make a scientifically-based "reasonable potential" determination regarding the facility's whole effluent for future permit modification or reissuance. This approach is consistent with that recommended in March 1991, "Technical Support Document for Water Quality-based Toxics Control" (EPA/505/2-90-001, page 60). Imposing these WET testing requirements is a proactive method of carrying out EPA's mandate to prevent the discharge of toxic substances into the Nation's waterway because the WET test results will provide an estimate of the overall toxicity of the discharge.

Therefore, the Draft Permit requires the Permittee to report the results of acute WET tests using Fathead Minnow (*Pimephales promelas*) and Daphnid (*Ceriodaphnia dubia*) on a quarterly basis. After four sampling periods (one year), the Permittee may request a reduction in toxicity testing (frequency to no less than once per year and/or number of species tested). If no toxicity is found, EPA will consider a reduction in sampling.

The "LC50" is defined as the concentration of toxicant, or in this case, as percentage of effluent, that would be lethal to 50 % of the test organisms during a 48-hour testing period. Therefore, an LC50 of 100 % means that a sample of 100 % effluent should not cause greater than a 50 % mortality rate of the test organisms. The "Acute-No Observed Effect Concentration" (A-NOEC) refers to the concentration

[6] Quality Criteria for Water 1986, EPA Number: 440586001, May, 1987.

of effluent at which no observed effects occur. The Draft Permit's WET testing requirements direct the Permittee to determine and report LC50 and A-NOEC concentrations once per quarter.

As required by the Freshwater Acute Toxicity Test Procedure and Protocol, the Draft Permit also requires reporting of selected parameters determined from the chemical analysis of the WET tests 100 % effluent sample. The following specific parameters are to be reported on the appropriate Discharge Monitoring Report (DMR) for entry into EPA's ICIS data base: Ammonia, Hardness, Total Organic Carbon, Aluminum, Cadmium, Copper, Chromium, Lead, Nickel and Zinc. Reporting these constituents is required with the submission of each toxicity testing report. (See Draft Permit, Attachment A, page 6).

In addition, over the life of the proposed facility, Russell Biomass may want to consider using different water treatment chemicals in the cooling water and boiler systems than the ones that have been identified to date. *See* Table 2 of the April, 2009 supplemental information for the list and amounts of chemicals the Permittee proposes to use. *See also* Section 2.4 of the August, 2006 Permit Application. It would be impractical for EPA to try to identify and limit every chemical the Permittee may use throughout the life of the permit. In addition, limiting individual chemicals would not take into account potential interactions between these chemicals. Therefore, the Draft Permit also requires Russell Biomass to conduct feasibility studies involving any new chemicals not currently approved for water discharge. EPA and MassDEP may require, among other parameters, WET testing as part of the feasibility studies. *See* Section I.A.6.a of the Draft Permit.

Temperature

Technology Standards

Heat is defined as a pollutant under the CWA. *See* 33 U.S.C. § 1362(6). Specifically, it is a nonconventional pollutant and discharges of heat (*i.e.*, "thermal discharges") are subject to the BAT standard. *See* 33 U.S.C. §§ 1311(b)(2)(A) and (F). *See also* 33 U.S.C. § 1314(a)(4).

As explained above in the section on chlorine discharges, the BAT standard subjects discharges to:

> . . . effluent limitations for categories and classes of point sources, . . . which ... shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the [EPA] . . ..

33 U.S.C. § 1311(b)(2)(A). Since EPA has not promulgated ELGs for thermal discharges (or any other type of discharge) from biomass-fired power plants, technology-based requirements for the proposed facility's thermal discharges are determined by applying the BAT standard on a case-by-case, BPJ basis. *See, e.g.,* 40 C.F.R. § 125.3(c)(2). Furthermore, the Steam Electric ELGs do not provide guidance for developing BPJ-based BAT requirements for thermal discharges from the proposed Russell Biomass facility because the ELGs do not presently include effluent limitations for the discharge of heat.

As stated above in the section on chlorine discharges, in setting a BAT effluent limit on a BPJ basis, EPA considers the relative capability of available technological alternatives for reducing pollutant discharges while also taking the following factors into account: (1) the age of equipment and facilities involved; (2) the process employed; (3) the engineering aspects of the application of various control techniques; (4) process changes; (5) the cost of achieving such effluent reduction; (6) non-water quality environmental impact (including energy requirements); (7) the appropriate technology for the category or class of point sources of which the applicant is a member based upon all available information; and (8) any unique factors relating to the applicant. *See* 40 C.F.R. §§ 125.3(c)(2)(i) and (ii), and 125.3(d)(3). *See also* 33 U.S.C. § 1314(b)(2)(B).

The proposed Russell Biomass facility requires some sort of cooling system for condensing the steam used to drive its electrical generation turbines. "Open-cycle" (or "once-through") cooling systems typically maximize thermal discharges (and water withdrawals) by power plant cooling systems. With this system, the entire volume of cooling water (and thus waste heat) is discharged to the receiving water. Russell Biomass has rejected open-cycle cooling, in part based on the potential for thermal pollution and EPA and MassDEP support this decision.

"Closed-cycle" (or "recirculating") cooling systems offer a more environmentally protective alternative because they greatly reduce thermal discharges (and cooling water withdrawals). In a closed-cycle system, cooling water is used to condense the steam, but rather than discharge the heated water to a water body, a cooling system is used to remove the waste heat from the cooling water so that the water can be reused for additional cooling.

There are two major types of closed-cycle (or recirculating) cooling systems – wet and dry. There are also two main types of "wet" closed-cycle systems: one using mechanical draft cooling towers and the other using natural draft cooling towers. (A third type of wet, closed-cycle system uses some type of cooling lake or pond.) With these systems, the cooling towers (or ponds) are used to remove waste heat from the cooling water, exhausting it to the atmosphere, so that the now colder water can be reused for cooling. This greatly reduces the amount of heat that must be discharged to the receiving water (and also greatly reduces the amount of water that must be withdrawn from the source water body for cooling). Several existing power plants, including Brayton Point Station in Massachusetts, and the McDonough and Yates Plants in Georgia, have been required to retrofit with cooling towers at least in part to reduce thermal impacts in the receiving waters.[7] With these systems, a much smaller thermal discharge remains that consists of cooling tower blowdown (and a much smaller water withdrawal is needed to provide "makeup water" to replace the blowdown and water lost to the atmosphere by evaporation).[8] For instance, retrofitting all four generating units at Brayton Point Station will reduce the heat load to the receiving water, Mount Hope Bay, by approximately 96%.[9]

[7] Cheek, T.E. and B. Evans. Geosyntec Consultants and Georgia Power. Thermal load, dissolved oxygen, and assimilative capacity; Is 316(a) becoming irrelevant? Presentation to the Electric Power Research Institute Workshop on Advanced Thermal Electric Cooling Technologies. July 8, 2008.

[8] Cooling towers (typically mechanical draft towers) also can be used in a "helper mode," rather than in a recirculating or closed-cycle mode. In the helper mode the cooling towers are used "on the back end" solely for reducing the temperature of

Mechanical draft and natural draft cooling towers reduce thermal discharges to the same degree, but certain considerations are raised by each. Having considered the tradeoffs, EPA currently concludes that both technologies would satisfy the BAT requirement for reducing thermal discharges. Mechanical draft cooling towers are lower to the ground and, therefore, have less visual impact. They also tend to have lower capital costs and have been more commonly used in the United States, at least in recent years. Natural draft cooling towers, on the other hand, tend to be quieter to operate (because they do not require fans), may have lower annual operations and maintenance costs (due to fewer moving parts), and are less likely to raise any issues concerning water vapor plumes. Whether and to what extent any of these types of effects will be raised by a particular cooling tower installation will depend on site-specific considerations, but a variety of technologies exist for mitigating any effects that are of concern. Both mechanical draft and natural draft cooling towers have been successfully used at various sites around the United States (and the world). EPA does not see insurmountable problems with either option and concludes that both would satisfy the applicable BAT standard. Given that Russell Biomass proposes using mechanical draft cooling towers, it is also obvious that the technology is not cost prohibitive. EPA finds the Applicant's selection of mechanical draft cooling towers to be reasonable.

Apart from wet, closed-cycle cooling systems, another type of closed-cycle system uses no, or virtually no, cooling water at all. "Dry cooling towers" (or "air-cooled condensers") eliminate the use of cooling water by condensing the steam by blowing air across the condenser and, thereby, rejecting waste heat directly to the atmosphere from the surface of the condenser. ***See, e.g.***, 66 Fed. Reg. 65255, 65282 (Dec. 18, 2001). As compared to wet cooling systems, dry cooling is regarded to be substantially more expensive, to require more space for siting, to emit more sound, and to cause a greater reduction in energy efficiency. ***See, e.g.***, 66 Fed. Reg. at 65282-83 (Dec. 18, 2001). Moreover, the greater loss of energy efficiency associated with dry cooling could indirectly lead to greater air pollutant emissions if the lost power is replaced by other pollutant-emitting generation. Despite these issues, dry cooling towers have been successfully used at many facilities, especially in locations where the water needed for wet cooling systems is in short supply.

The Applicant evaluated dry cooling in this case, but rejected it in favor of wet, mechanical draft cooling towers. This decision was based on dry cooling technology's substantially greater cost, greater energy efficiency losses, and greater air pollution impacts from replacement power generation. EPA's judgment is that both closed-cycle dry cooling and, as discussed above, wet cooling would satisfy the CWA's BAT standard for controlling thermal discharges from the proposed Russell Biomass facility. Wet cooling systems can reduce thermal discharges by approximately 98 percent, whereas a dry system could reduce it by essentially 100 percent. This is a relatively small, marginal difference. In this case, the difference is even less because the wet cooling system can be used to reduce the heat of the boiler blowdown, whereas the dry cooling system cannot be used in this manner. EPA does not regard the approximately 2 percent difference in thermal discharge reduction to be so significant in this case that

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the thermal effluent prior to discharge. This can be effective for reducing the discharge of heat, but it does not help to reduce cooling water withdrawals. EPA did not further evaluate "helper cooling towers" because they lack this important benefit that would be provided by closed-cycle approaches. The Applicant has not proposed "helper towers," in any event.

[9] USGenNE. Brayton Point Station 316(a) and 316(b) Demonstration. December 2001.

wet cooling should be rejected in favor of dry cooling, especially given that our analysis below indicates that the small remaining thermal discharge should not cause water quality problems. Moreover, the marginally greater reduction in thermal discharge provided by dry cooling would be accompanied by the other adverse environmental and energy effects discussed above and would be substantially more expensive. In light of the tradeoffs between wet and dry cooling under the facts of this case, EPA concludes that closed-cycle cooling, using *either* wet or dry cooling technology, is the BAT for reducing thermal discharge at the proposed Russell Biomass facility. (Closed-cycle cooling is further discussed in Section 7.4.1 of this Fact Sheet, addressing cooling water intake structure requirements.)[10]

EPA's thermal discharge limits are based on the use of the wet, mechanical draft closed-cycle cooling system proposed by Russell Biomass, but EPA expects that the limits would be achievable by any of the closed-cycle cooling systems discussed above. Specifically, the permit sets an instantaneous temperature maximum daily limit of 85 °F together with thermal discharge flow limits of a monthly average of 101,000 gallons per day (gpd) and a daily maximum of 133,000 gpd.

Water Quality Standards

As discussed earlier, MA WQS classify the reach (or segment) of the Westfield River that would receive the discharge from (and provide the cooling water for) the proposed Russell Biomass facility as a Class B warm water fishery. However, Massachusetts Division of Fisheries and Wildlife has also designated the Main Branch of the Westfield River as a cold water fishery resource (CWFR). A warm water stream, such as the Westfield, may be considered a CWFR due to the presence of cold water species, such as trout (brown, brook, or rainbow trout), slimy sculpin or longnose sucker, and/or if the waterbody is part of the Atlantic salmon restoration effort or is stocked with Atlantic salmon fry or parr.[11] (Atlantic salmon is also a cold water species.) In this case, brook, brown, and rainbow trout (all life stages) and Atlantic salmon (fry through smolts) are present in the Westfield River and its tributaries, and brook and brown trout are actively reproducing in the cold water tributaries (e.g., Bradley Brook).

