APPENDIX G

TR MILES DESIGN AND COST ESTIMATE FOR RDF LOCK HOPPER SYSTEM

TR MILES **Technical Consultants Inc**. Phone (503) 292-0107

Email: tmiles@trmiles.com 1470 SW Woodward Way Portland OR 97225 Fax (503) 292-2919

Fuel Feeding System

Technical Specification

1. SITE CONDITIONS

Fuel mass rate: 30,000 lb/hr per feed train (2 trains)
Feed Volume Required: 10,000 ft3/h at 3 lb/ft3; 3,000 ft3/h at 10 lb/ft3; 1,500 ft3/h at 20 lb/ft3
Reactor Pressure: up to 450 Psig
Temperature at Feed Point: up to about 2500˚ F

2. SCOPE OF FEED SYSTEM

The fuel feeding system is designed to feed finely divided loose feed to the gasifier. The system will continuously feed bulk solids into each of two inlets in the reactor. The feed system consists of two trains. Each train would have a dual lockhopper. Each lockhopper would have a precharge hopper with scale and lockhopper discharging alternately into a live bottom pressurized surge bin with metering screws and a feed screw. An alternative system would utilize a screw compactor to bring the solids to an intermediate pressure 260 psig, with a lockhopper raising pressure to 450 psig, or a series of screw compressors and rams that would fill the pressurized lockhopper at working pressures of 450 psig.

3. FEED PROCESS DESIGN DATA

2.1 General

Raw fuel will be RDF or agricultural residues with a base spill density of 3 lb/ft3, 12 % moisture content (MC), with a nominal size less than 2 inch, an ash content of less than 10 wt%, and a heating value of 7250 Btu/lb. It is anticipated that the fuel would be densified to a minimum of 10 lb/ft3 by using densification or pre-compression. Each of two feeders will have the following characteristics:

Feed rate, each train	3000	ft3/h
Precharge Hopper	50	ft3
Lockhopper, each	50	ft3
Meter/Surge Bin with Live Bottom	150	ft3
Metering Screws	500-3000	ft3/h
Injector screw Capacity	3000	ft3/h

3. DESIGN BASIS

This estimate is based on design experience up to 450 psig and operating experience with pressurized lockhopper systems up 5 tons per hour.

This estimate is based on separating the overall feeding function into three independently controlled steps of:

1. Lockhoppering to reactor pressure
2. Variable metering; and
3. Rapid injection into the reactor.

This design approach removes most of the feeding equipment from direct contact with the hot reactor.

FEEDSTOCKS

The reference feedstock for most gasification systems is a wood chip that will pass a 2-inch oscillating screen. RDF or agricultural residues specified here would have a spill density of about 3 lb/ft3. Feedstocks of this kind will require either densification or compaction prior to feeding. At 10 lb/ft3 feedstock will have 60% voidage permeable to gas that must be pressurized before feeding to the reactor.

The feedstock can be externally densified using cubing or pelleting equipment that in practice can increase the specific density up to 35 lb/ft3 and the bulk density to above 20 lb/ft3. Densification can add from $20-$45/ton to the cost of a feedstock. For RDF it is likely that the cost would be $25/ton including power costs equal to approximately 100 HP/ton/hr. Of this 50 HP/ton/hr is used in material preparation and 50 HP/ton/hr is used in densification.

An alternative to densification is the plug screw feeder that can be mounted directly onto the pressurized metering bin. Low-density RDF or loose agricultural residues are compressed in a tapered screw and fluffed at the outlet with a high-speed screw or chopper. A version made in the US has been operated on sugar cane bagasse at up to 150 psig per stage and 5 tons per hour at an installed energy cost of 80 hp/ton/hour. Another system under development in Denmark has achieved densities of 20-30 lb/ft3 up to 15 tons per hour but has not been used against significant pressure. The concept has the advantage of reducing the amount of purge gas necessary to pressurize the fuel charge to the reactor since the feeder could be operated at reactor pressure or at a reduced pressure with only partial pressurization from the lower pressure to reactor pressure.

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LOCKHOPPERS AND VALVES

The use of lock hoppers is the most straightforward method of overcoming high-pressure differentials, provided that the system is isolated from the heat and that a suitable valve is available. Feedstock preparation to 10-20 lb/ft3 improves handling, metering and general flowability.

COMPRESSED GAS and power requirements for the lock hoppers estimated here are:

	Double Lockhopper No Gas Recovery	Double Lockhopper Gas recovered to receivers	Two Trains W/ Gas Recovery 12 lbft3	Two Trains W/Gas Recovery 20 lb/ft3
Feedrate	15 tph	15 tph	30 tph	30 tph
Feed density	12 lb/ft3	12 lb/ft3	12 lb/ft3	20 lb/ft3
SCFM	1422	924	1848	1108
SCFM/ton/hour	95	62	62	37
HP	320	208	416	250
HP/scf 450 psig	.225	.225	.225	.225
HP/ton/hour	21	14	14	8

These figures include both the gas to bring the lockhopper charge up to pressure and also gas to displace the solid fuel moving from the Meter bin into the reactor. The Double Lockhopper arrangement permits venting the just emptied Lockhopper at system pressure into the other charged but not pressurized Lockhopper to realize the power savings shown.

Lock gas recovery systems have not been tested extensively with biomass. In Hawaii at lock gas was recovered and filtered at atmospheric pressure then blended with inert gas, which was CO2 from an inert gas generator, and reused.

Fuel charging to the lock hoppers is accomplished by metering the feedstock by pneumatic or mechanical conveyor to a PRECHARGE HOPPER with level controls. The charge is then quickly transferred into the lockhopper as needed, saving filling time.

The use of large valves and non-restricted material passages insures free and rapid transfer of feedstock. The lock hopper is characteristically empty by the time the valve is fully open.

