

# **Flood Recovery By the Book, While Writing the Book**

Recovery and Startup of the  
Nashville Central WWTP Biosolids  
Facility

Presented by Bob Wimmer, PE



**BLACK & VEATCH**  
Building a world of difference.®

# Co-Authors

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# The Distraction



Just when things are running smoothly... Other challenges present themselves.

BEFORE



AFTER





LIVE

# FLOODING CRISIS

NEWSCHANNEL 5 STORMWATCH



TN COUNTY SCHOOLS ⚡

Montgomery Co. Schools: CLOSED

# May 2010 Flood

- 2 day rain of > 19 inches
- Cumberland River Crested at 51.86 feet in Nashville
  - Highest level since 1937
  - Record crests at numerous points along the river
- \$2.3 Billion in damages



May 2010 Flood

# LP Field





# Central Biosolids Facility

- 137 DT per day facility
- 4 circular DAFTs
- 4 primary 2.5 MG mesophilic digesters
  - 3 fixed cover
  - 1 Dystor cover
- 1 secondary 2.5 MG digester
  - Dystor cover
- High solids centrifuges
- Rotary Drum Dryer





# Damaged Equipment

- 4 circular DAFTs **Out of service**
- 4 primary 2.5 MG mesophilic digesters **Out of Service**
- 1 secondary 2.5 MG digester **Out of Service**
  - Dystor cover
- High solids centrifuges **Functional but no power**
- Rotary Drum Dryer **Out of Service**
- Liquid Plant **Minor Damage**

# **Metro SOP**

## **Section 13 - Flood**

### **Recovery**

In the case of a 500 year flood – figure it out as you go (Ha, Ha, Ha)

# Immediate Actions

- Complete inventory of equipment
  - Develop documentation system
  - Photos, testing reports, repairs
- Emergency Maintenance Contracts
- Pull Motors and bake
- Make a Plan
  - Value of Electronic O&M
  - Off site staff
  - Vendors



