

Procter & Gamble Resource Assessment for Bioenergy

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Prepared for Procter & Gamble Box Elder Plant, Tremonton, Utah.

Table of Contents

1.	Project Scope	2
2.	Liquid Streams.....	2
3.	High Moisture Solids.....	4
4.	Low Moisture Solids	4
5.	Inorganic Waste.....	5

List of Tables

Table 1.	Daily record's from Moms/Post of liquid streams a day.	2
Table 2.	Summary of liquid streams	3
Table 3.	Summary of high moisture solids	4
Table 4.	Summary of low moisture solids	5
Table 5.	Inorganic waste	6
Appendix A.....		7
Appendix B		12

1. Project Scope

Assess the resource availability in liquid, high moisture, low moisture and inorganic waste stream in and around the Box Elder County in Utah.

2. Liquid Streams

Kris Harrop from Moms/Post reported their sugar liquid stream is producing high concentrations of BOD as much as 6-7 brix level. This is equivalent to 6-7g of sucrose dissolved in 100g of solution, and about 250g of sugar a day. At 6,000 gallons of water a day it would generate 1.7 t/day of sugar in solution.

They currently are working with an independent lab to perform an analyses on the composition of this stream and they are willing to share these findings once received. They also provided a daily record on the amounts of liquid they are producing daily (Table 1).

Table 1. Daily record's from Moms/Post of liquid streams a day.

<i>Sample Date</i>	<i>mg/l BOD</i>	<i>lbs. BOD</i>	<i>mg/l TSS</i>	<i>lbs. TSS</i>	<i>Gallons</i>
5/17/2015	47100	2357	306	15	6000
5/18/2015	56800	2842	892	45	6000
5/20/2015	98800	4944	2400	120	6000
5/21/2015	86800	4343	4830	242	6000
5/24/2015	121000	6055	5600	280	6000
5/31/2015	114000	5705	5580	279	6000
6/2/2015	83400	4173	2700	135	6000
6/3/2015	69400	3473	1430	72	6000
6/7/2015	63400	3173	1540	77	6000
6/8/2015	20000	1001	412	21	6000
6/10/2015	87800	4394	2410	121	6000
6/11/2015	58800	2942	1540	77	6000
Ave		3783.5		123.6667	

Schrieber Foods has a liquid “sludge” stream of 6K gal/day with 2-3% solids. The waste is sent through a pretreatment plant that processes the water down to 650 mg/L discharge limit. This is currently land applied at a cost to Schrieber. The sludge has not had a composition analyses performed. It could be fed to a digester if dewatered. They are not interested in investing in a

digester due to the costs, although the Wisconsin plant does have a digester. They mentioned a larger Schrieber plant located in Smithfield, UT a contact person is Brent Wackworther. The whey stream is high lactose; it produces 8% solids at 6K gal/day. This whey stream is currently being hauled off and applied to land. The yogurt stream is 2K gal/week with 30% solid, of that 1.4K goes to pork feed and the remainder 700k is land applied. Cream cheese stream produces 600 gal/week with 30-40% solids.

Loft house (ConAgra) plant produces 75M cookies and 20M waffles annually. Their organic waste is 70% cookies and frosting, the main use is cattle feed. The water waste is consistently stable in production throughout the year. They do not have a water treatment plant available due to costs. They are currently paying 35K annually to remove the liquid. They are using 45K gal/day of water of this amount 3-6K gallons is BOD.

JB's waste stream that's high in moisture is their sewage sledge which is being sent to compost. They pay to bulk it (includes feces and black water) 1000 ton/month, 10-18% solids. They are paying to mix it with woodchips \$9K/month and further paying for their own transportation. They use a centrifuge to remove water and compress it. They have a consistent liquid stream throughout the year. They currently use a lagoon to capture biogases 500-1000CFM.