Valves estimated are MILES designed valves that overcome several problems of using standard gate vales for use with dry solids.

METER BIN

METER BIN VOLUME in the feed system is approximately 10 minutes of operation at full capacity. Increasing the length of the straight cylindrical metal bin shell can increase the material capacity.

METERING & INJECTOR SCREW drives are variable speed. Special shaft seals are used to prevent leakage at high pressures. Meter screws are designed to provide uniform feed to the injection screw that transfers the feedstock into the reactor.

INJECTOR SCREW

Injection into the reactor is an important part of the system. Injector screws are water cooled internally or externally as desired. High-speed screws transfer feedstock into the reactor without accumulating char at startup or shutdown. Purge gas from the METER BIN offsets the flow of gas that is displaced from the reactor as the solids flow into the reactor. The injector can be adjusted to penetrate the flow in the reactor.

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Fuel Feeding System

COST ESTIMATE, (2) 15 TPH TRAINS INSTALLED*

Feed System Equipment	
Lock hoppers and Valves	$ 837,000
Precharge Hopper with Scales	
Lock hoppers	
Gate Valves	
Transition to Meter Bin	
Meter Bins and Injectors	$ 629,000
Inert and Purge Gas Compression	$ 689,000
Total Feed Equipment (installed)	$ 2,115,500
Civil/Structural- equipment supports, foundations	$ 98,000
Mechanical Installation, piping and hoppers	$ 86,000
Electrical and Controls – Feed System	$ 69,000
Electrical and Controls, Purge Gas	$ 115,000
Miscellaneous, freight, spares	$ 155,000
Total Other	$ 523,000
Indirect Costs- mechanical and electrical engineering	$ 217,000
Total Feed System Construction Cost	$ 2,895,000
25% Contingency and allowance for unlisted items	$ 723,000
Total Estimated Capital Cost	$ 3,618,000

*Note: Installation costs are estimated at 30% of equipment costs.

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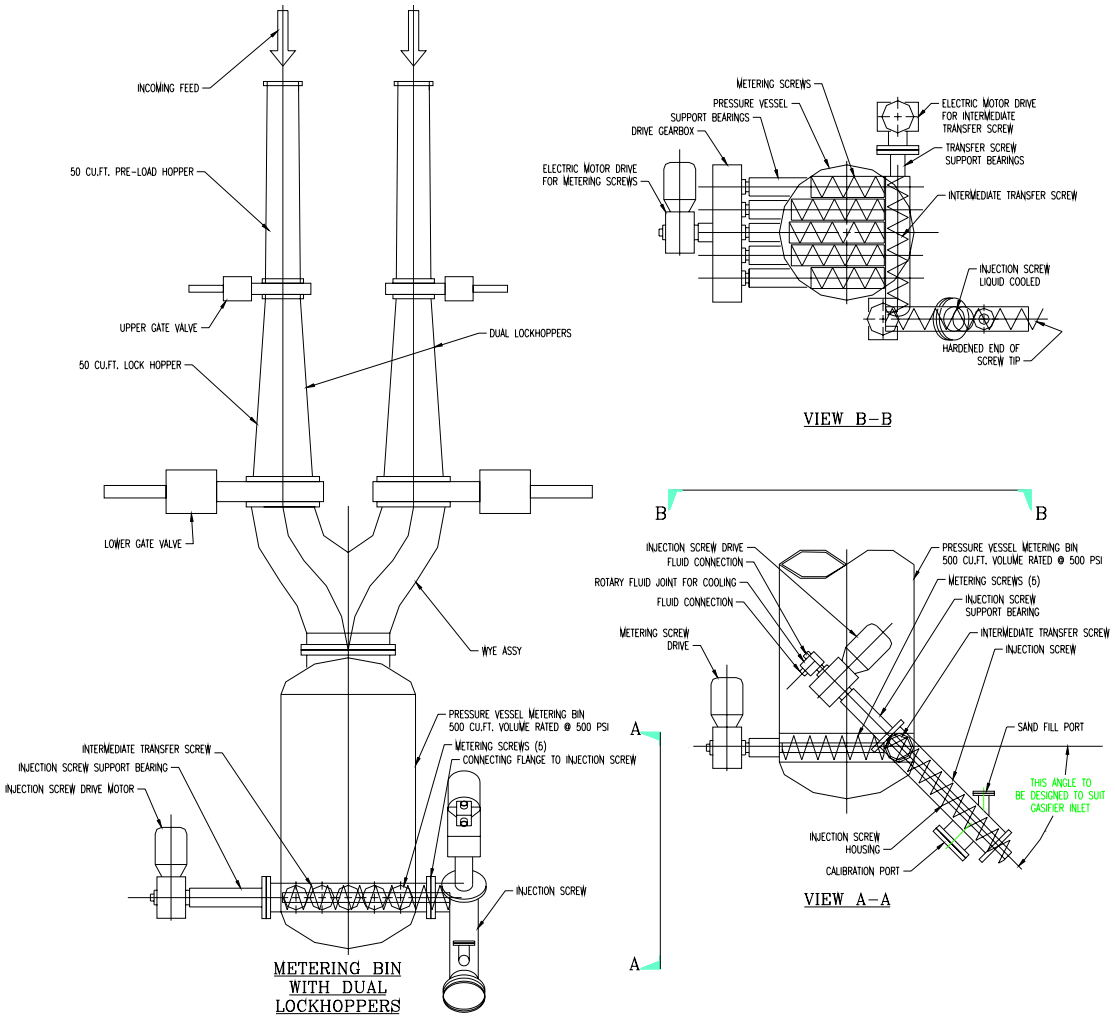