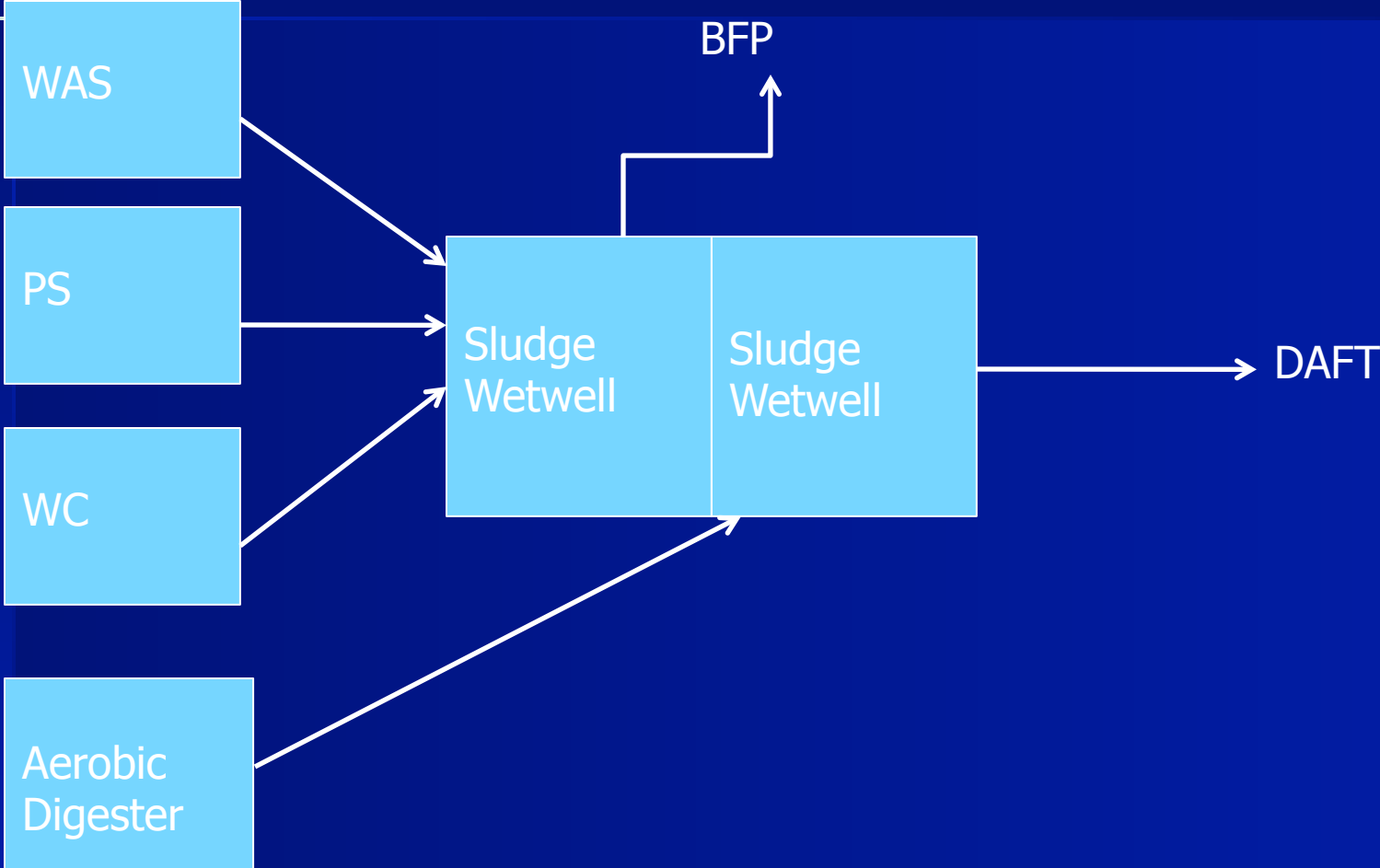
# Move Solids

- Installed a temporary belt filter press and hauling contract (unstabilized solids) between 20 to 25 dt/day
- Stop wasting primary
- WAS into out of service aeration basin
- Make a Plan