Table 2. Summary of liquid streams

<i>Liquid Stream</i>		
<i>JB's</i>	Sewage sledge	1000 t/month, 10-18% solids
<i>Mom's/Post</i>	Sugar water stream	6K gal/day producing 1.7 tons a day of sugar in solution ~250g sugar/gal; Brix level 6-7
<i>Scrieber Foods</i>	Sludge stream	6K gal/day, 2-3% solid
	Whey stream	6K+ gal/day, High lactose content, includes cream cheese, 8% solid
	Yogurt	2K gal/week, 30% solid
	Cream Cheese	600 gal/week, 30-40% solids
<i>Loft house (ConAgra)</i>	Sugar water	45K gal/day, 3-6K gal of solid

3. High Moisture Solids

JB's is environmentally conscious. They produce a high moisture stream of ponche. It's near 80% moisture, and the material contains grain and straw from cow bellies. They generate 120lbs a head and its post pressed. They currently slaughter 9K head/week, which converts into 540 ton/week in ponche (Table 3).

Bear Lake is a federal wetland in Montpelier, ID. They are eradicating bull rush, a woody plant that grows in and around the wetland. It is overtaking the wetland and must be managed, currently they are burning it. There is near 4K acres being managed through burning. This herbaceous material has not been harvested due to its location in and around the wetland. Therefore, we were unable to gather information on the harvest amounts of the plant.

Table 3. Summary of high moisture solids

<i>High Moisture</i>		
<i>JB's</i>	Ponch	540 t/week, 80% moisture (post press)
<i>Bear River</i>	Bull Rush	4K ac.

4. Low Moisture Solids

JB's has a grease waste stream that is low moisture content of .05%. They produce from the grease 6-8 lbs. a head/week, which converts into 27 t/week. This material is being sold as feed. Honeyville organic waste streams consists of barley flakes, cracked grains, flour and grains. They have a problem with mixed waste and overproduction. The mixed waste is difficult to sell and the overproduction is difficult to store. The barley hull is very expensive to run a boiler. They asked if there was a method to tote out the material which would be more cost effective. The material is used for animal feed. A bin can hold 50K lbs. depending on bulk density. They have excess production of near 50K bins annually, it will vary depending on the bulk density of the material. They process 100 lbs. every three days. The whole grain is 50 lbs. every 8 days. Three truckload of barley hulls within an 8 day period. Currently they run this material into pellets, however they would like to move away from this process due to costs.

Jensen Mill disposes of saw dust in bin's which also include large scrape pieces of lumber. This material goes into a dumpster and they are paying for it to be removed. The dust collection bin is empty twice a month.

Spoke to Jim Hall from USDA in Box Elder County he reported that corn stover is near 1/3 of the cropland in corn production, majority becoming grain corn. There is a small amount of stover

collection for low grade feed. Most of the stover is being shredded and tilled back into the soil. The common yields of stover on irrigated land is 230-250 bu/ac (pushing 300 on prime acres). Wheat straw is another 1/3 of cropland its production is 30K ac and of that 12-20K is irrigated. Residue management is an issue on irrigated lands and there is pressure for famers to get the fall planting into harvest. They are currently burning approximately 80%. They do very little baling of the residue and burning is becoming more restrictive and could draw interest into baling. The window of potential harvest for residue is between July and August with some flexibility towards October. Some farmers like to keep the residue on the field for cover and moisture retention. They plant with a conventional rotation of every other year fallow and incorporate safflower that gives the potential for a second crop before fallow. The estimated local collection cost is \$25-30 ac to swath and bale; there is many custom baling operations available. The dominate harvest technique is square bales (3'x4'x8'). In CRP, they are having an issue with Black Grass Bug over a 60K ac. It can be better managed through harvesting and by removing the grasses. This is allowed 1-2 times in a 10 year contract, but currently cannot be sold.

Table 4. Summary of low moisture solids

<i>Low Moisture Solids</i>	
<i>Mom's/Post</i>	Brix 6-7 from the liquid stream
<i>JB's</i>	Grease 27 t/week, .05% moisture
<i>Honeyville</i>	100lbs every 3 days ; >15k labs is pelletized
<i>Lofthouse</i>	BOD 3-6K gal/day of solid waste
<i>Bear River</i>	9K acres of phragmities
<i>USDA (Jim Hall) Box Elder County</i>	230-250 bu/ac., cornstover tilling in Wheat yielding 120-140 bu/ac. 60K of Blue Grass (potential) land management

5. Inorganic Waste

Mom's/Post is currently landfilling 8 t/week in plastic bags and other plastics containers. The plastic is made of polyethylene polypropylene. They also dispose of cardboard approximately 4-5 t/week. Currently, they are recycling this, but are open to other options for disposal. Schrieber foods also has substantial plastics and cardboard to dispose of. They were unable to give an exact amount of the inorganic waste but could provide a quantity if pursued. They said

that these items were a mixture of botched product in packaging, unsorted cardboard, dirty plastics and pallets. They dump approximately a 30 yard compactor every day. Loft house was very interested in the inorganic waste being used in bioenergy production. They reported to have 60-90 t/month in paper, clamshell and bags. These items contain food particles and cost the company to remove.