An electrofishing study conducted by MassWildlife in August 2001 also indicated that a number of cool water species, including fallfish, tessellated darter, and longnose dace, are present in the reach of the river that includes the discharge site. As quoted earlier, the MA WQS provide, among other things, that:

[10] Similarly, in developing the Phase I regulations applicable to CWISs at new facilities under CWA § 316(b), 40 C.F.R. Part 125, Subpart I, EPA determined that closed-cycle cooling using wet cooling towers was the nationally applicable BTA, rather than dry cooling. EPA found that dry cooling would achieve only a marginally greater reduction in water withdrawals than wet cooling, but would cost much more, would be infeasible in certain situations, and was associated with increased environmental effects of other types as well as increased energy effects. *See* 66 Fed. Reg. 65255, 65282-65284, 65304-65306 (Dec. 18,, 2001). EPA recognized that dry cooling might be the preferred technology in some cases, and the Phase I regulations were designed not to preclude its use, but the regulations did not command its use, either. EPA's decision regarding dry cooling for the Phase I regulations was upheld in federal court. *Riverkeeper, Inc. v. United States EPA*, 358 F.3d 174, 194-196 (2d Cir. 2004).

[11] Massachusetts Division of Fisheries and Wildlife. Coldwater Fisheries Resources. www.mass.gov/dfwele/dfw/fisheries/conservation/cfr/cfr_home.htm

> . . . Where a cold water fish population has been identified by the Division of Fisheries and Wildlife as meeting their protocol, but the water has not been documented to meet the cold water criteria in 314 CMR 4.00, the Department will protect the existing cold water fish population and its habitat as an existing use.

314 C.M.R. 4.06(1)(d)(7). The antidegradation provisions in the MA WQS at 314 C.M.R. 4.04(1) state "[i]n all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." In addition, the state's narrative temperature criteria for Class B waters state that:

> [w]here a reproducing cold water aquatic community exists at a naturally occurring higher temperature, the temperature necessary to protect the community shall not be exceeded and the natural daily and seasonal temperature fluctuations necessary to protect the community shall be maintained.

314 C.M.R. 4.05(b)(2)(a). Thus, the thermal limits in the Draft Permit must comply with the water quality criteria for a warm water fishery, and must also be protective of "the existing cold water fish population and its habitat as an existing use."

The MA WQS at 314 C.M.R. 4.05(b)(2) set a numeric criterion for the in-stream temperature of warm water fisheries at 83 ºF (28.3 °C) and a maximum rise in temperature (delta T) of 5 ºF (2.8 ºC) due to a discharge. While the Draft Permit includes an instantaneous maximum water quality-based temperature limit not to exceed 85 °F – which is higher than the water quality criterion for the in-stream temperature of a warm water fishery by 2 ºF – EPA's analysis demonstrates that the proposed Russell Biomass discharge will satisfy the water quality criteria of 83 ºF and a delta T of 5 ºF. The proposed discharge (maximum daily discharge of 133,000 gpd or 0.206 cfs) is less than one percent of the total 7Q10 flow, and the proposed location for the bank discharge was chosen to provide rapid natural mixing. As a result, the heat from the discharge will rapidly dissipate upon mixing with the receiving water and the discharge will not cause or contribute to excursions above the ambient maximum temperature or delta T criteria applicable to the river.

MA WQS also specify various narrative thermal criteria, including that the natural daily and seasonal temperature variations needed to protect existing and designated uses shall be maintained, and that natural background conditions shall not be changed in a way that would impair any designated use of Class B waters, including maintenance of normal species diversity, successful migration, reproductive functions and growth of aquatic organisms. 314 C.M.R. 4.05(b)(2)(b). Based on the above analysis, all of these thermal criteria will be satisfied if the facility complies with the temperature limits proposed in the Draft Permit.

As explained above, the Draft Permit must also be protective of the CWFR as an existing use. River temperatures in the summer already exceed the ambient maximum temperature criterion of 68 °F for cold water fisheries. Nevertheless, the river under current conditions supports certain species of cool water fish and certain (stocked) cold water fish. In order to protect the CWFR as an existing use, therefore, EPA has designed the Draft Permit's thermal discharge limits to assure that the river's in-

stream temperatures are not materially increased by the Russell Biomass discharge. EPA determined that the instantaneous temperature maximum daily limit of 85 °F, along with the thermal discharge flow limits of a monthly average of 101,000 gallons per day (gpd) and a daily maximum of 133,000 gpd, will produce a thermal discharge that will not materially impact existing in-stream temperatures, will satisfy the MA WQS's antidegradation provisions, and will be protective of the CWFR, because existing in-stream water temperatures during typical summer and winter conditions will not be materially altered.

The in-stream water temperature at Outfall 001 can be calculated as the flow-weighted average of the upstream receiving water temperature and discharge temperature, expressed as:

$$T_f = \frac{(Q_s * T_s) + (Q_d * T_d)}{(Q_s + Q_d)}$$

Where:

Qs = adjusted 7Q10 flow of the Westfield River at Russell = 22.92 (23.13 cfs river - 1.37 cfs intake)
Ts = in-stream temperature of Westfield River
Qd = maximum projected discharge of Russell Biomass = 0.206 cfs
Td = maximum projected discharge temperature
Tf = final temperature of Westfield River at point of discharge

EPA estimated the temperature of the receiving water resulting from the discharge based on proposed peak summer operating conditions and full mixing with the 7Q10 to demonstrate that the existing in-stream temperatures supporting the CWFR would be maintained. This calculation assumes a receiving water temperature of 73 ºF (based on the average summer water temperature at upstream USGS gages at flows equivalent to the 7Q10 flow at the facility) and a maximum permitted discharge temperature of 85ºF.

$$T_f = \frac{(22.92 * 73) + (85 * 0.206)}{(22.92 + 0.206)} = 73.1\ ºF \qquad \Delta T = 0.1\ ºF$$

Based on full mixing under low flow conditions and a typical ambient summer low flow temperature of the receiving water, the discharge at the proposed outfall will not increase the temperature of the receiving water more than 0.1 ºF. Similarly, at the maximum recorded ambient temperature based on upstream gages (82 ºF), the delta T is less than 0.3 ºF. Thus, the projected summer discharge temperatures will meet the thermal water quality requirements for a warm water fishery and will maintain existing in-stream temperatures protective of the CWFR in compliance with antidegradation provisions.

EPA also estimated the final temperature of the receiving water based on proposed peak winter operations and full mixing with the 7Q10, assuming a receiving water temperature of 32 ºF and a

projected winter discharge temperature of 68 ºF (based on projected cooling needs of the facility) as follows:

$$T_f = \frac{(22.92 * 32) + (68 * 0.206)}{(22.92 + 0.206)} = 32.3\ ºF \qquad \Delta T = 0.3\ ºF$$

Based on full mixing under low flow conditions (a conservative assumption for winter flow), the discharge at the proposed outfall would increase the receiving water temperature less than one-half of one degree (F). Based on the average in-stream winter temperatures and the projected cooling needs, the facility is unlikely to discharge at the maximum permitted instantaneous temperature of 85 ºF during the winter. Nonetheless, a discharge temperature of 85 ºF at an ambient river temperature of 32 ºF during the winter would still increase the receiving water temperature less than one-half of one degree (F). Thus, both projected and maximum winter discharge temperatures will meet the thermal water quality requirements for a warm water fishery and will maintain existing in-stream temperatures protective of the CWFR in compliance with antidegradation provisions.

Based on projected discharge temperatures and volumes and the rapid mixing provided by the Westfield River, thermal discharge from the facility will not exceed MA WQS for warm water fisheries, and will maintain existing conditions protective of the CWFR under the maximum instantaneous temperature and discharge volume limits included in the Draft Permit

Monitoring

The Draft Permit requires continuous effluent temperature monitoring at Outfall 001 to ensure the temperature limit of 85 ºF is not exceeded, and further requires the Permittee to conduct a thermal plume characterization study upon initiating operation to demonstrate that water quality standards are met and the estimated in-stream temperatures resulting from the discharge as calculated above are valid (see Part I.A.9 of the Draft Permit and Section 10 of this Fact Sheet).

Summary

The permit's maximum temperature and thermal discharge flow volume limits, *see* Draft Permit Part I.A.1, are based on the BPJ determination that closed-cycle cooling with wet cooling towers represents the BAT for controlling thermal discharges at the proposed Russell Biomass facility. Furthermore, EPA has determined that these technology-based limits will satisfy the requirements of applicable MA WQS. In addition, the Draft Permit contains certain narrative conditions limiting the thermal discharge that will further assure compliance with MA WQS. *See* Draft Permit Part I.A.7.

Phosphorus

Background

Nuisance levels of aquatic algae and other aquatic vegetation can develop rapidly in response to nutrient enrichment when other factors (e.g., light, temperature, substrate) are not limiting. Phosphorus is often the limiting nutrient for accelerated growth of algae and other nuisance aquatic plants in freshwater systems. Algal blooms from excessive nutrients can cause or contribute to a water body's failure to maintain its designated uses and to violations of in-stream water quality criteria, such as standards for in-stream dissolved oxygen.[12] Certain species of algae can also produce toxins that are harmful to human and animal health. In addition, habitat changes associated with vegetative growth and nutrient enrichment can alter the native composition and species diversity of aquatic communities.[13] These effects of nutrient discharges can impair the quality of the habitat provided by the receiving water as well as reduce its aesthetic quality, by promoting an unattractive appearance and noxious odors that undermine its attractiveness as a recreational resource.

Cultural eutrophication is the term used to describe excessive plant growth in a water body that results from nutrients entering the system due to human activities. Discharges from municipal and industrial wastewater treatment plants, agricultural runoff, and stormwater are examples of human-generated (*i.e.*, anthropogenic) sources of nutrients in surface waters. The *Massachusetts Year 2008 Integrated List of Waters* identifies nutrients, noxious aquatic plants, and organic enrichment/low dissolved oxygen, all of which are associated with nutrient-enriched streams, among the top five causes of water quality impairment in Massachusetts waters.

Russell Biomass proposes adding tri-sodium phosphate and other treatment chemicals to the feed water for the boiler in order to prevent corrosion. Use of tri-sodium phosphate will result in the facility's effluent containing added phosphorus. Consistent with CWA requirements already discussed with regard to other pollutants, EPA determines what technology-based standards apply to the proposed discharge of phosphorus. In addition, EPA also determines if discharge of the added phosphorus has the reasonable potential to cause or contribute to an excursion beyond numeric or narrative water quality criteria, or the impairment of an existing or designated use. If so, a water quality-based effluent limit is developed for phosphorus. *See* 40 C.F.R. § 122.44(d)(1). Between the technology-based and water quality-based limits, whichever is more stringent is included in the permit.

Technology-Based Requirements

As explained above, the proposed Russell Biomass facility would be a "new discharger" under the CWA, not a "new source." Moreover, phosphorus is a "nonconventional" pollutant under the statute. Therefore, as with chlorine and heat, discharges of phosphorus from the proposed facility would be

[12] Litke, D.W. 1999. Review of phosphorus control measures in the United States and their effects on water quality. U.S. Geological Survey. Water Resources Investigations Report. 99-4007. Denver, CO.

[13] Environmental Protection Agency. 2000. Nutrient Criteria Technical Guidance Manual. Office of Water. July 2000.

subject to the BAT technology standard. *See* 33 U.S.C. §§ 1311(b)(2)(A) and (F). *See also* 33 U.S.C. § 1314(a)(4).

The BAT standard subjects discharges to:

> . . . effluent limitations for categories and classes of point sources, . . . which ... shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants, as determined in accordance with regulations issued by the [EPA] . . ..

33 U.S.C. § 1311(b)(2)(A). Since EPA has not promulgated ELGs for pollutant discharges from biomass-fired power plants, technology-based requirements for the proposed facility's phosphorus discharges are determined by applying the BAT standard on a case-by-case, BPJ basis. *See, e.g.,* 40 C.F.R. §§ 122.44(a)(1), 125.3(c)(2). Moreover, the Steam Electric ELGs do not provide guidance for setting BPJ-based BAT requirements for phosphorus discharges from the proposed Russell Biomass facility because the ELGs do not establish effluent limitations for the discharge of phosphorus.

In setting a BAT limit on a BPJ basis, EPA considers the relative capability of available technological alternatives for reducing pollutant discharges while also taking the following factors into account: (1) the age of equipment and facilities involved; (2) the process employed; (3) the engineering aspects of the application of various control techniques; (4) process changes; (5) the cost of achieving such effluent reduction; (6) non-water quality environmental impact (including energy requirements); (7) the appropriate technology for the category or class of point sources of which the applicant is a member based upon all available information; and (8) any unique factors relating to the applicant. *See* 40 C.F.R. §§ 125.3(c)(2)(i) and (ii), and 125.3(d)(3). *See also* 33 U.S.C. § 1314(b)(2)(B).

