Place in CH2M HILL History

CHAPTER 4 - South Tahoe Public Utility Project

CHAPTER 10 - Upper Occoquan Sewerage Authority

CHAPTER 13 - The Milwaukee Water Pollution Abatement Program

CHAPTER 20 - Rocky Flats
1977

- Staff Size < 1,500 employees
- Annual Revenue ~ $60 million
- No international network, No O&M Business Group
- In fact, no business groups (TBG / WBG / ESG)
- Corvallis OR – Company HQ
- Fred Merryfield passed away
- Ralph Peterson (future CEO) – PM for Wisconsin paper mills
CH2M HILL History - 1977

Black, Crow and Eidsness
Gainesville, FL
CH2M HILL (GLO / PMO) - 1977

GLO – Mayfair Road

PMO – Water & Mason
Prior to the Milwaukee Water Pollution Abatement Program (MWPAP)

- **Community sewers**
  - > 400 sanitary sewer overflow locations
  - ~ 120 combined sewer overflow locations

- **MMSD interceptors**
  - 20 +/- sanitary sewer overflow locations

- **Treatment**
  - Treatment was provided at 2 MMSD plants and several community plants
MWPAP Drivers

- Raw sewage overflows
- Wisconsin DNR law suit (Dane County)
  - Reduce overflows
  - Compliance schedule
- Illinois law suit (US District Court)
  - Eliminate overflows
  - Provide advanced treatment
Approach

- Program Management Office (master agreement)
- Master schedule 1977-1996
- Up to 600 engineers associated with up to 88 companies (MMSD & consultants)
- Over 300 construction contracts
- Worked closely with WDNR & EPA to maximize grant funding (~ 48%)
Main Program Elements

- CH2M HILL – Program Manager
- Tom Gibbs, Hank Padgham, Gary Beech, John Ramage

<table>
<thead>
<tr>
<th>Element</th>
<th>Planning Lead</th>
<th>Design Lead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastewater System (interceptors / tunnels)</td>
<td>HNTB</td>
<td>HNTB</td>
</tr>
<tr>
<td>Jones Island WWTP</td>
<td>CH2M HILL</td>
<td>CH2M HILL</td>
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<tr>
<td>South Shore WWTP</td>
<td>Donohue (now AECOM+Donohue)</td>
<td>Donohue (AECOM+Donohue)</td>
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<tr>
<td>Solids Management</td>
<td>CDM (now CDM Smith)</td>
<td>(put into plant design)</td>
</tr>
</tbody>
</table>
The Jones Island Wastewater Treatment Plant, listed on the National Register of Historic Landmarks, was one of the first plants to use the activated sludge process. Excess sludge is heat-dried and processed into Milorganite™, an organic fertilizer product sold and distributed around the world since 1923.
Jones Island – General Plan

- Secondary Treatment
- Solids Processing
- Prelim / Primary
- Non-process
- Disinfection
Jones Island – Aeration Basin Diffusers
Jones Island Project History

- Planning / Pre-Design – 1978 thru 1981
- Design – 1981 thru 1993
- Over 50 construction contracts
- Operations during construction critical
- No effluent permit violations
Jones Island – Planning and Design

- Kim Erickson – Project Manager
- Key Concepts
  - Communication - No PCs, No e-mail
  - Design team located together
  - Corvallis core design team
  - Design contract lead engineers
Jones Island – 1983 Project Plan

[Diagram with notes and labels]

Notes:
- **INLINE SOLIDS**
- **DEWATER**
- **STORAGE**
- **INLINE P.S.**

1. **INCREASE**
2. **MOVE**
3. **INCREASE**
4. **MOVE**
5. **INCREASE**

- **NORTH-SOUTH VEHICULAR ACCESS**
- **EXISTING WEST PLANT GALLERY**
- **NORTH-SOUTH HEADWAY THROUGH NEW**
- **EXISTING WEST PLANT GALLERY**
- **SIDE BUILDING FOR BULK STORAGE OF SALT, **
- **GRAVEL AND SAND**
- **SIDE PARKING AT LABORATORY AND**
  - **ADDITION**
  - **SOUTHEAST OF NEW MAINTENANCE**
  - **RING**
- **SIDE OFF STREET PARKING FOR MAINTENANCE**
  - **CULES AT ALL PROCESS BUILDINGS**
- **SIDE RAIL SCALE**
- **SIDE STORAGE AREA FOR RAIL SWITCH ENGINE**
- **SIDE DURING FINAL DESIGN**
- **MAINTENANCE BLDG TO THE NORTHEAST**
- **CLEAR THE EXISTING ADMINISTRATION BLDG**
- **FILTER 8-86**
- **PLACE SERVICE BLDG TO THE SOUTHEAST**
- **CLEAR THE EXISTING FILTER HOUSE**
- **DATE OPERATIONS JULY 1984**
- **REVERSE**
- **NORTH AREAS, REVERSE ROADWAY LAYOUTS**
- **TO REFLECT LAYOUT CONCEPTS**
Jones Island – Final Project Plan
Jones Island – Kashube Fishing Village
Jones Island WWTP (WRF)
Jones Island
Dewatering and Drying Facility
Jones Island
Dewatering and Drying Facility
Jones Island
Dewatering and Drying Facility
Jones Island – Dewatering and Drying Facility
Jones Island – D&D Factoids

