Cumbre Binacional de Saneamiento Fronterizo y Calidad del Agua

Los Retos de Hoy, las Oportunidades del Mañana

Today's Challenges, Tomorrow's Opportunities

Binational Border Sanitation and Water Quality Summit

San Antonio, Texas
March 16-18, 2011

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South Bay International Wastewater Treatment Plant

PRESENTATION AGENDA:

- Project History & Overview
- Project Challenges
  - Design
  - Construction
  - Start-up
- Opportunities to Optimize Plant Operation
- Answer Questions

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South Bay International Wastewater Treatment Plant (SBIWTP) is the result of Bi-national cooperation between the US and Mexico to provide a long-term solution for environmental protection of the Tijuana River.

- Located on border between Tijuana and San Diego
- 1990 – United States and Mexico approve Minute No. 283
- 1992 – Pre-design investigations started
- 1993 – Design started
- 1995 – Construction of primary treatment plant started
- 1997 – Advanced primary treatment plant placed on line
- 2008 – Construction of secondary treatment plant started
- 2010 – Secondary treatment plant placed on line
- 2011 – Court order compliance date met

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South Bay International Wastewater Treatment Plant is a state-of-the-art facility designed to meet USEPA secondary treatment standards

PLANT CAPACITY

- 25 mgd average flow
- 48.75 mgd peak flow

PRELIMINARY TREATMENT

- Mechanical bar screens
- Aerated grit chamber

PRIMARY TREATMENT

- Primary sedimentation
- Anionic polymer addition
- Ferric chloride addition
- Disinfection

RESIDUAL SOLIDS HANDLING

- Unstabilized primary sludge storage
- Belt filter press dewatering
- Lime stabilization
- Disposal in Mexico

South Bay International Wastewater Treatment Plant is a state-of-the-art facility designed to meet USEPA secondary treatment standards

PLANT CAPACITY

- 25 mgd average flow
- 48.75 mgd peak flow

SECONDARY TREATMENT

- "Selector" modified activated sludge
- Secondary sedimentation
- Disinfection

RESIDUAL SOLIDS HANDLING

- Dissolved air flotation thickening
- Unstabilized primary/secondary sludge storage
- Lime stabilization
- Disposal in Mexico

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South Bay International Wastewater Treatment Plant Faced Many Challenges

WASTEWATER CHARACTERIZATION

- Constituents not fully quantified
- Concern about inhibitory/toxic constituents

SITE AND GEOTECHNICAL ISSUES

- 75-acre site
- Located in “active” seismic area
- Underlain with “liquefiable” soils
- Site located in Tijuana River flood zone

Extensive Wastewater Characterization and Treatability Studies Were Required to Define Influent Wastewater Loading and Design Criteria to Mitigate Potential Treatability Concerns

ROUND 1 WASTEWATER SAMPLING & CHARACTERIZATION PROGRAM

- Conducted from August 1992 to October 1992
- Over 130 composite and grab samples taken and analyzed

ROUND 2 WASTEWATER SAMPLING & CHARACTERIZATION PROGRAM

- Completed from November 1992 to September 1993
- Over 100 composite samples taken and analyzed

Extensive Wastewater Characterization and Treatability Studies Were Required to Define Influent Wastewater Loading and Design Criteria to Mitigate Potential Treatability Concerns

CHEMICALLY ASSISTED PRIMARY SEDIMENTATION LABORATORY SCALE PROGRAM

- Studies conducted in October 1992 and November 1992

ACTIVATED SLUDGE LABORATORY SCALE TREATABILITY PROGRAM

- Studies conducted in October 1992 and November 1992
- Studies performed by Arizona State University

Above Programs Defined Constituent Loading Criteria and Need for "Selector" Modified Activated Sludge System

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Site Liquefaction Concerns Required Mitigation Before Site Grading Could Begin

- Deep Dynamic Compaction (DDC) Selected Best Option
- Crude but Effective Mitigation Method
- Energy Imparted on Entire Site to Consolidate Liquefiable Soils 15’ to 20’ Below Grade