Evaluation of Technological Alternatives

Russell Biomass proposes that its boiler blowdown discharge would consist of 0.013 MGD of wastewater containing 0.407 pounds of phosphorus per day. As explained above, the phosphorus would result from using tri-sodium phosphate added to the boiler to prevent corrosion within the steam drum and boiler tubes. The blowdown will be discharged from the boiler at high temperatures and high pH. EPA's Draft Permit contemplates an effluent monitoring location at the point that the blowdown is discharged from the boiler so that it can be monitored directly prior to being mixed with other waste streams. The Applicant proposes to direct the boiler blowdown to the cooling tower both in order to cool the boiler blowdown and as a water conservation measure.

As previously discussed in Section 6.1 of this Fact Sheet, the cooling tower provides non-contact cooling water to the steam turbine condenser heat exchanger. Russell Biomass plans to withdraw a maximum of 0.885 MGD of water from the river for cooling and plant operations. This river water will contain a certain amount of phosphorus. The cooling tower blowdown flow from the cooling system will average 0.101 MGD with a maximum flow of 0.133 MGD. The facility will add no phosphorus to the water withdrawn for cooling purposes. In other words, the phosphorus in the cooling tower

blowdown would consist only of that which was already present in the water withdrawn from the river for cooling purposes and that present in the boiler blowdown.

EPA is not proposing a technology-based limit for the phosphorus in the cooling tower blowdown in light of the fact that phosphorus would not be added to the water by the facility and would, instead, already be in the water when it is withdrawn from the river. In essence, EPA is giving the facility "intake credits" to reflect the phosphorus already in the river water. *See* 40 C.F.R. § 122.45(g). As a result, the technology-based limits address only the phosphorus in the boiler blowdown, which the facility would have added to the wastewater.

Regarding the control of phosphorus in the boiler blowdown, EPA independently considered the Permittee's evaluation of different approaches to phosphorus reduction, including 1) using different corrosion inhibitors, 2) chemical treatment, and 3) biological treatment. These assessments can be found on pages 9-4 through 9-6 of the Russell Biomass Project, Final Environmental Impact Report dated February 2008, pages 2 and 3 of the April 24, 2009 supplemental information submission, and the June 22, 2009 supplemental information submission. EPA agrees that each option raises implementation challenges and significant uncertainties given that none of the technologies evaluated have been used for this type of treatment application. EPA's supplemental analysis identified other possible technologies, including CoMag™ and BluePRO® that were potentially feasible for treating boiler blowdown. EPA again found, however, that these technologies are unproven for this application and that further testing and/or research would be necessary.

Based on the information available at this time, including submissions from the Company, EPA has been unable to identify a different technological approach that would be feasible and more effective for this particular application than the approach proposed by Russell Biomass. Thus, use of the proposed corrosion inhibitor, limited to the proposed amounts, without additional treatment, is determined to be the BAT for phosphorus control at the proposed Russell Biomass facility. EPA's Draft Permit includes effluent limits on phosphorus discharges consistent with this BAT determination. As detailed below, EPA also concludes that the discharge of phosphorus consistent with these permit limits will satisfy MA WQS.

Water Quality Requirements

The Massachusetts Surface Water Quality Standards (MA WQS) do not contain numerical criteria for phosphorus. They do, however, contain a narrative criterion for nutrients at 314 C.M.R. § 4.05(5)(c), which states that "[u]nless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site-specific criteria developed in a TMDL or otherwise established by the Department pursuant to 314 CMR 4.00." No site-specific phosphorus criteria have been developed by MassDEP for the Westfield River. MassDEP's *Antidegradation Review Procedure for Discharge Requiring a Permit Under 314 CMR 3.03* states at Part VII(c) that, in the absence of site-specific information to predict when phosphorus is unduly contributing to eutrophication, the recommended maximum total phosphorus concentration for flowing streams and other non-sensitive areas is 0.10 mg/L. Furthermore, the MA WQS specify a number of designated uses and water quality criteria that may, in some cases, require

limits on phosphorus discharges in order to be satisfied. For example, Class B waters, such as the Westfield River, must provide a habitat for fish, other aquatic life and wildlife, a resource for primary and secondary contact recreation, and water with consistently good aesthetic value. In addition, the MA WQS set criteria for minimum in-stream dissolved oxygen levels, color and turbidity, solids, taste and odor, and aesthetics. *See* 314 CMR 4.05(3)(b) and 4.05(5)(a). If phosphorus discharges might cause or contribute to impairments of any of these uses or exceedances of these criteria, limits on such discharges might be necessitated.

Finally, as discussed below, the MA WQS's antidegradation requirements also must be satisfied and could, under certain circumstances, necessitate phosphorus limits. *See* 314 C.M.R. 4.04. These antidegradation requirements mandate (1) that water quality needed to protect existing uses be maintained, 314 C.M.R. 4.04(1), and (2) that "High Quality Waters" be protected and maintained for their existing level of quality, except that limited degradation may be allowed when MassDEP "determines that a new or increased discharge is insignificant because it does not have the potential to impair any existing or designated water use and does not have the potential to cause any significant lowering of water quality." 314 C.M.R. 4.04(2). The MA WQS define High Quality Waters as waters with quality that, among other things, "exceeds the minimum levels necessary to support the national goal uses." 314 C.M.R. 4.04(2). "National goal uses" are defined to include the "[p]ropagation of fish, shellfish other aquatic life and wildlife and recreation in and on the water..." 314 C.M.R. 4.02 (definition of "National Goal Uses"). The portion of the Westfield River into which the Russell Biomass facility proposes to discharge may be considered High Quality Waters under the antidegradation provisions of the MA WQS because the quality of these waters exceeds that necessary to support the national goal uses. These waters have high water quality (according to MassDEP's 2001 Westfield River Watershed Quality Assessment), including aesthetic value, and plainly support (at a minimum) the propagation of aquatic life and recreation.

EPA uses nationally-recommended values and other technical guidance to develop limits on the discharge of phosphorus. For example, EPA's national guidance document, *1986 Quality Criteria for Water* (the "Gold Book"), recommends that in-stream phosphorus concentrations not exceed 0.10 mg/L for any stream not discharging directly into lakes or impoundments. (This value mirrors the above-cited in-stream concentration recommended by MassDEP.)

More recently, EPA released "Ecoregional Nutrient Criteria" identifying values representative of water without cultural eutrophication (*i.e.*, without the adverse effect of excess human-generated nutrient inputs). The ecoregional values approximate water quality conditions in reference streams corresponding to minimally impacted conditions. These reference streams have the lowest levels of parameters related to nutrient input (nitrogen, phosphorus, chlorophyll a, and turbidity) within a population of rivers in the same ecoregion. Ecoregional values do not establish how much more, if any, of a pollutant could be added to a water body while still maintaining minimally impacted conditions.

The site of the proposed Russell Biomass facility is located in Ecoregion VIII, Nutrient Poor Largely Glaciated Upper Midwest and Northeast. The total phosphorus level identified in *Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion VIII*, is 0.010 mg/L. This level is an order of

magnitude lower than the above-cited values recommended by EPA's Gold Book and the MassDEP's *Antidegradation Review Procedure for Discharge Requiring a Permit Under 314 CMR 3.03*.

Phosphorus in the Westfield River

The proposed Russell Biomass facility will be located along the MA32-05 segment of the Westfield River. The *Westfield River Watershed 2001 Water Quality Assessment Report*, published by MassDEP in 2005, assessed aquatic life and aesthetics and concluded that both designated uses are supported in the upstream 16.8 miles of the reach. Upstream of the proposed discharge near Huntington, algal cover is less than 1 percent and the dominance of pollution-sensitive taxa indicate a healthy ecosystem. Similarly, the Westfield River at the Strathmore Paper Company dam approximately 2.5 miles downstream of the proposed facility provides excellent fish and epifaunal habitat with little to no growth of aquatic plants and algae.

Approximately 7 miles downstream from the proposed discharge and approximately 5 miles downstream of the Strathmore Paper Company dam, however, the Westfield River at and downstream of the Westfield Wastewater Treatment Plant (WWTP) discharge has dense cover of filamentous algae. As a result, the lower 1-mile section of the river immediately downstream of the Westfield WWTP is impaired for both aquatic life and aesthetics due to excessive algal growth, turbidity, and odor. The municipal point source discharge is listed as the cause of the impairments. This 1-mile downstream segment of the river near the Westfield WWTP is also listed in the *Massachusetts Year 2008 Integrated List of Waters* as a Category 5 Water (meaning it requires TMDL development) for taste, odor, color, noxious aquatic plants, and turbidity, although a TMDL is not yet in development. The cause of these impairments is listed as unknown, but all are commonly associated with eutrophication.

In order to develop an estimate of the in-stream phosphorus concentration for the "reasonable potential" analysis, EPA considered all the available phosphorus data for the Westfield River, but only used the validated data for this analysis. Total phosphorus data was collected by MassDEP near the proposed Russell Biomass discharge location in 2001 and 2006.

In 2006, MassDEP measured phosphorus concentrations from May to October at a location between the Town of Huntington and the Crescent Mills dam and approximately 2.5 to 3 miles upstream of the proposed discharge location. Raw data from this sampling event shows results lower than the 2001 values (ranging from 0.005 to 0.007 mg/L), but has a higher detection limit (0.015 mg/L). The detection limit for this sampling event is neither consistent with MassDEP's QAPP nor consistent with the 2001 detection limit. In addition, the validation documentation for this data set was not provided and it is, therefore, unclear if the data meets data quality objectives for the program. Because EPA was unable to evaluate the analytical methods or validation documentation for this data, the Agency did not use the 2006 data to estimate the in-stream phosphorus concentration for the Westfield River.

In 2001, MassDEP sampled at two locations – the west bank of the river at the Main Street Bridge in Russell (approximately 400 yards upstream of the Indian River dam and proposed discharge site), and farther downstream in Westfield, approximately 350 yards upstream of the Routes 202/10 Bridge – four times between August and October (Attachment D). Flows during 2001 were relatively low and on the

sampling dates, the flows were consistent with 80% to 95% duration (i.e., flows in the River typically exceed flows on sampling dates 80 to 95% of the time). The highest background concentration of phosphorus was 0.030 mg/L measured at Main Street Bridge on September 12, 2001. However, according to MassDEP, this and a second duplicate sample set (from Main Street Bridge on October 3, 2001) did not meet project data quality objectives (as relative percent difference) identified for the program or in the Quality Assurance Program Plan (QAPP). In other words, the duplicate samples on each date at the Main Street Bridge were too disparate to meet quality control objectives and may not accurately represent total phosphorus concentrations in the Westfield River. Therefore, EPA did not rely on these measurements. The average total phosphorus concentration from the 2001 data that met quality assurance standards at the two sampling locations is 0.010 mg/L. Therefore, EPA concludes that this value best represents the in-stream phosphorus concentration in the Westfield River for determining if the discharge has a reasonable potential to exceed numeric or narrative water quality criteria.

Reasonable Potential Analysis

The Draft Permit must contain a water quality-based effluent limit if, based on the permit writer's evaluation, limits more stringent than the applicable technology-based requirements are necessary to achieve water quality standards and the discharge will cause, have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric water quality criterion or an impairment of a designated or existing use. *See* 33 U.S.C. § 1311(b)(1)(C); 40 C.F.R. § 122.44(d). As stated above, the MA WQS do not contain a numeric criterion for phosphorus but do include a narrative criterion requiring that "[u]nless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses ..." 314 C.M.R. 4.05(5)(c). As also stated above, the MA WQS also prescribe additional criteria and designated uses that could in some cases necessitate phosphorus discharge limits (*e.g.*, aesthetic criteria, dissolved oxygen criteria). Finally, the antidegradation requirements of the MA WQS must also be satisfied and could potentially necessitate phosphorus limits.

To address the "reasonable potential" issue, EPA began by using the available data (summarized above) to calculate a projected in-stream concentration of phosphorus that would result from the proposed Russell Biomass discharge under critical stream conditions (7Q10 flow) in the relevant portion of the Westfield River. The projected in-stream concentration was then compared to relevant water quality target values to determine whether the discharge has a reasonable potential to cause or contribute to an excursion from compliance with any state water quality standard and, thus, whether a water quality-based effluent limit is necessary (EPA 1996 NPDES Permit Writers' Manual, p. 101). In the absence of applicable state numeric water quality criteria for phosphorus, EPA considered nationally-recommended values and other technical guidance governing the discharge of phosphorus, including the Gold Book value, the ecoregional values, the value from the Massachusetts guidance, and other values associated with the prevention of nuisance plant growth.

As discussed above, the tri-sodium phosphate added to the boiler to prevent corrosion will result in additional phosphorus in the boiler blowdown. In addition, Russell Biomass proposes to combine the boiler blowdown with cooling water in the cooling tower. The cooling water consists of water withdrawn from the river and, as discussed above, this water contains a certain level of phosphorus. In

the cooling tower, some portion of the mixed boiler blowdown and cooling water will be evaporated and the phosphorus will be concentrated.