DOUBLE LOCKHOPPER WITH METER BIN AND INJECTION SCREW 15 TPH

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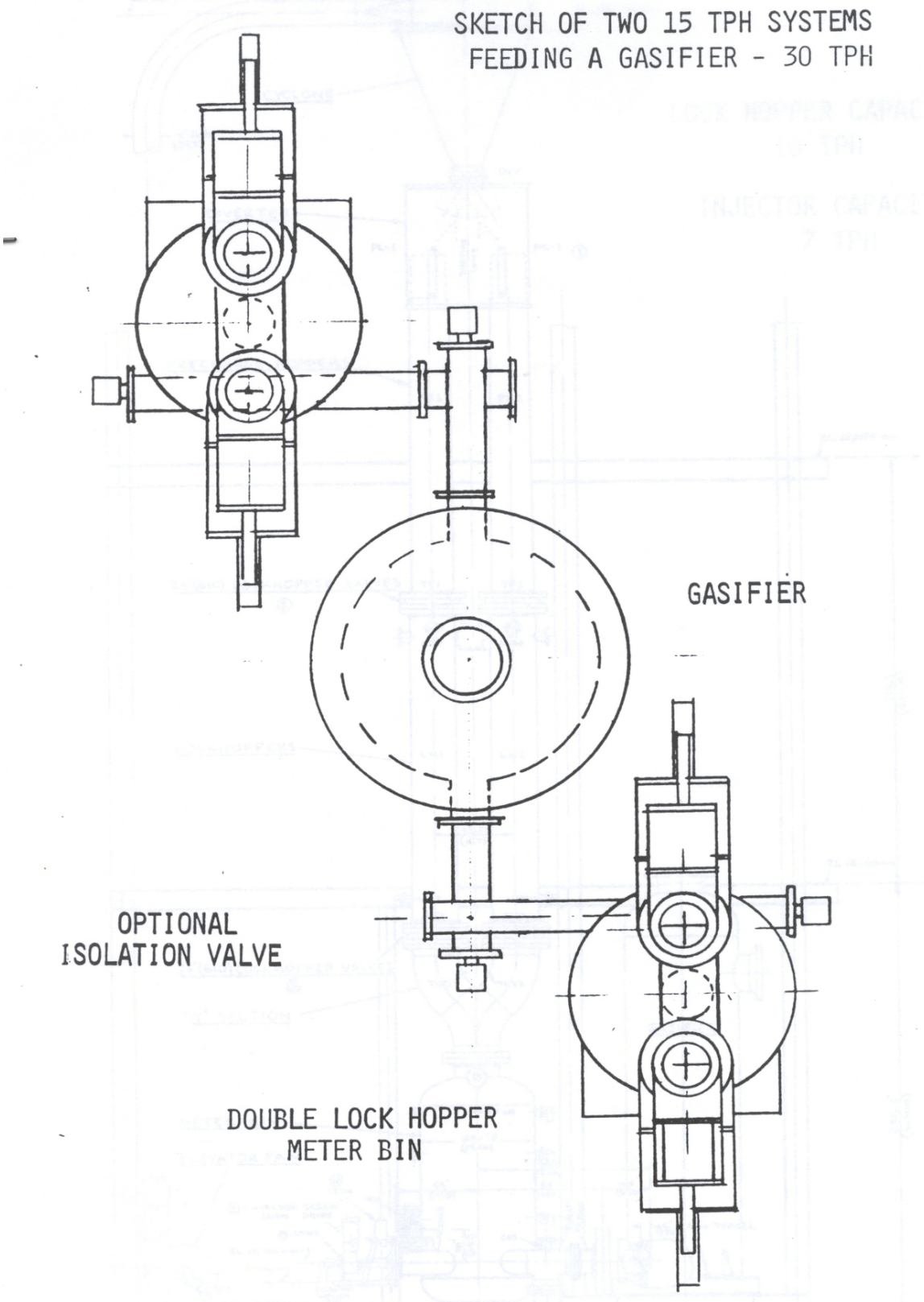