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2009/02/19 13:01

2009/02/20 09:18

2009/02/24 11:33

Site Location in the Tijuana River Flood Zone Required Extensive Mass Grading and Rip-Rap Protection Before Start of Construction

02/10/2011 09:40

02/10/2011 09:41

Schedule Acceleration Caused Significant Construction and Operations Challenges

CONSTRUCTION CHALLENGES

- Secondary plant completion scheduled for April 2011
- Court order compliance date set at January 5, 2011
- Secondary plant schedule accelerated in December 2009
- All parties accelerate activities to meet compliance date
- Compliance date is met

Schedule Acceleration Caused Significant Construction and Operations Challenges

OPERATIONS CHALLENGES

- Secondary treatment plant started-up in mid-November 2010
- Automatic controls and monitoring not ready
- Facilities operated in manual mode
- O&M manuals lagged start-up
- Operator training lagged start-up
- Compliance schedule met

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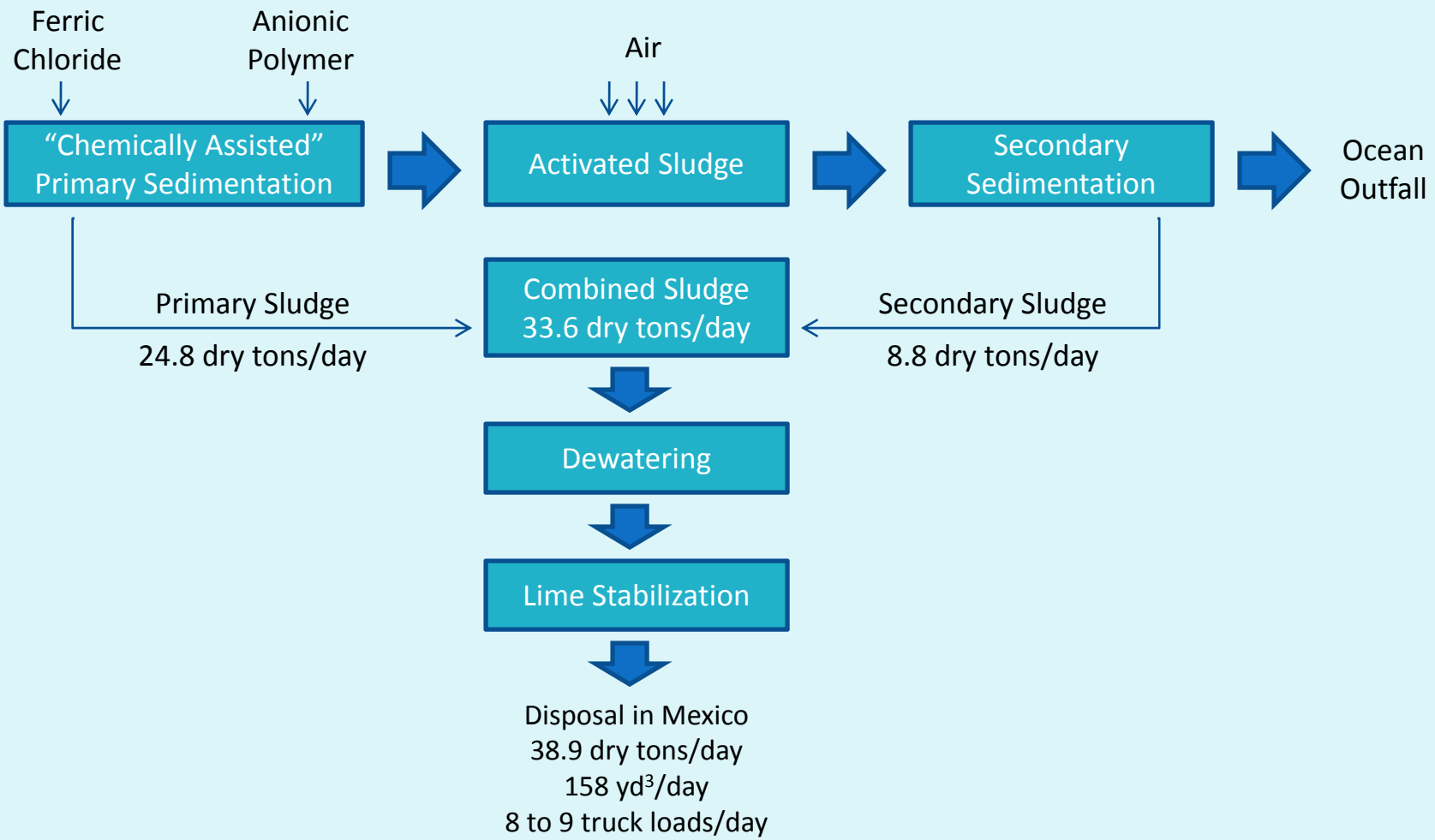
Opportunities to Optimize Plant Operation Center Around "Chemically Assisted" versus "Conventional" Primary Sedimentation