The Applicant projects that phosphorus concentrations in its future discharge at Outfall 001 will range from 0.4 mg/L to 0.8 mg/L. *See* Table 2 in Supplemental Information for NPDES Individual Permit Application, submitted February 27, 2009. This estimate reflects both the phosphorus added by the facility at the boiler as well as background concentrations of phosphorus already present in the water withdrawn from the Westfield River for cooling. As a result, the projected effluent concentration of 0.4 to 0.8 mg/L overstates the amount of phosphorus being added by Russell Biomass. The final effluent phosphorus concentration will be dependent on the cooling needs of the facility and the cycles of concentration in the cooling tower, but the phosphorus load (mass) will remain constant. Therefore, EPA calculated the projected in-stream phosphorus concentration based on the mass of phosphorus added by the facility to determine if the addition of phosphorus by the Permittee has the reasonable potential to cause or contribute to an excursion above state water quality requirements.

The total phosphorus load added to the boiler by the Permittee is 0.407 lbs/day. The total phosphorus load based on an estimated intake water phosphorus concentration of 0.01 mg/L is calculated as follows:

Mass = (Concentration)(Conversion Factor)(Flow)

where
Conversion Factor = 8.34
$Flow_{Intake}$ = 0.885 MGD

$Mass_{Intake}$ = (0.010 mg/L)(8.34)(0.885 MGD) = 0.074 lbs/day

$Mass_{Outfall\ 001} = Mass_{Boiler} + Mass_{Intake}$ = 0.407 + 0.074 = 0.481 lbs/day

The projected in-stream phosphorus concentration resulting from the discharge is calculated by adding the projected total phosphorus load in the discharge to the existing in-stream phosphorus load based on the 7Q10 (adjusted for the intake withdrawal)[14] as follows:

$Mass_{Outfall\ 001}$ = 0.481 lbs/day
$Flow_{Adjusted\ 7Q10}$ = 14.813 MGD (24.29 cfs low river flow - 1.37 cfs intake flow converted to MGD)
$Mass_{In\text{-}stream}$ = (0.010 mg/L)(8.34)(14.813 MGD) = 1.235 lbs/day
$Flow_{Total} = Flow_{Outfall001} + Flow_{Adjusted\ 7Q10}$ = 0.133 MGD + 14.813 MGD = 14.946 MGD

[14] EPA estimated a phosphorus mass (load) in the River at 7Q10 conditions based on the average in-stream concentration during 2001 flows. The 2001 monitoring data was collected during a dry period and is representative of low flows, albeit not 7Q10 flow. Phosphorus in the river is subject to a naturally fluctuating system with multiple sources, and thus the load is likely to fluctuate. On the other hand, the limited data available suggest that in-stream concentration, unlike load, remains fairly consistent over time even when flows vary (Attachment D). Thus, EPA has concluded that the 7Q10 load used in the calculation is a reasonable approximation of the in-stream concentration in the Westfield River given the limited data available at this site.

Projected In-stream Mass at Outfall 001 = 0.481 lbs/day + 1.235 lbs/day = 1.716 lbs/day

In-stream phosphorus concentration = (1.716 lbs/day)/(8.34)(14.946 MGD) = 0.014 mg/L

Based on an average in-stream phosphorus concentration of 0.01 mg/L, the effluent will result in an in-stream phosphorus concentration of 0.014 (14 µg/l) under worst case, 7Q10 river flows. A concentration of 0.014 is considerably less than the Gold Book and Massachusetts guidance recommended level of 0.10 and is unlikely to cause or contribute to an impairment of an existing or designated use of the Westfield River or a significant lowering of water quality.

EPA notes that the discharge would be anticipated to contribute only 0.004 (4 µg/l) of additional phosphorus to the river's concentration under reasonably acute, worst case river flow conditions. While the resulting in-stream phosphorus concentration of 0.014 would exceed the ecoregional value (0.010), the former would only be expected to occur in the short-term under the low river flow conditions. Under average summer river flows at the discharge (approximately 244 cfs), a river flow that is more consistent with ecoregional values as long-term average values, the discharge would be unlikely to cause any exceedance of the ecoregional value. Thus, the in-stream phosphorus concentrations resulting from the proposed Russell Biomass discharge is expected to be consistent with the ecoregional values.

EPA has also published several nutrient guidance documents by which to evaluate whether an in-stream phosphorus concentration of 0.014 is likely to contribute to excessive algal growth leading to eutrophication and impairment of designated uses. In the *Nutrient Criteria Technical Guidance Manual: Rivers and Streams* (July 2000), total phosphorus concentrations generally lower than 0.020 mg/L are recommended to prevent nuisance conditions and water quality degradation due to algal growth (Tables 4, p.101). In the *Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion VIII* (EPA 2001), the boundary for trophic classification based on a cumulative frequency distribution of phosphorus concentrations between a low nutrient ecosystem (oligotrophic) and a moderate nutrient system (mesotrophic) is 0.025 mg/L. Based on the analysis presented above, an increase of 0.004 mg/L from the facility is unlikely to cause concentrations in the river to exceed either value.

EPA also considered the pre-existing excessive algal growth and impairments at the Westfield WWTP as presented in MassDEP's 2001 Water Quality Assessment and *Massachusetts Year 2008 Integrated List of Waters*. This area is not designated as impaired for nutrients, but excessive nutrients, particularly phosphorus, can encourage growth of algae and noxious aquatic plants. The 2001 Water Quality Assessment cited the municipal point source as the cause of excessive algal growth. The cause of the noxious aquatic plant growth is unknown, but could be encouraged by discharge of phosphorus from the Westfield WWTP. Recently, this facility's draft NPDES permit was re-issued with a more stringent phosphorus limit, which will likely help to discourage plant growth. The impaired segment is more than 7 miles downstream from the proposed location of the Russell Biomass discharge. Additional phosphorus from Russell Biomass could be transported downstream, but the minimal increase in the in-stream concentration at the discharge is consistent with concentrations to prevent nuisance algal growth. Moreover, the additional load from Russell Biomass is not expected to contribute to phosphorus levels

in the area of the WWTP given the long travel time between the two locations. Additionally, the dam at Strathmore represents an impoundment where some phosphorus could be taken up by aquatic plants or settle out, thereby further reducing concentrations available downstream. Thus, because the phosphorus increase is minimal and may further decrease during travel time before reaching the WWTP, the discharge will be unlikely to cause or contribute to water quality impairments due to plant growth downstream. Moreover, the more stringent draft phosphorus limit recently required at the Westfield WWTP would likely improve conditions in that area.

The projected in-stream phosphorus concentration resulting from the proposed Russell Biomass discharge will remain well below values recommended by the Gold Book and Massachusetts guidance, and the discharges over the long-term should be consistent with the relevant ecoregional value. In addition, the projected in-stream concentration after the discharge, based on available data, will remain representative of an oligotrophic, or low nutrient system, and will not contribute to nuisance conditions or cause any significant lowering of water quality. Therefore, the narrative state water quality standard for nutrients and the antidegradation requirements of the MA WQS will be satisfied. Moreover, EPA concludes that the proposed discharge of phosphorus by Russell Biomass does not have a reasonable potential to cause or contribute to any impairment of designated uses or excursions from compliance with water quality criteria. Therefore, no water quality-based effluent limit is required in the permit.

Although no water quality-based limit for phosphorus is required, the Draft Permit does include a year-round, mass-based maximum daily total phosphorus limit of 0.407 lbs/day at outfall 003 (boiler blowdown), determined on a technology basis. This technology-based limit is driven by the minimum phosphorus load generated by the use of treatment chemicals needed to prevent corrosion in the boiler. In addition, the Draft Permit requires year round monthly monitoring and reporting of phosphorus at both the intake and outfall 001.

Aluminum

Aluminum is toxic to some aquatic plants and fish. Initially Russell Biomass proposed to use aluminum as a coagulant during treatment of the raw water. In the February 27, 2009 supplemental information submission, the Permittee estimated that the final aluminum concentration in the discharge would be between approximately 1.0 and 1.5 mg/L, which is below the calculated water quality-based limits to meet water quality standards based on dilution under a conservative low flow (7Q10). However, as a new facility, Russell Biomass is also subject to stringent standards to protect existing uses under the antidegradation requirements of the MA WQS. The Westfield River also contains species that are particularly sensitive to aluminum toxicity, including salmon.[15] Moreover, the in-stream Westfield River aluminum concentration frequently exceeds the chronic in-stream aluminum water quality criteria (87 ug/L).

[15] Poléo et al. (1997) observed that of the seven freshwater species exposed to aluminum-rich acidic water, Atlantic salmon were the most sensitive to aluminum.

In order to ensure protection of the biological community, the Permittee agrees not to use any water treatment chemicals that contain aluminum or aluminum compounds. This requirement is included in the Draft Permit.

6.3.2 Internal Outfall Locations 002 and 003 (Low Volume Waste)

Total Suspended Solids and Oil & Grease

As explained above, EPA has not promulgated ELGs for biomass-burning power plants and the Steam Electric ELGs do not apply to biomass-burning plants like the proposed Russell Biomass facility. That said, it is reasonable to look to the Steam Electric ELGs for guidance in developing technology-based limits on a BPJ basis for the Russell Biomass facility because the only distinction between it and the facilities covered by the ELGs is the type of fuel being burned (biomass vs. fossil or nuclear fuels).

Total Suspended Solids (TSS) and Oil and Grease (O&G) are considered conventional pollutants but the Steam Electric ELGs do not include BCT limitations. (EPA has indicated that BCT limits are "reserved." *See* 40 C.F.R. § 423.14. For existing facilities and "new dischargers," like the Russell Biomass facility, in the absence of a BCT limit, EPA would use any ELGs promulgated under the "best practicable control technology" (BPT) standard in setting limits. *See* 33 U.S.C. § 1311(b)(2)(A); 40 C.F.R. §§ 125.3(a)(2)(i) and (d)(1). For "new sources," in setting technology-based limits, EPA would use any applicable NSPS in the ELGs.

The Steam Electric ELGs specify identical BPT and NSPS standards for both TSS and for O&G from low volume and ash transport wastes as set forth below. *See* 40 C.F.R. §§ 423.12(b)(3) and (4) and §§ 423.15(c) and (f). In addition, 40 C.F.R. § 423.15(g) prohibits the discharge of wastewater pollutants from fly ash transport water. EPA has determined on a BPJ basis that these technology-based limits should be included in the Draft Permit.

The quantity of pollutant (mass limit) is determined by multiplying the flow of low volume/ash transport waste source by the concentration listed in the table. However, the Draft Permit limits are expressed as concentration limits pursuant to Section 423.15(m). The permit reflects these limits at 1) internal outfall 002, which consists of equipment cooling, laboratory wastewater, miscellaneous floor drains and floor washing after treatment in an oil/water separator and prior to mixing with cooling tower blowdown and 2) internal outfall 003, which is boiler blowdown prior to mixing with cooling tower waters.

Pollutant	Maximum for any 1 day (mg/L)	Average of daily values for 30 consecutive days shall not exceed (mg/L)
TSS	100.0	30.0
O&G	20.0	15.0

It is EPA understanding that any soaps or detergents used during floor washing operations at the plant may adversely interfere with the operation of the oil/water separator at outfall 002 (i.e., accumulated oil

could be emulsified and washed through). Therefore, the Draft Permit prohibits the use of soaps/detergents for wastestreams treated in the oil/water separator.

See Section 6.3.1 of this Fact Sheet for the discussion of phosphorus limits at outfall 003.

6.3.3 Outfall Location 004 and 005 (Stormwater)

Effluent Limitations

At the time of this Draft Permit, Russell Biomass has not applied for coverage under the 2008 Final Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activities[16] (MSGP). EPA concludes that is reasonable to look to the MSGP for guidance on determining appropriate monitoring requirements and limits for the proposed Russell Biomass facility. Therefore, EPA has added benchmark concentrations, monitoring, inspection and reporting requirements to the Draft Permit that are consistent with the MSGP. Specifically, EPA has determined the following technology-based requirements on a BPJ basis: (1) add monitoring with a benchmark concentration for iron based on the MSGP, Part 8, Subpart O – Steam Electric Generating Facilities; (2) add monitoring and benchmark concentration for total suspended solids based on the MSGP, Part 8, Subpart A – Timber Products, Subsector A3 – Log Storage and Handling; and (3) require the Permittee to develop, submit, annually update and implement its Storm Water Pollution Prevention Plan (SWPPP) for its storm water discharges.

