SCWRF Thermal Dryer Facility

TOWN OF CARY BIOSOLIDS MANAGEMENT PROGRAM

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Topics

- Background
- Process & Operations
- Safety & Housekeeping
- Regulatory Overview
- Questions/Discussion

Town of Cary's Vision and Goals for Biosolids Management

"The Town of Cary's vision for its residuals and biosolids management program is to sustain a cost-effective, independent, and robust, utility-wide program that:

- *Integrates common management strategies among individual facilities*
- *Aligns with current and potential future regulatory direction*
- *Achieves exceptional quality, reduced volume products with multiple options for beneficial reuse*
- *Minimizes nuisance potential and gains community acceptance*
- *Maximizes flexibility through multiple contingency options*

BACKGROUND

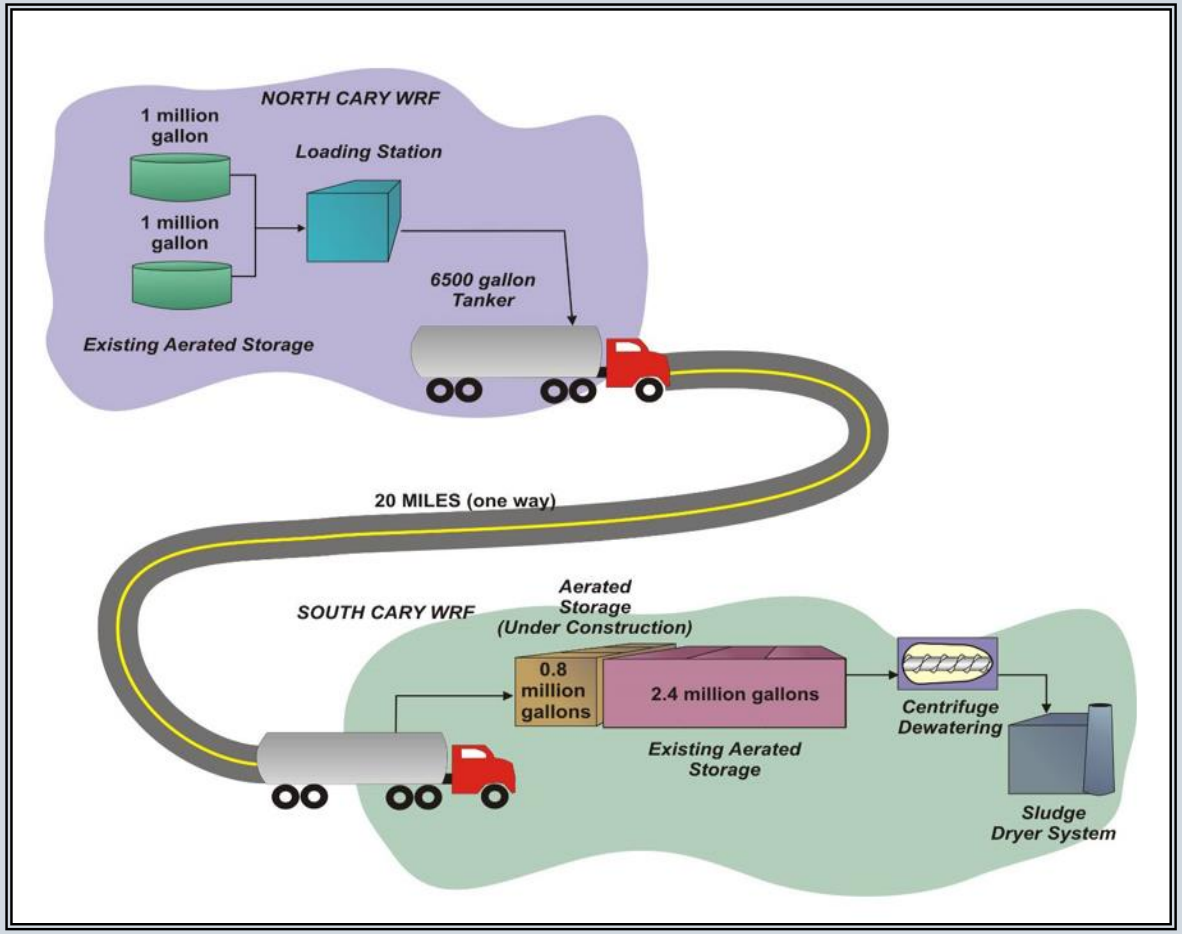
- Employed land application programs at both North Cary WRF and South Cary WRF from late 1980's through 2004.

