

Challenges in Selecting New Biosolids Treatment and Disposal Equipment for the Mattabassett WPCF

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WRIGHT-PIERCE 
Engineering a Better Environment

The Mattabassett District

- Regional WPCF
 - Serves the member communities of New Britain, Berlin, Middletown and Cromwell and portions of Farmington, Rocky Hill and Newington, CT
- Plant went into operation in 1968
- Upgraded to Secondary Treatment in 1989
- Nutrient Removal and Capacity Expansion in 2015



Sludge Handling



Fluidized Bed Incinerator

- Ex. FBI
 - 72,000 lbs/day capacity
 - ◆ 25,000lbs/day (internal)
 - ◆ 35,000 lbs/day± (merchant)
 - 25 years old
 - Limited remaining life
 - District owns Ash Landfill



- Sewage Sludge Incineration Regulations
 - New Emission Requirements
 - Host of pollutants including particulates, metals, mercury and dioxins

New Fluidized Bed Incinerator

- Sustainable Disposal Option
 - Plenty of capacity in District's landfill
 - Autogenous Burning
 - Merchant sludge not required for self sustainability
 - Excess heat will be used for heating various buildings on-site
- Will meet new SSI rules
 - Wet Electrostatic Precipitator
 - Carbon Adsorption system



Sludge Handling

- Plant Generated Sludge (25,000lbs/day)
 - Primary and secondary – co-settled in P.C.'s
- Merchant Sludge (35,000 lbs/day)
 - Septage
 - Fats, Oils and Grease
 - Municipal Sludge
 - Occasionally sludge from other Merchant Facilities
- Storage
 - Two large storage tanks (2 day HRT)
 - Mixed and partially aerated

Sludge Dewatering Goals

- Autogenous Incinerator Operation
 - 24% to 28% cake dryness
 - Ability to control cake dryness (Incinerator Temp)
- Ability to handle varying sludge conditions
- Minimal operator attention
- Enclosed technology (odor control)

Autogenous Incinerator Operation

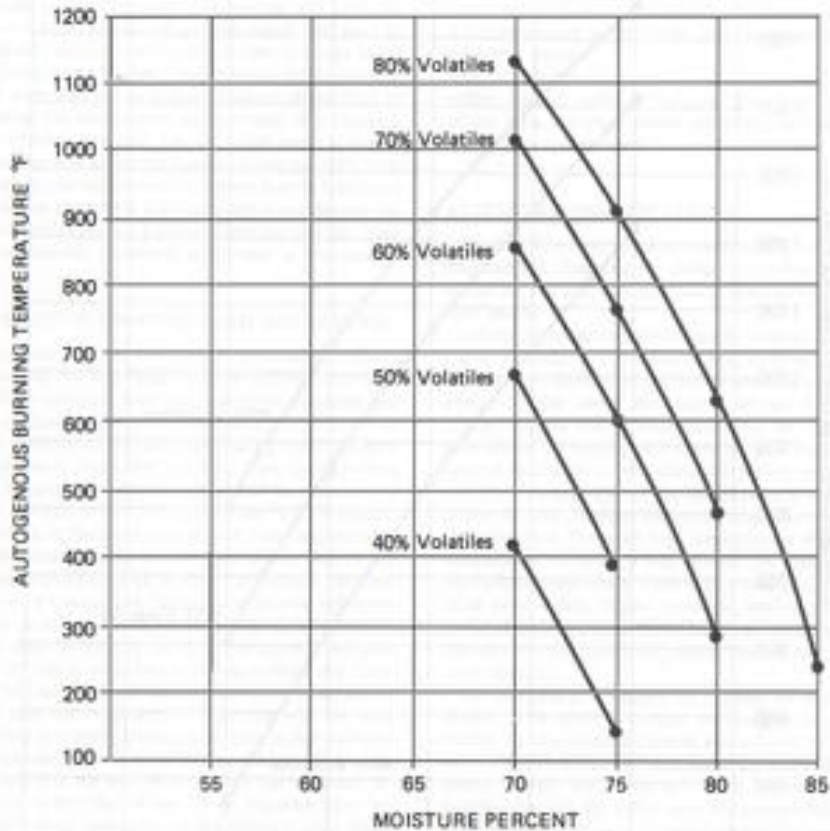


FIG. 1 CHEMICAL CONDITIONED SLUDGE CAKE, 10,000 Btu/lb, 85% EXCESS AIR. AUTOGENOUS BURNING TEMPERATURE VS MOISTURE CONTENT.

