

National Association of Clean Water Agencies 2007 Law Seminar

Egg-Shaped Digester Facility Project District of Columbia Water and Sewer Authority



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Outline

- 💧 History of Project

- 💧 Economics of Project

- 💧 Options

History of Project

History of Solids Handling at Blue Plains

💧 1990's

- EPA rejects incineration and calls for composting and land application
- 1996 Facilities plan recommends 100% digestion with land application
- 1996 plan shelved, no funding available
- 1996 New Authority created by Congress
- 1998 Montgomery Regional Composting Facility closed

Situation in 1999

- 💧 Producing 1200 to 1400 wet tons of solids per day – 60 to 70 truckloads – adding 100 tons of lime per day
- 💧 Aging infrastructure
 - 60-year old digesters with operational issues
 - Aging thickening and dewatering equipment
- 💧 Lack of redundant processing capacity needed for reliability

Situation in 1999 (cont'd)

- 💧 High O&M costs – using contractors to keep up with production and lack of reliability
- 💧 Total reliance on land application
 - Inconsistent biosolids and odorous products
 - Potential regulatory non-compliance
 - Public resistance and local bans
- 💧 Concerns about increasingly stringent regulatory environment and continuing land application

Purpose of the Biosolids Master Plan/Decision Science Workshops

- 💧 **March 1999 – First BMP / Decision Science (DS) Workshop**
- 💧 **As a group, reach consensus decisions on how to:**
 - ◆ **Provide solids processing capacity at Blue Plains**
 - ◆ **Replace aging facilities and increase reliability**
 - ◆ **Improve the quality of biosolids**
 - ◆ **Reduce risk**

Key Considerations

- 💧 Effluent, biosolids and air quality are equally important
- 💧 Public and political support is needed for BMP success
- 💧 WASA cannot contract away its responsibility

Key Considerations (cont'd)

- 💧 WASA must go beyond regulatory compliance to world class operations consistent with the National Biosolids Partnership to ensure long-term program viability
- 💧 Diversity is required through multiple modes of end use and disposal to prepare for changing markets, politics and regulations
- 💧 The current program must be improved through enhanced systems and operations



Key Considerations (cont'd)

- 💧 The Status Quo program is not acceptable as a long-term alternative
- 💧 Biosolids processing within plant site boundaries maximizes WASA control of its program



WASA's Vision Statement

To establish a self-sustaining, world-class, regional solids management program, providing top service to customers in the 21st century for Biosolids Management.

Alternatives Considered

- 💧 14 Alternatives considered
- 💧 Determined full digestion followed by heat drying, if necessary in the future
- 💧 Decided to build egg-shaped digesters



Economics of Project

History of Project Budget

Capital Budget	Total EDF Project Budget ¹	Construction Budget	Comments
FY2000	\$147,650,000	\$116,000,000	Approved Original Budget
FY2001	\$256,985,000	\$211,361,000	Approved Facility Plan
FY2003	\$256,985,000	\$214,559,000	No increase in project budget, revised construction cost estimate within current budget.
FY2005	\$310,675,000	\$263,500,000	Mar 2004 Board approved for FY 2005: \$35 M for Class A, \$18.3 M escalation for schedule. Denied \$13 M for Architecture
FY2006	\$354,411,000	\$298,200,000	Recommended budget increase of \$25 M for extended construction duration 4 to 5.5 yrs and escalation to mid-point of const: \$25.5 M for market adjustment and savings of \$5.8 M from VE. Adopted budget of \$10 M less.
FY2007	\$626,311,000	\$550,000,000	For discussion: \$245.9 M for Construction Cost increases, \$11.5 M for Design Services, \$8.5 M for Construction Management, and \$5.0 M for OCIP

¹ Includes all other costs PM, Design, CM, OCIP, Start-up.....

Bid for Contract

- 💧 **Contract includes:**
 - ◆ Foundations
 - ◆ Vessels and Mixers
 - ◆ Gallery, Tunnel, and Structures
 - ◆ Cladding
- 💧 **Bid price \$306.7 M**
 - ◆ One Bidder: US/Cianbro, LLC
 - ◆ Significantly higher than current budget
 - FY 2006 Budget: Construction - \$187 million

Factors Affecting Costs

- 💧 Construction commodity prices
- 💧 Regional construction market
- 💧 Project-specific factors
 - ◆ Egg shaped digesters
 - ◆ Foundation work
 - ◆ Cranes
 - ◆ Surety concerns
 - ◆ Schedule slippage

Construction Commodity Prices

- 💧 Construction commodity prices – steel, concrete, energy costs have skyrocketed due to unprecedented building in Asia, natural disasters, global conflicts and energy price increases.