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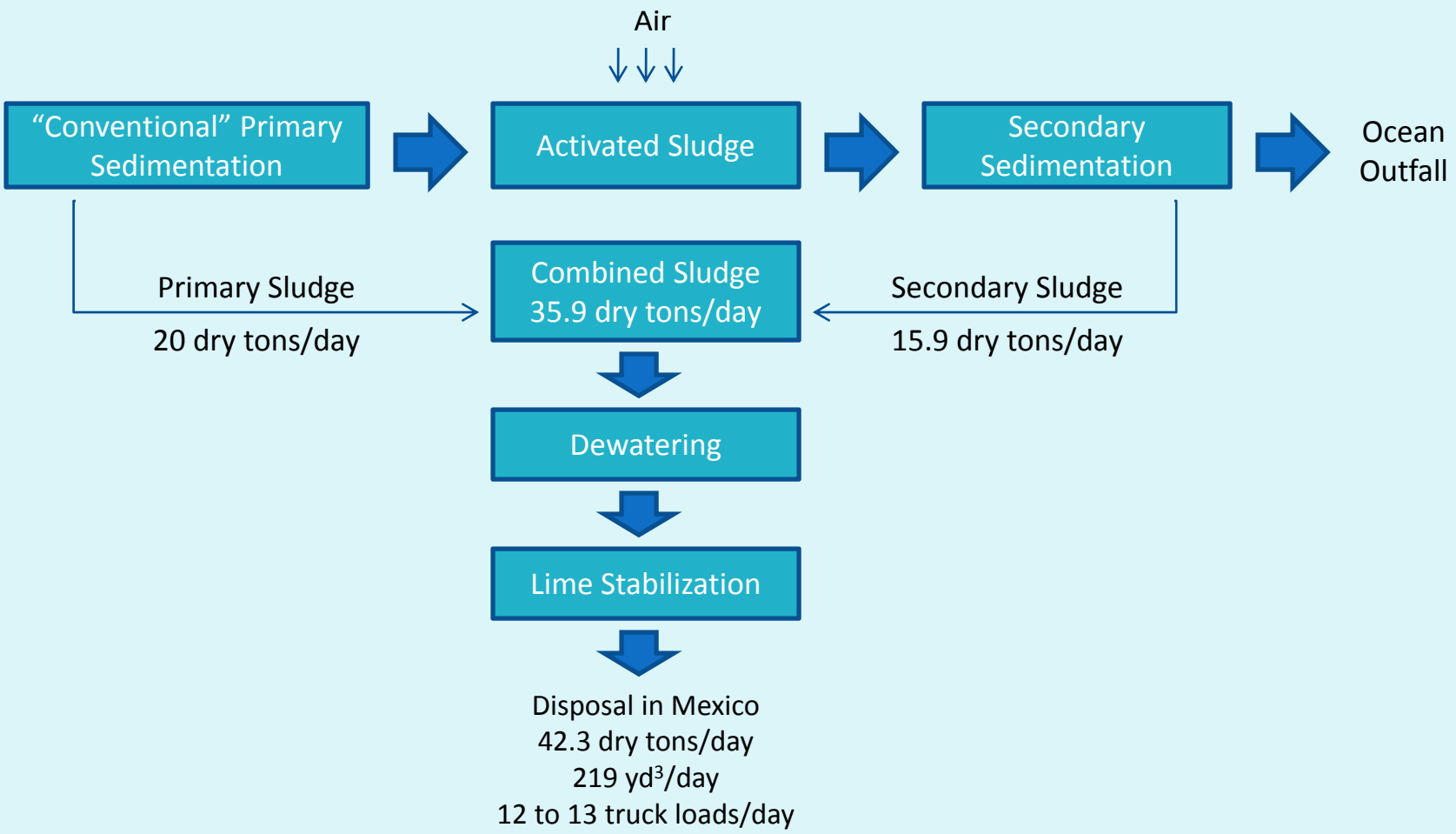