The benchmark concentrations for total suspended solids and iron are 100 mg/L and 1.0 mg/L, respectively. In the MSGP, these concentrations are not effluent limitations, but rather indications of the effectiveness of the facility's Storm Water Pollution Prevention Plan (SWPPP – see Part VI.D.8.). Similar to the MSGP, if the average concentration of four (4) samples exceeds the benchmark concentration, the Draft Permit requires the Permittee to review the selection, design, installation, and implementation of all best management practices (BMPs) and control measures in their SWPPP.

The Draft Permit also includes pH limits that are based on MA WQS, which require that the pH be within the range of 6.5 - 8.3 standard units (s.u.). The MSGP, Part 8, Subpart A – Timber Products, Subsector A3 – Log Storage and Handling requires pH in the range of 6.0-9.0 s.u. The water quality-based limits are more stringent than the technology-based limits that would otherwise be imposed by EPA and, therefore, the water quality-based limits govern the permit.

Again, similar to the MSGP, a provision has been added to the Draft Permit that allows the Permittee to request a reduction in monitoring (to no less than once per year) if four consecutive monitoring values show compliance with the permit limits.

[16] See Federal Register, Vol. 73, No. 189, September 29, 2008, p. 56572-56578, as modified effective May 27, 2009.

Stormwater Pollution Prevention Plan

This facility engages in activities which could result in the discharge of pollutants to waters of the United States either directly or indirectly through stormwater runoff. These operations include at least one of the following in an area potentially exposed to precipitation or stormwater: material storage, in-facility transfer, material processing, material handling, or loading and unloading. To control the activities/operations that could contribute pollutants to waters of the United States, potentially violating the MA WQS, the Draft Permit requires the facility to develop, implement, and maintain a Stormwater Pollution Prevention Plan (SWPPP) containing best management practices (BMPs) appropriate for this specific facility (*See* Sections 304(e) and 402(a)(1) of the CWA and 40 CFR §122.44(k)). Specifically, at this facility, waste ash and wood chip storage areas are examples of material storage, processing and handling operations that shall be included in the SWPPP.

The goal of the SWPPP is to reduce, or prevent, the discharge of pollutants through the stormwater system. The SWPPP requirements in the Draft Permit are intended to provide a systematic approach by which the Permittee shall at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of the permit. The SWPPP approach involves the following four main steps:

(1) Forming a team of qualified facility personnel who will be responsible for developing and updating the SWPPP and assisting the plant manager in its implementation;
(2) Assessing the potential stormwater pollution sources;
(3) Selecting and implementing appropriate management practices and controls for these potential pollution sources; and
(4) Reevaluating, periodically, the effectiveness of the SWPPP in preventing stormwater contamination and in complying with the various terms and conditions of the Draft Permit.

The Draft Permit requires the Permittee to develop and submit the SWPPP no later than 90 days after the Permit's effective date and continue to implement the plan throughout the duration of the permit. The SWPPP shall be prepared in accordance with good engineering practices and identify potential sources of pollutants which may reasonably be expected to affect the quality of stormwater discharges associated with industrial activity from the facility. The SWPPP, upon implementation, becomes a supporting element to any numerical effluent limitations in the Draft Permit. Consequently, the SWPPP is equally enforceable as the numerical limits.

7.0 Cooling Water Intake Structure Requirements under CWA § 316(b)

7.1 Discussion of Legal Requirements

Section 402(a) of the CWA and 40 C.F.R. §§ 122.43(a) and 122.44 require that NPDES permits include limits and conditions necessary to meet applicable federal technology-based standards and any more stringent limits required by state water quality standards or other state law requirement. *See also* 33

U.S.C. §§ 1311(b)(1)(C) and 1341(a)(1) and (d). Thus, federal technology-based standards represent the minimum level of pollution control to be required by an NPDES permit.

With regard to cooling water intake structures (CWIS), CWA § 316(b) imposes a technology-based standard requiring that:

> Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

33 U.S.C. § 1326(b). Therefore, an NPDES permit issued to a facility with CWISs should, in general, include limits reflecting the BTA for minimizing adverse environmental impacts under CWA § 316(b), and any more stringent water quality-based standards. *See* 40 C.F.R. §§ 122.4(d) and 122.44(d). *See also* 40 C.F.R. §§ 125.80(d), 125.84(e).

Permit Based on Best Professional Judgment

In the absence of detailed regulations, EPA has for many years made CWA § 316(b) determinations on a case-by-case, best professional judgment (BPJ) basis, for both new and existing facilities with regulated CWISs. On December 18, 2001, EPA promulgated final regulations to implement § 316(b) of the CWA for *new facilities* that use CWISs to withdraw water from rivers, streams, lakes, reservoirs, estuaries, oceans, or other waters of the United States for cooling purposes. 66 Fed. Reg. 65338 (Dec. 18, 2001). These regulations are promulgated at 40 C.F.R. Part 125, Subpart I, and are collectively referred to as the "Phase I Rule." The Phase I Rule establishes national, technology-based performance requirements applicable to the location, design, construction, and capacity of cooling water intake structures at new facilities. *See* 40 C.F.R. § 125.80(a). These requirements are designed to minimize the adverse environmental impacts of CWISs, including impingement and entrainment.[17] Reducing impingement and entrainment at new facilities through implementation of the technology-based standards will help preserve aquatic organisms and the ecosystems they inhabit in waters in which CWISs are located, and may provide benefits that accrue at the population, community, or ecosystem level of ecological structure. *See, e.g.,* 66 Fed. Reg. at 65256.

The Phase I Rule applies to new facilities that have a design intake flow of greater than 2 million gallons per day (MGD) and that use at least 25 percent of water withdrawn for cooling purposes. *See* 40 C.F.R. § 125.81(a). The proposed Russell Biomass facility would be a new facility under the Phase I Rule but, nevertheless, the Rule's categorical standards do not apply because the facility's proposed maximum design flow is 1.08 MGD. The Phase I Rule also states, however, that:

[17] When a CWIS draws water into a facility's cooling system, aquatic organisms in that water may be harmed as a result of impingement or entrainment. Impingement occurs when relatively larger organisms (e.g., juvenile or adult fish) are pulled against a CWIS's screens, whereas entrainment occurs when relatively smaller organisms (e.g., fish eggs or larvae) are pulled along with the cooling water through the intake screens and through the entire cooling system.

> [n]ew facilities that do not meet the threshold requirements regarding amount of water withdrawn or percentage of water withdrawn for cooling water purposes in 125.81(a) must meet requirements determined on a case-by-case, best professional judgment (BPJ) basis.

40 C.F.R. § 125.80(c). *See also* 66 Fed. Reg. at 65256. Therefore, the Draft Permit's CWIS-related requirements are based on a BPJ application of CWA § 316(b).

While the Region has applied CWA § 316(b) on a BPJ basis, the Region's BPJ is nevertheless informed by the terms of the Phase I Rule. This is reasonable and appropriate given that those regulations were developed under § 316(b) to minimize the adverse environmental impacts of CWIS operations at new facilities. Furthermore, it should be understood that the reason that the proposed Russell Biomass facility's intake design flow is projected to be below the Phase I threshold is that the Company has affirmatively chosen upfront to use closed-cycle cooling, a technology that successfully minimizes CWIS impacts by greatly reducing intake flow (by as much as 98 percent), and a technology that EPA has determined represents the BTA for new facilities covered by Phase I. *See* 40 C.F.R. § 125.84(b)(1). In other words, had Russell Biomass proposed using open-cycle cooling, its proposed intake flow would almost certainly be above the Phase I threshold.[18] Instead, Russell Biomass concluded that open-cycle cooling was not feasible for this project from a permitting perspective because of the large volumes of water that would be required. *See* NPDES Permit Application 2001, p. 5-23.

In addition, the permit's limits under § 316(b) must ensure that the proposed facility's cooling water intake operations do not cause or contribute to a failure to attain the designated uses of the Westfield River. *See* 40 C.F.R. §§ 125.84(e) and 125.80(d). *See also* 314 C.M.R. 4.05(3)(b). Since the NPDES permit that EPA expects to issue to Russell Biomass will be subject to State certification under CWA Section 401, the permit will also need to satisfy any MassDEP conditions of such a certification (*See* 33 U.S.C. § 1341(a)(1) and (d); 40 C.F.R. Sections 124.53 and 124.55). EPA anticipates that the proposed CWIS conditions of the Draft Permit will satisfy Massachusetts water quality standards and that the MassDEP will provide this certification before issuance of the Final Permit.

7.2 Biological Impacts

Entrainment and impingement by CWISs can kill large numbers of aquatic organisms. These adverse environmental impacts associated with CWISs can also contribute to reductions of local species of commercial and/or recreational importance, locally important forage species, and local threatened or endangered species [See 66 FR p.65264]. Any of these losses could, in turn, contribute to a decrease in the diversity of, or the alteration of, the community of organisms inhabiting the ecosystem.

Entrainment of organisms occurs when water is withdrawn by a facility into the CWISs from an adjacent water body. Eggs and larvae are typically small enough to pass through the mesh of the CWIS's intake screens and become entrained within the cooling water drawn through the facility. As a result, the eggs

[18] Some facilities' cooling water needs are so great that even with closed-cycle cooling, their intake volumes for makeup water are well above 2.0 MGD. Obviously, this is not the case for the proposed Russell Biomass facility.

and larvae are exposed to shear forces from mechanical pumps, physical stress or injury, elevated temperatures from waste heat removal, and, in some cases, high concentrations of chlorine or other biocides. These organisms can be killed or otherwise harmed as a result of entrainment. The extent of entrainment of fish and invertebrates in cooling water intake structures is determined by several factors, including the nature of the water body in which the cooling water intake structure is located, the particular location in the water body in which the intake structure is placed, the biological community present in the water body, the volume and velocity of the waterbody and the intake flow, the nature of any intake screening system or other entrainment reduction equipment used by the facility, and season. The number of organisms that become entrained is primarily dependent upon the flow of cooling water through the plant and the concentration of organisms in the source water body that are small enough to pass through the screens of the plant's intake structure(s). [See 66 FR p. 65273].

Impingement of organisms occurs when water is drawn into a facility through its cooling water intake structures and organisms too large to pass through the intake screens, and unable to swim away, become trapped against the screens and other parts of the intake structure. The quantity of organisms impinged is a function of the intake structure's location, its depth, the volume and velocity of water at the entrance of the intake structure and through the screens, the seasonal abundance of various species of fish, and the size of various fish relative to the size of the mesh in any intake barrier system (e.g., screens).

The Westfield River supports a balanced riverine fish community and exhibits good habitat conditions, high water quality, and a stable flow regime. The high quality of the Westfield River in the vicinity of the intake is exhibited by the support of designated uses in the area, including aesthetics and aquatic life.[19] An August 2001 survey conducted between the Texon Mill and the Wippernon Golf Course, including the facility site, by MassWildlife encountered common shiner, smallmouth bass, longnosed dace, American eel, Atlantic salmon, tessellated darter, fallfish, rock bass, creek chubsucker, white sucker, and pumpkinseed. For several of these species in the sunfish and minnow families (e.g. pumpkinseed, fallfish, common shiner), males build and guard nests for adhesive eggs. For this reason, eggs of these species are less susceptible to entrainment. The facility's CWIS must also allow for passage of anadromous and catadromous species. MassWildlife stocks some branches and tributaries of the Westfield River with trout and Atlantic salmon fry, including in 2008 and 2009 at the Town of Russell in the vicinity of the proposed facility. American eels, a catadromous species, were present in 2001 biological surveys. In addition, the presence of numerous barriers to fish migration along the Westfield River has prompted MassWildlife to undertake dam improvements, including installation of an elver ladder for passage of American eel at the Indian River Hydro dam. To date, no biological monitoring for impingement mortality and entrainment at this CWIS (formerly used for the Westfield Paper Mill) has been initiated.

7.3 Cooling Water Intake Structure

The Permittee proposes to rehabilitate the Westfield Paper Mill's existing intake structure as the new facility's cooling water intake structure (CWIS). The CWIS is located on the east bank of the Westfield

[19] Massachusetts Department of Environmental Protection. 2005. Westfield River Watershed: 2001 Water Quality Assessment Report. 32-AC-1.

River approximately 300 feet upstream of the Indian River Dam. The existing enclosed concrete structure is 16 feet wide by 11 feet long and 15 feet high, with a carbon steel trash rack at the intake's entrance and three hatches on the top cap. Two of these hatches access the intake pipes, while the third hatch accesses the intake's screening system and includes three slots to fit intake screens. The existing screens in the screening hatch are in poor condition. The common chamber includes two 12-inch, steel intake pipes also in poor condition. The bottom of the structure is covered with two to three feet of sand, sediment, and sticks.