Metal Tank Costs have dramatically increased since 2004

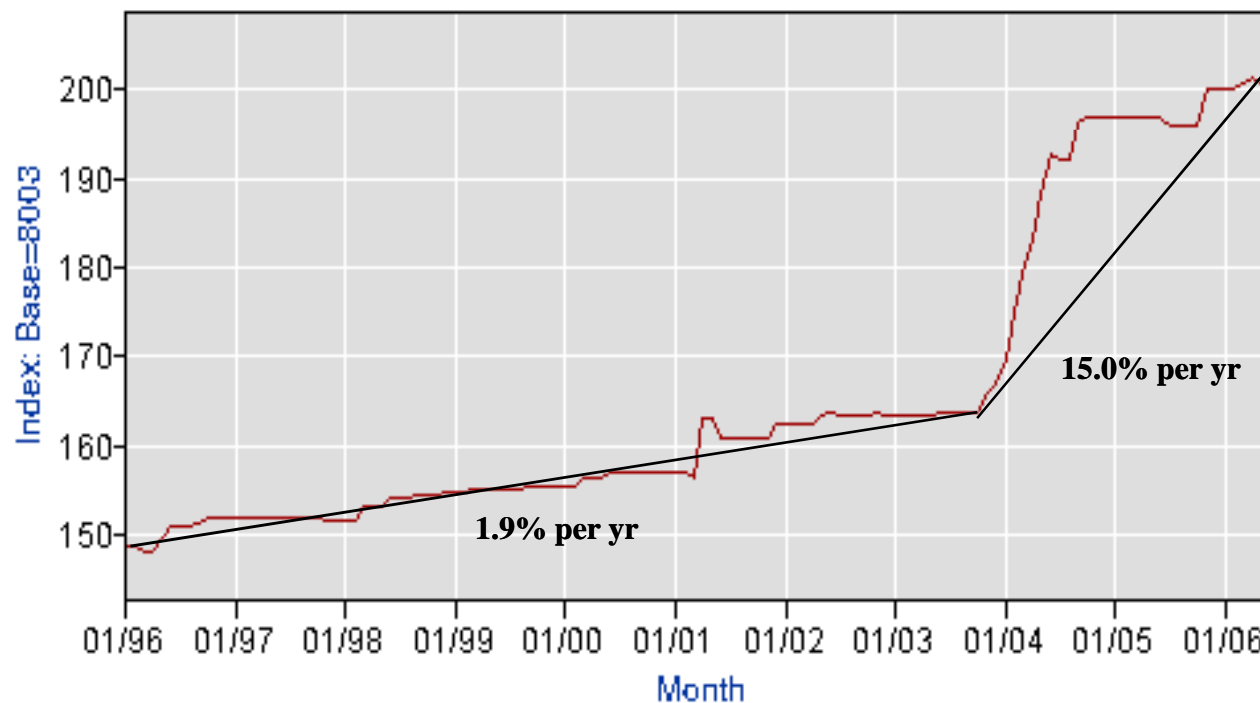
Series Id: PCU3324203324209

Industry: Metal tanks (heavy gauge) manufacturing

Product: Metal tanks and vessels, custom fabricated and field erected

Base Date: 8003

Source: Producer Price Index



So Have Concrete Prices

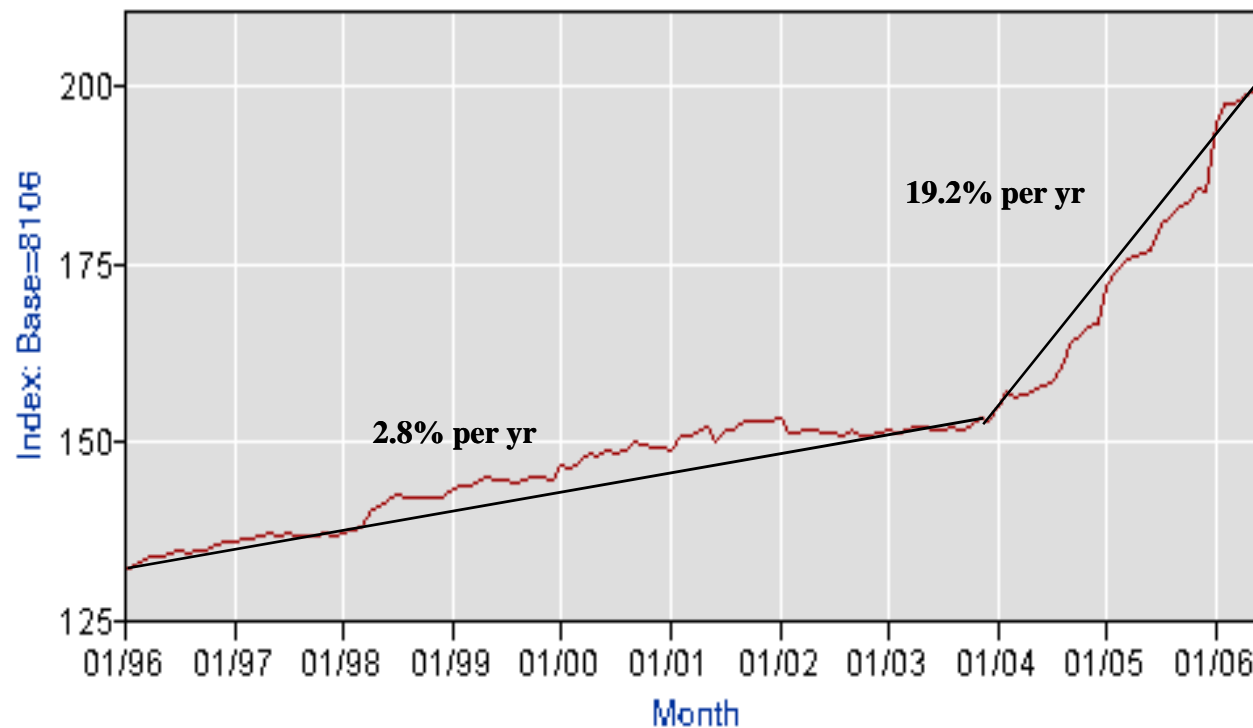
Series Id: PCU3273203273201

Industry: Ready-mixed concrete mfg. and dist

Product: Ready-mixed concrete

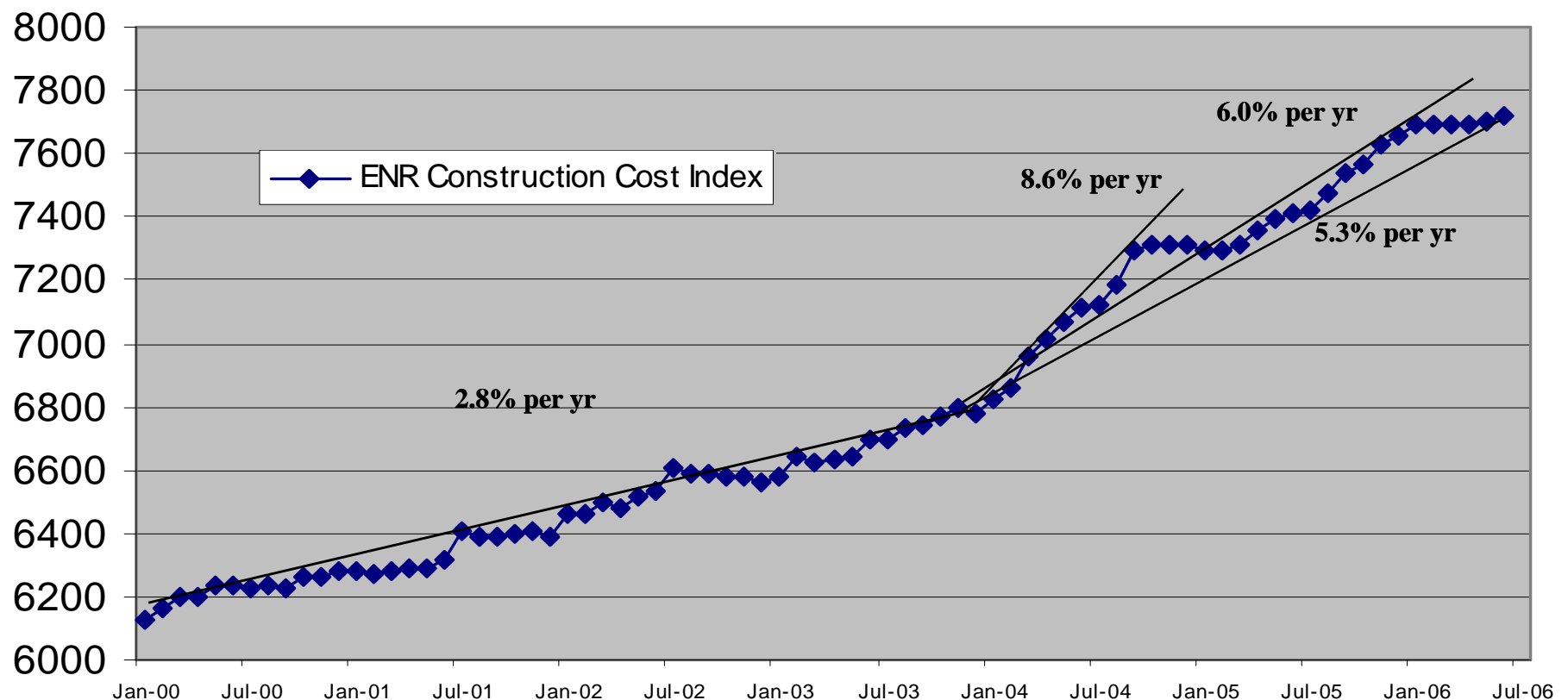
Base Date: 8106

Source: Producer Price Index



The National Construction Cost Index has inflated significantly since 2004

Cost Trends since Jan. 2000



The Regional Construction Market is Booming

- 💧 Regional construction market – DC area is very active; contractors are having difficulty getting skilled or common labor; rental equipment is limited and at a premium
 - Construction firms specializing in water and wastewater work are especially busy
- 💧 According to two Regional Contractors:
“Local construction cost increases may be as high as 1 to 1.5% per month” Fall 2005