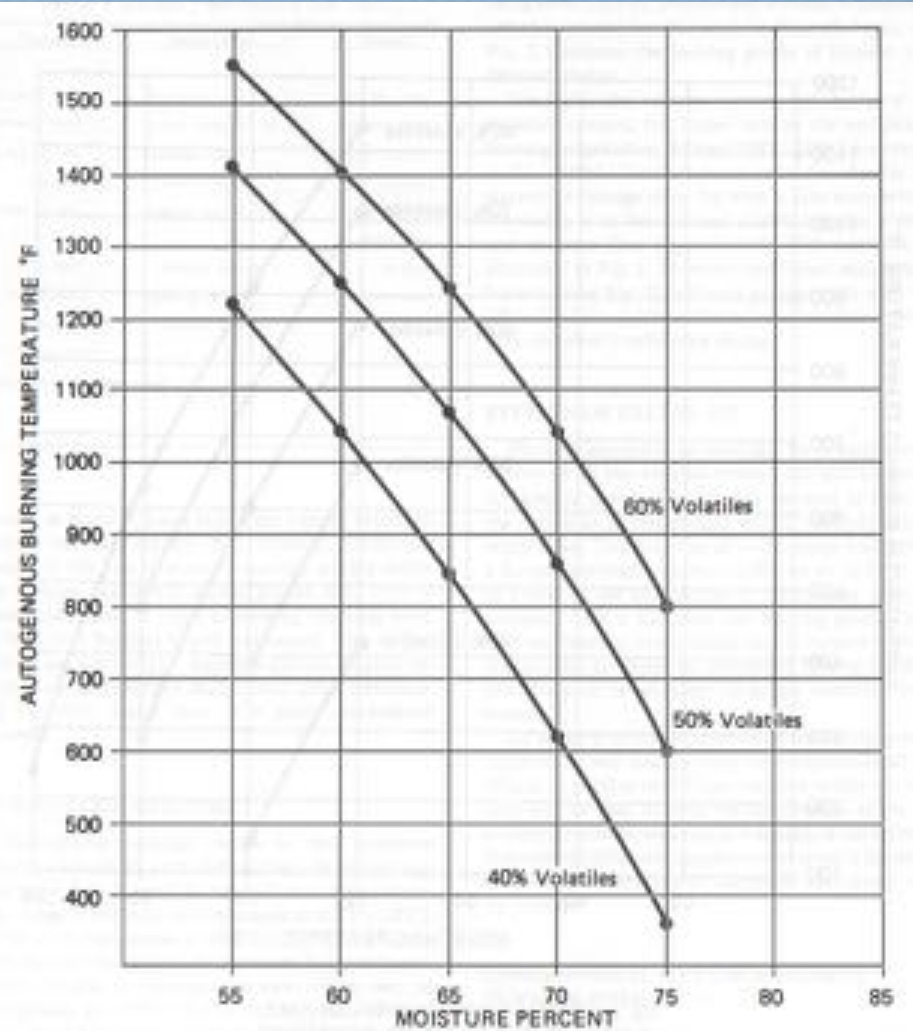
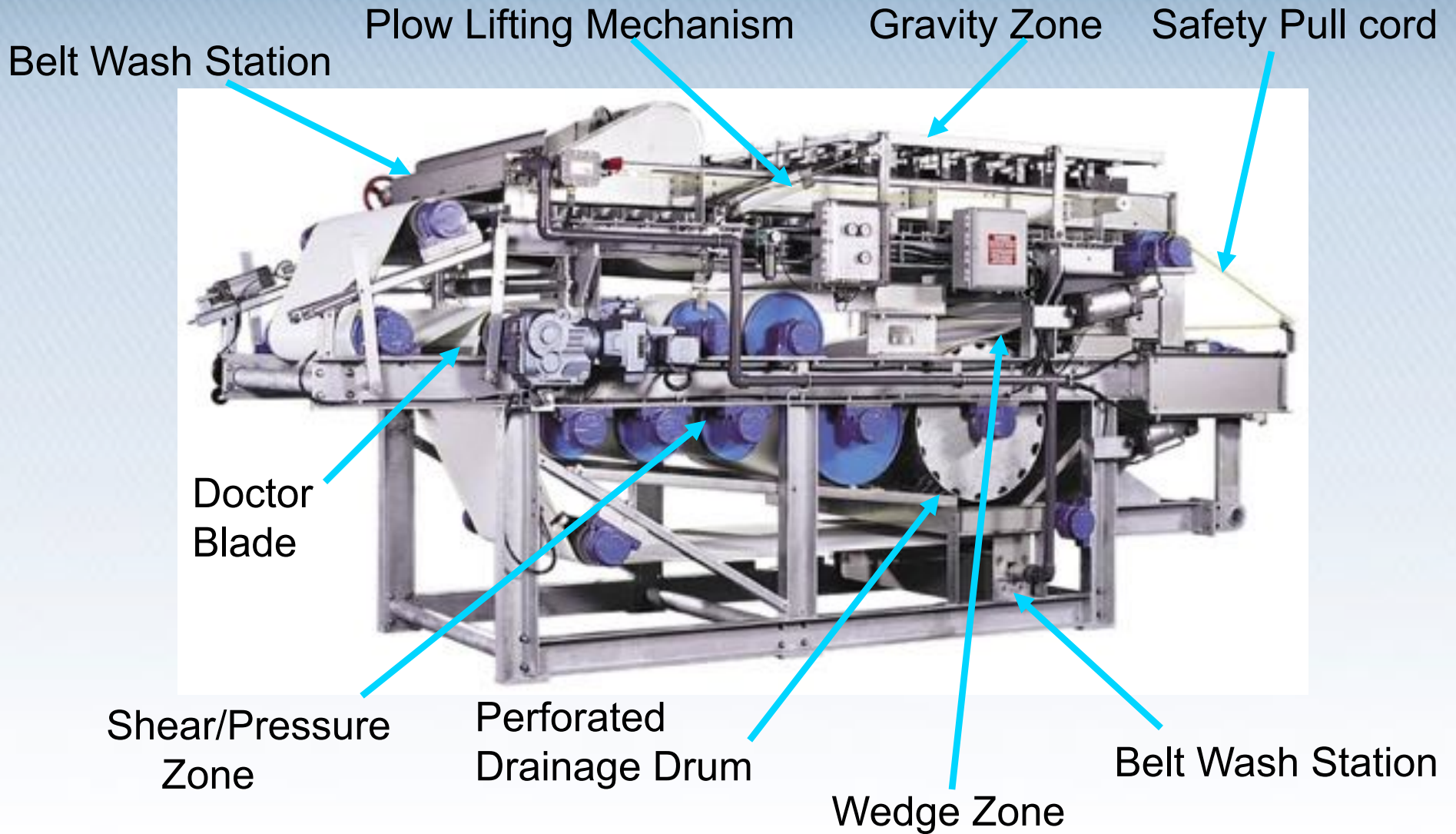


FIG. 2 THERMAL CONDITIONED SLUDGE CAKE, 12,000 Btu/lb, 85% EXCESS AIR. AUTOGENOUS BURNING TEMPERATURE VS MOISTURE CONTENT.

