Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products
P.O. Box 919
Palatka, FL 32178-0919

September 1, 2009

Mr. Greg Strong
District Director, Northeast District
Florida Department of Environmental Protection
7825 Baymeadows Way, Suite B200
Jacksonville, FL 32256

RE: Response to June 1, 2009 "Letter Order" to Georgia-Pacific Palatka Mill – Production Optimization and Saltcake Alternatives

Dear Mr. Strong:

Attached is Georgia-Pacific's response to the request for Information from the June 1, 2009 "Letter Order". This response is specifically addressing "Production Optimization and Saltcake Alternatives" which is due September 1, 2009.

Georgia-Pacific looks forward to working with the Department as we continue gather information and address the remaining items in the "Letter Order". If you have questions during your review of the information provided, please don't hesitate to contact me at your convenience.

Sincerely,

Gary Frost
Vice President of Operations
Palatka Mill

Mike Curtis
Environmental Health & Safety Manager

Cc: Melissa Long – FDEP
Khalid Al-Nahdy
Traylor Champion – GP (Alt)
Michael Davis – GP (Alt)
Mike Curtis – GP (Pal)

PROCESS OPTIMIZATION AND SALT CAKE

In the June 1, 2009 "Letter Order", the Florida Department of Environmental Protection requested additional information on the Palatka Mill's process optimization efforts and for further analysis of alternatives to current salt cake disposal practices. The following paragraph is the specific language from the "Letter Order":

> *"By no later than September 1, 2009, GP shall submit a report to the Department detailing the additional activities it has taken to further optimize the process improvements since it March 2007 report. This report shall focus on optimization efforts intended to reduce the level of specific conductivity, and the formation of dioxins and furans. This report shall identify all spills and leaks (where they occurred, from what unit process, and the amount of the leak or spill) since March 2007 and how they were managed. GP shall also provided a further analysis on the feasibility of the Chloride Removal Process (CRP) for managing salt cake from the recovery furnace and the CRP's ability to reduce specific conductance and chlorinated organics, particularly dioxins and furans. The report shall also address the feasibility of land filling salt cake on GP property."*

Georgia-Pacific has completed extensive analysis of alternatives. The following is a summary of the findings. A more detailed review can be found in the subsequent sections.

A. G-P continues the process of continuous improvement of our operations and has completed several additional projects since March 2007 to improve our effluent quality. A list of the most significant projects has been compiled for this report. Our efforts between January 1, 2008 to July 1, 2009 have reduced the average conductivity to approx. 2200 µohms/cm.
B. A review of black liquor spills and leaks has been completed for this report. G-P finds black liquor is well managed in the Palatka Mill and no BMP incidents have occurred in 2007, 2008, or 2009. Additionally, conservative estimates find that spills and leaks only account for a 2 µohms/cm impact on the effluent.
C. Alternative salt cake disposal practices have been reviewed to determine if they are viable. An update of salt cake marketing analysis has been completed along with the cost of implementing a dry handling system. Additionally, dry salt cake disposal in the Putnam County Landfill and within our disposal site has been evaluated. Our review finds salt cake disposal has an average impact of approximately 150 µohms/cm. From this analysis, alternative salt cake handling system will not allow the facility to comply with conductivity standards in Rice Creek and are not justified.
D. A review of the CRP process finds the environmental benefits would be less than that of alternative salt cake disposal and water quality standards in Rice Creek would not be achieved. GP finds that the CRP process would not be justified at this time.

A. PROCESS EQUIPMENT OPTIMIZATION

Georgia-Pacific has been requested to provide a list of additional activities taken to further optimize the process improvements since the March 2007 report. The Palatka Mill has continued its improvement efforts regarding optimizing and improving operations. The continuous improvement efforts have resulted in reducing the average wastewater treatment plant influent conductivity from 2500 to 2200 µohms/cm from the time period starting January 2008 through July 2009. Specifying specific conductivity improvement from the individual projects is difficult and has not been attempted.

The "Letter Order" also requested we focus this report on optimization efforts intended to reduce the formation of dioxins and furans. G-P continues to measure non-detectable values for dioxins and furans in our bleach plant effluents.

List of Projects:

- Caustic in the oxygen delignification system has been changed from industrial to a low chloride grade. This has resulted in minimizing the amount of chlorides entering the liquor cycle and reduced the amount of salt cake that is required to be purged for chloride control.