- Began Development of Thermal Drying Alternative to Land Application Program in 1999

- Piloted Centrifuge systems and blending of North & South biosolids
  - Produced a Class B cake product (18 – 21 % TS) for Composting 2004 - 2005

- Dryer construction took ~ 20 months to startup in November 2005

North Cary Water Reclamation Facility



12 MGD BNR Water Reclamation Facility in service since 1984

Biosolids are Gravity Belt Thickened to ~2.5% TS and Aerobic Storage prior to delivery to South Cary WRF

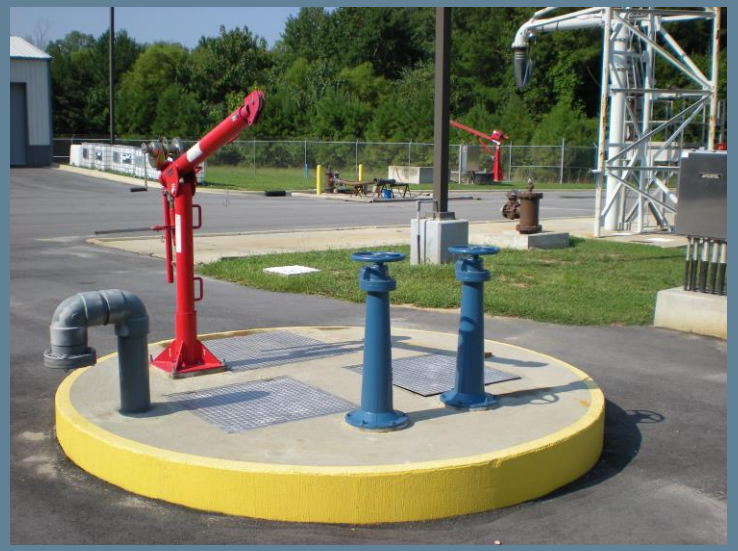
Biosolids Receiving

North Plant liquid hauler weighs in/out to calculate volume; used for blending, performance monitoring, and regulatory reporting.

Receiving ~ 300,000 gallons/week

or

50 trucks/week



South Cary Water Reclamation Facility

12.8 MGD BNR Water Reclamation Facility in service since 1988

Biosolids are Gravity Belt Thickened to ~2.5% TS with Aerobic Storage; blended with NCWRF prior to De-watering for Thermal Drying

South Cary WRF Biosolids Dryer

Background

- South Cary WRF's Andritz Rotary Drum Dryer has been in operation since 2006
- Centrifuge dewatering
- Processed 3,529 dry tons CY2017
  - 56% SCWRF and 44% NCWRF
- ~3mm Pelletized product
- Class A, Exceptional Quality
- Nutrient content of 5-4-0 in *Enviro **Gems*** with 1.5% iron.