Overview of Leading Technologies

- Older Technologies
 - Belt filter press
 - Centrifuge
- Newer/Comeback Technologies
 - Rotary drum press
 - Rotary screw press
 - Centrifuge

Belt Filter Press



Belt Filter Presses



Belt Filter Press

- Expected performance

SLUDGE TYPE	FEED %	CAKE %	FILTRATE CAPTURE
PRIMARY	4-8	28-40	96
ANAEROBICALLY DIGESTED	2-5	17-27	96
50% PRIMARY/ 50% SECONDARY	3-6	20-34	96
WASTE ACTIVATED	0.5-1.5	16-21	97
AEROBICALLY DIGESTED	1-2	14-19	98

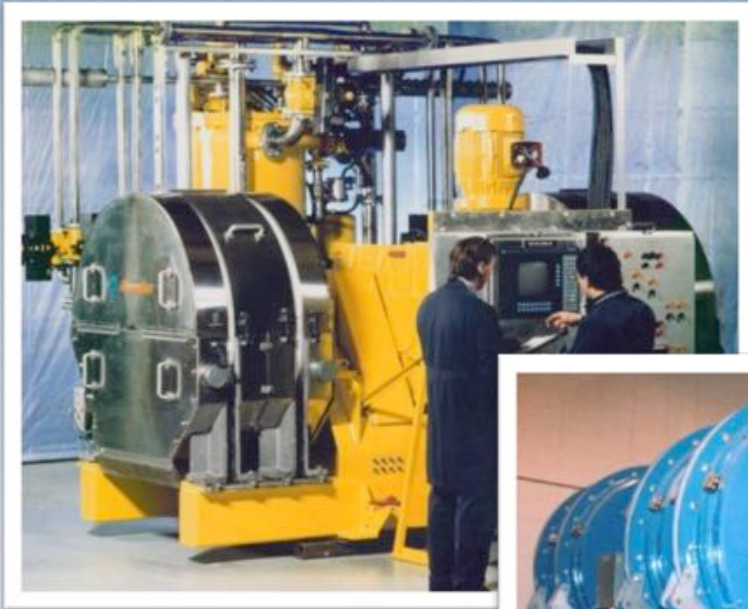
Belt Filter Press

- Tried and true, proven dewatering technology
- Continues to be cost-effective, viable alternative
- Newest generation of presses perform well due to:
 - large gravity zones
 - more contact time under pressure
 - good belt washing

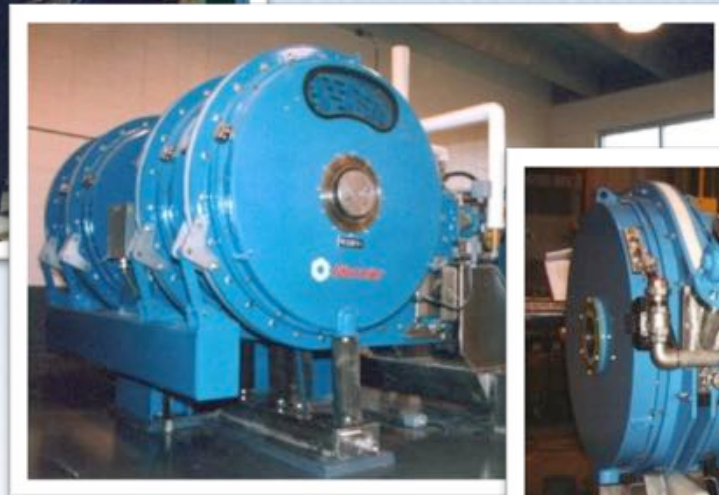
Belt Filter Press

- Disadvantages
 - odors not easily contained
 - may not outperform newer technologies if looking strictly at cake solids
 - relatively high level of operator attention required and many moving parts
 - required high pressure/volume wash water
 - greasy sludges can blind belts
 - requires more cleanup

