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**APPENDIX D.**  
**REVISED PROJECT DOCUMENTATION**

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**Red Shield Environmental LLC  
Old Town Pulpmill  
Delivered Hardwood  
Chip Quality Specifications**

**Species Mix:**

Maple	>50%
Beech	15-20%
Birch	10-20%
Poplar	<10%

No oak, elm or basswood

**Chip Size & Quality:**

Chip thickness distribution shall be measured by RADER Chip Classifier. Categories to be measured includes bark, pins and fines (dust and 0-2mm thick), accepts (2-4mm, 4-6mm, and 6-8mm), and overs (8-10mm and >10mm).

Bark shall average <1.0% (maximum of 1.3% in winter and 1.0% in summer).

Pins and fines shall be <4% in winter and <3% in summer.

Overs shall average <9.0% (maximum of 10%).

Average chip thickness shall be in the 4-6mm range.

All chips shall be sound and free from rot, burn and char.

Chip moisture shall be between 30 and 60% by weight. Kiln dry chips are not acceptable.

No mixed species of hardwood and softwood will be accepted.

All chips shall be free of rocks, sand, dirt, plastic, Styrofoam, metal, large quantities of snow and ice, or other foreign material.

Outside chip inventory shall be 3-5 days.

Old Town Hardwood Chip Expected Distribution						
Dust 1%	0-2mm 2%	2-4mm 33%	4-6mm 39%	6-8mm 15%	8-10mm 5%	>10mm 5%

**Old Town Fuel and Fiber  
Wood Procurement Description  
May 15, 2012**

The fiber procurement system for Old Town Fuel and Fiber is complex but also very diverse and flexible. The planning and scheduling of over 600,000 green tons of clean hardwood chips per year is managed by one full time and one half time procurement professionals that have over 75 years of combined experience. Scheduled chip truck deliveries are received by two hydraulic truck dumps that convey the chips pneumatically to an inventory pile or directly to the woodroom. At Old Town chips are sampled and tested for size distribution and species composition. The sourcing of the clean chips is primarily from 5 chip plants located throughout Northern Maine and 4 hardwood sawmills. A description of the individual chip plants and the management strategy for each will allow a better understanding of the reliability and security of the procurement system.

**Milo Chip Plant**

This facility is owned and operated by Richard Carrier who has his main office in Skowhegan, Maine. The plant is capable of chipping over 150 truck loads per week but is scheduled for one shift operation. It is located about 30 miles from the Old Town Mill. The Old Town procurement group purchases approximately 150,000 green tons of hardwood pulpwood stems into this plant per year. The chip plant is then contracted to weigh, unload and chip the wood. Inventory levels here are managed by Old Town and spring volumes may reach 50,000 tons to cover production through mud season. The storage yard has capacity for 100,000 tons if needed. This site also has an active rail siding for delivery of roundwood loads. Milo chip plant is located in an area that experiences low to medium competition for wood and as such is a location for readily available wood at a low cost. Potential for additional volume would involve longer trucking or some rail opportunity to the north.

**Costigan Chip Plant**

The Costigan facility is owned and operated by E. J. Carrier out of Jackman. The plant is located about 10 miles from the Old Town Mill and has the lowest transportation cost of all sources. Similar to Milo this plant is contracted as a service to weigh, unload, chip and deliver. Old Town procurement contracts for purchase about 150,000 green tons of hardwood pulpwood annually. Inventory levels are managed by Old Town. The real estate available for inventory is limited here to about 50,000 tons presently. There is some opportunity to expand storage areas to about 75,000 tons total. This facility is located on a private logging road so that many truckloads have the advantage of off-highway trucking.

**Dolby Chip Plant**

This facility is owned by W. T. Gardner. It is a very large plant with production in excess of 200 truck loads per week. They chip for other mills in the area so they purchase and store the wood without Old Town involvement. This mill is about 50 miles

from the Old Town site. Old Town will contract with the plant for chips on a green ton delivered basis. The Dolby facility is located on a private road system with off-highway access to several million acres of timberland managed by multiple companies. The mill enjoys low cost wood as the result of the large off-highway wood basket. Rail access is possible with this plant but a siding has yet to be built into the chip plant to load rail cars.