# Stabilize Solids

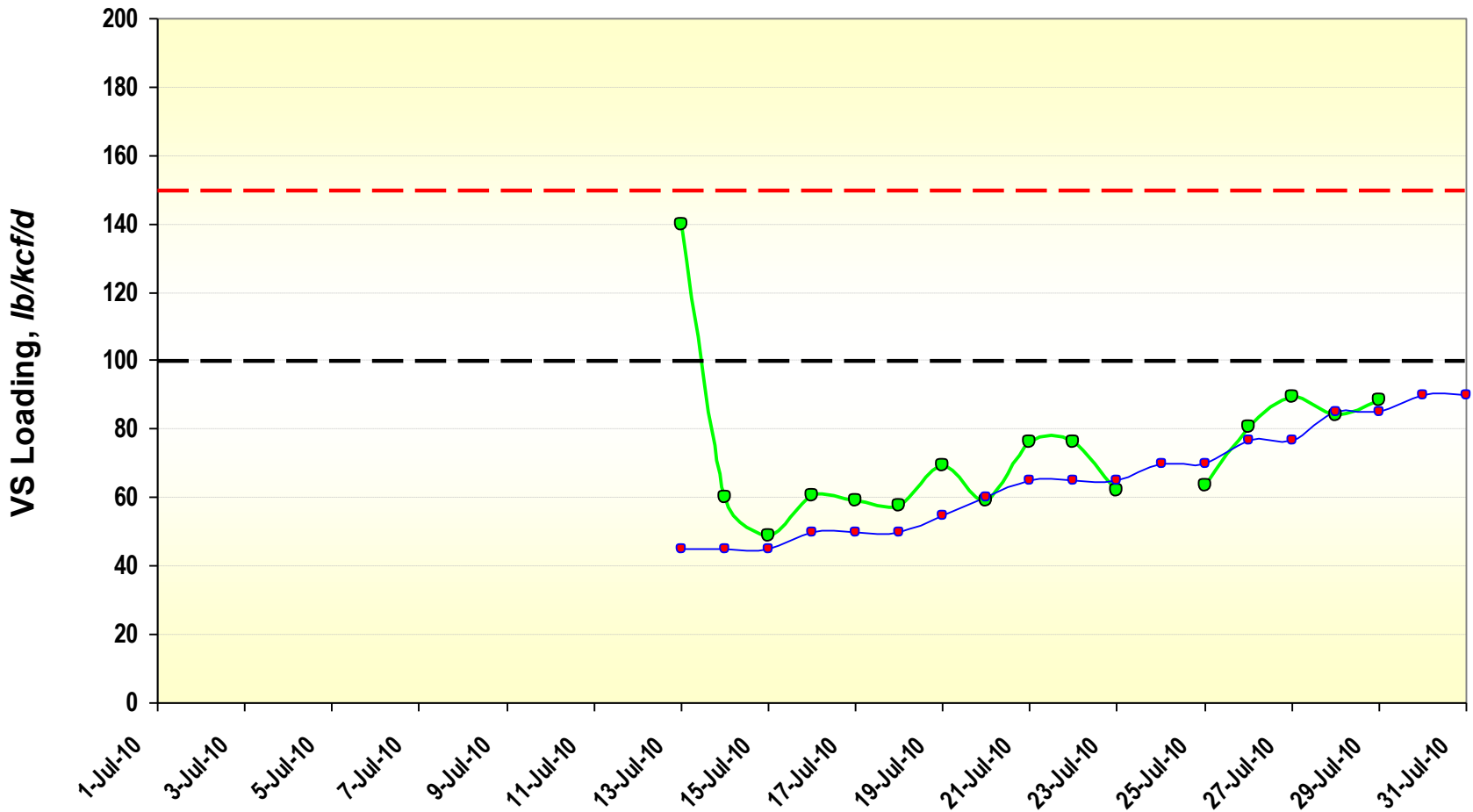
- Created 2 stage aerobic digester
  - Utilized out of service aeration basins (approx 2MG per basin)
- Temporary pumping between basins
- Use out of service primary clarifier as digested sludge storage
- Restart DAFT
- Restart Centrifuges – relieve some pressure

# Sludge Pumping Challenges

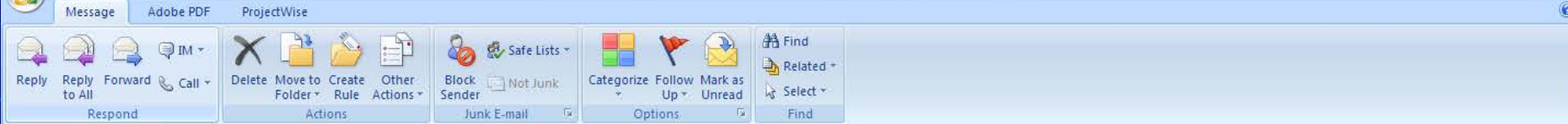


# Digester Start Up

DIGESTER 2 & DIGESTER 3 - AVERAGE VOLATILE SOLIDS LOADING







From: Santha, Harikishan  
 To: Roy.Denney@nashville.gov; paul.hunter@nashville.gov; jimmy.howell@nashville.gov; terry.highsmith@nashville.gov; andrew.schutt@nashville.gov; Angie.Moore@nashville.gov; Ron.taylor@nashville.gov; joe.white@nashville.gov  
 Cc: Lambert, Michael S. (Shannon); Qubeck, Tazio R.; Moore, Patrick K.; Wimmer, Bob; Neun, Gary W.; Massart, Neil S.; Al-Zarjawi, Ammar J.; Ken.Schnaars@aecom.com; Santha, Harikishan  
 Subject: July 26 Digester Operations Planning/Sludge Transfer