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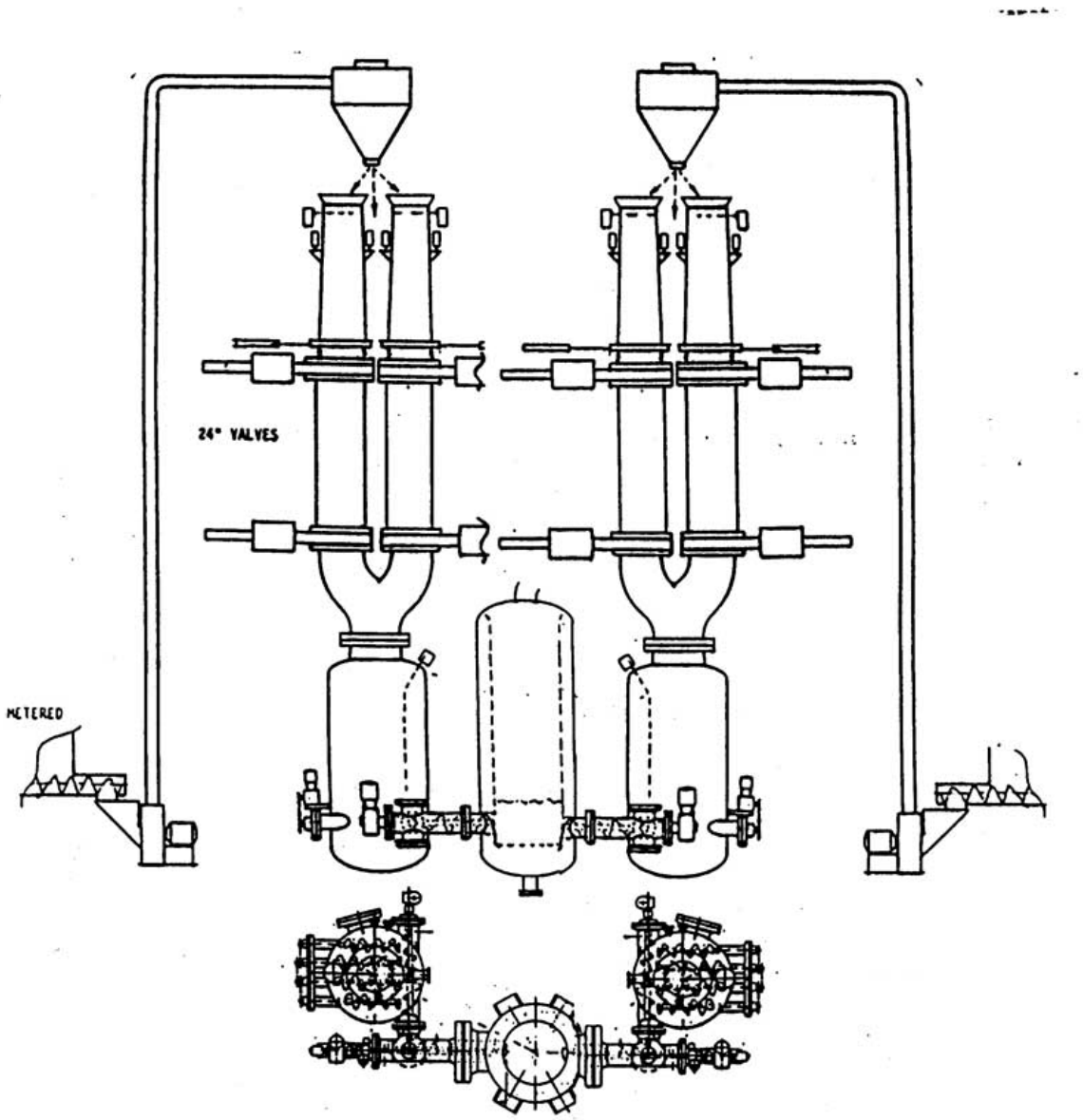

TWO DOUBLE LOCKHOPPERS FOR 30 TPH

APPENDIX H

PROJECT-RELATED WEBSITES

PROJECT-RELATED WEB SITES

Associations

http://www.wastexchange.org/Exchanges/default.cfm
http://www.rta.org/
http://www.preservedwood.com/
http://www.aar.org/

Biosolids

http://www.epa.gov/epaoswer/non-hw/compost/biosolid.pdf
http://www.mwrdgc.dst.il.us/

US Census Data

http://www.census.gov/population/estimates/metro-city/ma99-01.txt

City Offices

http://www.city.bloomington.in.us/
http://www.ci.champaign.il.us/
http://www.evansville.net/mayor/mainmenu.htm
http://www.ci.indianapolis.in.us/
http://www.city.lafayette.in.us/
http://www.ci.decatur.il.us/
http://www.indygov.org/dpw/dev/wastewater.htm
http://www.cityofdanville.org/

Energy Crops and Agricultural Residues

http://www.reap-canada.com/Reports/pelletaug2000.html
http://www.ott.doe.gov/biofuels/cornbridge.html
http://bioenergy.ornl.gov/papers/misc/switgrs.html
http://www.cvrcd.org/biomass.htm
http://www.eren.doe.gov/biopower/feedstocks/
http://www.ceassist.com/collection.htm
http://www.ianr.unl.edu/pubs/FieldCrops/nf310.htm
http://www.blueplanetbiomes.org/elephant_grass.htm
http://www.agry.purdue.edu/ext/corn/pubs/agry9509.htm
http://www.state.ia.us/government/dnr/energy/pubs/irerg/biomass2.htm
http://bioenergy.ornl.gov/papers/miscanthus/miscanthus.html
http://bioenergy.ornl.gov/oreccl/database.html
http://agproducts.unl.edu/corn/pricefar.htm
http://www.wisc.edu/cias/pubs/briefs/051.html

http://www.usda.gov/agency/oce/waob/jawf/profiles/html/usa/usasoy.html
http://www.producer.com/articles/20010104/production/20010104prod02.html

Equipment and Technology

Atmospheric Feeding

http://www.sarinc.com/weighbelt_beltscales.html
http://www.acrison.com/index00.htm
http://www.arbo-feeders.com/
http://www.belltechutility.com/html/sec/gravimet.htm
http://www.brabenderti.com/
http://www.zeppelin-usa.com/hrotary.html
http://www.ktron.com/
http://www.kamengo.com/approach04.html
http://www.merrick-inc.com/solutions.html
http://penncrusher.com/7feeders.html
http://www.accutechinc.com/

Bin Discharging

http://www.bmh.fi/
http://www.deckerindustries.com/silo_dischargers.html
http://www.hindon.com/roplex.html
http://www.metalfabinc.com/
http://www.wameng.com/dischargers.htm

Biosolids Processing

http://www.creativewaste.com/nonthermalsludge.html
http://www.sernagiotto.it/e_essicc.htm
http://www.enviroaccess.ca/fiches_5/F5-02-95a.html
http://www.mitchell-dryers.co.uk/
http://www.limus.de/etro.htm
http://www.komline.com/
http://www.roediger.com/p_sludgedryer.html
http://www.vatech.ch/images/Bars/Start_frame_e_VF.htm

Gas Compression

http://www.gascompressor.com/acidgas.htm
http://www.atlascopco.com/
http://www.burtoncorblin.com/recip.htm
http://www.tencarva.com/air/gas.htm
http://www.gotoppi.com/compressors/compressors.html

http://www.pdcmachines.com/diaphragm_compressors.asp
http://www.elliott-turbo.com/new/products_compressors.html
http://www.enerflex.com/html/comp_power/comp_power.htm
http://www.gardnerdenver.com/GDCorpPortal/
http://www.knox-western.com/
http://www.arielcorp.com/TECHDATA/TECHPAPER/AATECHPAPER.htm

