



Sappi North America

89 Cumberland Street
PO Box 5000
Westbrook, ME 04098-1597
Tel: +1 207 856 3532
Fax: +1 207 856 3770

Subject: Response to “Request for Information (RFI) DE-FOA-0001615: Cellulosic Sugars and Lignin Production Capabilities”

Company: Sappi North America

Company Contact:

Beth A. Cormier – VP - Research, Development & Innovation
Sappi North America – Technology Center

P.O. Box 5000

Westbrook, Maine 04098

(207) 856-3532

Email: beth.cormier@sappi.com

Category 2 Questions: Lignin

For this category of material Sappi has two potential sources of lignin for use/sale. These will be referenced below as: a) sulphite lignin which is available in commercial quantities and b) kraft lignin from a PHK process available in demo/pilot quantities after March 2017. Unless otherwise specified, answers given pertain to both materials.

- 1) To which types of research entities are you willing and able to sell or otherwise provide your lignin?

We are willing to provide lignin to any research facility; furthermore there are no types of known research entities to whom we are not willing and able to sell our lignin.

- 2) What are the maximum and minimum quantities of lignin that you are willing and able to sell (kg)?

For sulphite lignin, we can provide samples of a few kilograms. In addition, larger quantities (600kg to 1t) can be arranged via a special order with freight costs for the customer’s account. Commercial quantities of 24t per container can be shipped as per normal commercial orders. Kraft lignin from the PHK process is available in smaller quantities after March 2017. Quantities range from grams to maximum 50-100 Kg as part of pre-hydrolysis kraft liquor.

- 3) In what units do you sell your lignin and is it packaged (e.g., super sacks), or sold in bulk?

Liquid product (sulphite lignin) is sold in flexi-tanks of 24t at 45% solids. Powder/dry product available in large bags of 600kg. Minimum commercial order is one shipping container of approx. 24t or sacks of 600kg.

Kraft lignin from the PHK process will be provided in liter bottles, with larger quantity shipments available.



4) How do you ship lignin?

International deliveries are made via shipping lines to selected port of destination.

5) What is the lignin concentration in your product?

For Sulphite lignin, our liquid product is 45% dry solids. The powder version is at 96% dry solids. The organic content (including sugars, sugar breakdown products and lignin) of both is ~65 % on a dry solids basis.

Our Kraft PHL typically contains 3 to 5% dry solids. The lignin content is ~30% of the dry solids.

6) What type(s) of biomass do you use in your process?

Eucalyptus, Aspen and Maple hardwoods

7) What process do you use that produces lignin (dilute acid, ammonium fiber expansion (AFEX), hot water, organosolv, etc.)?

For the larger sources (ton quantities) it is neutral sulfite semi-chemical pulping. We have a second operation for the smaller quantities (Kg-kilo) mentioned above which is Pre-hydrolysis Kraft.

8) What details of the scale of your process are you willing to share (e.g. batch and/or continuous or volumetric productivity)?

Annual capacity is 40,000t on a dry basis for the sulphite lignin. The pre-hydrolysis kraft process for lignin is a DEMO scale batch process, producing approx. 6-8 cubic meters of Pre-hydrolysis liquor which is the source of the lignin.

9) Do you measure the typical composition of your lignin? If so, what method do you use? How consistent is the composition of your lignin?

Ad hoc measurements for the sulphite lignin process. We have measures for the acid soluble lignin from the kraft process and these are stable.

10) Do you routinely test your lignin for consistency within and between lots?

Yes for both industrial and pilot/DEMO scale

11) What impurities are present in your lignin and what testing do you

perform to determine the presence of impurities?

Insoluble material, inorganics

12) Does your process include a purification or filtration step?

Yes for the sulphite lignin. Purification processes are being developed for the kraft lignin.

13) What is the typical concentration in g/L you can provide?

The lignin content of the Kraft PHL is typically between 10 and 15 g/L.

14) Have you examined the impacts of transport and storage on lignin? If so, can you please provide any relevant (non-proprietary) details of these impacts?

For the sulphite material, the liquid product has to be managed < 50% to avoid high viscosity at lower temperatures. The powder product is hygroscopic and moisture contact must be avoided. The kraft lignin remains constant over a 3 month period, both at room temperature and under refrigeration.

15) Into what markets do you typically sell your lignin? What is a typical application for your lignin?

For the sulphite lignin, we sell into most of the known Lignosulphonate applications. For the kraft process lignin we have no commercial market engagement.

Kind regards,



Beth A. Cormier
Sappi North America