Sent: Mon 7/26/2010 11:53 AM

### Targets and Action Items for July 26.

- Digester loading for July 25: Target **70 lb VS/kcf/d** - **Actual: 62 lb VS/kcf/d**
- Temporary BFP dewatering restarted on July 25 - operating at a hydraulic throughput of approximately 230 gpm/24 hours.
- Digester loading increased to 77 lb VS/kcf/d.
- Sludge pumping rates adjusted for the target digester loading of 77 lb VS/kcf/d

#### **Approx 46:54 PS:WAS on dry weight basis**

North Primary for 12 hours @ 150 gpm

South Primary for 12 hours @ 150 gpm

North Waste Sludge for 12 hours @ 700 gpm

Whites Creek sludge for 12 hours at 300 gpm

Next meeting - **SA on Tuesday July 27 @ B&V trailer.**

#### Attachments:

1. Pumping Rate Spreadsheet for July 26, 2010



**HARI SANTHA, P. E.**  
**BLACK & VEATCH - BUILDING A WORLD OF DIFFERENCE™**  
 8400 WARD PARKWAY

**PUMPING SCHEDULE FOR JUL 26 2010**

Cells in   are input values  
 Cells in   are calculated values

**ANAEROBIC DIGESTION**

Digester Operating Level  34  ft

Number of Primary Digesters  2

	TARGET	ACTUAL
	<i>lb VS/kcf/d</i>	<i>lb VS/kcf/d</i>
Organic Loading Rate to Digesters	<span style="background-color: yellow;"> 75 </span>	<span style="background-color: cyan;"> 77.3 </span>

	Volatle Solids	Total Solids	Feed Volume
	<i>lb/d</i>	<i>lb/d</i>	<i>gpd</i>
Total Feed to Digesters	<span style="background-color: cyan;"> 48,100 </span>	<span style="background-color: cyan;"> 73,050 </span>	<span style="background-color: cyan;"> 175,180 </span>

	PS	WAS
Approximate PS:WAS Split (TS Basis)	<span style="background-color: cyan;"> 46% </span>	<span style="background-color: cyan;"> 54% </span>

**DISSOLVED AIR FLOTATION THICKENING**

Solids Capture Efficiency  85.0%

Digester Feed Solids Concentration  5.0%

	Volatle Solids		Total Solids		Feed Volume
	<i>%VS</i>	<i>lb/d</i>	<i>%TS</i>	<i>lb/d</i>	<i>gpd</i>
Total Feed to DAF	<span style="background-color: cyan;"> 65.8% </span>	<span style="background-color: cyan;"> 56,590 </span>	<span style="background-color: cyan;"> 1.7% </span>	<span style="background-color: cyan;"> 85,940 </span>	<span style="background-color: cyan;"> 604,800 </span>