Process and Operations

Advantages ***VS*** ***Challenges***

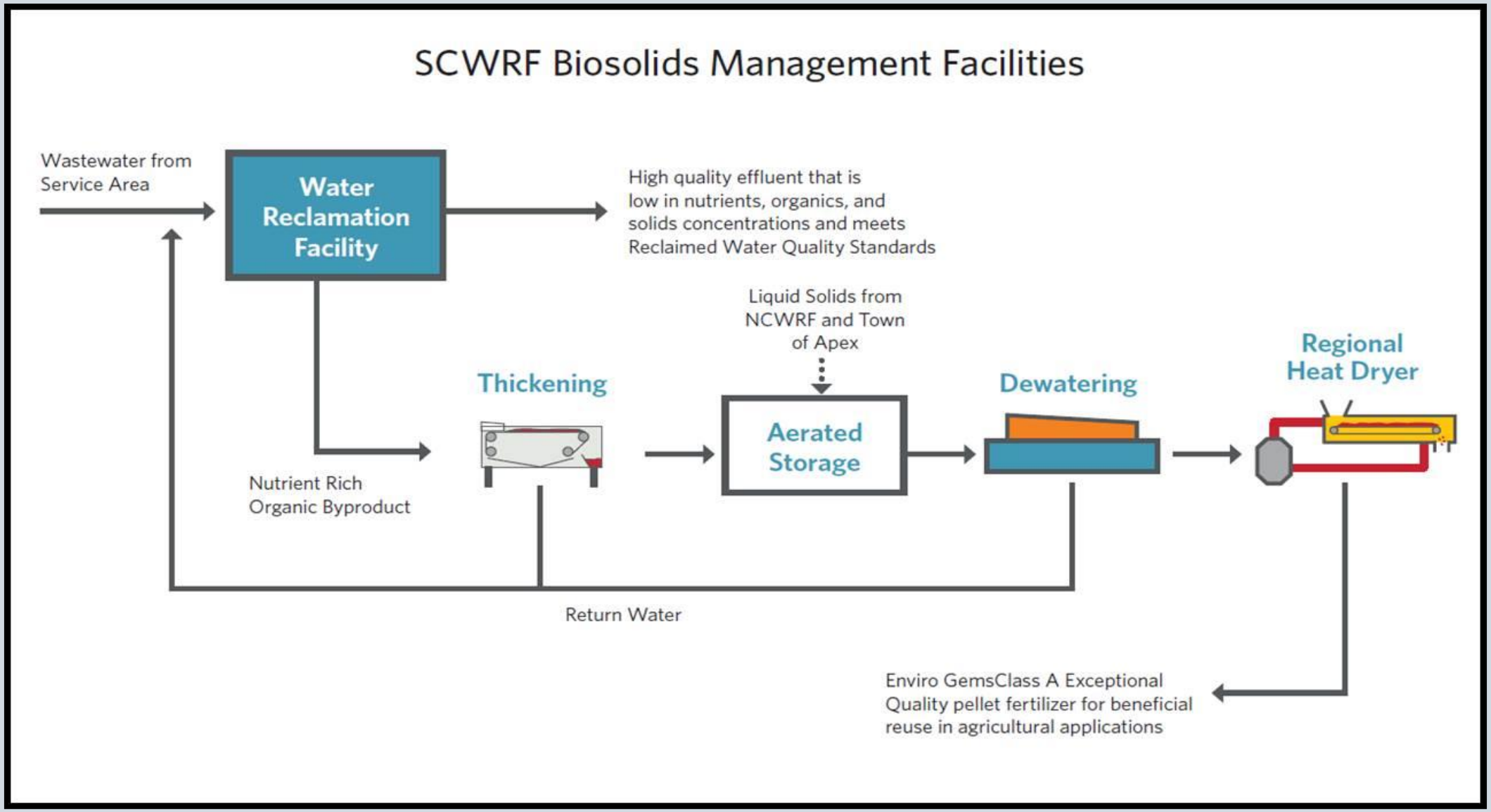
- Reduced material volume (solid vs. liquid) of reusable biosolid
- Ease of handling reuse product (solid vs. liquid)
- More flexible “year round” reuse program
- Can reuse Class A pellets or Class B wet cake
- Ample demand for product
- Additional reuse options include composting, alternative fertilizer, and alternative fuels (opens up out of state markets)

- Costly to build
- Intensive operation, maintenance, and laboratory analysis for compliance monitoring
- Increased impact to BNR facility from dewatering and drying side-stream(s)
- Budgeting for market fluctuations in fuel and polymer costs
- Finding the right customer to mesh with year- round operation.
- Customers may have varying product content/quality requirements to manage.