Mechanical Conveying

http://www.4conveyors.com/
http://www.goodmanconveyor.com/
http://www.screwconveyors.com/
http://www.jervisbwebb.com/jbw/productsofjervisbwebbco3.htm
http://www.martinsprocket.com/
http://www.digitex.net/newtonconveyors/
http://www.summerlot.com/
http://www.thomasconveyor.com/
http://www.unicoservices.com/
http://www.feeco.com/

Drying

http://www.airpreheatercompany.com/thermproc.asp
http://www.barr-rosin.ca/products/b9.html
http://www.heylpatterson.com/products/Flashdryerren.asp
http://www.theonixcorp.com/dehydration.html

Flow Measurement

http://www.sarinc.com/weighbelt_beltscales.html
http://www.kanawhascales.com/standard/beltscale/default.htm
http://www.easterninstruments.com/solids_flow_measurement.htm
http://www.ramsey.it/impact-en.htm
http://www.merrick-inc.com/solutions.html
http://www.milltronics.com/product/product.asp?CFC=MMI
http://www.tecweigh.com/index.html
http://www.thayerscale.com/

High-Pressure Feeding

http://www.andritz.com/ANONIDZ52119F43/ppp/ppp-products/ppp-mechanicalfibre/ppp-mechanicalfibre-mainref/ppp-mechanicalfibre-mainref-psftpiec.htm
http://www.komarindustries.com/komarext.htm
http://www.fortum.com/main.asp?path=1
http://www.metso.com/

http://www.steamexplosion.com/
http://www.sri.org.au/home1.html
http://www.thermoselect.com/
http://www94.thomasregister.com/olc/asb/

Metering Bins

http://www.nbe-inc.com/photobook/conveying/photo-index.htm
http://www.sellbergs.se/brini/
http://www.hallco-mfg.com/
http://www.keith.nl/en/index.html
http://www.machinery.verville.com/
http://www.sherbrooke-oem.com/english/wood_pro.html

Pneumatic Conveying

http://www.enviro-engineering.com/kshoe.html
http://www.macawber.com/
http://www.mactenn.com/

Pumping

http://www.bornemannpumps.com/how.htm
http://www.discflo.com/
http://www.morgenmanufacturing.com/index.html
http://www.moyno.com/
http://www.putzmeister.com/
http://www.schwing.com/
http://www.seepex.com/english/frame_e.html

Shotcreting

http://www.shotcretetechnologies.com/
http://www.airplaco.com/equipment.htm
http://www.shotcretetechnologies.com/graphics/i_handappl.jpg
http://www.morgenmanufacturing.com/index.html
http://www.cfultratech.com/

Size Reduction

http://www.advancedrecyclingequip.com/
http://www.ampulverizer.com/
http://www.bliss-industries.com/htm/prodinfo.htm
http://www.cbi-inc.com/main.html
http://www.cuttercorp.com/

http://homepages.ihug.co.nz/~grain/grainA.html
http://www.newhouse-mfg.com/html/c5000.html
http://www.jeffreycompany.com/whatsnew.htm
http://www.pallmannpulverizers.com/pptmref.htm
http://www.rotogrind.com/
http://www.komarindustries.com/komarshr.htm
http://www.shred-tech.com/english/index.html
http://www.ssiworld.com/
http://www.sturtevantinc.com/Products/products.html
http://www.vecoplan.de/eng/Start.php3
http://64.224.66.115/home/welcome.asp?LNG=EN

Valves

http://www.everlastingvalveco.com/
http://www.hiltonvalve.com/showcase.htm
http://www.weyvalve.com/knifegate.html
http://info.jamesbury.com/public/home.asp

Wear-Resistant Materials

http://www.blastnozzles.com/welcome.htm
http://www.cartech.com/cpp/index.html
http://www.clevelandhardfacing.com/index.htm
http://www.stellite.com/en/default.asp
http://www.haynesintl.com/
http://www.malyn.com/nozzle.htm
http://www.xaloy.com/
http://www.ntktech.com/wear-resistant.htm
http://www.omegaslate.com/nozzles.htm
http://www.efunda.com/processes/surface/hardfacings.cfm
http://www.copelandind.com/valve_retrofits.htm
http://www.wallcolmonoy.com/
http://www.cruciblecompaction.com/wear.html
http://www.thomasregister.com/olc/ferrokilnfurn/wearres2.htm

MSW-RDF

Cleaning

http://www.sellbergs.se/brini/
http://www.forsbergs.com/mlmpd.html
http://www.eriez.com/
http://www.lovac.com/fuel.htm

http://www.karlschmidt.com/sort_classifier.htm

Thermal Processing

http://www.isr.gov.au/resources/netenergy/aen/aen10/10swerf.html
http://www.jxj.com/yearbook/iswa/2000/isrecycling_100_possible.html
http://www.interstatewastetechnologies.com/
http://www.mmc.co.jp/english/business/ecology08.html

Resource Information

http://www.winrock.org/reep/Publications/mswrpt/MSW2.html
http://www.epa.gov/epaoswer/non-hw/muncpl/facts.htm
http://www.epa.gov/epaoswer/non-hw/muncpl/msw99.htm
http://www.epa.gov/epaoswer/non-hw/muncpl/states.htm
http://www.eia.doe.gov/cneaf/solar.renewables/renewable.energy.annual/chap03.html
http://www.swana.org/default.asp