**TEMPORARY BELT FILTER PRESS DEWATERING**

Hours of Operation  24

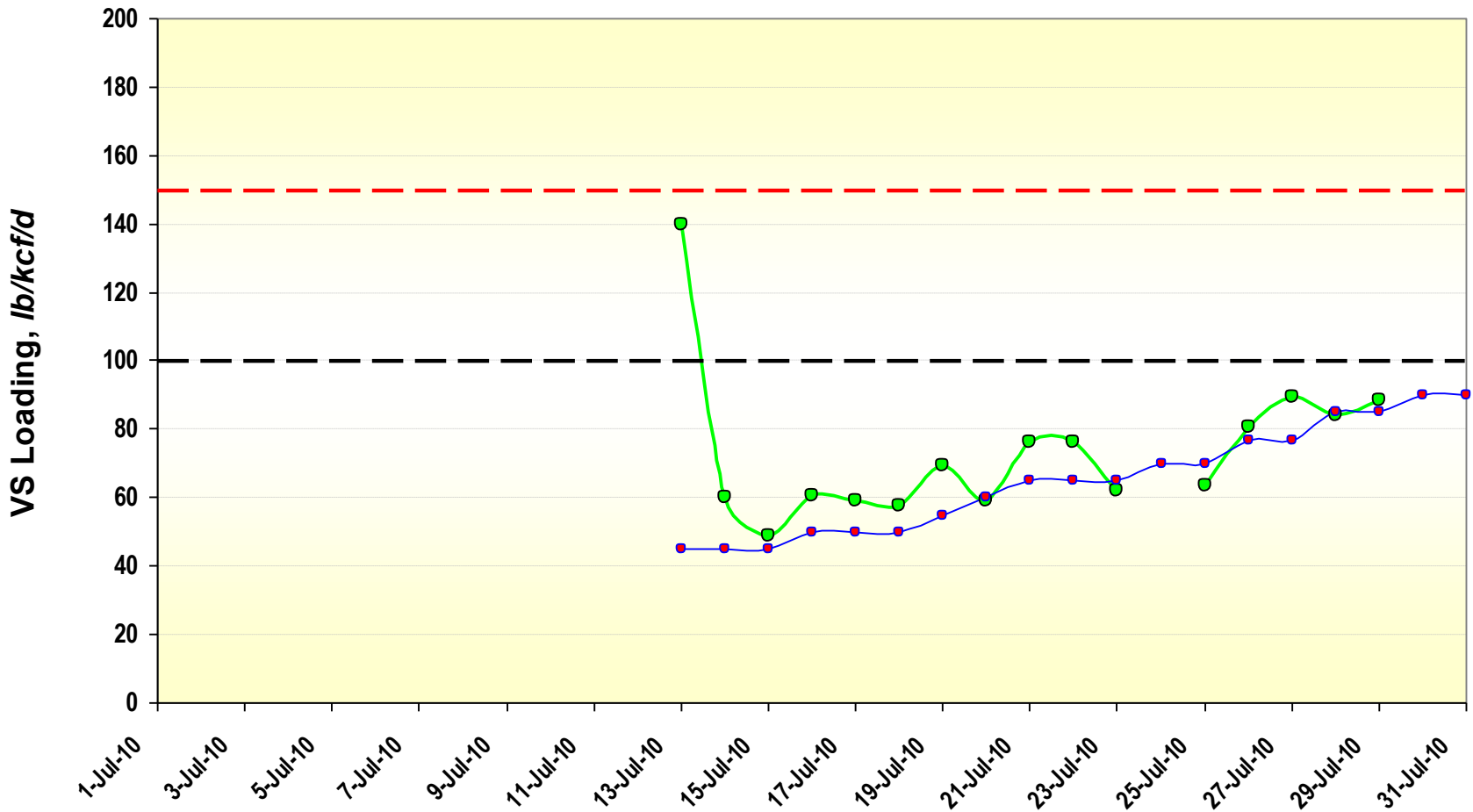
Hydraulic Loading Rate  230  gpm

	Volatle Solids	Total Solids	Feed Volume
	<i>lb/d</i>	<i>lb/d</i>	<i>gpd</i>
Total Feed to BFP Dewatering	<span style="background-color: cyan;"> 30,990 </span>	<span style="background-color: cyan;"> 47,060 </span>	<span style="background-color: cyan;"> 331,200 </span>