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The Ratio of Primary Sludge and Secondary Sludge in the Total Sludge Mass Impacts the Dewaterability of the Sludge

	Primary Sludge	Secondary Sludge	Primary/Secondary Ratio
Chemically Assisted Primary and Secondary	24.8 dry tons/day	8.8 dry tons/day	73% / 27%
Conventional Primary and Secondary	20.0 dry tons/day	15.9 dry tons/day	55% / 45%

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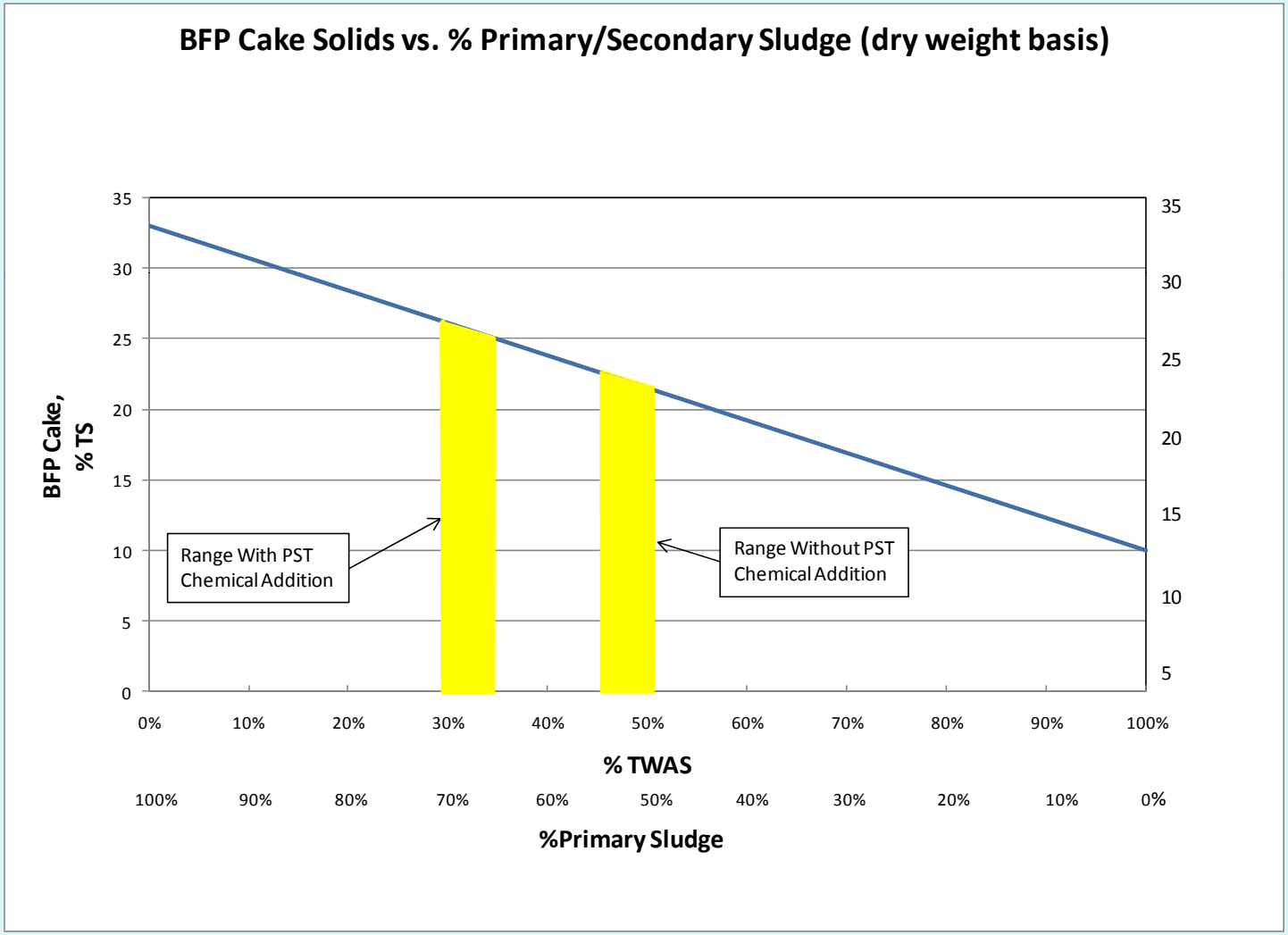
Secondary Sludge is More Difficult to Dewater than Primary Sludge