Miscellaneous Processing Information

http://www.robson.co.uk/environment.html
http://www.hwest-equipment.com/
http://www.lundellmfgco.com/pef.html
http://www.marathon-equipment.com/
http://www.plasticsresource.com/recycling/ARC99/PEF_ARC99_PAPER_Final.htm
http://starfire.ne.uiuc.edu/ne201/course/topics/biomass/refuse.html
http://es.epa.gov/techinfo/facts/powrplnt.html
http://www.iclei.org/efacts/enrgywst.htm
http://www.co.ramsey.mn.us/recovery/Spring99_12.htm
http://www.co.ramsey.mn.us/recovery/trashtoday.htm

Federal Offices

http://www.epa.gov/owmitnet/mtb/biosolids/index.htm
http://www.cglg.org/projects/biomass/index.html
http://www.usda.gov/nass/pubs/agr02/acro02.htm
http://www.epa.gov/epaoswer/osw/
http://www.fe.doe.gov/
http://www.netl.doe.gov/
http://www.nrel.gov/
http://www.eia.doe.gov/

Gasification Web Sites

http://www.enerkem.com/

http://www.enviroaccess.ca/fiches_4/F4-11-96a.html
http://www.crest.org/index.html

Reports

http://bioenergy.ornl.gov/resourcedata/
http://tonto.eia.doe.gov/FTPROOT/features/biomass2002.pdf
http://www.eren.doe.gov/biopower/bplib/library/li_snowpapr.htm
http://bmf.osti.gov/cgi-bin/dexpldcgi?nrbmf.results;6
http://www.reap-canada.com/Reports/PelletSG.htm
http://bioenergy.ornl.gov/papers/bioam95/graham3.html
http://bioenergy.ornl.gov/papers/bioen96/mclaugh.html
http://www.afdc.doe.gov/pdfs/4809.pdf
http://www.afdc.doe.gov/pdfs/4902.pdf
http://www.nrel.gov/docs/fy99osti/25918.pdf
http://www.reap-canada.com/Reports/bioenergy2000Aug2.html
http://bioenergy.ornl.gov/papers/bioen96/noon1.html
http://www.cvrcd.org/deliverables.htm

State Offices

http://www.agstats.state.il.us/
http://www.agr.state.il.us/
http://www.epa.state.il.us/
http://www.nass.usda.gov/in/index.htm
http://www.in.gov/idem/
http://www.ai.org/oca/

Tires and Tire-Derived Fuel

http://www.auburndalerecycling.com/companyprofil.htm
http://www.scraptirenews.com/

Wood Fuel and Wood Waste

http://www.eren.doe.gov/biopower/feedstocks/
http://www.eren.doe.gov/biopower/feedstocks/fe_wood.htm
http://www.kppc.org/kwwrs/
http://www.srs4702.forprod.vt.edu/PUBSUBJ/abstract/ab9764.htm
http://www.ciwmb.ca.gov/Markets/StatusRpts/WoodWste.htm
http://www.ciwmb.ca.gov/ConDemo/Factsheets/UrbanWood.htm

Railroad Ties

http://www.tieyard.com/about_us/about_us1.htm

http://www.sites.onlinemac.com/andersonwhsl/index.htm
http://www.rta.org/pdf/tieanalysis.pdf
http://www.koppers.com/
http://www.railworks.com/sc/comp/rwks_wood.htm
http://www.preservedwood.com/aboutawpi.html

APPENDIX I

LIST OF CONTACTS

LIST OF CONTACTS

Entity	Location	Contact/Title	Phone/e-mail
Feedstock Resources Information			
A&K Railroad Materials	Portage, IN	Stacie	(219)882-1411
Auburndale Recycling Center	Auburndale, WI	Jerry Swensen	(715) 652-3622
Bartholonew County SWMD		Greg Hartwell	(812) 376-2614
BNSF	Topeka, KS	Mac Wiens	(705) 435-5882
Burlington Northern Sante Fe (BNSF) Railroad		Steven Forsberg, General Director Public Affairs	(913) 551-4479
Clay-Owen-Vigo Solid Waste Management District	Indiana	Janet Reed	(812) 443-0168
CMS Generation	New Bern, NC	Ray Bonner Jim Welborn	(252) 633-9525 (252) 633-9525
Conrail	Philadelphia, PA	Joe Sessa	(215) 209-2000 (856) 231-2015
CSX Transportation, Solid Waste Compliance Branch		Leah Foutty, Chief Solid Waste Rosemary Cantwell, Chief Special Waste	(317) 308-3104 (317) 308-3003
CSX Transportation			(904) 359-3100
CSX Transportation		Steve Watson	(317) 267-3003
CSX Corporation			(804) 782-1400
Daviess County Chamber of Commerce	Washington, IN	Dave Cox	(800) 449-5262
Exten Energy Project	Sterling, CT	Ken Wycherley	(860) 564-7000
Farm Bureau Coop	Monroe County, IN		(812) 332-4472
Great Lakes Regional Biomass Energy Program		Fred Kuzel	(312) 407-0177

GreenMan Technologies	Savage, MN	Phil Sherrier	(952) 894-5280
Illinois Department of Agriculture		John Herath Joe Saputo	(217) 524-2751
Illinois EPA		Gary Cima	(217) 785-8604
Illinois EPA		Jeff Hutton	(217) 780-0610
Illinois Department of Commerce & Community Affairs, Bureau of Energy & Recycling		Norm Marek	(217) 785-5082
Indiana Department of Environmental Management, Office of Land Quality		Bruce Palin	(317) 233-6591
Indiana Department of Environmental Management (IDEM)		Richard Worth	(317) 233-5156
Indiana Department of Commerce		Sarah Carney	(317) 232-8944 (219) 642-3677
Indiana Department of Agriculture		Kathy Altman	(317) 232-8765
Indiana Department of Commerce, Division of Energy Policy		Phil Powlick	(317) 232-8970
Indiana Department of Environmental Management		Jim McCurdy	(317) 232-8731
Indiana Department of Transportation, Railroad Section		Tom Beck	(317) 232-1478
Indy Pallet Company	Indianapolis, IN	Brad	(317) 780-0700
International Paper	Terre Haute, IN	Robert Sleeman	(812) 234-6688
Iowa Department of Natural Resources (DNR)		Lori McDaniel	(515) 281-8094
Kieffer Paper & Pulp Mill, Inc.	Brownstown, IN	Dennis Lankford	(812) 358-2413
Metropolitan Water Reclamation District of Greater Chicago Calumet Facility	Chicago, IL	John Sundera	(773) 256-3702