**SLUDGE PUMPING FROM CENTRAL WWTP**

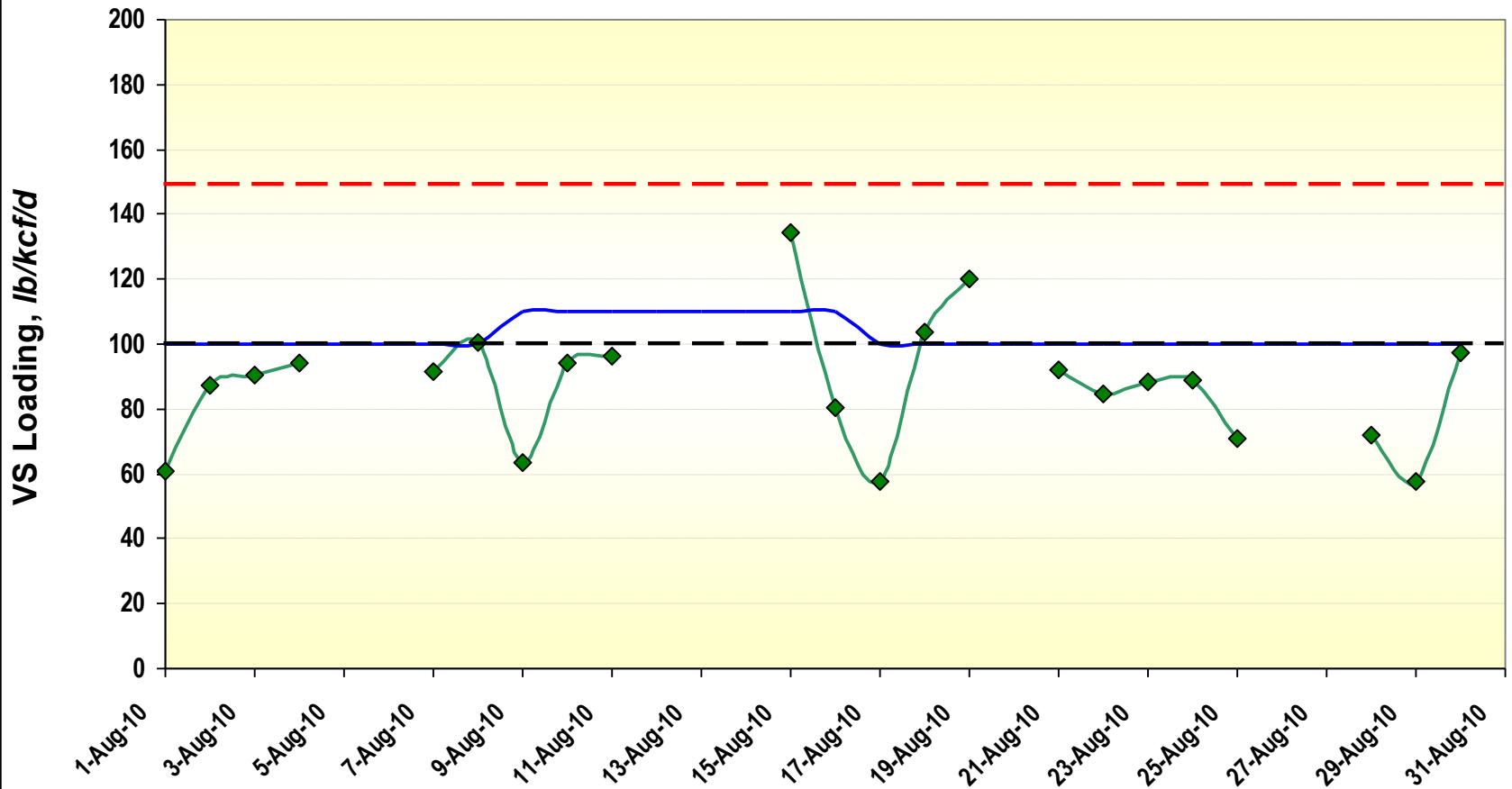
# Digester Start Up

DIGESTER 2 & DIGESTER 3 - AVERAGE VOLATILE SOLIDS LOADING



# Digester Start Up

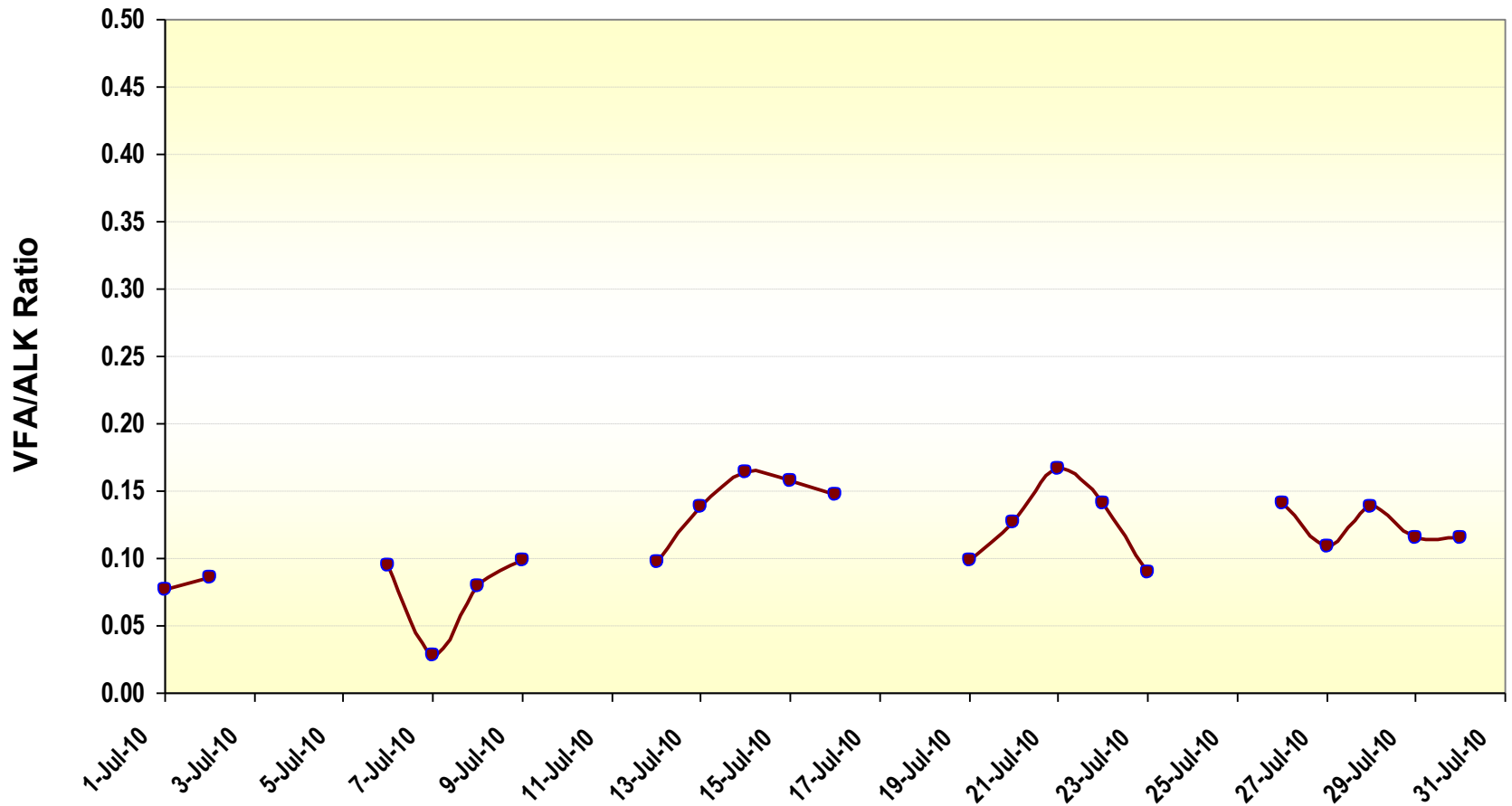
DIGESTER 2 & 3 - AVERAGE VOLATILE SOLIDS LOADING





# VFA:Alkalinity

DIGESTER 2 - VFA:ALKALINITY



# Dystor Collapse



# Cover Repairs



# Lessons Learned

- Communication
- Valve Options
- Slow and Steady
- Critical Failure Analysis

# Thank you

- All the Metro Staff
- Numerous Contractors
- Numerous Vendors

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