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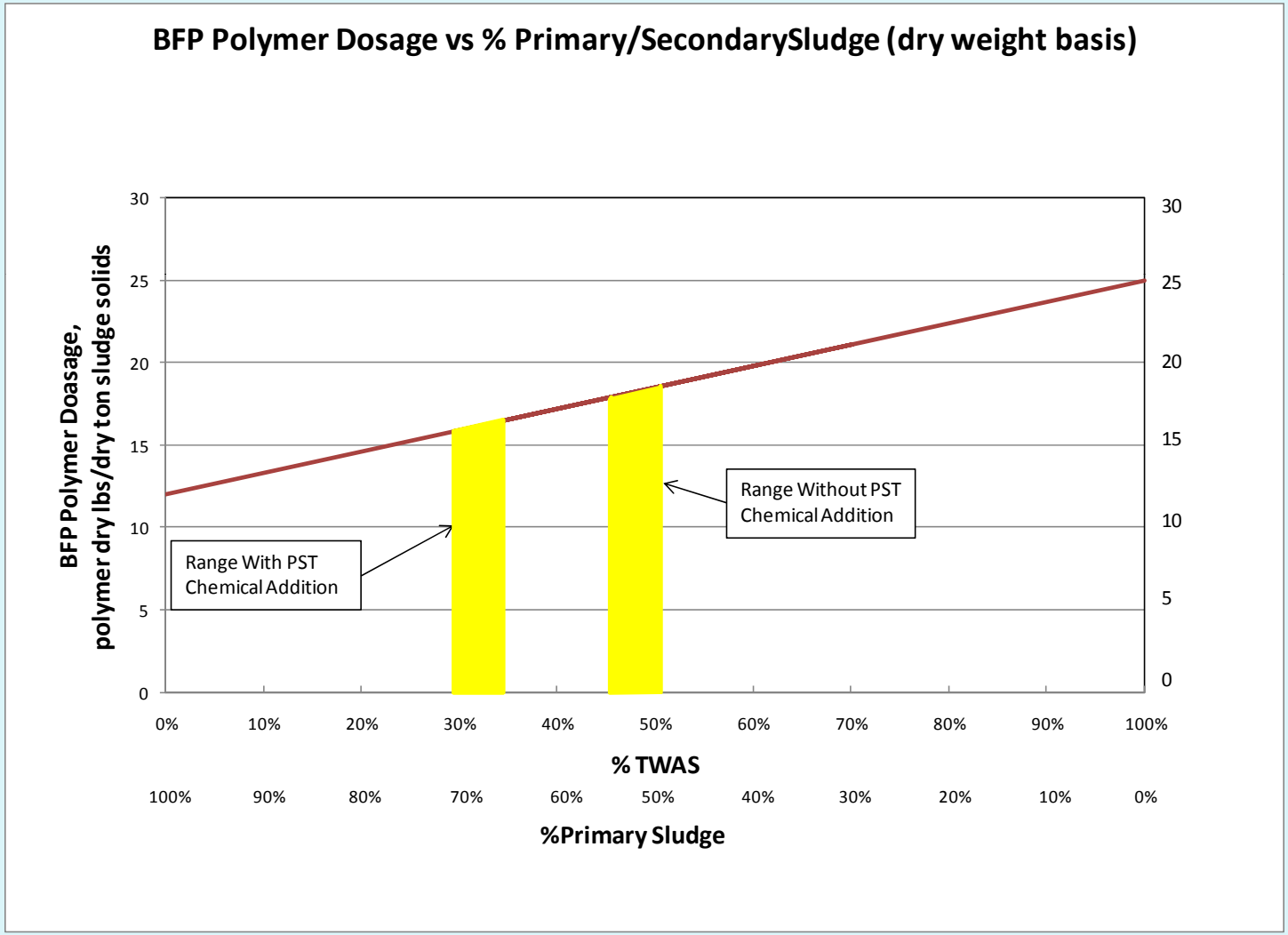
Secondary Sludge Requires More Polymer to Dewater Than Primary Sludge