- The brownstock washer feed tank agitators were upgraded which resulted in reducing overall foam/air to DD brownstock washers.

- Re-design of oxygen flow meters to Oxygen Delignification Stage (O2D) to optimize Kappa reduction in the system. We are now obtaining 55-60% delignification in O2D of Soft Pine and 45-50% for Hardwood.

- Optimized caustic usage in the Oxygen Delignification System to maximize the extent of delignification.

- Upgraded filtrate system for Post Oxygen Washer to allow for all filtrate to be used on the washer via counter current washing

- Removed closing pieces on DD brownstock washers to allow for better drainage and improved washing.

- Replaced 5, 6, 7 DD brownstock washer vacuum pump motors with 1200 RPM motors to maximize filtrate removal.

- Installed new rotors on 6&7 primary screens to increase consistency to DD washers.

B. Spill Management

Georgia Pacific identified the spills and leaks that occurred from March 2007 to July 2009 (Table 1). During that 28 month period, there were fourteen events where the peak and duration were above the conductivity lower limit of 3448 umhos/cm.

The mill experienced no events that exceeded the Best Management Plan's Level 2 Action Level during the 20,440 hours of continuous operation. The impact of these spills on final effluent conductivity is calculated at 2 umhos/cm.

Georgia Pacific finds that the black liquor BMP systems installed are working adequately and Spills/ Leaks to the sewer are not a significant issue.

Table 1 List of Black Liquor Spill Events

Black Liquor Event	Date of Event	Duration (start of peak to end of of peak) - hr.	Duration (above upper limit) - hr.	Conducivity (peak) - uS
Diverting Kraft liquor charge tank and #1 foam tank	6/4/2007	<.5	<.5	4200
	7/3/2007	3	0	3900
	12/31/2007	5	1	5500
	3/24/2008	2	0	3000
	3/29/2008	2	0.5	4700
	5/30/2008	3	0	3500
	6/24/2008	3	2	4900
	6/25/2008	0.5	0.5	6500
	8/3/2008	2.5	2	6800
	8/24/2008	1.5	<.5	4500
Black Liquor Losses to containment while collection system was diverted due purging of salt cake	5/9/2008	2	0	4000
	8/2/2008	2	<.5	4900
	9/3/2008	1.5	0.5	6800
No.1 Evaps startup / valve position	9/14/2008	3	1.5	8500

Black liquor losses to the process sewer are generally a result of two causes. The first is the overflowing of the charge tank in the digester area and the second was due to unexpected black liquor losses while the containment system was diverted due to purging of salt cake.

The charge tank overflow was addressed by the replacement of a leaking block valve going into the tank and modifying the diversion system set-points. The loss of black liquor while salt cake was being sewered was addressed by modifying diversion set point and revising operating procedures.

C. Salt Cake Usage

G-P has completed an analysis of alternatives to the current disposal practices for salt cake from the manufacturing practices. This analysis evaluated the options of removing dry salt cake from the Recovery ESP and either selling the product or disposing of the dry product in a landfill. An equipment assessment has also been completed to identify changes necessary to remove dry salt cake from the Recovery Furnace. The following paragraphs review the marketing analysis, equipment modifications and the landfilling alternatives.

A review of the salt cake use and disposal practices finds that the Palatka Mill recovers salt cake generated from the ClO2 generator as a chemical make-up to the process chemical system. Salt cake is removed from the liquor cycle at the Recovery ESP where not only sulfur but chlorides are removed from the liquor cycle. Currently, chlorides are the controlling factor in determining the amount of salt cake removed from the process. Due the improvements to the process over the past three years, there has been a notable reduction in the amount of salt cake sewered. Currently, salt cake recovered from the electrostatic precipitator at the recovery furnace is balanced with the mill's needs. Most of the material is returned. As a result we are only sewering approximately 11 tons per day of salt cake.

Based on current sewering practices of an average of 11 tons daily, an analysis performed determined that by removing salt cake from the process sewer, the waste water discharge water quality for Conductivity would improve by 150 µohms (the mean value drops from 2200 µohms/cm to 2050 µohms/cm). The 99th percentile from the data set is approximately 3300 µohms/cm. This reduction would not allow the conductivity standard of 1650 to be met in Rice Creek.

In the Florida DEP "Letter Order", the following statement suggests that the inorganic salts in the Salt cake may be contributing to dioxin in the discharge.

