AN UPDATE ON THE IMPLEMENTATION OF THE STICKNEY, CALUMET AND NORTHSIDE WATER RECLAMATION PLANTS’ MASTER PLANS

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MWRDGC
PRESENTATION OVERVIEW

1. Review of the Objectives of the Master Planning Process
2. Review of the Master Plans Program
3. Current Implementation Progress
4. A Look Ahead
HISTORY OF THE MASTER PLANS

2000: Recognized Need for a Comprehensive Plan to Address Major Plant Shortcomings at Stickney.

40 Year Planning Horizon (2040)
20 Year Improvement Projects (2020)

2003: Initiated First Master Plan Work at Stickney

2004: Completed Stickney Master Plan

2005: Completed Calumet Master Plan

2007: Completed North Side Master Plan
Objectives of the Master Plan Process:

1. Assess Future Flows and Pollutant Loadings
2. Maintain the Treatment Capacity of the Plant through the Year 2040 Projected Flows
3. Replace/Upgrade Undersized or Underperforming Unit Processes
4. Review Opportunities with Respect to Process Changes
Objectives of the Master Plan Process:

5. Provide Sustained Treatment Capability for TARP Phase II Reservoir Pumpback (Stickney & Calumet)

6. Prepare to Respond to Changes in Potential Regulations (Nutrient Removal, Disinfection)

7. Standardization of Processes and Equipment Between Plants Where Practical
Products:

1. Master Plan Prioritizing Capital Improvement Projects Over the Next 20 Years
2. Computer Model of the Plant Processes for Future Analysis
The Master Planning Process is a “Road Map to the Future”:

Where Do We Need to be in 40 Years, and How Do We Get There?
New Parking Area
SITE PREPARATION CONTRACT 2004

Temporary Trailers and Contract Staging Area

Demolition of Decommissioned Buildings
NEW HIGH LEVEL INFLUENT PUMPING STATION

- 480 MGD Firm Capacity
- 5 Mechanically Cleaned Bar Screens
- Operating Engineer’s Room
- Electrical Operator’s Room
- Odor Control
- Construction Completion 2010
HIGH LEVEL INFLUENT PUMPING STATION
NEW HIGH LEVEL INFLUENT PUMPING STATION
NEW HIGH LEVEL INFLUENT PUMPING STATION
CENTRAL BOILER FACILITY

- 4 Boilers, 70,000 lbs./hr Capacity Each
- 100 psi Output
- Dual Gas (Natural Gas and Digester Gas)
- Simultaneous Co-firing, Maximize Use of Digester Gas
- Overhead Steam and Condensate Return Line
GRIT REMOVAL FACILITY

- 8 25’ X 135’ Aerated Grit Tanks
- Traveling Bridge Grit Removal System
- Grit Dewatering
- Tanks Covered for Odor Control
PRIMARY SETTLING TANKS

- 12 155 ft. dia. Circular Primary Settling Tanks
- 4 Primary Sludge and Scum Pumping Stations
- Piping Gallery
PRIMARY SETTLING TANKS

Construction 2008-2011
COMPUTATIONAL FLUID DYNAMICS MODELING
CFD Model Results
INTERMEDIATE BLOWERS

- 2 75,000 scfm Blowers
- Reduce Energy Consumption at Below Peak Demand
- Looped Air Main to Improve Air Pressure to Battery A
- Construction 2008--2010
SLUDGE THICKENING FACILITIES

- Separation of Primary Sludge from WAS
- Primary Sludge Only to Existing 12 Gravity Concentration Tanks
- Replace Primary Sludge Screens
WAS TO 6 NEW 2.5m GRAVITY BELT THICKENERS
- Expand Polymer Feed System
- Construction 2008-2011
NEW INTERMEDIATE BLOWER
NEW INTERMEDIATE BLOWER

- New Blower # 2 in SW P&BH
- 155,000 Scfm
- Adjustable Inlet Guide Vanes to Better Tailor Air Production to Air Demand
- Will Be Connected to Plant Wide DCS So New DO Probes in Aeration Tanks Can Control Blower Output
- Construction Completion 2008
SOUTHWEST PRIMARY SETTLING TANKS

Master Plan Recommendations:

- Increase Primary Treatment Capacity at the Southwest Plant by Adding 12 New 160’ Circular Clarifiers
- Two Dedicated New Circular Primary Clarifiers for Thickening
- Modify the Existing Sludge Pumping System to Accommodate In-tank Thickening to 4-5% Solids
Existing Site

Proposed Layout
Problems:

- Hydraulic Analysis Revealed Very Uneven Flow Split Between New and Existing PSTs. Less than 5% to Circular / More than 95% to Rectangular

- Water Level in Existing Inlet Channels Must Be Raised 2.5 Ft to Push the Desired Flow Rate to the New PSTs

- Increase of Required 2.5-ft of Pumps TDH Results in About 100-mgd Reduced Capacity

- Flow to Existing PSTs Must Be Regulated by Valves or Gates Based on Pumped Flow