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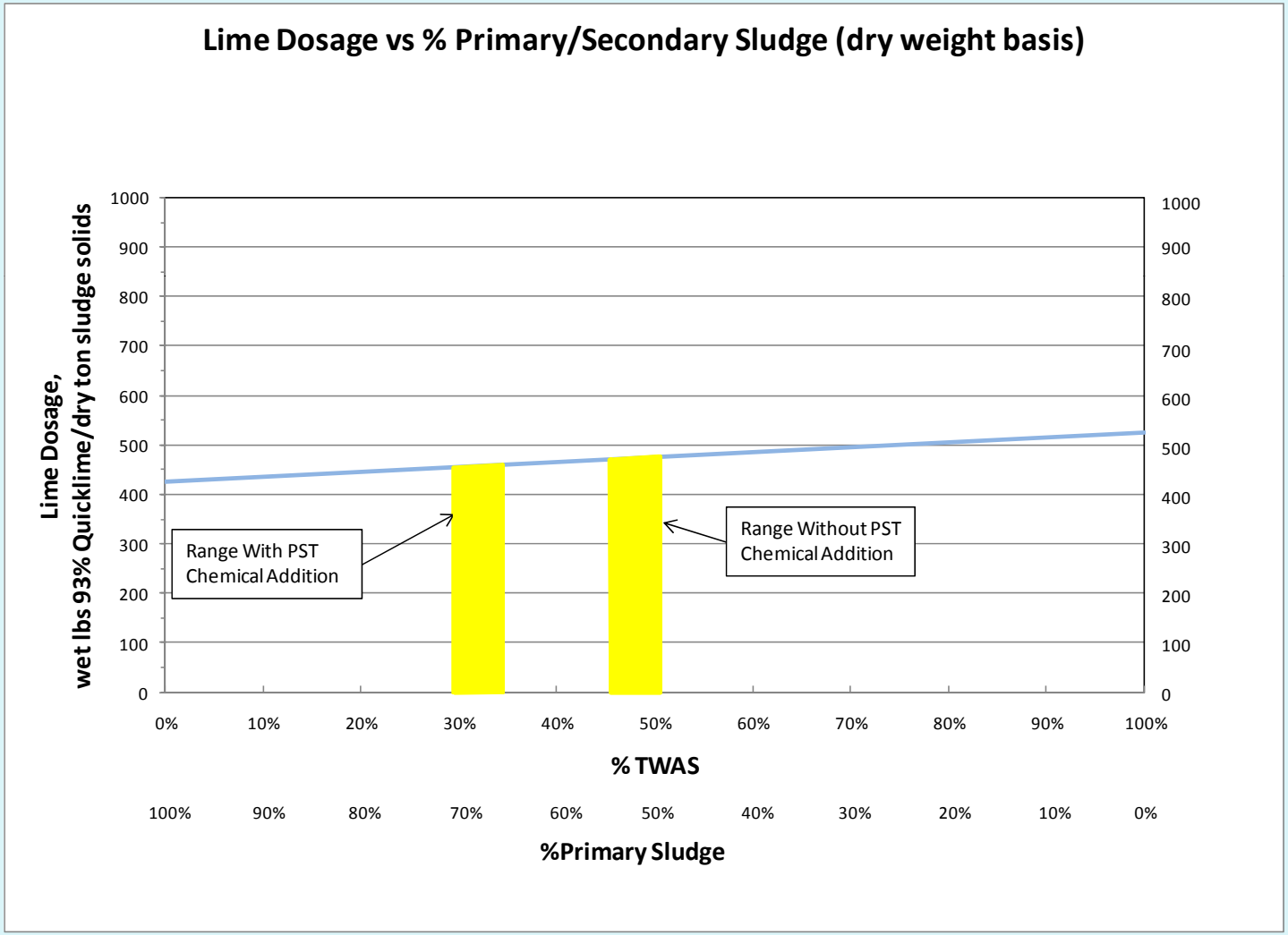
Secondary Sludge Requires More Lime to Stabilize Than Primary Sludge