#### Houlton Chip Plant

This plant is owned and operated by W. T. Gardner and like its sister plant in Dolby the purchasing arrangement is for chips delivered to Old Town. Much of the wood opportunities are from smaller landowners and farming woodlots. This mill can produce over 100 loads per week. The delivery to Old Town is generally managed by issuing a total number of combined loads from Dolby and Houlton. There is less potential for expansion here as competition is nearby and fairly keen. A rail spur was removed by a previous owner but could be re-installed. The truck transportation route is primarily on interstate 95 but the plant is almost 100 miles to Old Town.

#### Portage Chip Plant

This is owned by Seven Islands Land Company, a Bangor based land Management Company with over 1 million acres under management. The chip plant is located at the end of a large private road network that can access several million acres of Seven Islands land and land of other large owners. This chip plant has large capacity and serves several markets but due to the remote location has a cost disadvantage with trucking. Portage is about 150 miles from Old Town. The plant has a modern siding and rail loading equipment. The Old Town contract with Portage involves an FOB price for chips loaded on rail. Old Town then contracts with the regional railroad to transport the chips to the Lagrange reload location. There is good opportunity for expansion at this location since much of the competition does not have rail access.

#### Lagrange Reload Facility

This facility is owned by Precision Trucking whom Old Town Fuel and Fiber contracts with to unload the rail cars from Portage, reload the chips into tractor trailers and deliver 13 miles to the Old Town Mill. The production from Portage is only unloaded three days per week, due to empty car return time. This facility offers a very good opportunity for expansion either from an existing mill in the procurement system or location such as western Maine. Moving this activity directly into the Old Town Mill is a possibility.

#### Other Suppliers

In addition to the facilities previously mentioned chips are procured from 4 regional hardwood sawmills. Chips from sawmills are the byproduct of the sawmill operation and are usually from the slabs removed to make a log square. They are the least costly chip that is in our system, but the supply is limited. There is not much opportunity for additional chips in this market without an expansion or the construction of a new sawmill. Additionally, Old Town Fuel and Fiber will procure a small percentage of chips from New Hampshire. This allows a presence in the region as well as the ability to

understand market direction. This is a region that could have potential for increased volume.

The Old Town Fuel and Fiber procurement system is very diverse both from a geographic standpoint as well as the level of contractual involvement in the individual plants. This allows flexibility to change when market conditions require it and to not be at risk when competition increases in one area.

## **Biorefinery Project Impact**

The additional 337 tons per day of green hardwood chips will be managed in the same manner as we currently support the operation of the mill. The supply chain will remain unchanged, purchasing from the same suppliers and delivering in the same trucks. There is no need to increase mill handling systems as they are adequately sized to handle this increase in tonnage. All costs associated with this increase are simply incremental feedstock costs at prevailing rates per ton of hardwood chips delivered to Old Town. Currently these feedstock costs are in the \$65 - \$75 per ton range. On an annual basis of 350 operating days, this would range from \$7.6 MM to \$8.8 MM.

# SGS

Certificate SGS-COC-005951  
US09/5522

The management system of

## Red Shield Acquisition, LLC

24 Portland St.  
Old Town, ME, 04468  
United States



has been assessed and certified as meeting the requirements of

## Chain-of-Custody

The company was assessed against the following standards:

FSC-STD-40-004 (V2-0) FSC Standard for Chain of Custody Certification

For those products detailed below and derived from a

### Well managed forest

**Purchase of FSC mixed and controlled wood wood chips delivered to the mill scale, manufacture of wood pulp (credit system) for sale and delivery.**

This certificate is valid from 12 March 2009 until 11 March 2014.  
Issue 1. Certified since March 2009.  
SGS Ref # US09/5522

Authorised by

A handwritten signature in black ink, appearing to read 'G. Quinn'.

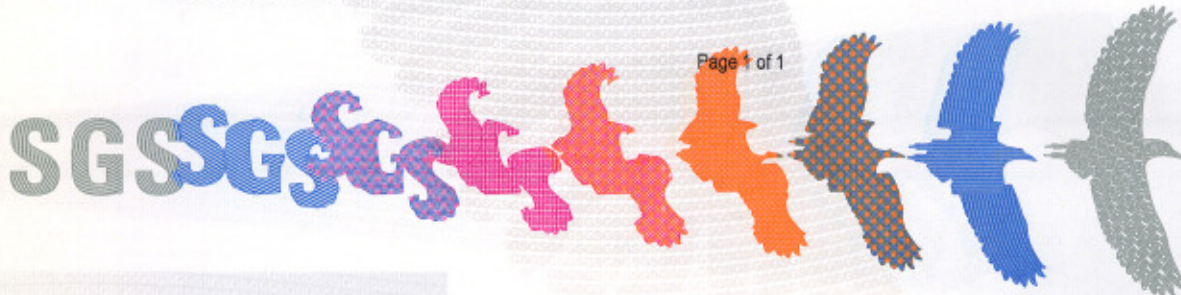


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t +27 (0) 11 681-2537 f +27 (0) 11 681-2543 [www.sgs.com/qualifor](http://www.sgs.com/qualifor)

This certificate remains the property of SGS and shall be returned upon request.