Other Impacts

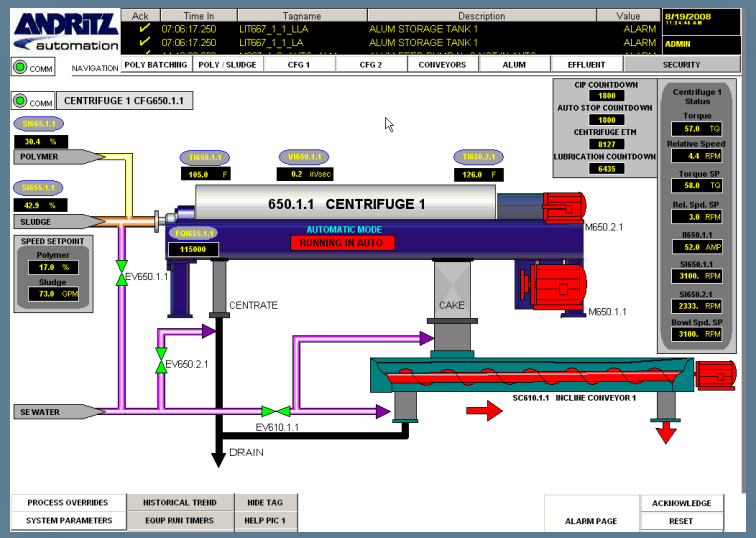
- Seasonal high digester liquor temperatures and pH's causing reduced dewaterability (increases polymer costs)
- Increased phosphorus release and "backloading" of BNR facility to levels approaching permit limits
- Solution - chemical addition to digesters or centrate
  - *Ferrous Sulfate*
  - *Ferric Sulfate (currently)*
- Centrate to drain can increase oxygen demand in BNR facility requiring additional aeration supply i.e. increased energy cost.