The Permittee has proposed to update the existing structure in order to comply with CWA § 316(b) requirements. One of the existing intake pipes will be used to draw water from the CWIS. The second pipe will be used as a backup should it be needed. Any sand, sediment, and sticks currently covering the floor of the CWIS will be removed, materials will be processed on-site, and solids disposed of following methods approved by MassDEP. The intake structure will be fitted with two, new 9.5 mm fixed mesh screens. The estimated approach velocity into the intake structure based on a maximum pumping rate of 1,000 gpm is 0.19 feet per second (fps). Intake velocity is a key factor affecting the impingement of fish and other aquatic biota, and reducing this velocity to a threshold level below which most adult and juvenile aquatic biota are able to escape is an effective means of minimizing impingement. EPA considers a through-screen intake velocity no greater than 0.5 fps protective of most adult and juvenile fish, including juvenile trout and Atlantic salmon fry (See 40 CFR Part 125.83).

In addition to updating the CWIS, the Permittee has proposed installing and operating a wet, mechanical draft cooling tower to reduce the temperature of condenser discharge water. By recirculating the cooling water, a cooling tower would enable the proposed Russell Biomass facility to substantially reduce the volume of water it would withdraw from the Westfield River through the CWIS. The cooling tower would provide cooling water to the steam turbine condenser heat exchanger. The main cooling water pumps would circulate cooling water from the tower basin, through the condenser heat exchanger, and back to the tower to remove waste heat from the facility. Evaporation in the cooling tower removes waste heat collected from the steam turbine condenser, rejecting it to the atmosphere. Because of this evaporation, a continuous supply of "makeup water" is needed, which would be supplied by the Westfield River via the clarifier and raw water storage tank. The raw water storage tank will hold a reserve of about 1.4 million gallons of water for fire protection emergency reserve and cooling tower makeup.

The Phase I Rule specifies, among other things, that a reduction in total design intake flow commensurate with that which can be attained by a closed-cycle, recirculating cooling water system constitutes the BTA for new facilities withdrawing more than 10 MGD. *See* 40 C.F.R. § 125.84(b)(1); 66 Fed. Reg. at 65273. The number of aquatic organisms entrained is expected to decrease in direct proportion to a reduction in the volume of water withdrawn, making closed-cycle cooling one of the most effective means of reducing entrainment.

In this case, EPA has made a BTA determination for Russell Biomass based on site-specific conditions and BPJ, while looking to the Phase I Rule for guidance regarding appropriate requirements for new facilities. At Russell Biomass, operation of a closed-cycle wet, mechanical draft cooling tower, in

conjunction with an intake design through-screen velocity low enough to minimize impingement, would meet the § 316(b) requirements for new, larger plants under the Phase I Rule.

7.4 Best Technology Available (BTA) Determination

This section presents EPA's determination with respect to the application of CWA § 316(b), 33 U.S.C. § 1326(b), to the NPDES permit for Russell Biomass. CWA § 316(b) requires that the design, capacity, location and construction of CWISs reflect the Best Technology Available (BTA) for minimizing adverse environmental impacts. EPA has considered the location, design, construction, and capacity of the CWIS – the four factors set forth in § 316(b) – at this facility. Information used in this assessment includes the permit application, supplemental information, and the Phase I Rule. EPA has concluded, based on its BPJ, that the proposed CWIS for the proposed Russell Biomass facility reflects the BTA for minimizing adverse environmental impact.

7.4.1 BTA Factors

Location

The type of water body, such as a river, ocean or estuary, on which a CWIS is located, plays a role in determining the amount of entrainment and impingement by that CWIS. CWISs located on bodies of water with large concentrations of entrainable organisms are likely to have greater adverse environmental impacts due to entrainment of organisms. Similarly, selecting locations to avoid important spawning areas, juvenile rearing areas, fish migration paths, shellfish beds or other areas of particular importance for aquatic life is one means of reducing impingement mortality. *See* 66 Fed. Reg. at 65276.

The proposed location of the CWIS for the Russell Biomass facility on the east bank of the Westfield River is likely to help reduce impingement and entrainment. The intake is located across the river from the confluence with Bradley Brook and upstream of the Indian River Dam spillway. According to the Permittee, river substrate conditions in the immediate vicinity of the intake structure are largely free of fine sediments, while closer to Bradley Brook the sediment includes fine sands. This substrate pattern may indicate scouring near the intake structure, which is indicative of higher river velocities and may help to reduce both entrainment and impingement of organisms in the Westfield River (NPDES Permit Application page 3-34 and 4-2). In other words, the velocity of the river would be greater than the approach velocity at the intake structure and this should help organisms to move downriver and past the CWIS. Thus, the location of the former Westfield River Paper Company CWIS may help to reduce adverse environmental impacts from impingement and entrainment as compared to other possible locations in this vicinity of the Westfield River.

Capacity

The “capacity” of the CWIS refers to the volume of cooling water that it withdraws and the velocity at which it is withdrawn. The volume of cooling water withdrawn will be discussed here, while intake velocity is discussed below in the section addressing CWIS design because the CWIS’s design features

affect intake velocity. The existing CWIS will withdraw water from the river as needed for makeup water for a proposed closed-cycle cooling system using a wet, mechanical draft cooling tower. Reducing the CWIS's capacity is one of the most effective means of reducing entrainment and impingement because limiting the volume of water withdrawn reduces the number of organisms entrained and can also reduce the intake velocity to allow organisms that would otherwise become impinged to swim away. See Phase I Final Rule 66 Federal Register 65273. Closed-cycle cooling systems are estimated to reduce water withdrawals by 98 percent compared to once-through systems, and, as a result, are one of the most effective ways to minimize entrainment and impingement. In addition to reducing the capacity of the CWIS, closed-cycle cooling systems also minimize the potential for degradation of water quality from thermal pollution. Heat which would be discharged at Outfall 001 with a once-through cooling system is, instead, removed from the effluent during the evaporation process in the cooling tower.

Makeup water withdrawal volumes for the proposed wet cooled condenser system, based on a net plant output of 50 megawatts (MW), 24 hours a day, 365 days a year, are estimated at an annual average of 662,000 gpd, and a maximum daily volume of 885,015 gpd, during the hottest day of the summer. The use of closed-cycle cooling with wet, mechanical draft cooling towers at Russell Biomass complies with the Phase I Rule's requirements for larger (greater than 10 MGD) power plants under 40 C.F.R. § 125.84(b)(1), which states "a new facility drawing equal to or more than 10 MGD must reduce intake flow to a level commensurate with which can be attained by a closed-cycle recirculating cooling water system."

Use of a "dry" or air cooled condenser (ACC) system at the plant is also technically viable and would require an annual daily average of only 13,460 gallons per day (gpd) of cooling water makeup volume. However, according to the Permittee, over a 30-year plant life, an ACC would cost a total of $67.8 million more than the proposed wet cooling system, primarily from higher capital and lost revenue costs.

Russell Biomass could utilize either a "wet" or "dry" cooling system to effectively minimize impingement and entrainment.

According to the Permittee, the annual average flow of the Westfield River on the reach where the intake is located is 412 MGD (634 cfs). Based on a maximum daily withdrawal of 885,000 gpd (1.37 cfs), the makeup water withdrawal represents approximately 0.2 percent of the annual average flow, which is well below the Phase I Rule's proportional flow requirement (no greater than 5 percent of the source waterbody mean annual flow for freshwater rivers and streams). *See* 40 C.F.R. §§ 125.84(b)(3)(i), 125.84(c)(2)(i), and 125.84(d)(2)(i). Withdrawal at the facility is further limited by the state's Water Management Act Permit, which prohibits withdrawals at stream flows less than 17.8 cfs. In addition, the velocity gradient at the impoundment will contribute to minimizing entrainment and impingement by encouraging mobile and non-mobile aquatic organisms past the intake towards the spillway, particularly for organisms originating from Bradley Brook. Thus, the proposed capacity of the CWIS consistent with the use of a closed-cycle, cooling tower system at Russell Biomass reflects the minimization of potential adverse environmental impacts from impingement and entrainment.

Design and Construction

Water used for non-contact cooling and in-plant power generation is withdrawn from the Westfield River through the CWIS. The Permittee has proposed a wet mechanical draft cooling tower for the Russell Biomass facility. Using a cooling tower would greatly reduce the volume of non-contact cooling water needed for facility operation, thereby reducing the potential for impingement and entrainment of aquatic organisms. The water recycling process inherent in the selected cooling technology has a high recycle rate (7.4 times in this case) and greatly reduces the need for water withdrawn for cooling purposes, which proportionally reduces the number of eggs and larvae entrained, and the numbers of larger organisms impinged.

In addition to constructing a cooling tower to meet BTA requirements under Section 316(b) of the CWA, Russell Biomass has proposed a rehabilitation plan for the existing intake structure. The intake structure screens will be replaced and modifications made, as required, to reduce impingement of aquatic species. Use of the existing intake for the new facility will avoid the water quality impacts that would be associated with construction of a new CWIS, including displacement of biota and habitat, increased turbidity, and effects of disposal of excavated material. *See* 66 Fed. Reg. at 65263. In addition, debris from the CWIS will be prevented from entering the river during rehabilitation (i.e., during construction) by stop logs, or solid panel screens, which will be installed in the first slot of the screen hatch to block the opening and minimize contact with the river.

A site investigation of the existing CWIS was conducted by Underwater Construction Corporation in August 2005. *See* NPDES Permit Application, Appendix E. This investigation reports that the existing intake structure is fitted with a carbon steel trash rack with 1-inch bar spacing in very good condition, which may exclude many juvenile and adult fish from entering the intake structure. It further reports that the flow area of the trash rack is approximately 15.9 square feet with about 75 percent of the area open, based on 1-inch bar spacing, which will allow passage of small mobile organisms in and out of the vault. The intake structure will also be fitted with two, new 9.5 mm fixed mesh screens to prevent smaller fish from entering the intake pipe.

The velocity of water entering the intake structure and moving through the intake screens is another important factor that contributes to the impingement of organisms. Some species of fish may be attracted by high velocity water movement at the entrance to the intake structure, and this can result in higher impingement rates. In addition, higher intake velocities will tend to cause higher impingement levels if they are too much for fish to swim away from. The Phase I Rule requires new facilities with design intake flows equal to or greater than 2 MGD to limit the maximum design through-screen velocity to no more than 0.5 fps. *See* 40 CFR § 125.84(b)(2). This velocity is an approximate, conservative threshold below which most fish would be able to escape, based on a review of the swimming speeds and endurance of multiple species of fish. *See* 66 Fed. Reg. at 65274.

The Permittee estimated an approach velocity at the CWIS of 0.19 feet per second, based on a proposed maximum pumping capacity of 1,000 gallons per minute. The Draft Permit limits pumping capacity to 750 gallons per minute, which will result in a lower approach velocity. In addition, the velocity of the river at the location of the CWIS may be greater than this approach velocity, which would encourage

fish and other organisms past the trash racks and minimize impingement. The through-screen velocity at the 9.5 mm fixed mesh screens is not known at this time. However, based on the low estimated approach velocity, the through-screen velocity is not expected to be more than 0.5 fps. To ensure that this condition is met, the Draft Permit requires the Permittee to measure or calculate the through-screen velocity at all screens upon initiating operation of the pumps.

Given a through-screen velocity of no more than 0.5 fps, adult and juvenile fish that are small enough to enter the CWIS through the trash rack are likely to have the capacity to swim back between the trash rack bars and return to the river without being impinged. In this case, the low through-screen velocity likely meets the BTA requirements under the Phase I Rule for larger facilities for minimizing impingement mortality. Thus, the proposed CWIS rehabilitation and low through-screen velocity at Russell Biomass will help to reduce the potential for adverse environmental impacts from impingement and entrainment.

7.4.2 BTA Conclusion

As explained in this Fact Sheet, the CWIS for the proposed Russell Biomass facility, as conditioned by the Draft NPDES Permit, will comply with the requirements of CWA § 316(b). As proposed by the Applicant, the facility will operate a closed-cycle cooling system using a wet, mechanical draft cooling tower. The Applicant will also improve and locate the existing CWIS in ways geared to minimize adverse environmental impacts. As a result, the proposed CWIS would (a) withdraw only an annual average of 662,000 gpd and a maximum daily volume of 885,015 gpd during the hottest day of the summer, (b) have a through-screen velocity of less than 0.5 fps, and (c) be located in an area likely to minimize the potential for the impingement and entrainment of aquatic organisms. In other words, EPA determines on a site-specific, BPJ basis that the location, construction, design and capacity of the Russell Biomass CWIS, as proposed and discussed herein, will reflect the BTA for minimizing adverse environmental effects. Permit conditions consistent with this determination are included in Part I.A.8 of the Draft Permit. Specifically, the Draft Permit limits the volume of cooling water withdrawals from the Westfield River to the volumes indicated above, which are commensurate with the proposed closed-cycle cooling system. In addition, the Draft Permit requires that the intake be fitted with a maximum1-inch trash rack and two 9.5 mm fixed screens to exclude larger organisms from being entrained, and limits the through-screen velocity at all screens to a level no greater than 0.5 fps.