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"Chemically Assisted" versus "Conventional" Primary Sedimentation Impact Chemical, Power, and Sludge Disposal Costs

COMPARISON OF "RELATIVE" CHEMICAL COSTS

Chemical	Chemically Assisted Primary Plus Secondary	Conventional Primary Plus Secondary
PST Ferric Chloride	$758,000	N/A
PST Anionic Polymer	$77,000/yr	N/A
DAF Cationic Polymer	$60,000/yr	$110,000/yr
BFP Cationic Polymer	$567,000/yr	$730,000/yr
Lime	$233,000/yr	$267,000/yr
Total	$1,695,000/yr	$1,107,000/yr

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"Chemically Assisted" versus "Conventional" Primary Sedimentation Impact Chemical, Power, and Sludge Disposal Costs

COMPARISON OF "RELATIVE" ELECTRICITY COSTS

Process	Chemically Assisted Primary Plus Secondary	Conventional Primary Plus Secondary
PST Chemical Addition Equipment	$70,000/yr	N/A
Activated Sludge Blowers	$1,930,000/yr	$2,479,000/yr
Total	$2,000,000/yr	$2,479,000/yr

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Opportunities to Optimize Plant Operation Center Around "Chemically Assisted" versus "Conventional" Primary Sedimentation

COMPARISON OF "RELATIVE" TOTAL COSTS

Cost Component	Chemically Assisted Primary Plus Secondary	Conventional Primary Plus Secondary
Chemicals	$1,695,000/yr	$1,107,000/yr
Electricity	$2,000,000/yr	$2,479,000/yr
Subtotal	$3,695,000/yr	$3,586,000/yr
Sludge/Disposal ➢Trucks/day ➢Cost	 8 to 9 ?	 12 to 13 ?

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The South Bay International Wastewater Treatment Plant is a Successful Bi-National Project that Meets the Goals Established by the U.S. and Mexico 21 Years Ago to Protect Our Environment

MORE OPPORTUNITIES TO BE EXPLORED:

- Secondary effluent return to Mexico
- Anaerobic digestion to reduce sludge volume
- Co-generation to offset power costs

QUESTIONS?

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