"t*he CRP's ability to reduce specific conductance and chlorinated organics, particularly dioxins and furans"*

G-P does not understand the basis of this statement but decided to address it specifically by testing the dry salt cake for dioxins and furans. This analysis was completed in July 2009 and, as expected, found dioxins and furans at non-detectable levels.

Marketing Alternatives

GP evaluated the marketing alternatives for dry salt cake. Dr. Sujit Banerjee, Professor of Institute of Paper Science and Technology at Georgia Tech University was contracted to update the marketing analysis (See Appendix 1) conducted in 2003.

Georgia-Pacific's Palatka operations produce sodium sulfate (salt cake) as a byproduct of two processes. Sodium sulfate is generated at the recovery furnace electrostatic precipitator (ESP) at 120 tons per day at roughly 90% purity, which the vast majority is recycled back into the liquor cycle. The chlorine dioxide generator produces 13 tons per day of sodium sulfate at greater than 99.99% purity. The mill needs salt cake as a make-up chemical and it uses the higher purity material for this purpose. The mill sewers the low-purity salt cake from the precipitator for sulfidity control and as a purge for non-process elements such as chloride and potassium. Currently, removing salt cake from liquor cycle is triggered by the level of chlorides in the process liquor and only incidentally due to liquor sulfidity.

Sodium sulfate is a commodity raw material used by various industries. G-P is interested in determining whether the sewered salt cake is a viable product, or if modifications are required to meet market needs. It is only interested in marketing the ESP product because the salt cake from the chlorine dioxide generator is required for internal use.

The main objectives of the study were to provide G-P with information about the needs of the salt cake market through discussions with consumers, processors, distributors, brokers, and trade organizations. In 2004, G-P contracted with Dr. Stephen Makris to prepare a report entitled *Georgia-Pacific Palatka Salt Cake Project* (1). This report updates the Makris report.

The principal consumers of salt cake are the detergent, paper, textile and glass industries. Sodium sulfate is used as filler in powdered detergents; the amount used can be as high as 50%. Unbleached Kraft mills use salt cake for sulfidity control. The textile industry utilizes sodium sulfate in dyeing applications. Sodium sulfate is used in glass manufacturing as a fining agent to help remove small air bubbles from molten glass.

Salt cake from the recovery boiler electrostatic precipitator (ESP) will be difficult to market because it is out-of-specification for all but the paper industry. These potential customers include Interstate Paper at Riceboro, GA; Khem-Tech, a broker in industrial chemicals; Giles Chemicals, a manufacturer/processor of salt cake; and Aume Consulting, which is sourcing salt cake for a new glass manufacturing facility in Jacksonville, FL. Even for these customers, the high sodium chloride content makes it less desirable. Several parties expressed interest in the chlorine dioxide salt cake because it is a purer product. Unless salt cake from the ESP is purified, sewering remains the only practical means of disposal for this material.

Economic Evaluation of Removing Salt Cake from Recovery Furnace Precipitator

As previously discussed, there is a limited opportunity to sell salt cake from the ESP to other pulp and paper mills. The marketing opportunities are more viable if the salt cake could be removed from the precipitator in a dry form. However, the salt cake from Palatka's precipitator is presently removed as slurry rather than in a dry form.

In order to remove the salt cake in a dry form, the slurry mixers at the ends of the precipitator would have to be replaced with a dry handling system designed for dry powder removal. However, since each drag chain removes each half of the total precipitator catch (approximately 120 tons per day), it would be feasible to modify only one mixer. Georgia-Pacific contacted equipment vendors that could retrofit the precipitator with a new dry handling system, the equipment necessary to transport the salt cake to a storage vessel, and a storage vessel which would allow the salt cake to be loaded into trucks for shipment to a customer.

Southern Environmental, Inc. (SEI) submitted a detailed budget estimate for retrofit of the precipitator. Their estimate of the total installed cost for the major process equipment was $808,000, including the following equipment:

- Replacement conveyor at the end of the precipitator
- Rotary valves
- Transfer conveyor from the rotary valve to the storage silo
- Storage silo 12' diameter by 37' high
- Note: Electrical equipment, structural steel, and foundations for the silo were not included in the SEI budget estimate

Georgia-Pacific estimates the total installation cost of the project to be approximately $1.3-1.6 million including the cost of the electrical equipment, structural steel, and foundations and indirect costs such as engineering, startup, and working capital are added. A detailed breakdown is provided Appendix 2. Georgia-Pacific also estimates the annual operating cost of the system to be approximately $180,000 per year, including depreciation, as shown Appendix 3.