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## DRAFT

# WASTEWATER CHARACTERIZATION FOR USE IN BIOLOGICAL ASSESSMENT OLD TOWN FUEL AND FIBER BIOREFINERY REVISED APRIL 2012 FOR ALGAL FERMENTATION (April 23, 2012)

## INTRODUCTION

The following information summarizes the wastewater loads from the proposed Old Town Fuel and Fiber (OTFF) biorefinery project for the purpose of estimating the incremental increase in the discharge from the OTFF wastewater treatment system to the Penobscot River.

This assessment updates the previous assessment that was prepared in January 2011 for the butanol biorefinery process that was being considered at that time. This assessment is performed for wastewater projected to be produced from the proposed integrated biorefinery project for the Old Town Fuel and Fiber mill in Old Town, Maine. The currently proposed biorefinery utilizes an algal fermentation process to produce "green oil" that will be upgraded to produce a cellulosic biofuel.

The quantity of wastewater, and related waste components, from the algal fermentation processes is much lower than the flows from the previous butanol process.

The current integrated biorefinery process involves the following processes, which are shown on Figure 1: Biomass Deconstruction, Sugar Production and Clarification, Fermentation, and Oil Extraction and Solvent Recovery.

The wastewater loads from the proposed biorefinery have been developed using the process flow diagrams and mass balances that have been prepared by AMEC and BSI Engineering (BSI) for submittal to the Department of Energy (DOE) as part of the FEL 3 Stage Gate Report dated February 2012. The following sections: a) describe and summarize the biorefinery wastewater characteristics, b) estimate the removal efficiency in the mill's wastewater treatment system, and c) estimate the incremental increase in the amount of key parameters in the wastewater treatment system effluent as a result of the biorefinery operation.

## BIOREFINERY WASTE LOAD SUMMARY

The following information summarizes the character of the wastewater discharge from the proposed algal fermentation biorefinery. The unit processes that comprise the biorefinery are described in more detail in Section 2 (Proposed Action and Alternatives) of the Environmental Assessment, prepared by ICF International. A schematic process diagram, showing the biorefinery process, is included as Figure 1.

- The wastewater discharges from the biorefinery will come from three unit processes, as shown on Figure 1. The three unit processes are: Sugar

Production and Clarification, Fermentation, and Oil Extraction and Solvent Recovery.

- The total wastewater flow from the biorefinery will be approximately 150,000 gallons per day (GPD)(104 gallons per minute). This flow is divided among the three unit processes as follows:
  - Sugar Production and Clarification: 122,000 GPD
  - Fermentation: <1,000 GPD
  - Oil Extraction and Solvent Recovery: 24,000 GPD
- In addition to the flows described above, small quantities of system washwater will be discharged on an intermittent basis. These flows will represent less than 10,000 GPD and will not represent a significant loading to the wastewater treatment system.
- Salts from the biorefinery process enter the wastewater stream from the electro dialysis process that removes salts as part of the sugar clarification process. Based on the biorefinery mass balance, approximately 3 pounds of salt per minute (4,320 pounds/day) is produced by the electro dialysis process.
- The approximate BOD loading contributed from each of the three unit processes is presented below:
  - Sugar Production and Clarification: 8,000 Pounds BOD per Day
  - Fermentation: <100 Pounds BOD per Day
  - Oil Extraction and Solvent Recovery: 1,000 Pounds BOD per Day
- The total BOD loading from the biorefinery is estimated to be approximately 9,000 pounds per day.
- Based on our review of the biorefinery's unit processes, the mass balance, and the process chemicals used in the biorefinery, no heavy metals are added to the process and no heavy metals (other than naturally occurring trace levels) are anticipated to be contributed to the waste stream from the biorefinery.
- Based on the process flow diagram and the mass balance, nutrient loading in the biorefinery wastewater is expected to be minimal. The current mill discharge license includes a phosphorous limit of 0.5 mg/L. We do not expect any problem meeting the license limit for phosphorous when wastewater from the biorefinery is discharged to the mill's wastewater treatment facility.