Rotary Drum Press

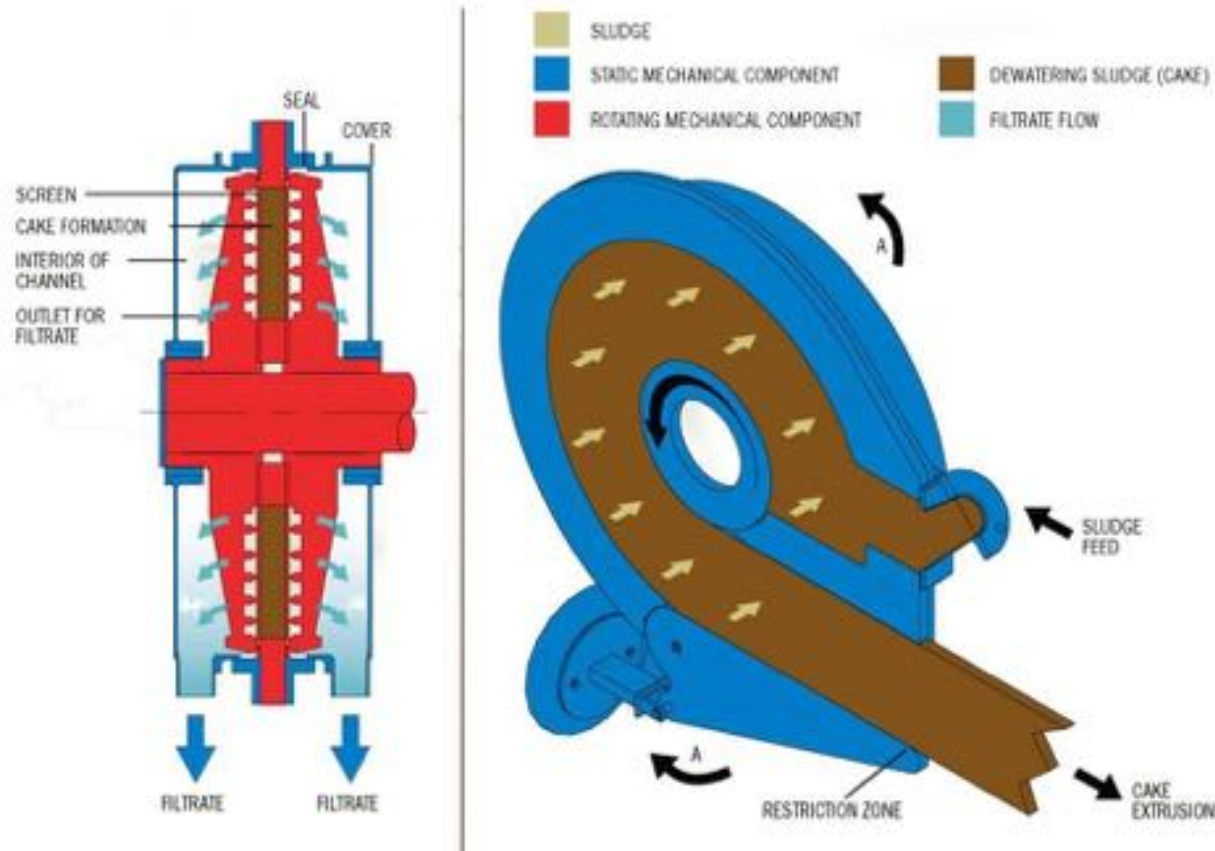


Design
progression...



Rotary Drum Press

Principle of operation



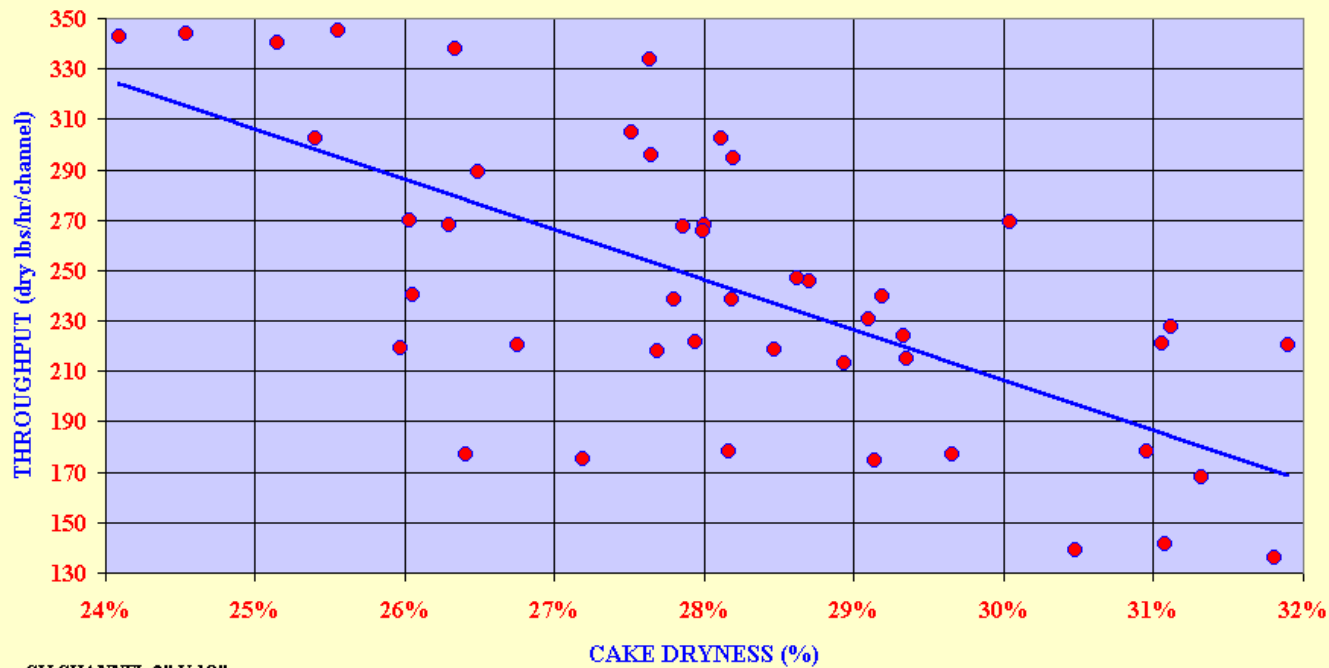
Rotary Drum Press

- Typical loading rates
 - 100 dry lbs./hour/channel = WAS
 - 250 dry lbs./hour/channel = combined sludge
 - 450 dry lbs./hour/channel = straight primary

2004 Pilot Test – Rotary Drum Press

THE MATTABASSETT DISTRICT
Plant location: Cromwell, CT
CAKE DRYNESS VS THROUGHPUT
(MIXED SLUDGE)