Process & Operations

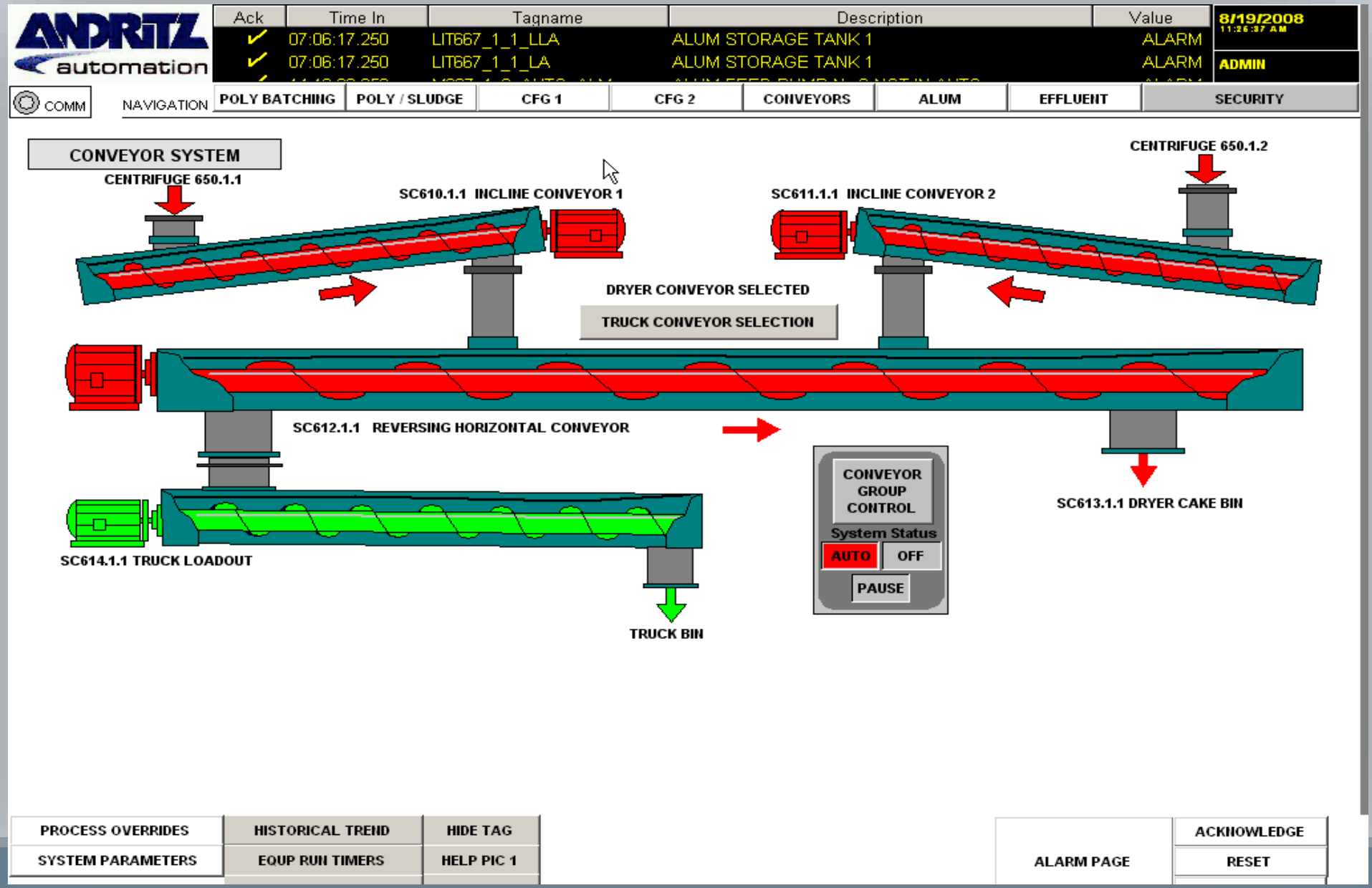


South Cary WRF Biosolids Dewatering Operations

- Target wet cake : 17 -18% TS
- Monitoring frequency:
  - Visually: on SCADA and Trending software continuously
  - Physically: minimum 3 times per 12 hr. shift
  - Process control sampling minimum 3 times per 12 hr. shift
    - Cake %TS
  - Performance Sampling 1 time per day (during operation)
    - Cake and Centrate %TS



