

# A Report For the Ontario Ministry of Natural Resources

“To identify potential viable uses and markets for the waste pulp mill fibre located in the wet lagoon of the former CIP mill in Hawkesbury.”



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EASTERN ONTARIO  
MODEL FOREST

## **Scope of the Project**

To identify potential viable uses and markets for the pulp and paper waste fibre (biosolids) located in the wet lagoon of the former Canadian International Paper (CIP) mill located in Hawkesbury, Ontario.

## **Background**

The Canadian International Paper Company (CIP) was a Montreal-based forest products company, a former subsidiary of International Paper. It was originally formed as the St. Maurice Lumber Company in 1919 but was renamed in 1925. It was sold to Canadian Pacific Forest Products in 1989, which became Avenor Inc. in 1994; this company was then bought by Bowater in 1998. The company operated plants in Gatineau, Three-Rivers, Temiscaming, La Tuque, Hawkesbury, Grand Falls, New Brunswick and Corner Brook (Wikipedia).

In 1961 the CIP pulp mill dammed four islands in the Ottawa River to form a lagoon to accept pulp mill fibre rejects. Prior to that point, the waste was deposited directly into the Ottawa River. Periodically from 1961 to the mill closure in 1982 the biosolids were extracted from this wet lagoon and deposited into a nearby dry lagoon. The Province of Ontario is the current owner of the original four islands as well as the former bed of the Ottawa River which forms the present bottom of the wet lagoon. Numerous reports have been commissioned to analyze the quantity and quality of the biosolids in the wet lagoon. As well, recommendations on the rehabilitation of the wet lagoon were provided.

The Levac Report (1999) identified the following options for the CIP wet lagoon:

- a) Recycling of the wood fibre in the lagoon sludge
- b) Excavation and haul of sludge to landfill
- c) Chemical fixation of the dyke and capping of the site
- d) Incineration of the sludge
- e) Land application
- f) Composting
- g) In-situ bio-degradation following dewatering

Agra Monenco estimated the cost of rehabilitation for these options ranged from \$81 million for option b) to \$1.4 million for option g).

## Characteristics of the Biosolids

The following is a summary of the physical and chemical properties of the lagoon and biosolids:

- a) Total area of the wet lagoon = 14.5 hectares
  - i. Ponded = 8.5 hectares
  - ii. Dry biosolids area = 2.6 hectares
  - iii. Islands and berms = 3.4 hectares
- b) Depth of the 8.5 ha wet pond
  - i. 4.5 hectares less than 3 meters
  - ii. 3.4 hectares from 3-6 meters
  - iii. 0.6 hectares from 6-7 meters
- c) Volume of sludge
  - i. 183,000 m<sup>3</sup> Natech Report (2006)
  - ii. 264,000 m<sup>3</sup> AGRA Monenco Report (2000)
  - iii. 350,000 m<sup>3</sup> Levac Report (1999)
- d) Average moisture content = 87%
- e) Average organic matter of biosolids = 85.2%
- f) Heavy Metals

“Concentrations of all parameters tested were below the respective MOE criteria for commercial/industrial land use” (except for marginal exceedence of copper in two samples out of 14), AGRA Monenco Report (2000)

“Heavy metals do not pose any problems with land application and/or possible future products such as a compost” Levac Report (1999)

## Project Approach

On behalf of the Ontario Ministry of Natural Resources (OMNR), the Eastern Ontario Model Forest (EOMF) will identify viable uses and markets for the waste pulp mill fibre located in the wet lagoon. The following is a preliminary list of clients that will be contacted to determine if a market for this material exists;

- a) Green Field Environmental Services, Alexandria, Ontario  
This company has over 15 years of experience in land application of over 600,000 tonnes of industrial and municipal biosolids in Eastern Ontario.  
Contact: Mr. Brent Winters (613) 534-3989
- b) Consolidated Giroux Environmental Inc., Charlo, New Brunswick  
Giroux specializes in environmental maintenance and cleanup solutions including dewatering of lagoons.  
Contact: Montreal Office (514)-212-5531

- c) Pala Wood Service Co., Inc., Watertown, New York  
Since 1989 Pala Wood has operated a bulk mulch and composting company utilizing pulp mill residues as a primary source of their raw materials.  
Contact: Mr. Bruce Strough (315) 788-3713
- d) Chateaugay Power Station, Chateaugay, New York  
Boralex Inc. operates this 20 megawatt wood-residue thermal power station in Upstate New York. Their daily consumption of wood residues is 225,000 tons.  
Contact: Boralex Inc. (524) 284-9890

### **Land Application**

Wayne Young met with Green Field Environmental Associates to discuss the biosolids in the former CIP mill and explore opportunities for land application. Green Field Environmental Services Inc.'s credentials include:

- Experience in land application (since 1994 for Domtar Inc.)
- million tonnes of industrial biosolids and residues diverted from landfilling
- Over 700,000 wet tonnes of paper mill biosolids land applied
- Sub-contracted to land apply Ottawa biosolids in 2005 and 2006
- Sub-contracted to land apply Toronto biosolids in 2006 and 2007
- Excellent relationship with MOE and OMAF officials
- Experienced in agricultural, silvicultural and land rehabilitation beneficial uses

Green Field indicated that, based on their experience with land application of biosolids from the Domtar Cornwall Mill, the CIP wet lagoon biosolids could be utilized in the Hawkesbury area for the following three applications;

- a) Silvicultural (application in forest plantations)
- b) Agricultural fields
- c) Land rehabilitation (i.e. gravel pits)

However, this would require a site specific Certificate of Approval through the Ministry of Environment's Provincial Biosolids Utilization Committee and the local Ministry of Environment. As well Green Field indicated that land spreading of this material would fall under the Ontario Nutrient Management Act.

In order to economically handle and spread the biosolids, they would have to be dried to a minimum of 25% solids. This is a challenge as conventional dewatering process reduces the water content to 65-75%. Based on 25% moisture content, the land application costs would be estimated at \$30 to \$35 USD per wet tonne. Green Field indicated that the following area would be required to spread the 120,000 wet tonnes calculated to be contained within the wet lagoon;

- a) Silviculture                      30,000 dry tonnes @ 100 dt/ha = 300 ha
- b) Agricultural fields            30,000 dry tonnes @25 dt/ha over 5 years = 240 ha
- c) Land rehabilitation            30,000 dry tonnes @ 400 dt/ha = 75 ha

Staff from Green Field Environmental Services indicated that there would be no value associated with the biosolids due to its very low nutrient content. Therefore, disposal of the biosolids through land application would be an expense proposition with no revenue recovery.

### **Consolidated Giroux Environmental Inc**

This firm specializes in environmental cleanup and site restoration. They have the equipment and expertise to dredge and dewater the CIP wet lagoon but offered no recommendations for the potential commercialization of the biosolids.

### **Pala Wood Services**

Pala Wood has operated a wholesale mulch business in Watertown, New York for over fifteen years. Pala Wood purchases bark from regional pulpmills and sawmills in New York, Ontario and Quebec. As well, they have purchased some heritage bark piles in Ontario. Pala Wood purchased all of the bark from the Domtar Cornwall Mill prior to its closure in 2005. The company processes the bark at their Watertown facility by grinding and screening. Colours are added to the mulch for cosmetic purposes. They produce numerous grades, textures and colours of mulch for their customers in Northeastern USA. Approximately 75% is sold wholesale while 25% is bagged.

I met with Mr. Bruce Strough, President of Pala Wood on January 23, 2008 and explained the CIP Wet Lagoon project to him to see if he was interested in the biosolids. He felt that the biosolids may be too fine of texture to utilize exclusively for mulch. He did indicate that the biosolids may be mixed with the bark. He was very concerned with the potential for contaminants within the biosolids as his product eventually is used by the public for landscaping around their homes and businesses. Pala Wood has a fleet of trucks that pick up the raw materials and deliver the processed mulch to their customers. In order to make trucking to Watertown economically feasible, the moisture content of his raw material must be below 50%. He indicated that dewatering of the biosolids through traditional screw presses would result in moisture content of approximately 65-75%.

Mr. Strough indicated that if he was able to utilize the CIP wet lagoon biosolids, the value would be approximately \$75.00 per truck load. Based on a payload of 30 green tonnes, per load the total value of the biosolids would be \$300,000. However that is based on the assumption that the biosolids could be dried to a minimum of 35-45%.

### **Chateaugay Power Station**

I contacted the fibre procurement manager for the Chateaugay Power Station to discuss the potential use of the CIP biosolids as a fuel source for the biomass co-generation plant in Chateaugay, New York. That plant currently uses sawmill residues (including bark) and whole tree chips to fire its boilers. The plant requires biomass with a moisture

content of less than 42% with 20-30% their ideal fibre moisture content. Currently they are paying \$26-27 US per green ton of biomass delivered to the plant.

Chateaugay Power Station is interested in looking at a sample of the biosolids. However the challenge would be to dewater the wet lagoon biosolids down to moisture content less than 42%. Conventional dewatering normally reduces the moisture content down to 65-75%. As well, the transportation cost to truck the biosolids from Hawkesbury to Chateaugay is estimated to be \$25 USD per green tonne. That cost does not include an estimated cost of \$2.50 USD per green metric tonne to handle and load the biosolids into the trucks. Thus the value of this biosolid delivered to the Chateaugay Power Station would be offset by loading and transportation costs.