Metropolitan Water Reclamation District of Greater Chicago Stickney Facility	Chicago, IL	Bill Bergman	(708) 588-4305
Metropolitan Water Reclamation District of Greater Chicago	Chicago, IL	Hugh McMillan, General Superintendent	(312) 751-6635 fax
Metropolitan Water Reclamation District of Greater Chicago	Chicago, IL	Edmund Cook	(312) 751-5600 (312) 751-7828 fax
Monroe County Landfill	Bloomington, IN		(812) 349-2864
Monroe County Solid Waste Management District	Indiana	Mike Frey	(812) 349-2020
Norfolk Southern Railroad, Material Management		Material Management Gary Bible Dana Hellsly	(540) 981-3664 (540) 981-3886
NRG Energy		Joe Weinhold Manager Environmental Services	(612) 373-5431
Public Works	Bloomington, IN	Scott Dompke, Director of Operations for City Utilities	(812) 349-3661
Public Works	Bloomington, IN	Christina Fulton Services Coordinator	(812) 349-3410
Railworks Wood Waste Energy	Ballwin, MO	Greg Smith	(636) 207-8898
Railworks Western Tar Products	Terre Haute, IN	Sam Satopo	(888) 232-2384
Sanitary District	Urbana/Champaign, IL	Rod Fletcher	(217) 384-2355
Sanitary District	Decatur, IL	Greg Kuche, Director of Engineering	(217) 422-6931 ext. 217
Sanitation Department	Lafayette, IN	Ron Berryman	(765) 476-4570

Sewage Treatment	Evansville, IL	Harry Lawson Kenny Virgin, Plant Superintendent	(812) 428-0550
Solid Waste Management	Solid Waste Evansville, IN	Jim Daniels, Recycling Coordinator	(812) 436-7800 (812) 436-4926
Solid Waste Division, Mayors Action Committee (MAC)	Indianapolis/Marion County, IN	John Workman, Supervisor for Solid Waste	(317) 327-2372
Solid Waste Division	Decatur, IL	Hala Ahmed	(217) 424-2798
State of New York Department of Environmental Protection		Pedick Lai Assistant Chemical Engineer Beth Petrillo	(718) 595-6571 (718) 595-5064
Streets and Sanitation	Urbana/Champaign, IL	Ren Liman Dennis Schmidt	(217) 367-3409
Tampa International		Dave Johnson, General Manager	(800) 776-2028
Twin Bridges Recycling and Disposal Facility	Danville, IN	Jim Davis	(317) 745-2878 ext. 13
Union Pacific Railroad		Arlen Mafziger Keith Rawsen	(402) 930-1229 (402) 930-1232
Victory Environmental Landfill	Terre Haute, IN	Terry Moon	(812) 299-9227
Waste Water Treatment	Danville, IL	Phil Morgan	(217) 442-3193
Water Pollution Control	Lafayette, IN	Angela Andrews, Chief of Surveillance	(765) 476-4550
West Clinton Landfill	Clinton, IN	Ed Kanizer	(765) 832-6798
West Central Solid Waste Management District		Jane Collisi	(317) 745-2491
Whitewater River Environmental Partnership	Indianapolis, IN	Dave Smith	(317) 639-7145
Worthington Landfill	Worthington, IN		(812) 875-2545
Xcel Energy		Alma Allen Web Joe Brobjorg	(612) 330-5956 (612) 330-2856

Feedstock Supplier			
Ag Processing Inc. (AGP)	Omaha, NE	Darcy Ehmann	(402) 431-5027 (402) 492-3352 fax
American Woods	Grand Forks, ND	Ed Hippen Rick Waxvik	(701) 775-7388
Biomass Agri-Products	Harlan, IA	Tom Schechinger	(712) 744-3296 (712) 744-4296 (712) 755-5363
Biomass Industries	Gulf Breeze, FL	Kevin Mills	(850)916-1300
Chariton Valley Resource Conservation and Development (CVRCD)	Centerville, IA	Marty Braster John Sellers, Field Coordinator Velvet Glen Dora Guffy	(641) 437-4376 (641) 872-2657
Ramsey/Washington County Resource Recovery Project	Newport, MN	Gary White, Plant Superintendent Doug Germain, Duty Supervisor	(651) 458-1278
Whitewater River Environmental Partnership	Indianapolis, IN	Chris Holmes Kim Cussen	(317) 639-7051 (317) 639-7049
Haulage Companies			
Merrell Brothers	Kokomo, IN	Terry Merrell	(219) 699-7782
Oxcart Trucking		Joe Lambardo	(219) 933-9338 (219)933-9348 fax
Rebacz Trucking		Stan Rebacz	(708) 579-9750
Today Cartage	Plano, IL	Tom Klatt	(630) 552-4145
High-Pressure Feed System Supplier/Developer			
(Pennsylvania Crusher Posimetric Feeder vendor)			
Andritz/Ahlstrom	Muncy, PA	Joe Keller	(570) 546-1236
Andritz/Ahlstrom	Branford, Ontario CANADA	Larry Nemeth	(519) 754-4590
Andritz/Ahlstrom	Montreal, Quebec CANADA	Thomas Pschorn	(514) 731-0404