Conveyors move Wet Cake to DDS or Truck Wet Cake Loadout

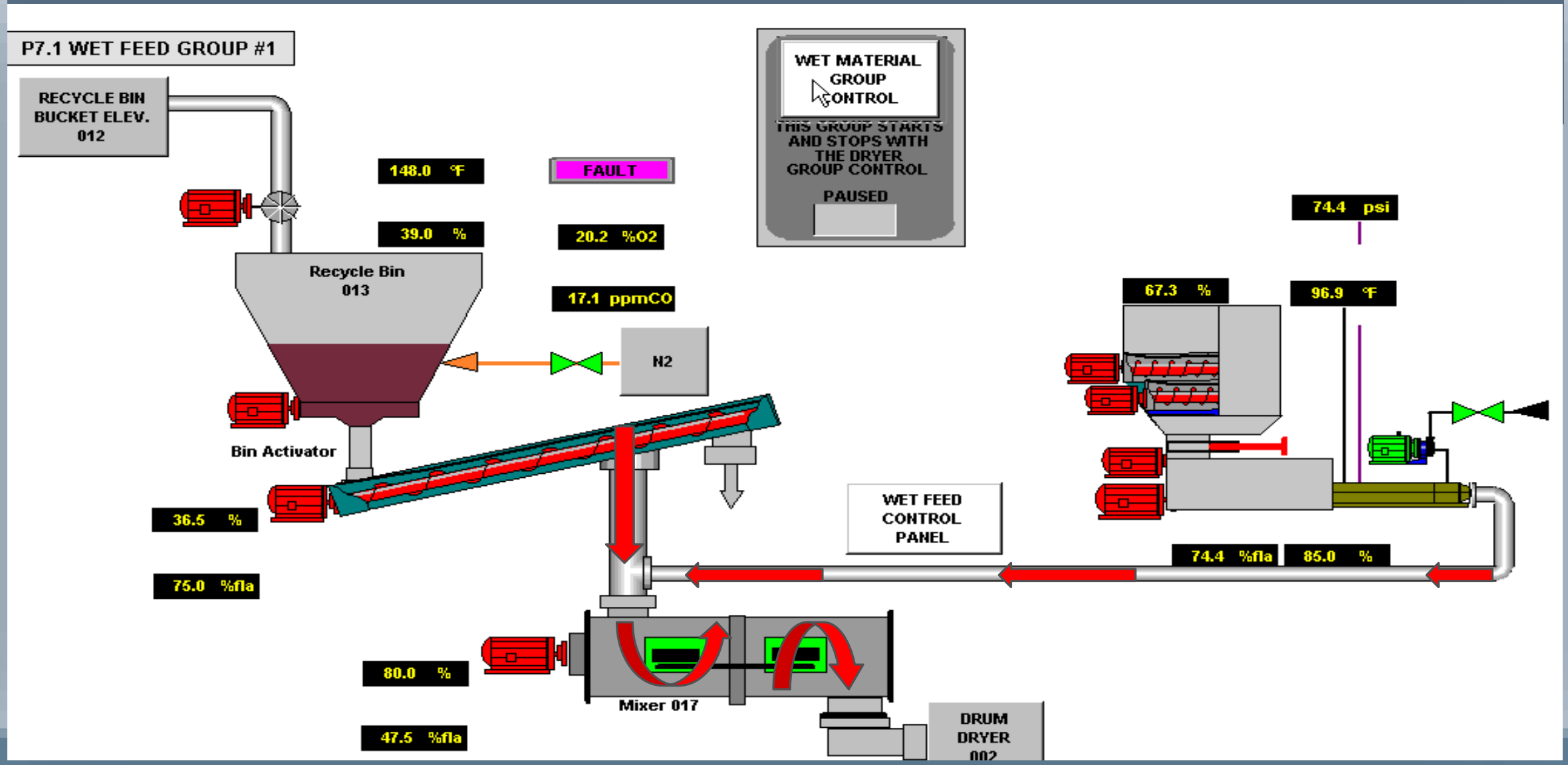


Andritz DDS40 Rotary Drum Dryer

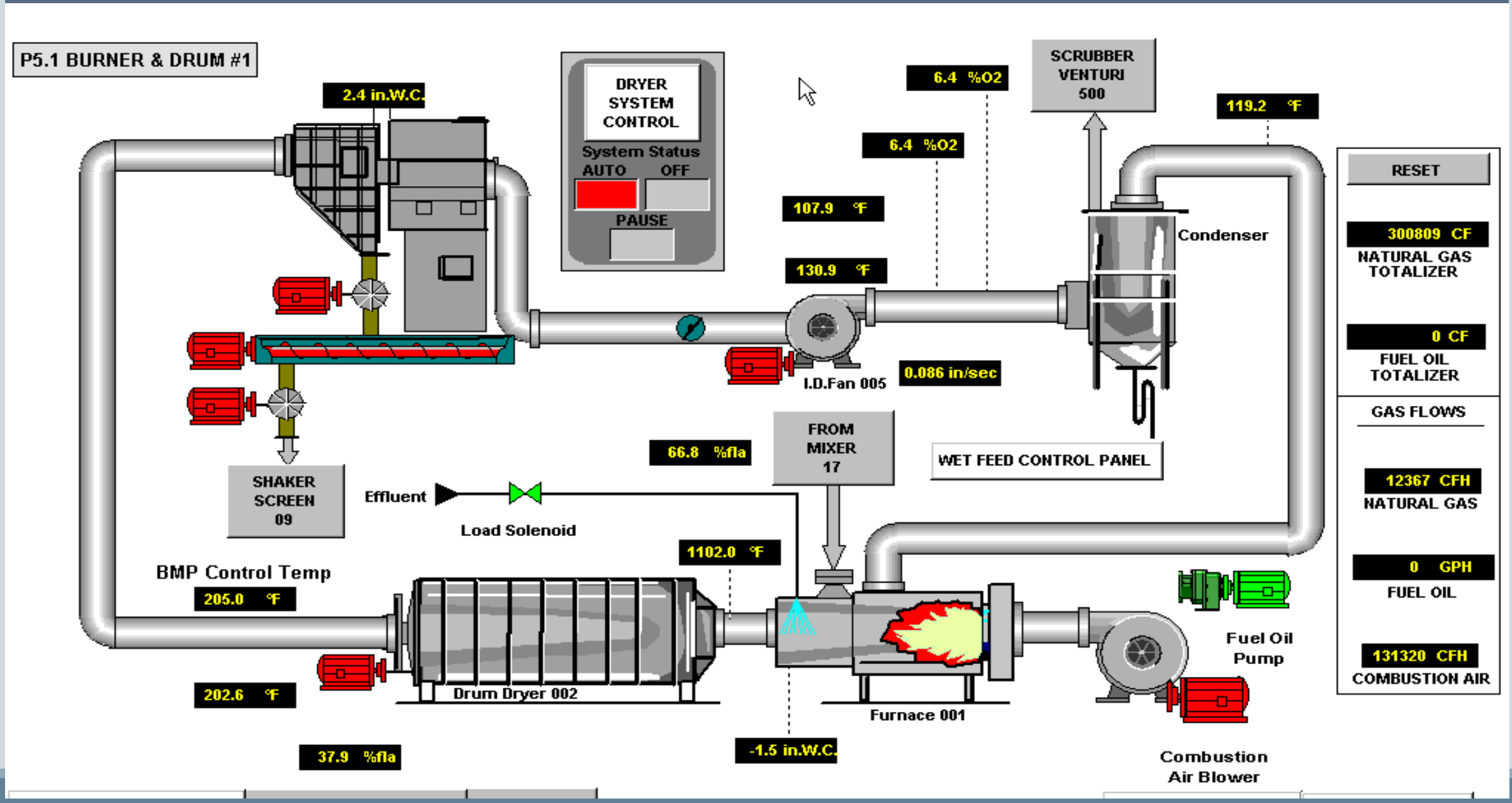
- Triple-pass rotary drum
- 1,886 cubic feet
- 8,820 lbs/hr H2O evaporation rate
- 20 MBTUH furnace
- 16,900 scfm process air flow