Landfilling Alternative

A feasibility report for landfilling salt cake on GP property was performed by Sevee and Maher Engineers, Inc (See Appendix 4). The purpose of the study was to identify the site improvements that would be required by the regulating agency for GP to dispose of salt cake waste on-site. Due to the potential for groundwater contamination of the disposal site, the facility would need a complete liner and leachate collection system to be installed.

The cost to design, permit and construct the solid waste system necessary to landfill salt cake is estimated at $6.9 million capital costs and an operation cost of $400,000 annually.

Inquiries into hauling salt cake to the Putnam County Class 1 Landfill were also explored. The cost to haul the material to the site is estimated at $10 per ton and the landfilling price is $100 per ton.

E. CRP EVALUATION

Georgia-Pacific has completed an assessment of installing a CRP (Chloride Removal Process) in the chemical recovery system. (See Appendix 5). As previously noted, G-P removes salt cake from the process liquor cycle for the management of liquor sulfur content and non-process element contaminate levels of such as Chlorides and Potassium. Currently, chloride level is the controlling parameter to determine when salt cake needs to be removed from the process. A CRP installation would remove these two non-process elements from the liquor cycle and eliminate the need for salt cake removal for chloride level control. With chlorides being controlled with a CRP, sulfur content control could be managed by removing a portion of the ClO2 generator salt cake that could be marketed or landfilled.

HPD, Inc. has developed a commercial application that removes these two non-process elements which is called the "Chloride Removal Process" (CRP™). In the CRP™ process, Recovery Electro-Static Precipitator salt cake is dissolved in water and fed to an evaporative crystallizer. As the water evaporates, sodium sulfate crystals are precipitated. The resultant slurry is transferred to a centrifuge where the crystals are de-watered and returned to the recovery cycle.

This centrate, which contains concentrated chloride and potassium, is then recirculated back to crystallizer and is partially purged from the system. According to HPD, Inc., chloride and potassium removal efficiency is approximately 99 percent.

Georgia-Pacific has installed a CRP™ process at another facility to improve liquor cycle performance due to the very high chloride content in the liquor cycle. The unique configuration of the facility where the CRP™ process is installed makes the investment in that case feasible. The capital investment of similar project in Palatka is projected to be between $6 to $8 million dollars.

With the $6 to $8 million dollars cost of the CRP™ process to eliminate salt cake removal for chloride control, liquor system sulfur would be maintained by removing salt cake generated by the ClO2 generator. To allow for this product to be sold into the detergent market, the pH of the salt cake would need to be adjusted to greater than 5 and then dried to less than 0.5%. Equipment necessary would include pH adjustment system, salt cake drying device, and dry salt cake handling and storage systems. The added capital cost of equipment that would be needed to make these adjustments would have to be added to the cost of the CRP™ project.

The CRP™ process and ClO2 salt cake pH adjustment / drying equipment could technically be installed at the Palatka Mill. The high capital cost of such a project could possibly be justified if a significant improvement were to occur; however, G-P does not anticipate a CRP would result in any improvements to the production process. The only benefit would potentially be an improvement to the effluent conductivity of approximately 100 µohms/cm, which is not nearly the reduction necessary for meeting conductivity standards in Rice Creek.

APPENDIX 1

SALT CAKE MARKETING REPORT

APPENDIX 2

Palatka Electrostatic Precipitator Modifications
Dry Sat Cake Removal Capital Cost

Cost Items		Cost Factors	Dollars
DIRECT CAPITAL COSTS (DCC):			
(1)	Purchased Equipment Cost		
	(a) Cost from SEA quote	Based on SEA quote	$606,000
	(b) Structural, piping and electrical	0.20 x 1a	$121,200
	(c) Freight	0.05 x (1a + 1b)	$36,360
	(d) Subtotal	(1a + 1b +1c)	$763,560
(2)	(a) Direct Installation (SEA provided equipment)	Based on SEA quote	$202,000
	(b) Direct Installation (structural, piping and electrical)	0.25 x 1b	$30,300
Total DCC:		(1d) + (2a) + (2b)	$995,860
INDIRECT CAPITAL COSTS (ICC): (a)			
(3)	Indirect Installation Costs		
	(a) Engineering & Supervision (a)	(0.10) x (DCC)	$99,586
	(b) Construction & Field Expenses (a)	(0.10) x (DCC)	$99,586
	(c) Contingencies	(0.10) x (DCC)	$99,586
(4)	Other Indirect Costs		
	(a) Startup & Testing (a)		included
	(b) Working Capital	30-day DOC	$2,309
Total ICC:		(3) + (4)	$301,067
TOTAL CAPITAL INVESTMENT (TCI):		DCC + ICC	$1,296,927

Notes:
(a) Factors and cost estimates reflect EPA OAQPS Cost Manual.