8.0 Essential Fish Habitat (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801, *et seq.*), EPA is required to consult with the National Marine Fisheries Service (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, "may adversely impact any essential fish habitat," 16 U.S.C. § 1855(b). The Amendments broadly define "essential fish habitat" (EFH) as: "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," 16 U.S.C. § 1802(10). "Adverse impact" means any impact which reduces the quality and/or quantity of EFH, 50 C.F.R. §600.910(a). "Adverse effects" may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity),

and site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. *Id*.

EFH is designated only for fish species for which federal Fisheries Management Plans exist. 16 U.S.C. § 1855(b)(1)(A). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. Atlantic salmon (*Salmo salar*) is the only managed species present within this section of the Westfield River, but the river is not designated as EFH for Atlantic salmon. As result, the proposed permit will have no effect on EFH and EPA is not required to consult with NMFS under the EFH provisions of the Magnuson-Stevens Act.

Beyond the above EFH analysis, EPA also provides the following discussion regarding the Atlantic salmon. The Westfield River is classified by the State as a warm water fishery but, as discussed above, it also provides habitat for certain cold and cool water species. Although adult Atlantic salmon have been extirpated from this reach of the river by downstream impediments to migration, some of the upstream tributaries of the river are stocked with salmon fry. This results in juvenile salmon being present in this reach during migration downstream to the Atlantic Ocean. EPA has concluded that the limits and conditions contained in this Draft Permit will avoid and/or minimize adverse effects to Atlantic salmon for the following reasons:

- the permit limits have been established to ensure that the intake and discharge by the proposed Russell Biomass facility will comply with state water quality standards;
- the CWIS's location, low through-screen velocity, and restricted water withdrawal volumes, consistent with the operation of cooling towers, avoid and minimize the potential for adverse impacts from impingement and entrainment associated with the CWIS;
- the Draft Permit's technology-based limits developed on a BPJ basis meet the comparable regulatory requirements for pollutant discharges under the Steam Electric ELGs even though, as a biomass facility, these regulations do not apply to this facility;
- the Draft Permit's CWIS limits developed on a BPJ basis are consistent with the stringent regulatory requirements for CWISs at large new facilities (i.e., EPA's Phase I regulations under CWA § 316(b), *see* 40 C.F.R. Part 125, Subpart I), even though these regulatory standards do not directly apply to the proposed Russell Biomass facility;
- the intake volume is limited to an annual average of 662,000 gpd and a maximum daily volume of 885,015 gpd, during the hottest day of the summer, while the discharge volume is limited to 0.133 MGD, and the dilution factor in the receiving water is 112;
- the technology-based limits used in this permit for pollutants associated with cooling tower blowdown are more stringent and protective of aquatic organisms than those based on water quality criteria; and
- acute whole effluent toxicity tests will be conducted four times per year on fathead minnow *(Pimephales promelas)* and daphnid *(Ceriodaphnia dubia)*.

9.0 Endangered Species Act (ESA)

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA), grants authority to and imposes requirements upon Federal agencies regarding federally endangered or threatened species of fish, wildlife, or plants ("listed species"), and the habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of such species' critical habitat. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species. NMFS administers Section 7 consultations for marine species and anadromous fish.

EPA has reviewed the federal endangered or threatened species to determine if any such listed species might potentially be impacted by the proposed Draft NPDES Permit. The review focused on freshwater species and anadromous fish and EPA has determined that no federally listed freshwater species or critical habitat are present. Therefore, EPA concludes that issuance of the proposed NPDES permit to the proposed Russell Biomass facility will have no effect on federally listed endangered or threatened species and it is not necessary for EPA to consult with either the USFWS or NMFS under the ESA.

The federally endangered dwarf wedgemussel (*Alasmidonta heterodon*) was a species EPA specifically considered for this permit, because this species was historically found in the Westfield River. The species is unlikely, however, to occur in the Westfield River presently, and according to site data from the *Dwarf Wedgemussel 5 year Review: Summary and Evaluation* (USFWS New England Field Office 2007), recent populations of dwarf wedgemussels in Massachusetts are limited to the Mill River and Fort River. A freshwater mussel survey conducted around the proposed site, including from 650 meters upstream of the intake to 950 meters downstream of the discharge location, found no dwarf wedgemussels and determined that the rocky substrate, high flow velocities, and high shear stress in the vicinity of the discharge would be unsuitable habitat for freshwater mussels. *See* FEIR 2008, Appendix F. Furthermore, the effluent limitations and other conditions included in the Draft Permit should preclude any adverse effects should there be any incidental contact with listed species in the Westfield River.

The Department of Interior has listed the shortnose sturgeon (*Acipenser brevirostrum*) as endangered for portions of the Connecticut River. However, given the distance of the facility from the confluence with the Connecticut River, and the presence of the Woronoco dam downstream of the facility, EPA has determined that presence of shortnose sturgeon is unlikely in this reach of the Westfield River.

Although consultation with NMFS and USFWS under Section 7 of the ESA is not required, EPA will provide a copy of the Draft Permit and Fact Sheet to both NMFS and USFWS during the public comment period.

10.0 Monitoring

The permit's monitoring requirements have been established to yield data representative of the facility's pollutant discharges and CWIS operations under the authority of Sections 308(a) and 402(a)(2) of the CWA and consistent with 40 C.F.R. §§ 122.41 (j), 122.43(a), 122.44(i) and 122.48.

Thermal

The Draft Permit contains strict limits on thermal discharges from the proposed Russell Biomass facility. At the same time, Part I.A.9 of the Draft Permit also requires monitoring to characterize the thermal plume that will result from the permitted discharge. To EPA's knowledge, no thermal monitoring has been conducted at the location of the discharge to date. An adequate characterization of the impact of the facility's thermal discharge on the receiving water during peak summer operating conditions is needed to confirm that the discharge does not adversely affect the resident aquatic community and that the permit's water quality-based limits are being met. To this end, the Draft Permit requires that the Permittee complete a limited thermal monitoring study during the first year of the facility's operation. As part of the study, the Permittee is required to collect temperature samples during two weeks representative of peak summer operations during the first year of operations from thermistors deployed at intervals across transects of the Westfield River. Each thermistor will be equipped with a data logging device to allow the development of a continuous data record at 15-minute intervals. The Permittee is solely responsible for gaining all permits and authorizations necessary for the placement of the thermistors in the Westfield River. The results of this study will be used during future reissuance(s) or modification(s) of the permit and must be submitted to EPA and MassDEP in a report.

Biological

EPA has determined on a site-specific, BPJ basis that the location, design, capacity and construction of the proposed facility's CWIS reflects the BTA for this specific facility and will minimize the entrainment and impingement of all life stages of fish. EPA is not aware of any past environmental studies that monitor impingement or entrainment at the existing intake structure. In assessing the potential impact of impingement and entrainment at the proposed Russell Biomass facility, EPA has considered the characteristics of the CWIS and information about the local biological community. In this case, enough information is available for EPA to make a BTA determination under CWA § 316(b). At the same time, regular monitoring for impingement and entrainment of aquatic organisms is required by the Draft Permit to provide information to confirm EPA's evaluation of the likely environmental impact on the aquatic community of the Westfield River from the facility's CWIS. This monitoring will also provide valuable information to consider when re-issuance of this permit is evaluated in the future. Biological monitoring requirements are presented in Part I.A.10 of the Draft Permit.

Monitoring will also provide information to ensure that operation of the Russell Biomass facility does not interfere with the attainment of state water quality requirements. See CWA §§ 301(b)(1)(C) and 401(a)(1); 40 C.F.R. § 122.4(d). In addition, the monitoring requirements are reasonable and appropriate in light of the need to gather data to help ensure that the permit, and future renewals of it,

will comply with the CWA and the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. §§ 1801, et seq.

11.0 State Certification Requirements

EPA may not issue a permit in the Commonwealth of Massachusetts unless MassDEP either certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate the MA WQS, or waives this certification. The staff of the MassDEP has reviewed the Draft Permit. EPA has requested permit certification by the state pursuant to 40 C.F.R. § 124.53 and expects that the Draft Permit will be certified.

12.0 Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to Sharon DeMeo, U.S. EPA, Office of Ecosystem Protection**,** Industrial Permits Branch, 1 Congress Street, Suite 1100, Boston, Massachusetts 02114-2023.

The Regional Administrator has determined, pursuant to 40 C.F.R. §124.12, that a significant degree of public interest exists in the proposed Draft Permit and that a public hearing should be held to consider this action. Accordingly, a public hearing has been scheduled. In addition, EPA will hold a public informational meeting on the permit immediately prior to the public hearing. The dates, times and location of the public informational meeting and the public hearing are as follows:

DATE: August 13, 2009

TIME: Public Informational Meeting: 6:30pm - 7:00pm
Public Hearing: 7:00pm

LOCATION: Russell Elementary School Auditorium/Gym
155 Highland Avenue
Russell, MA 01071

In reaching a final decision on the Draft Permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period and after the public hearing, EPA will issue a final permit decision and forward a copy of the final decision to the Applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the final permit decision, any interested person may submit a petition for review of the permit to EPA's Environmental Appeals Board consistent with 40 C.F.R. § 124.19.

13.0 EPA Contact

Additional information concerning the Draft Permit may be obtained between the hours of 9:00 A.M. and 5:00 P.M. (8:45 A.M. and 5:00 P.M. for the state), Monday through Friday, excluding holidays from:

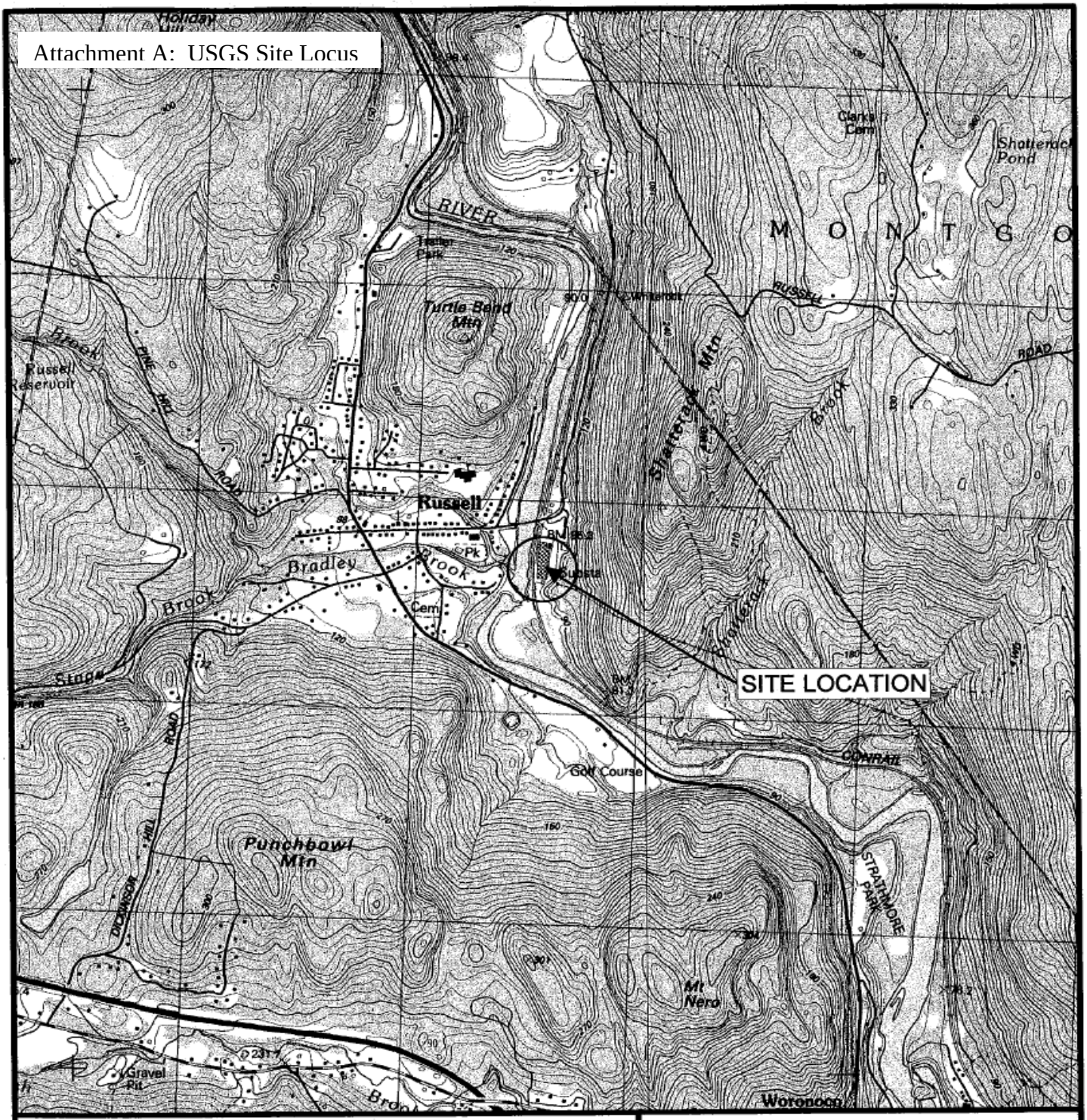
Sharon DeMeo, Environmental Engineer
U.S. Environmental Protection Agency
Office of Ecosystem Protection
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023
Telephone: (617) 918-1995 / FAX No.: (617) 918-0995