- 1,575 drawings < 16 months
- 30,000+ cubic yards concrete
- 169,000 feet (32 miles) piling
- 1,300 miles wires
- 2+ miles sludge/product conveyors
- Milorganite samples
Reuss Federal Plaza (1980s)

411 East Wisconsin (1990s)
Jones Island – 2012

Landfill Gas to Energy

Graphic: courtesy of MMSD
Inline Storage System

Green is from MWPAP
Typical TBM (in shop)
TBM Cutterhead
TBM Launch Site
Typical Roof Support Rock Dowel System – possibly add straps/mesh
STA 251+35

“A Station that shall live in infamy.”

1st Problem!

2500 GPM
Second Problem!
Rock Dowels can’t be installed
Combination: Ribs and Boards Plus Water
Lesson Learned:
Don’t mine down hill
A Tight, Wet 32’-4” Tunnel – Not for the claustrophobic
Connection bet. NS Ph 1 and Ph 2
shortest, steepest waterslide in WI
Best use write-in-rain notebooks when underground
Just a peek!
A bit wider, please.
Inline Storage System at a Glance

- Collectors
- Shafts
- Tunnels
- Central Control System
Consolidated Shafts

- Intercepting structures capture overflows before spilling into the waterways
- Collector sewers consolidate overflows and route towards the tunnels
- 24 Dropshafts (IIHL Vortex Type-H)
  - reduced size of drop chamber by dissipating energy through wall friction
- 9 Maintenance Access shafts 15 - 27 feet in diameter
Tunnels

- 12 to 30 foot diameter
- ~ 20 miles long
- 300 feet below ground
- 400+ million gallons
- Grouted rock surface
- 40% concrete lined
- 3 ~ 50 MGD dewatering pumps
Real Time Controls

- 12 automated pump stations
- 38 automated diversions
- 176 passive diversions
- 250 level monitoring stations
- 103 RTUs
- Dedicated Telephone Lines
- Central control computer
- 17 weather stations
Number of CSO Overflows
Deep Tunnel Operation
Aug 16, 1983 was severe storm of memory, used to size separate sewer conveyance during the

June 20, 1940 was the most severe storage event from the 40 year period of record available to WPAP
MWPAP Summary

- Facility Plan w/Environmental Assessment  ~ $247M
- Jones Island Wastewater Treatment plant  ~ $678M
- South Shore Wastewater Treatment plant    ~ $203M
- Deep Tunnel                                ~ $705M
- Combined Sewer Overflow/Connections to Deep Tunnel  ~ $338M
- Offsite Solids Management                  ~ $52M
- MIS and Local Rehabilitation                ~ $32M
- Hydraulics and Control                      ~ $30M

- Total Cost : $2.3 billion
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<tr>
<th>Project Description</th>
<th>Cost ($ Millions)</th>
<th>Percentage</th>
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MWPAP Impact on Milwaukee Engineering

- EMCS
- Kapur and Associates
- TN and Associates
- Symbiont
- Donohue – *the current version*
- AES Engineering
- Superior Engineering
MWPAP Impact on CH2M HILL

- Set the stage for major program work (Rocky Flats, Puerto Rico, London Olympics, etc)
- Set the stage for major tunnel work (Singapore, Thames River)
- Set the stage for core technologies (geotechnical, cost estimating, scheduling, permit and consent decree negotiation, real time controls, dropshaft hydraulics, utility management services)
CH2M HILL Impact on Milwaukee

- Milwaukee Riverwalk
- Milwaukee Water (Linnwood, Howard Ave)
- Wisconsin Ave Viaduct
- Marquette Interchange
- North-South Freeway
- Menomonee Valley
- Milwaukee River (Lincoln Park)
- ...and others
End of Presentation