Dryer Systems - Wet Feed & Recycle Backmixing

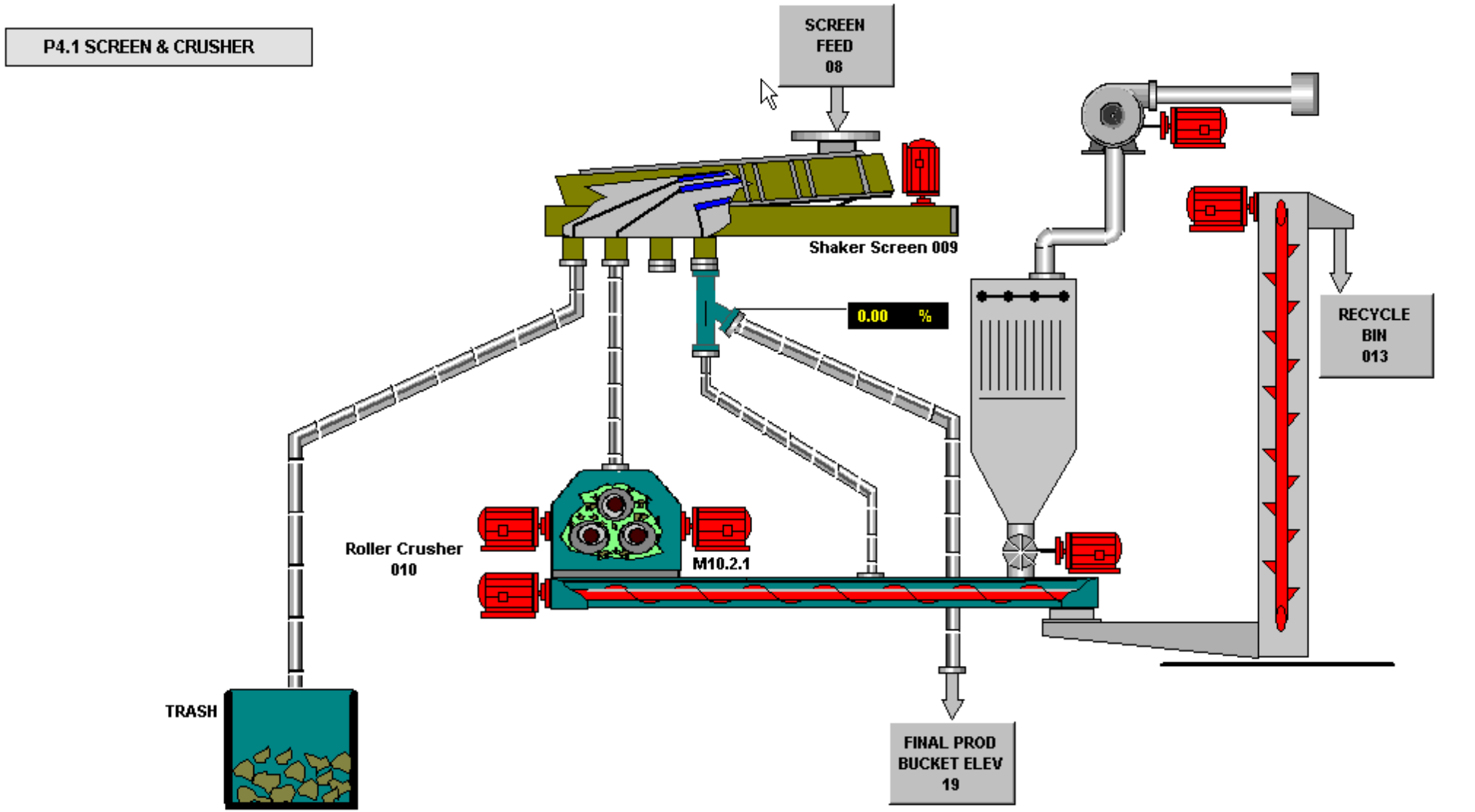
92 – 95% TS Recycle 69 – 72% TS Mix 17 – 18% TS Wet Cake