- Thickening in primary settling tanks not desirable
REVISED APPROACH TO SOUTHWEST PRIMARY SETTLING TANKS

■ 8 225 Ft. dia. Circular Tanks
■ Existing Rectangular Tanks Demolished
■ Capacity Reduced to 700 MGD Due to Hydraulic Restrictions
■ Need to Raise Wall Height of Grit Tanks 18”
IMHOFF TANK REPLACEMENT
WESTSIDE IMHOFF TANKS

Master Plan Recommendations:

- Nine 150 ft. dia. Circular Primary Settling Tanks Per Battery Constructed Within the Imhoff Tanks Influent/Effluent Channels
- Total 27 New Circular Primary Settling Tanks
- One Dedicated Circular Primary Clarifier for Thickening per Battery
- Replace Skimming Tanks with Pista Grit Vortex Grit Removal
WESTSIDE PRIMARY SETTLING TANKS
PROPOSED MASTER PLAN LAYOUT
Problems

- Proposed Arrangement of Nine Tanks per Battery Leaves Center Tank Without Access
- Surgical Cutting of Concrete Walls of Imhoff Tanks Very Expensive
- Thickening in Primary Tanks Not Desirable
- Lacks Sludge Screening
- Vortex Grit System Undersized and Prone to Clogging After First Flush
REVISED APPROACH TO WESTSIDE PRIMARY SETTLING TANKS

- Replace 3 Batteries of 108 Imhoff Tanks with 3 Batteries of 18 Circular Primary Settling Tanks
- Imhoff Battery C Abandoned
- Primary Sludge to New Gravity Concentration Tanks
- Replace Skimming Tanks with Aerated Grit Tanks
- Utilize CFD Modeling Work Performed Under Calumet Project for Sizing New Primary Settling and Grit Tanks
- Construction 2010-2015
NEW WESTSIDE PSTs AND GRIT
NEW SLUDGE THICKENING PROCESSES

- Separate Primary Sludge Stream from WAS
- Existing Concentration Tanks to be Decommissioned
- SW Primary Sludge, and Future WS Sludge to be Thickened in New Round Gravity Concentration Tanks
- Eight 80-ft Diameter Tanks
- North Side Sludge to be Thickened in Existing Centrifuges
- WAS to be Thickened by New 3-Meter GBTs
- Construction 2009-2012
NORTHSIDE WRP
NORTHSIDE WRP
MASTER PLAN
NEW BATTERY E
NSWRP NEW BATTERY ‘E’

- Four 130-ft dia. Primary Settling Tanks with 14-ft SWD
- Nine 2-pass Aeration Tanks, 69-ft wide x 325-ft long x 21-ft deep
- Eight 130-ft dia. Final Settling Tanks with 15ft SWD
- Primary Influent and Secondary Effluent Conduits
- Process Air Piping from Existing Site Blowers
PROJECT DESIGN PROCESS

- Kick-off Meeting with M&O Staff
- Priorities and Expectations
- Technical Workshops
- Technical Memoranda
- Preliminary Design Report (30% Complete)
- Value Engineering
- 60% Complete Review
- Final Documents
- Bidding and Award
- Construction Support Services
DESIGN TEAM

PLANT DESIGN MANAGEMENT SECTION
   Ed Brosius, Supervising Civil Engineer

PROCESS DESIGN
   Glenn Rohloff, Supervising Civil Engineer

ELECTRICAL DESIGN
   Glenn Gottardo, Supervising Electrical Engineer

MECHANICAL DESIGN
   Jeff Weber, Supervising Mechanical Engineer

CIVIL, STRUCTURAL, ARCHITECTURAL DESIGN
   Jagannath Khanna, Supervising Structural Engineer
MAINTENANCE AND OPERATIONS SUPPORT

Brett Garelli, *Stickney Area*
Tom Conway, *Calumet Area*
Tony Quintanilla, *North Area*

CONSTRUCTION ADMINISTRATION AND SURVEILLANCE

Ken Kits
Ray Lemming
Joe Kennedy
A LOOK AHEAD

- New Blowers and Upgrade of Raw Sewage Pumps, NSWRP
- Expansion of Gravity Concentration Tanks, NSWRP
- Grit Dewatering and Sodium Hypochlorite Feed Modifications, NSWRP
- MUPP, NSWRP
A LOOK AHEAD

- Southwest Screens Handling Equipment Upgrades, SWRP
- Low Pressure Digester Gas Storage, SWRP
- Class A Biosolids Digestion Process Task Force
What’s all this going to cost?

Stickney Master Plan Work: $755,000,000
Calumet Master Plan Work: $434,000,000
North Side Master Plan Work: $1,078,000,000
Total: $2,267,000,000

2007 dollars, does not include disinfection or nutrient removal
All Seven MWRD
Water Reclamation Plants
Costs for Construction Projects
Needed to Start 2007—2012:

$1,209,498,000
Questions?

Keep On Truckin’!