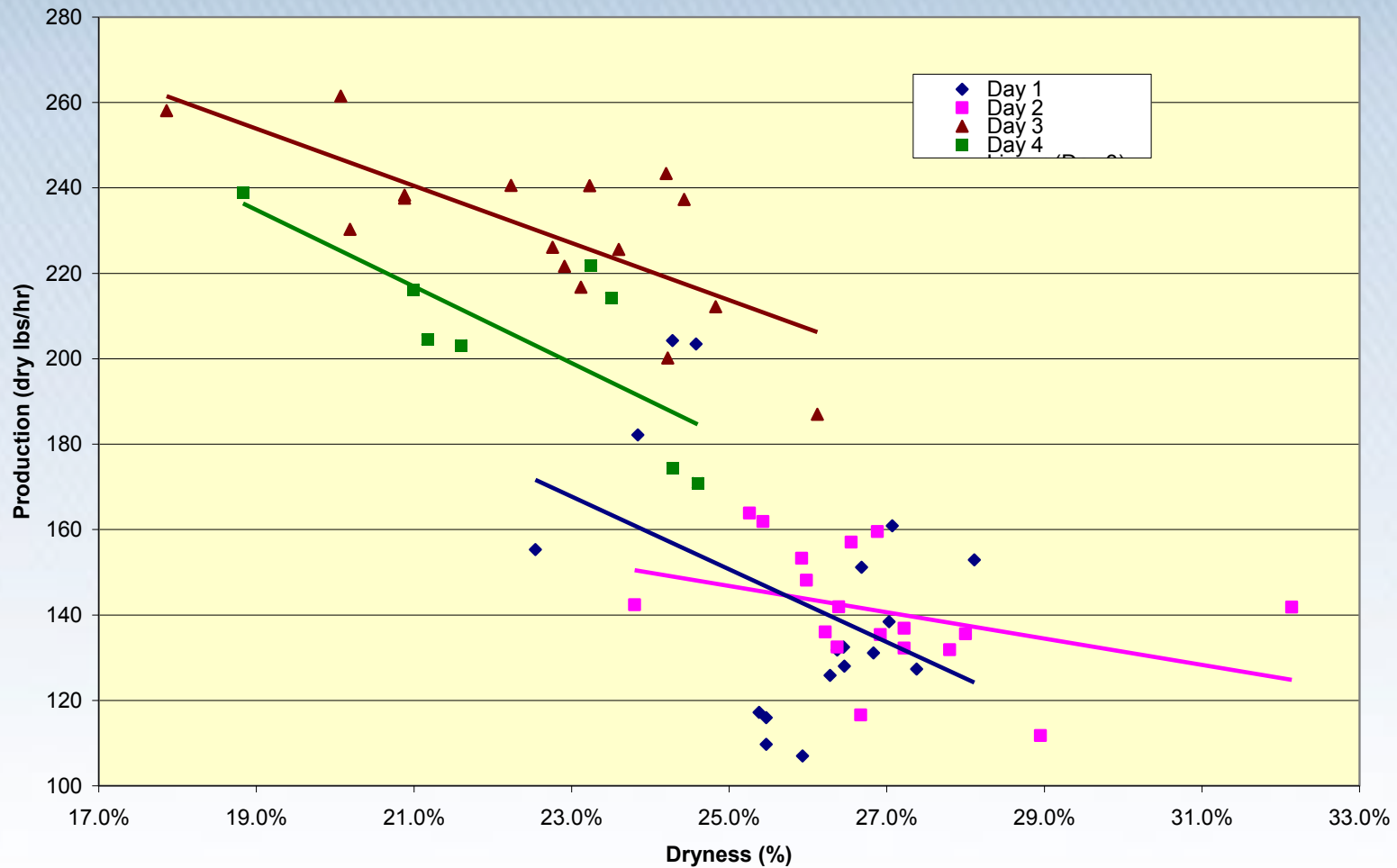
April 26 to 29, 2004



CV CHANNEL 2" X 10"