Fortum	Fortum, FINLAND	Pekka Jokela	Pekka.Jokela@ fortum.com
Komar Industries	Groveport, OH	Mark Koenig	(614) 836-2366
Macawber Engineering	Maryville, TN	Preston Spalding	(865) 984-5286
Metso Paper	Atlanta, GA	Chris Kajzer Anders Mokvist	(770) 263-1589 (770) 263-1543
Stake Technology Ltd.	Norval, Ontario, CANADA	John Taylor, President	(905) 455-1990
Sugar Research Institute	Mackay, AUSTRALIA	James Joyce Terry Dixon	j.joyce@sri.org. aut.dixon@sri.org.au
TR Miles, Technical Consultants	Portland, OR	Tom Miles	(503) 292-0107
Current/Past Users of High-Pressure Feeders			
Boise Paper Solutions	Wallula, WA	Don Holmes, Engineer	(509) 546-3421
Duluth Western Lake Superior Sanitary District	Duluth, MN	Al Parela Dave Mattson	(218) 722-3336 ext. 247
Longview Fibre	Longview, WA	Pat Ortiez Doug Hinderager Tom Plamondon	(360) 425-1550 (360) 575-5397 (360) 575-4548
National Renewable Energy Laboratory (NREL)	Golden, CO	Andy Trenka Richard Bain	(303) 275-4745 (303) 275-2946
Pacific International Center for High Technology Research (PICHTR)	Honolulu, HI	Keith Matsumoto	(808) 258-9209
Weyerhaeuser	Springfield, OR	Wayne Nay	(541) 746-2511
Pump Vendors			
DiscFlo Corp.	San Diego, CA	John Pacello	(619) 596-3181
Morgen Manufacturing	Yankton, SD	Marlen Slagle	(605) 665-9654
Putzmeister	Sturtevant, WI	Scott Larkin	(412) 366-6303
Quality Flow Systems (Seepex and Alfa Laval vendor)	New Prague, MN	Pat Malay	(952) 758-9445

Schwing America	White Bear Lake, MN	Chuck Wanstrom Paul Katka	(651) 429-0999
VanBergen & Markson (Moyno vendor)		Gregg Nolt	(763) 546-4340
Wear-Resistant Materials			
Xaloy, Inc.	Pulaski, VA	Danny Porter	(540) 994-2219
Bin/Bin Discharging			
Hallco Floor Systems	Mooresville, NC	Stan Fisher	(770) 923-9118
Keith Walking Floor	Madras, OR	Jonathan Smith	(541) 475-3802
SITA Sverige AB	Solna, SWEDEN	Folke Giesen	Folke.Gieson@ sita.se
Pressurized Screw Conveyor Vendor			
UNICO Services Inc.	Benicia, CA	Noland Nicdao	(707) 745-4540
Shotcrete Nozzle Vendor			
Shotcrete Technologies Inc.		Kristian Loevlie	(303) 567-4871
MSW/RDF Cleaning Vendors			
Environmental Services	Dickinson, ND	Doug Buckman	(701) 663-4069
Eriez Magnetics	Erie, PA	Al Gedgaudas	(814) 835-6000
Forsberg	Thief River Falls, MN	Denny Bakke Loren Holen	(218) 681-1927
General Kinematics	Barrington, IL	Ron Zorn	(847) 842-2067
Karl W. Schmidt & Associates	Denver, CO	Karl Schmidt	(303) 287-7400
Thermal Processor of RDF			
Brightstar Synfuels (SWERF Process)	Baton Rouge, LA	Ron Menville Jr.	(225) 769-9801
Interstate Waste Technologies (North American vendor for Thermoselect Technology)	Malvern, PA	Frank Campbell, President	(610) 644-1665
Komar Industries (Spiralclave System)	Groveport, OH	Mark Koenig	(614) 836-2366
Drier Vendors			

Barr Rosin	Boisbriand, Quebec CANADA	Kosta Kanellis	(450) 437-5252
Heyl & Patterson, Inc.	Canonsburg, PA	Jeff Morris	(724) 743-1000
Size-Reduction Vendors			
American Pulverizer	St. Louis, MO	James Holder	(314) 781-6100 ext. 32
Dynequip (rep for Williams Patent Crusher)	St. Paul, MN	Vince Anderson	(651) 776-1002
Marathon Equipment	Leeds, AL	Gary Krumweide Mike Mothersell	(253) 584-4744 (888) 733-8248
Williams Patent Crusher	St. Louis, MO	Harold Groves	(314) 621-3348
Pressure Vessel Fabrication Shops			
Arrow Tank & Engineering	Cambridge, MN	Lee Reese	(763) 689-3360
Lunseth Plumbing	Grand Forks, ND	Phillip Cramer	(701) 772-6631
Mid America Steel	Fargo, ND	Ron Peterson	(701) 232-8831
Wheeler Tank Manufacturing	Sioux Falls, SD	Chris Wheeler	(605) 332-2012
Compressor Vendors			
Elliott (Ebara Group)	Jeannette, PA	Jim Behovik	(724) 600-8171
Gardner Denver	Quincy, IL	Ed Heckle	(217) 221-8715
Knox Western	Erie, PA	Dave Sechrist	(800) 233-5208
PDC Machines	Warminster, PA	Osama Al-Qasem	(215) 443-9442 ext 105
Pressure Products Industries	Warminster, PA	Lee Coleman	(215) 675-1600
VR Systems (now part of Enerflex)	Odessa, TX	Jack Motley	(800) 478-0011
Miscellaneous			
OSHA (North Dakota)	Bismarck, ND	Keith Thompson	(701) 250-4521
Public Works	Grand Forks, ND	Mike Shea	(701) 746-2713 ext. 713