Paul Hogan, Environmental Engineer
Massachusetts Department of Environmental Protection
Division of Watershed Management
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608
Telephone: (508) 767-2796

July, 2009

Ken Moraff, Acting Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Attachment A: USGS Site Locus



BASED ON USGS TOPOGRAPHIC MAP FOR WORONOCO & BLANDFORD, MA QUADRANGLES REVISED 1987

6-METER CONTOUR INTERVAL

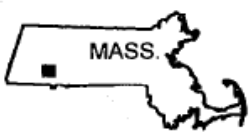


FIGURE 1
SITE LOCATION MAP

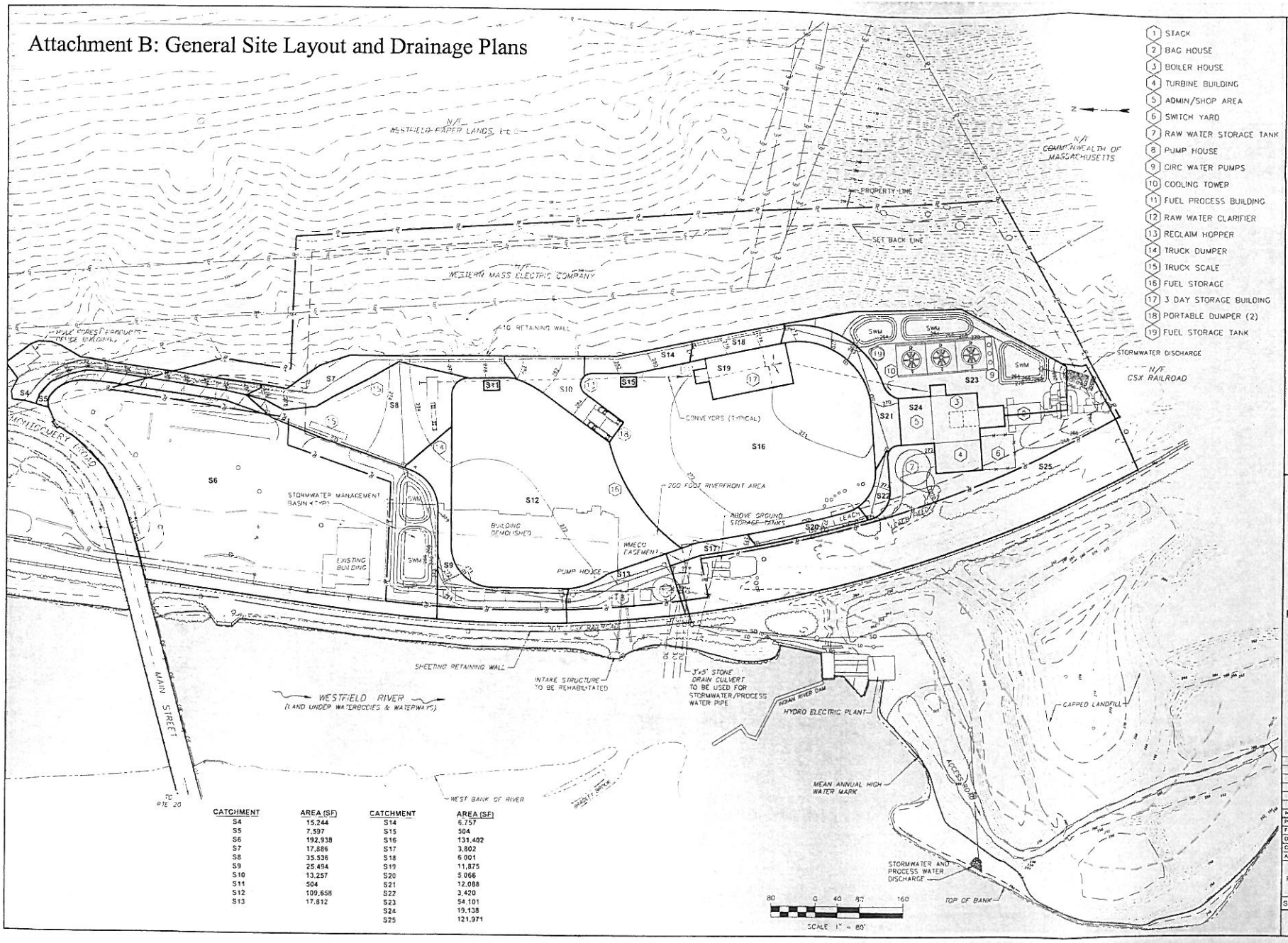
RUSSELL BIOMASS
RUSSELL, MASSACHUSETTS

Tighe&Bond

SCALE: 1:25000 SEPTEMBER 2005

r0105_fig_2_site_location_as_Fig1.apr

Attachment B: General Site Layout and Drainage Plans



CATCHMENT	AREA (SF)	CATCHMENT	AREA (SF)
S4	15,244	S14	6,757
S5	7,597	S15	504
S6	192,938	S16	131,402
S7	17,686	S17	3,802
S8	35,536	S18	6,001
S9	25,494	S19	11,875
S10	13,257	S20	5,066
S11	504	S21	12,088
S12	109,658	S22	3,420
S13	17,812	S23	54,101
		S24	19,138
		S25	121,971

Tighe&Bond
Consulting Engineers
53 Southampton Road
Westfield, Massachusetts
(413) 562-1600
www.tighebond.com

WALDRON ENGINEERING, INC
EXETER, NH 03833

PERMIT SET - NOT FOR CONSTRUCTION

Russell Biomass, L.L.C.

Biomass Power Facility

Russell, Massachusetts

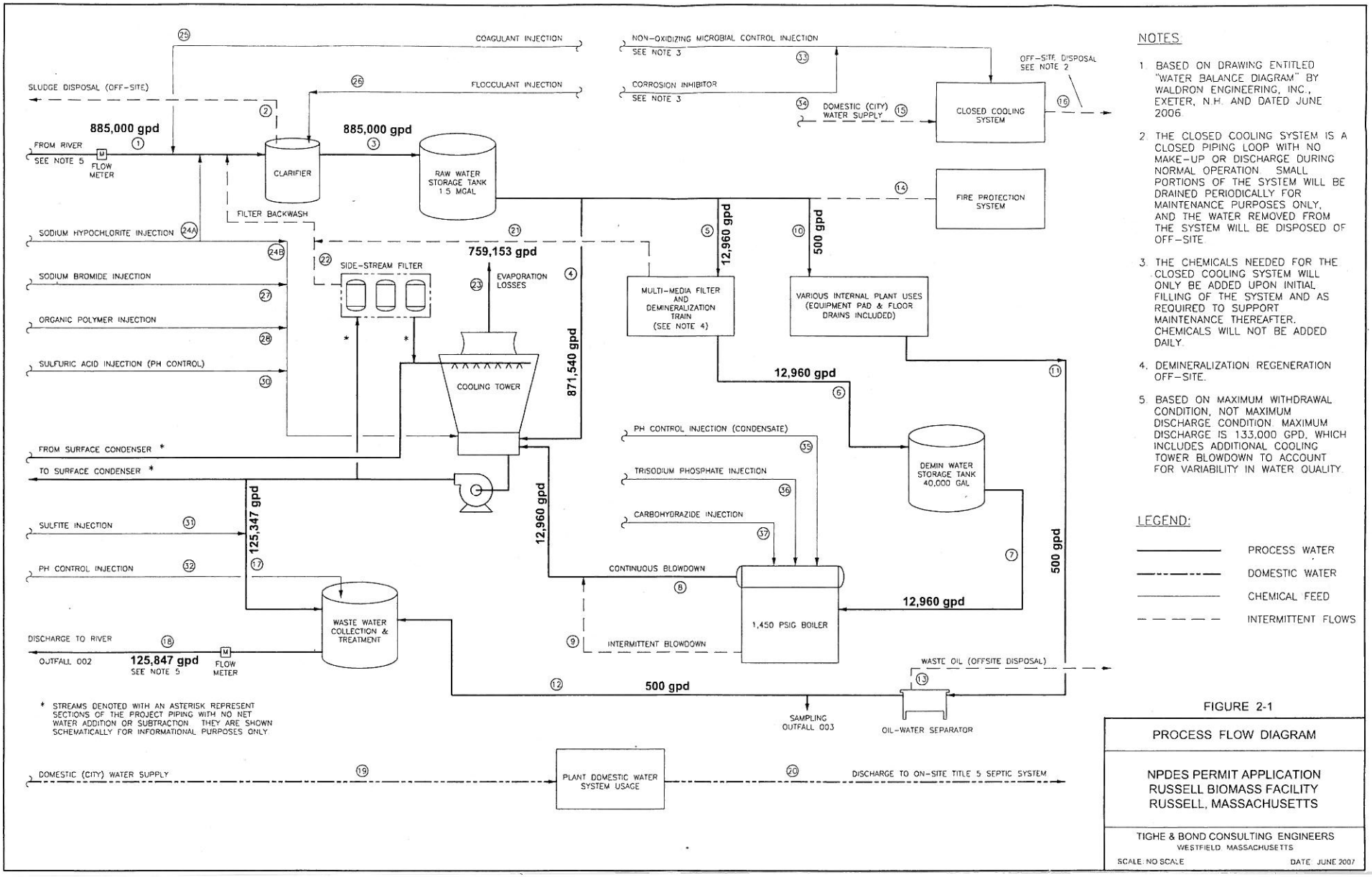
Mark	Date	Description
PROJECT NO:		R0105
FILE:		PROP_DRN_AREA
DRAWN BY:		TMF,LPT
CHECKED:		JJC
APPROVED BY:		RLS

PROPOSED SITE PLAN

SCALE: 1"=80'

SHEET 2
SHEET 2 OF 2

8/31/06



Attachment C: Process Flow Diagram

Attachment D: Massachusetts Department of Environmental Protection In-stream Phosphorus Data

Table 1. Westfield River 2001 total phosphorus (mg/l) data from sample location WSFR 21.3 (western bank at Main Street Bridge, Russell) and WSFR 12.7 (350 upstream /west of Route 202/10 Bridge in Westfield). Source: 2001 Westfield River Watershed Water Quality Assessment Report (MassDEP 2005).

Site	Date	Total P (mg/l)	
		Duplicate 1	Duplicate 2
WSFR21.3 Main St. Bridge	8/1/01	0.010	0.011
	8/22/01	0.011	0.011
	9/12/01	0.015[a]	0.030[a]
	10/3/01	0.009[a]	0.019[a]
WSFR 12.7 Rte 202/10 Bridge	8/1/01	0.012	--
	8/22/01	0.008	--
	9/12/01	0.009	--
	10/3/01	0.009	--

[a] Precision of field duplicates (as relative percent difference) did not meet project data quality objectives identified for program or in Quality Assurance Program Plan. Batched samples may also be affected.

Table 2. Daily flow (cubic feet per second), low flow, and average monthly flows recorded at USGS gages upstream from sampling locations in Table 1.

Parameter	Flow at USGS Gages (cubic feet per second)		
	Knightville No. 01179500	Middle Branch No. 01180500	West Branch No. 01181000
8/1/01	56	7.2	16
8/22/01	26	3.1	13
9/12/01	53	2.2	14
10/3/01	64	15	29
7Q10	10.9	1.4	5.79
July Average	129	35	66
Aug Average	109	31	59
Sep Average	127	37	69
Oct Average	196	54	119