Pilot Results – Rotary Drum Press

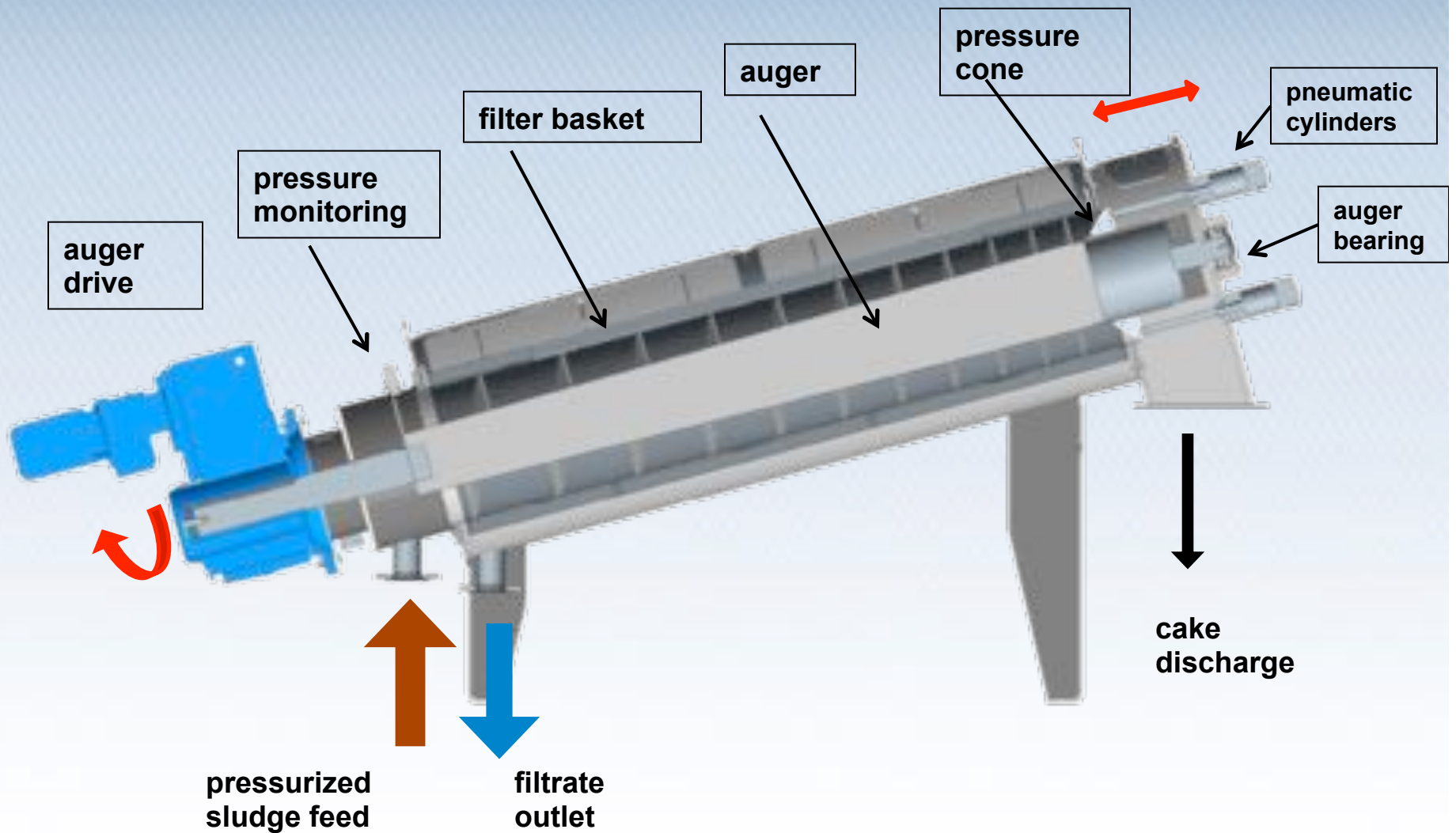
Production vs Dryness (separated by day)



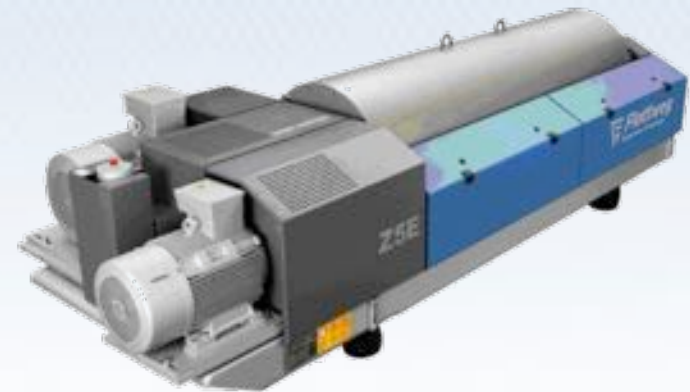
Rotary Drum Press

- Disadvantages
 - Cake dryness is a function of throughput and sludge quality/characteristics
 - Concerns with FOG
 - sole-source procurement required or bid against an alternate technology