Table 5. Inorganic waste

<i>Inorganic</i>		
<i>Mom's/Post</i>	Plastics	8 t/week
	Cardboard	4-5 t/week
<i>Schrieber</i>	Blotched products, cardboard, dirty plastics and pallets	30 yds./ a day
<i>Loft house</i>	Paper, clamshells and bags	60-90 t/month

Appendix A

<i>Business</i>	<i>Contact</i>	<i>Phone</i>	<i>Location</i>
<i>Grain Farm Dealers</i>	John Farms Trucking	435-257-7246	Tremonton
	Lish Jr. & Sons Inc	435-257-5393	Tremonton
	Evans Grain	801-476-0877	Ogden
	Grain Craft	801-627-1844	Ogden
	Cache Commodities	801-392-2490	Ogden
	Idaho Milling and Grain	208-766-2206	Malad, ID
	Scoular Co	208-852-2070	Preston, ID
<i>Farms</i>			
	Bailey Farms International	435-257-7095	Tremonton
	CJ Farms	435-854-3713	Tremonton
	Facer Farms	435-723-6585	Mantua
	Francom Farms	435-257-7379	Tremonton
	Historical Farm	435-257-7696	Tremonton
	Kka First Farm	435-854-3640	Tremonton
	Little Rock Farms	435-872-8381	Snowville
	Nelson Farm & Livestock	435-257-5029	Tremonton
	Norman Farms Bear Valley Onion	435-744-2018	Corinne
	Randy Iverson Farms	435-279-8871	Bear River City
	Roche Farms Inc.	435-452-1446	Tremonton
	Taylor Farms	435-257-3976	Tremonton
	Walker Farms	435-723-2579	Brigham City
	Zollinger Farms Inc.	435-854-3692	Tremonton
	All American Sod Farms	801-452-8600	Ogden
	Allen J Bennett Farm	801-776-1896	Clearfield
	Anderson Brothers Farms	435-245-3841	Wellsville
	Arnold Hog Farm	435-563-6372	Clarkston
	Ballard Hog Farm	435-753-7857	Smithfield
	Black Island Farms	801-825-6236	Syracuse
	Bosen Farms	208-852-1858	Preston, ID
	Bosen Land and Livestock	208-852-1726	Preston, ID
	Briar Crest Farm	801-605-8784	Ogden
	Carrus Land Systems	435-787-2211	Logan
	Cranney Farms	208-862-3346	Oakley
	DRD Farms Inc.	208-698-3310	Holbrook
	Dibble Farms Inc.	801-544-3825	Layton
	Double C Farms	801-544-0790	Kaysville