**ESTIMATED BIOREFINERY IMPACT ON WASTEWATER TREATMENT PLANT EFFLUENT**

Based on our review of the capacity of the existing OTFF wastewater treatment plant and the estimated quantity and character of the wastewater from the biorefinery, we believe that the existing system has adequate capacity to treat the additional wastewater



from the biorefinery while maintaining the system's effluent well within the limits of the existing wastewater discharge license. The reasons for this conclusion are summarized below. Also included below are estimates of the incremental increase in key wastewater parameters.

- The existing OTFF wastewater treatment system has a licensed capacity of approximately 24.4 million gallons per day (MGD). Based on mill operating data for 2010 and 2011, the treatment system is currently processing approximately 11 – 13 MGD.
- It is estimated that the proposed biorefinery will produce 0.15 MGD, which is less than 1% of the treatment system's hydraulic capacity.
- Based on data from the mass balance for the biorefinery, it is conservatively estimated that the BOD loading from the proposed biorefinery will be approximately 9,000 pounds of BOD per day. The majority of this BOD loading is from C6 sugar that passes through the sugar production and clarification processes.
- Assuming a BOD removal efficiency of 85% in the existing wastewater treatment system, the BOD in the wastewater to be discharged to the Penobscot River will increase by 1,350 pounds per day as a result of the biorefinery operation.
- Based on a review of the discharge monitoring reports from the existing wastewater treatment facility, the average monthly BOD discharge for 2011 was approximately 3,750 pounds per day. The maximum average BOD discharge for any month was approximately 5,339 pounds per day in April 2011 (compared to a permit limit of 8,850 pounds per day).
- Therefore, when considering the highest monthly average BOD discharge in 2011 and a conservatively high assumption for the BOD loading from the biorefinery, the existing wastewater treatment system can treat the wastewater from the biorefinery without exceeding the existing discharge license; 7,500 pounds of BOD in the summer and 8,850 pounds of BOD in the winter. Based on conservative assumptions, the BOD loading to the River, during the summer months, when the biorefinery is operating, will be less than 5,000 pounds of BOD per day, which is well below the summer license limit of 7,500 pounds per day.
- Although reliable data is not available regarding the total suspended solids (TSS) loading from the biorefinery, it is anticipated that the TSS loading would be similar to the loading from the existing pulp mill. Therefore, an increase in flow to the treatment system of 0.15 MGD will result in an increase in the TSS loading of less than 1% and it is projected that the mass loading of TSS discharged to the river will increase no more than 1% from the most recent discharge data. Based on recent data, the treatment system is discharging an average of approximately 9,190 pounds of TSS per day. Therefore, it is estimated that the increased TSS discharge resulting from the biorefinery will be less than 100 pounds per day. The total discharge of TSS from the wastewater treatment system, once the biorefinery is in operation, will be less than 9,500 pounds per day, which is less

than the existing license monthly average limit of 20,000 pounds per day during the period from June 1 to October 31.

- Based on the review of the biorefinery unit processes, mass balance, process chemicals and feedstock, 51.9 pounds of ammonia per hour (1,245 pounds/day) is added to the biorefinery fermentation process. The ammonia added to the fermentation process is generally consumed in the process and is not expected to be present, at significant concentrations, in the biorefinery effluent. The small quantity of ammonia in the biorefinery effluent will not adversely affect the operation of the wastewater treatment system.
- It is expected that the temperature of the wastewater from the biorefinery will be no higher than the temperature of the wastewater currently produced by the pulp mill. Based on a review of temperature data for the wastewater treatment system effluent for the past 12 months, the temperature of the effluent is well below the license limit of 105 degrees F. It does not appear that the effluent temperature will exceed the license requirements when processing the biorefinery wastewater.
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- The pH of the biorefinery wastewater will be in a range similar to that of the existing pulp mill effluent. For the past several years the pH of the effluent from the wastewater treatment system has been in the range of 7 to 8, which is well within the license limits of 5 to 9.

## Fiore, Whitney

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**From:** Steve\_Mierzykowski@fws.gov  
**Sent:** Thursday, May 17, 2012 11:14 AM  
**To:** Fiore, Whitney  
**Cc:** Wende\_Mahaney@fws.gov; dan.tierney@noaa.gov  
**Subject:** Re: FW: Wastewater Summary Update - Algal Fermentation; Old Town Fuel and Fiber

No additional effects are anticipated from the change in the proposal, so no need to reinitiate at this time.