Dryer System Overview



Dryer System - Shaker & Movers



Pellet Product Storage

- 500 Wet Tons = ~ 20 days of production
- Coordinated production and pellet sales to maintain safe storage and steady supply

Product Loadout

24.5 tons/loadout

~ 50 yd box

12.15 – 50 $/ton

Coordinated production and pellet sales to maintain safe storage and steady supply

SAFETY

PHYSICAL HAZARDS:

- **HEAT, FIRE, EXPLOSION from FUEL VAPORS**
- **HEAT, FIRE, EXPLOSION from DUST ACCUMULATION**
- **SELF-HEATING OF PELLETIZED PRODUCT**
- High pressure process air
- High pressure super-cooled (cryogenic) liquid
- HOT equipment surfaces & sample streams
- Low oxygen, high carbon monoxide process environments
- Moving or rotational equipment

HEALTH:

- Fine dust & particulates (PPE & housekeeping)
- Vectors
- High frequency noise (hearing tests)
- More intensive exposure to biosolids in various states
- (PPE, housekeeping, hygiene, ventilation)

THREE STEPS TO SAFE OPERATION

Maintain all safety controls and interlocks such as:

sensors, design set points, telemetry, and engineered controls

Operational Awareness:

Staff trained on SOP's and procedures, managing multiple processes and support systems

HOUSEKEEPING:

- Daily/weekly housekeeping – controls mold & fungus growth, vector attraction, dust accumulation.
- Semiannual contract "stem-to-stern" cleaning.

REGULATORY

Thermal Drying Facility Operating permit

- Non-discharge WQ0029376
  - Achieve Class A EQ Product by:
    - Meet Pollutant Concentration Limits for EQ Biosolids
    - Process for Further Reducing Pathogens (PFRP) = Heat Drying
    - Pathogen Requirement – 503.32(a) = <1000 MPN/g
    - Vector Attraction Reduction– 503.33 (8) = drying to > 90% TS
- Annual reporting - NCDWQ and EPA 503
  - Plant staff prepare the report (forms and EPA filing on-line)
- Frequency of Pollutant Analysis depends on quantity generated:

0 – 289	Metric DT/YR	1/year
290 -1,499	Metric DT/YR	4/year
1,500 – 14,999	Metric DT/YR	6/year
>15,000	Metric DT/YR	12/year

REGULATORY

- NCDA Weighmaster Regulations & Licensing
- Calibrated & NCDA Certified truck scales

Acknowledgements

- Andritz Separation, Inc.,
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QUESTIONS?

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