***Grain Salvage and
Transfer Service***

Dairy Farms

HJ Fuhriman	435-753-6578	Logan
Hubbard & Co. Inc.	208-335-2269	Holbrook, ID
J Hill Farms	801-782-6328	Ogden
Kevin Smith Farms	208-431-6001	Oakley
Leland Ward Family Farm	208-766-4006	Malad, ID
Northridge Farms LLC	208-766-2933	Malad, ID
Office House Grant 4-d Farms	208-645-2656	Malta
Parker Farms	801-985-0277	Hooper
Pleasant Valley Ranch	801-479-5960	Ogden
RV Farms	435-563-5532	Newton
Reese Kenton Farm	435-753-4923	Smithfield
Ritewood Inc. Feedmill Inc.	208-646-2250	Franklin, ID
Sportsman Paradise	435-245-4611	Paradise
Talbot Farms	208-766-2425	Malad, ID
Task Master Holsteins Inc	435-258-2719	Lewiston
Tuddenham Farms Inc.	435-245-3830	Logan
Turnbow Farms	208-747-3769	Weston
Winder Farms	801-399-4040	West Haven
Zaugg Jersey Farms	435-258-0250	Lewiston
Rick A Shey Inc.	801-552-8578	Layton
Acme Dairy	208-862-2263	Oakley
Andrew's Dairy Inc.	435-563-3430	Trenton
Clawson & Sons Dairy Inc.	435-245-4004	Hyrum
Country Boy Dairy	801-786-0054	Ogden
D&K Dairy	435-258-2114	Lewiston
Degiorgio Farms	801-731-0652	Ogden
Diamond R Dairy	435-753-2006	Millville
Dolphin Winder Dairy	801-399-4040	Ogden
Double Diamond Dairy	208-852-2425	Preston
Elo Dairy Inc.	435-752-4304	Wellsville
Gibbons LC Dairy Farm Inc.	435-258-2302	Lewiston
Gibson's Green Acres	801-731-7404	Ogden
Hall Ed & JW Dairy	435-258-2816	Lewiston
Hawker Cattle Feeders	208-862-3474	Oakley
JP Larsen & Sons	435-563-5747	Newton
Johnny's Dairy	801-393-1461	Ogden
Kapner Bro		Tremonton
Meadow Gold	801-629-4503	Ogden

	Ogden Dairy	435-258-5110	Richmond
	Olsen Dairy Farm	435-245-3326	Paradise
	Richman Dairy LLC	435-245-6884	Hyrum
	Rosehill Dairy Home Delivery	801-876-3061	Morgan
	Ross H. Wangsgard Family	435-753-3445	Logan
	Sagamore Farms	435-245-3479	Paradise
	Schrieber Foods	801-745-3760	Logan
	Silver Sage Dairy	435-258-5315	Cornish
	Tarbet Dairy Farms	435-258-2836	Lewiston
	Westland Dairy Farms	801-731-1166	Ogden
	Westergard Jerseys LLC	801-731-1127	Ogden
	Westover Dairy LLC	208-747-3224	Clifton, ID
	Winder Farms	801-399-4040	West Haven
	Wit's End	435-245-3112	Wellsville
<i>Poultry Plants</i>			
	West Liberty Foods LLC	435-207-7000	Tremonton
<i>Butchering</i>			
	MB Meat Packing	435-257-3967	Tremonton
	West Liberty Food LLC	435-207-7000	Tremonton
	WW Meat Processing	801-782-6550	Willard
	Champion Meats	801-394-9980	Ogden
	Davis Custom Meat Cutting	801-731-7488	Ogden
	JB's	435-245-5812	Hyrum
	Palmer Meat Packing Co		Tremonton
	Earland's Meats		Tremonton
	Theurers Quality Meats		Lewiston
<i>Landfills</i>			
	Box Elder County Solid Waste	435-744-2275	Corrine
	Wasatch Integrated Waste Mgmt	801-614-5600	Layton
	Wasatch Integrated Waste Mgmt	385-244-1180	Layton
	Molding & Sons	801-399-9994	Odgen
<i>Recycling Services</i>			
	Econ Waste Quality	435-257-5588	Tremonton
	A-1 Disposal	801-593-6333	Layton
	Recycled Earth	801-452-6143	Ogden
	Republic Services	801-332-9950	Ogden
	Robinson Waste Svc Inc.	801-825-3800	Layton

Cabinetry

Hillside Recycling	435-257-5111	Deweyville
Chateau Mill and Supply	208-852-3653	Preston
Creative Look	801-399-3457	Ogden
Dryden Woodworking	208-852-2338	Preston
Ellis Planning Mill	801-394-6851	Ogden
Lewis Cabinet Specialties	435-854-3948	Tremonton
Thompson & Sons Cabinet	435-257-7152	Deweyville
Whitaker Custom Woodworking	435-723-9227	Brigham City
Specialized Cabinets	801-544-2464	Kaysville
Swainston Mill and Cabinets	208-852-2730	Preston
J&R Mill Inc.	801-399-1710	Ogden
Out of the woods Cabinets	801-444-9663	Layton
Premier Woodwork and Design Inc.	801-547-8009	Kaysville