### **ASCO Construction**

On February 1, 2008 I meet with Mr. Anthony Assaly the President of ASCO Construction at their corporate head office in Hawkesbury. This company owns approximately 150 acres of land immediately west of the CIP wet lagoon. This property was originally a portion of the CIP mill site that was used for storage of biosolids recovered from the wet lagoon during the period of 1962 to 1982. There are five dry lagoons that were created by building 4-6 foot earthen dykes to contain the biosolids. It is estimated that this property has approximately 1,000,000 cubic meters of biosolids. The biosolids are approximately 3-5 feet deep and have a moisture content of 50-85%. Mr. Assaly purchased this property with the intent of disposing of the biosolids and commercially developing this site.

For the past ten years Mr. Assaly has explored potential commercial markets for the biosolids contained within his dry lagoons. To date he has not found a viable market or use for this material. He has contacted Lafleche Environmental in Moose Creek to see if the biosolids could be utilized for cover material at their landfill site. Unfortunately Lafleche do not require any additional cover material at this time.

Mr. Assaly also contacted Emery Moulding Machines to investigate whether the biosolids fibre could be utilized to produce moulded fibre products such as fibre egg trays. Their analysis showed that the fibres from the dry lagoon are suitable for making moulded products with two modifications: further refining of the fibre to make a more uniform raw material and bleaching or decolouring of the fibre to a more acceptable colour. Substantial capital investments, a finite supply of raw material and product market entry challenges has precluded this option.

Mr. Assaly has also contacted Ensyn Corp in Pembroke to see if they were interested in his biosolids as a feed source for their plant. However due to the high moisture content they are not interested.

Mr. Assaly continues to be very cooperative with the Ontario Ministry of Natural Resources as solutions for marketing or disposal of biosolids are not mutually exclusive.

## **Recommendations**

Unfortunately the Eastern Ontario Model Forest was not able to find any commercially viable markets or disposal options for the biosolids contained within the CIP wet lagoons at Hawkesbury. This is reinforced by the fact that ASCO Construction which has approximately five times as much material that has already be dewatered, has also not been able to find an economical option to market or dispose of the biosolids contained on their property.

The challenges associated with finding a beneficial use for this product are listed below;

### a) Moisture Content

At present the moisture content of the biosolids in the CIP wet lagoon are 87%. Conventional dewatering process would reduce the moisture content down to 65-75%. At this level the material is still too wet to use for energy production. Water contents above 50% precludes trucking the material other than a few kilometers. The cost to dewater material is exponentially related to the amount of water removed. It is very expensive to remove the last 15-25% moisture.

### b) Potential Contaminants

All of the potential users of the CIP biosolids expressed concerns about the potential of contaminants within the biosolids given this material was a byproduct of a pulpmill. This concern was elevated when the end product ultimately could have contact with the general public i.e. landscape mulch, egg cartons and land application on farmers' field that grow crops for human consumption. Although the sampling to date only showed slightly elevated copper levels in two samples, this concern will continue to be raised by potential end users.

### c) Finite size of raw material

Although the wet lagoon contains 200,000 cubic meters of material, this equates to only 30,000 dry tones of biosolids. Given the high operating costs to handle and load this material, once it has been dredged and dewatered from the wet lagoon, the relatively small volume and finite amount of material increases the cost per tonne substantially.

Based on the results of this report, the most economical solution for the biosolids contained within the CIP wet lagoons appears to be in-situ bio-degradation following dewatering as recommended in the Levac Report (1999).

## Next Steps

1. For the Ontario Ministry of Natural Resources to maintain contact with Mr. Assaly as he pursues potential markets and disposal options for the biosolids contained within the dry cells on his property.
2. In late April, once the snow has melted, The Eastern Ontario Model Forest will facilitate the visit of Mr. Bruce Strough, President of Pala Wood Services with Mr. Anthony Assaly to explore the potential use of the biosolids as a raw material in his landscaping mulch business.
3. Once the ice has gone from the wet lagoon, the Eastern Ontario Model Forest will co-operate with the Ontario Ministry of Natural Resources to obtain a 20 kilogram sample of the biosolids and deliver them to Mr. Mario Dugas, the Fibre Supply Manager for Chateaugay Power Station. Mr. Dugas will then determine if this material has any potential for energy production in their wood-based energy plant.
4. The Eastern Ontario Model forest will continue to utilize its network of contacts to explore potential markets for the biosolids contained within the CIP wet lagoons.

## References

- a) Beak Consultants Ltd. (1989), Assessment of the Fibre Deposits in the Former CIP Settling Lagoon, Hawkesbury, ON, Report – April 1989
- b) Neil A. Levac, Engineering Limited. (1999), Town of Hawkesbury, Former CIP Lagoons, Phase I & II Environmental Site Assessment, Pre-Feasibility Study Report for Site Remediation
- c) AGRA Monenco (2000), Final Report for OMNR - Dam Safety and Environmental Assessment for the Canadian International Paper (CIP) Dam in Hawkesbury, Ontario
- d) Natech Environmental Services Inc. (2006), Hawkesbury Lagoon Survey for the Ontario Ministry of Natural Resources, Natech Environmental Services Inc.