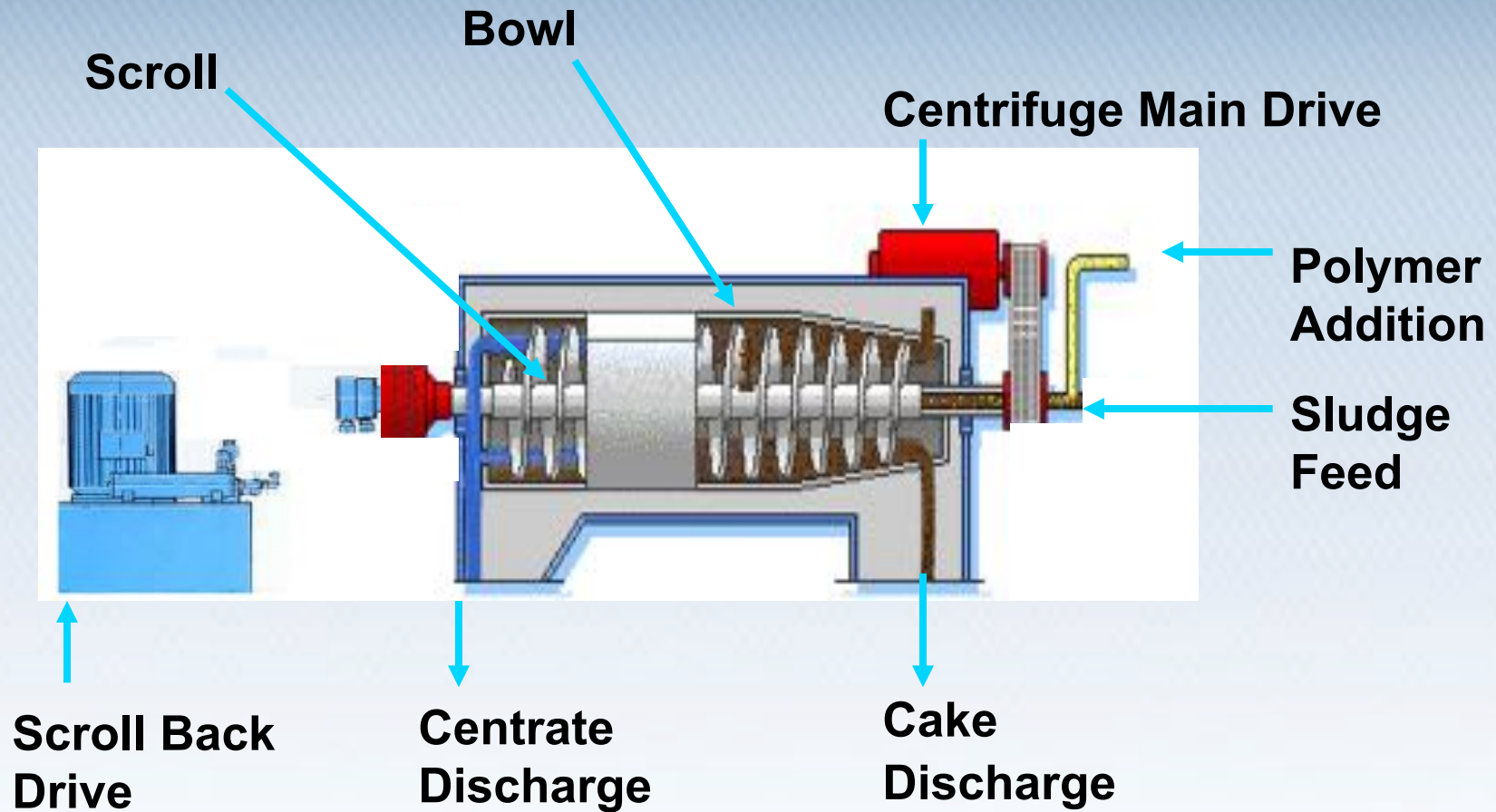
Inclined Rotary Screw Press



Centrifuge



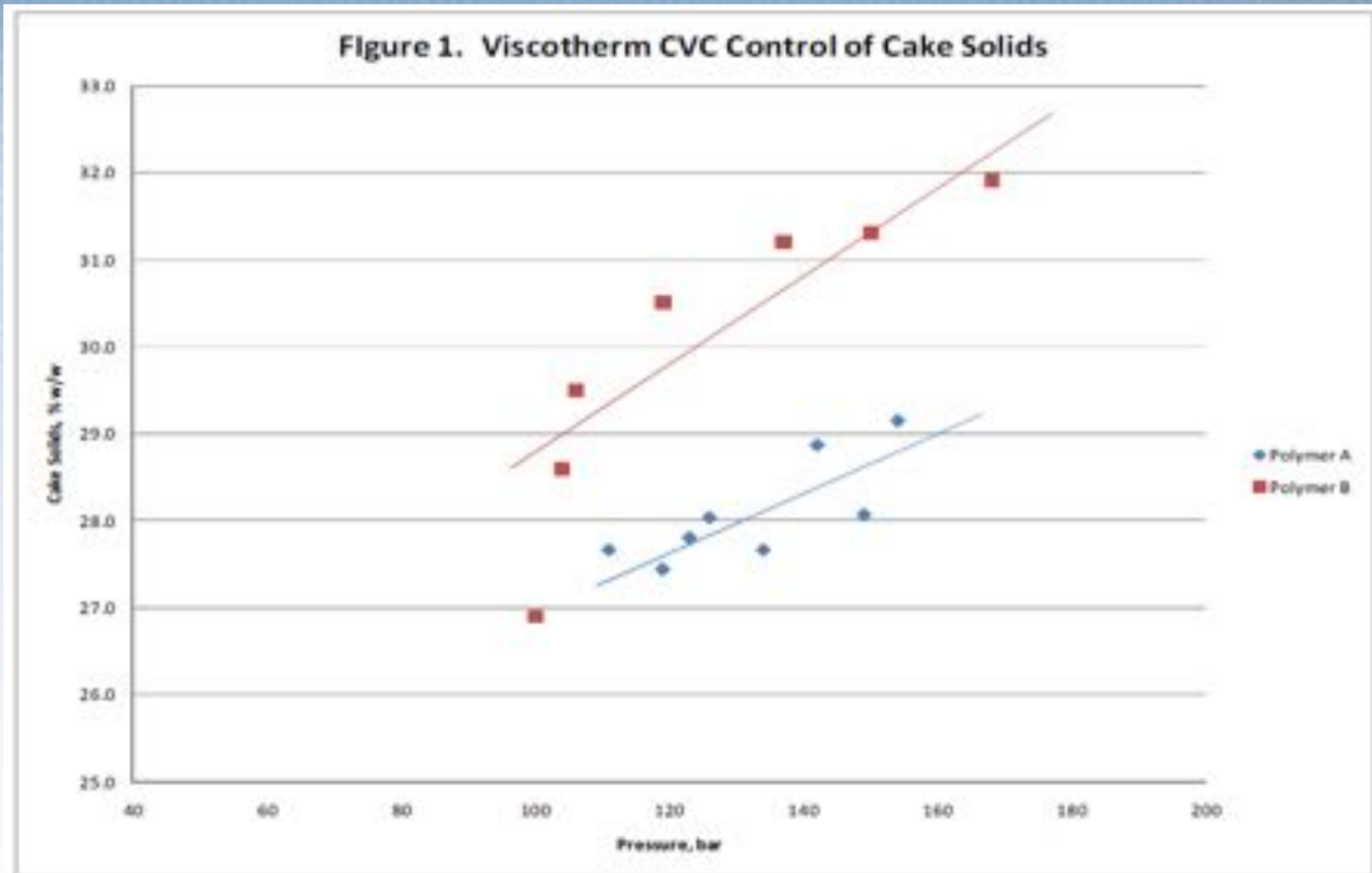
Centrifuge



Centrifuge Pilot Test



Centrifuge – Cake % Control



Centrifuge

- Advantages
 - changes in feed solids can be automatically compensated
 - high throughput in small footprint
 - competitive procurement
 - can handle difficult to dewater/greasy sludges
 - fully enclosed for minimal odors
 - minimal wash water requirements