APPENDIX 3

Palatka Electrostatic Precipitator Modifications
Dry Sat Cake Removal Operating Cost

Cost Items		Cost Factors	Dollars
DIRECT OPERATING COSTS (DOC):			
(1)	Operating Labor		
	Operator	$22/hr; 1 hr/day = 365 hr/yr	$8,030
	Supervisor (a)	15% of operator cost	$1,205
(2)	Maintenance (a)		
	labor	Equivalent to Operating labor	$9,235
	Materials	Equivalent to Maintenance labor	$9,235
Total DOC:		(1) + (2)	$27,704
INDIRECT OPERATING COSTS (IOC): (a)			
(7)	Overhead (a)	60% of operating labor & maintenance	$16,622
(8)	Property Taxes (a)	1% of total capital investment	$12,969
(9)	Insurance (a)	1% of total capital investment	$12,969
(10)	Administration (a)	2% of total capital investment	$25,939
Total IOC:		(7) + (8) + (9) + (10)	$68,499
DEPRECIATION (DEP)		15 Year, straight line; TCI/15	$86,462
ANNUALIZED COSTS (AC):		DOC + IOC + DEP	$182,664

Notes:
(a) Factors and cost estimates reflect EPA OAQPS Cost Manual.

APPENDIX 4

LANDFILL DESIGN REVIEW

APPENDIX 5

CRP REVIEW

Georgia-Pacific

Intracompany Memo

To:	Mike Curtis	*Facility*	FL180
From:	Jeffrey W. Brown	*Facility*	GA030 18
Date:	June 18, 2009		
Subject:	CRP Study		

I have investigated the CRP (Chlorine Removal Process) at a P-0 level to determine what impact such a process would have on the Palatka liquor cycle and liquor balance. The following comments are based on the following assumptions:

1. Salt cake from the ClO_2 plant is being totally recovered to the liquor cycle.
2. ElectroStatic Precipitator (ESP) ash is being sewered to maintain potassium/chloride levels in the liquor cycle on an as needed basis.
3. No NaSH is being added to the liquor cycle to maintain sulfidity.

These assumptions appear to be true when I look at the monthly Pulp & Utilities Cost Package.

My study has returned the following information:

1. I talked with Mike Begley (HPD Systems) and he estimated the cost of a CRP ala Brunswick would be approximately $6-8MM Total Installed Cost.
2. The conductivity added to the effluent by sewering the ESP ash is about 150 ms per Mike Curtis.
3. Inasmuch as the ESP ash is 80 percent salt cake and 20 percent carbonate, the real savings is the carbonate, which represents a caustic make-up reduction opportunity. Most of the remaining saltcake (85%) will be returned to the system. Assuming these numbers are close, the estimated impact on the effluent conductivity would be:
   a. (20% (Na_2CO_3) + (1-.85)* 80% (salt cake recovery)) * 300 ms = 96 ms reduction
   b. This reduction would occur when ESP ash is sewered.
4. Because 85 percent of the saltcake from the ESP ash is recovered with the CRP, an equivalent amount of saltcake from the ClO_2 plant must be sewered to maintain the liquor balance.
5. An additional 200 horsepower of electrical energy and 2000 lbs/hr of low pressure steam would be consumed.

6. The CRP would be beneficial if it is desired to take a high quality salt cake from the ClO_2 plant to sell to some vendor off site. The cost of the CRP and drying vs the benefit would need to be evaluated to determine economic fit.

Conclusions:

1. Installing a CRP will not get us the desired amount of conductivity reduction to reach our goal. It looks as if about 100 ms reduction in the effluent would be the benefit.
2. One method to reduce conductivity is to remove saltcake from the ClO_2 or the ESP ash from the mill site.
3. Costs of operating a CRP are significant and will add to the operating costs and the air pollution discharge.

If you have any questions, please give me a call to discuss.