Steve

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Steve Mierzykowski, Senior Fish & Wildlife Biologist

U.S. Fish & Wildlife Service

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<http://www.fws.gov/northeast/mainecontaminants/>

\*\*\*\*\*

▼ "Fiore, Whitney" <WFiore@icfi.com>

"Fiore, Whitney"  
<WFiore@icfi.com>

05/17/2012 10:40  
AM

To "Wende\_Mahaney@fws.gov" <Wende\_Mahaney@fws.gov>,  
"Steve\_Mierzykowski@fws.gov"  
<Steve\_Mierzykowski@fws.gov>

cc

SubjectFW: Wastewater Summary Update - Algal Fermentation; Old  
Town Fuel and Fiber

Wende and Steve – Here is the email from NMFS.

Whitney

**From:** Dan Tierney [<mailto:dan.tierney@noaa.gov>]  
**Sent:** Thursday, May 17, 2012 10:28 AM  
**To:** Fiore, Whitney  
**Subject:** Re: Wastewater Summary Update - Algal Fermentation; Old Town Fuel and Fiber

Hi Whitney,

As the effects under the new proposal are the same or less than what we consulted on in April 2011, there is no need to reinitiate consultation at this time.

Thanks,

Dan

On Wed, May 16, 2012 at 6:45 PM, Fiore, Whitney <[WFiore@icfi.com](mailto:WFiore@icfi.com)> wrote:

Hello, I am just checking in to see if either the FWS or NMFS has had a chance to review the information on the revised project and if there are any questions or comments. I will be on vacation starting next week, so please if you do have any follow-up correspondence, cc: Christopher Carusona at DOE and Elizabeth Diller at ICF so we are sure to get it and respond promptly if necessary. Also, if you have not had a chance to look at the information, could you provide an estimate of when you or one of your colleagues may get to it?

Thank you,

Whitney Fiore  
310.387.7755

**From:** Fiore, Whitney

**Sent:** Friday, April 27, 2012 8:55 AM

**To:** [dan.tierney@noaa.gov](mailto:dan.tierney@noaa.gov); Wende Mahaney; 'Jeff Murphy'

**Cc:** [christopher.carusona@go.doe.gov](mailto:christopher.carusona@go.doe.gov); Diller, Elizabeth; 'Jim St. Pierre'

**Subject:** Wastewater Summary Update - Algal Fermentation; Old Town Fuel and Fiber

Regarding: USFWS File #53411-2010-I-0360; NMFS File Code: Sec 7 DOE-Maine OTFF Biorefinery

Hello Wende, Dan and Jeff,

Hope you are all well. Per direction of Chris Carusona, DOE Document Manager for the above-referenced Informal Consultation for Old Town Fuel & Fiber proposed biorefinery, I am writing to inform you of project changes. The project has changed from biorefinery production of butenol and acetic acid to production of an algal based green oil (green oil) from lignocellulosic (wood) extract. The green oil would be sold to an offsite refinery for processing into a bio-based fuel.

We are working with DOE to identify any changes in the environmental analysis and/or impacts resulting from the changed project. As part of this reexamination, we looked at the anticipated waste stream that would be sent to the existing wastewater treatment facility on site and compared it with the analysis contained in the Effluent Report for the former biorefinery project (final version provided to NMFS and USFWS in April 2011).

Based on the comparison, it appears that no additional effluent analysis for the green oil production is necessary as the quantities of BOD and TSS for the proposed green oil biorefinery are below the anticipated increase in these constituents contained in the April 2011 Effluent Report for the butenol facility. Additionally, the increase in total volume of effluent has decreased substantially from the volume analyzed in the Effluent Report (0.15% increase for green liquor vs. 5% increase for butenol). Lastly, temperature and Ph were both anticipated to remain about the same with the butenol biorefinery and this same result is anticipated for the proposed green oil biorefinery.

Based on the above, there are no new or increased potential effects from the change in the project.

In fact, it appears that effluent discharges determined to *not likely to adversely affect* from the former butenol biorefinery would be even less with operation of as green oil biorefinery. Therefore, other than revisions to the NEPA document for the proposed project, no additional information will be sent

Please do not hesitate to contact me if you have any questions or require any additional information. You will be provided with the updated NEPA document upon its issuance.

Thank you,

Whitney

*Whitney Fiore  
Expert Consultant  
ICF International  
310.387.7755*

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