Centrifuge

- Disadvantages
 - high rotational speed (wear and cell lysing)
 - highest energy requirements
 - high operating noise level
 - some report high polymer consumption but not universal
 - maintenance requirements higher than other technologies

Summary

- Centrifuge Chosen
 - 3 Units – 0.75lbs/hr per unit each
- Small footprint
- Enclosed
- Ability to handle a variety of sludge characteristics
- Ability to control cake dryness



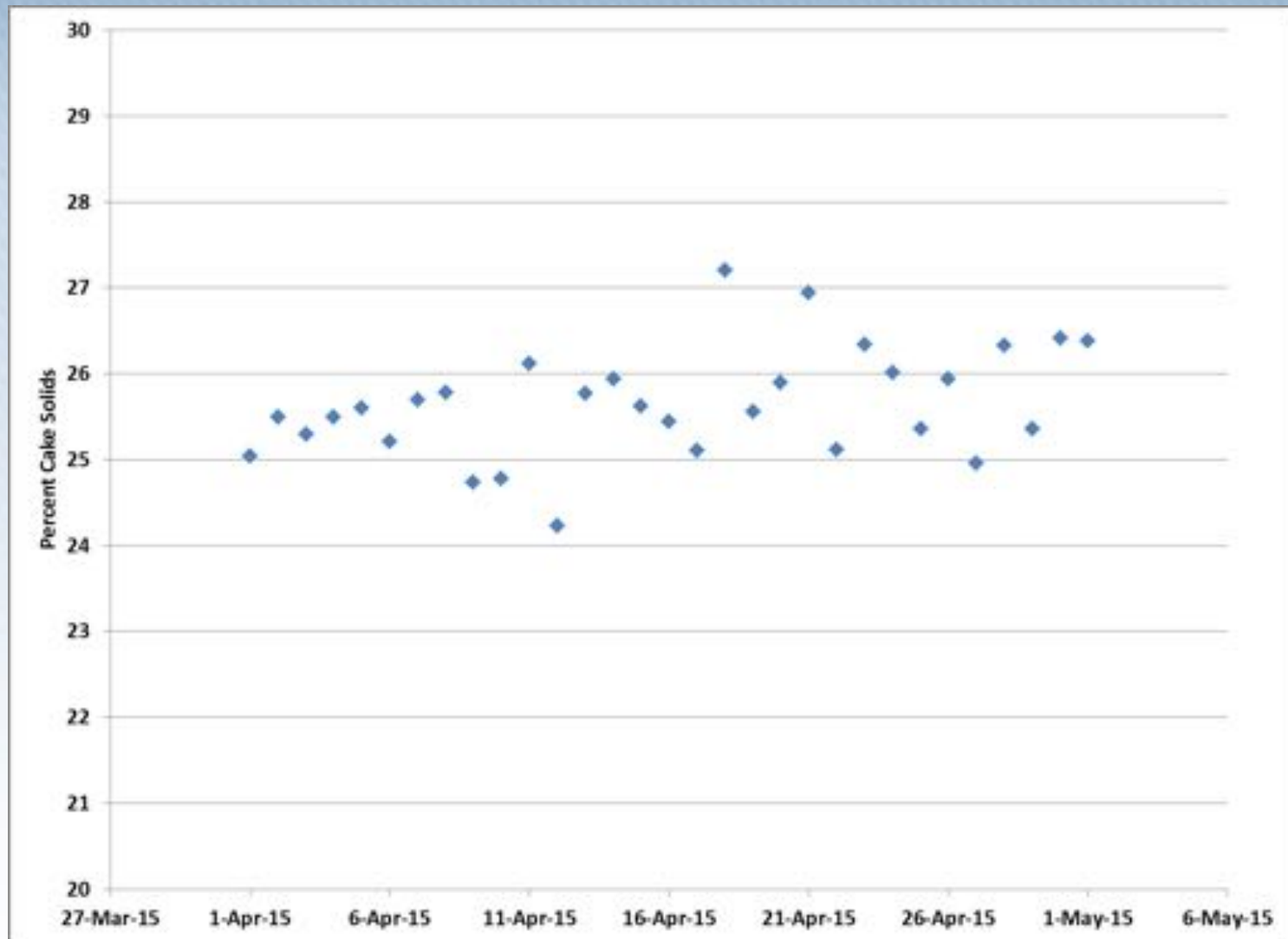




Centrifuge Performance Test

	<u>Average Feed % TS</u>	<u>Average Cake % TS</u>	<u>Average Centrate Recovery % TS</u>	<u>Average Polymer lbs/ton</u>
Centrifuge No. 2	2.25% - 2.74%	27.50%	97.20%	10.70 lbs/ton
	2.75% - 3.24%	27.60%	97.50%	10.40 lbs/ton
Centrifuge No.3	2.25% - 2.74%	27.50%	96.30%	11.50 lbs/ton
	2.75% - 3.24%	27.60%	97.80%	10.10 lbs/ton

Cake Solids Percentage



Summary

- New Centrifuge Dewatering Equipment
 - Ability to dewater varying sludge conditions
 - Pilot testing confirmation
 - Autogenous burning control