Wood Manufacturers

Pages Professional Tree Service	801-54	Roy
AA Tea's Tree Service	435-723-5989	Brigham City
All-wood tree service	801-476-9181	Ogden
Bear River Tree Service	435-458-3486	Garland
PAC Travel	435-257-0117	Tremonton
Alpine Tree and Stump removal	801-726-3060	Kaysville
Little C Tree Service	801-392-3332	Ogden
A Tree Specialist	435-752-9203	Logan
AAA Lawn and tree service	801-837-0710	Clearfield
Cooper's Quality Tree and Shrub	801-546-6039	Layton
Darrell's Tree Service	801-782-0982	Ogden
Double Tree Enterprises	801-782-5531	Ogden
Ernestos Tree Service	801-525-2948	Syracuse
Hull Tree	435-760-6587	Logan
Millers Tree Service	435-713-4369	Smithfield
Nelson Tree Farms Inc.	801-394-5303	Ogden
JM Thomas Forest Products	801-399-1710	Ogden
Lucas Lumber	801-392-6940	Ogden
Wheelwright Lumber Co	801-627-0850	
Bowen Enterprise	801-621-3624	Ogden
Blazzard Lumber	435-783-4550	Kamas

***Cereal and food
Manufacturers***

Malt-o-meal aka Post	435-257-9000	Tremonton
Honeyville Grain	435- 494-4193	Brigham County
Pepperidge	801-773-3022	Clearfield
Associated Food Distributor		Far West
Big J Milling & Elevator	435-723-3459	Brigham City
Walmart Distribution		Corinne
Lofthouse cookie and bakery	888-692-3451	Brigham
Gossner Foods	435-752-9365	Logan
Lower Foods	435-258-2449	Richmond
Don Julio Foods	801-775-9909	Clearfield

Researchers

Darren McAvoy	435-797-0560	Logan
Karrin Kettenring	435-797-2546	Logan

Industrial

OrbialATK	801-775-1766	Clearfield
Lifetime Products	801-728-1251	Clearfield
Vulcraft	435-735-9433	Brigham City

School District

Box Elder	435-734-4800 ext105	Brigham City
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Refuge

Bear River Bird	435-734-6436	Brigham City
Bear Lake	208-241-1827	Montpelier

Appendix B

<i>Company</i>	<i>Liquid Streams</i>	<i>High Moisture</i>	<i>Low Moisture Solids</i>	<i>Inorganics</i>
<i>Moms/Post</i>	Sugar water waste ~250g sugar/gal 6K gal/day Approx. 1.7 tons/day sugar in solution		BOD – brix 6 to 7 from liquid streams. Selling dry waste stream at ~1 mil/yr as cattle feed	Plastic bags and other plastics ~8 tons/week (currently landfill) Bonded polyethylene polypropylene Cardboard ~ 4 to 5 tons/week
<i>Schrieber Foods</i>	Sludge stream 6K gal/day at 2-3% solids Whey stream high lactose, 8% solids 6K gal/day land applied and used for feed Yogurt waste 2K gal/week, 30% solids 1.4K goes to pork remainder land applied Cream Cheese 600 gal/week			Some being currently recycled “substantial” quantities. Mixture of botched product in packaging, unsorted cardboard, dirty plastics, pallets, etc. Approx. 30 yard compactor every day.
<i>JB's</i>		Ponche (bellies of cows-contains grain and straw) 80% moisture 120lbs/head a day (post press) Grease sold as animal feed 6-8lb/head moisture .05%		Cardboard, plastic, gloves
<i>Cabinets</i>			Saw dust empty a dumpster weekly	Rags, cans, paper ~9 cubic yards
<i>Honeyville</i>			Mixed waste is a problem with excess production amounts ~ 50K bins roughly, depends on the bulk density of the material 100 lbs every 3 days	

		Whole grain is 50 lbs every 8 days 3 truckloads of barley hulls within an 8 day period >15K lbs run into pellets want to move away from pellets	
<i>Lofthouse</i>	45K gal/day, waste water 50% is sugar waste	BOD – 3-6K gal/day of solid waste	60-80t/month in paper, clamshell, bags, cardboard, plastic
<i>Bear Lake Bear River</i>	Bullrush 4k acres		
		Phragmites 9k acres	
<i>USU Dr. Kettingen</i>		10-12k acres 80% is phrag	