Project-Specific Factors Affecting Cost

💧 Single bidder

💧 As of Feb 2006, 5 major contractors were in competition for this project. Subsequently four of them declined to bid and gave the following reasons:

- opportunities elsewhere & limited resources
- concerns over schedule and length of contract
- liquidated damages and liability provisions
- no objective dispute resolution board
- a high level of project complexity and risk
- contract payment retention policy
- time for payment
- tying up bonding capacity

Project-Specific Factors Affecting Cost (Cont'd)

- 💧 Limited competition – egg structures are a specialty
 - Originally two steel and one concrete vessel vendors were interested, only one at bid time...steel vendor CBI
- 💧 Foundation work was more expensive due to heavy volume of work and limited equipment in the Eastern US
- 💧 Very large tower cranes with limited regional availability are needed to construct the egg-shaped digesters

Project-Specific Factors Affecting Cost (Cont'd)

- 💧 The contract work is very complex and has a relatively long schedule – six years
- 💧 Surety issues:
 - ◆ Limited number of sureties – consolidation
 - Remaining sureties are very risk adverse
 - ◆ Concern over risk allocation in WASA construction documents
- 💧 Schedule and bidding delays

Budget Impact

- 💧 Total estimated costs for both construction contracts may be as much as \$ 550 million
 - Total construction cost FY 2006 budget was \$ 298 million
 - Total estimated project budget maybe as much as \$ 626 million
 - Total project budget FY 2006 was \$ 354 million



Options



Alternatives for proceeding with EDF project

Other Delivery Options for EDF

💧 Project Delivery Options

- ◆ Construction Management at Risk
- ◆ Multiple Prime Contracts
- ◆ Design-Build
- ◆ Design-Build-Own-Operate

💧 Redesign and Repackage

Delivery Option Using Existing Concept

At-Risk Construction Management (CM@ Risk)

Typically a Guaranteed Maximum Price (GMP) is negotiated between the Owner and the contractor when the design is at a conceptual level.

Pros

- 💧 Since the EDF design is 100% complete, contractor has a good starting point for developing cost savings ideas
- 💧 Allows for significant negotiation of the contract

Cons

- 💧 The EDF project is very complex and giving up control of the design to the contractor would be very risky for DCWASA
- 💧 WASA's procurement regulations may need to be amended to accommodate CM at Risk resulting in major project delay
- 💧 This method would result in only 1 contract as the design could not be accomplished by multiple contractors
- 💧 Project coordination would be extremely difficult exposing DCWASA to potential claims

Delivery Option Using Existing Design

Multiple Prime Contracting

Involves DCWASA holding multiple contracts of various disciplines such as GC, Foundations and De-watering, Steel Vessels/Access Towers/Walkways, Process Mechanical, HVAC/Plumbing, Electrical and Instrumentation & Controls for the EDF project.

Pros

- 💧 Could increase contractor interest and participation through specialized contracts
- 💧 May reduce overall project construction cost

Cons

- 💧 DCWASA manages the overall schedule and budget during the entire construction phase resulting in substantial risks to WASA
- 💧 The total cost of the project is not known until the final contract is awarded.
- 💧 Very similar to the 'Wick's Law' approach used in New York City contracts. It is very complicated to manage, as the GC does not have the responsibility to manage and coordinate the work of the other discipline contractors. WASA will assume responsibility and disproportionate project risk
- 💧 Requires significant re-design to separate the work by disciplines resulting in additional cost and delays to project start and finish. The packages would have to be fully coordinated to minimize contractors' claims
- 💧 WASA has no experience with this type of construction procurement

Alternative Delivery Option

Design Build (D-B)*

DCWASA selects a D-B Team (Contractor and his selected Designer) and negotiates a price to complete the design and construction of the EDF

💧 Pros

- D-B Team performs design based on a preliminary scope or design presented by DCWASA; this would likely be the completed designs for EDF-1C and EDF-2C

💧 Cons

- Best suited to conventional projects for which project requirements can be clearly defined and for which expertise is widely available
- Likely take more than 18 months to get a contract in place
- DCWASA would be responsible for design coordination of D-B Teams
- WASA loses significant control
- D-B Team is in charge
- EDF is unique and highly complex and specialized expertise is not widely available

*Applies to **Design-Build-Operate** and Design-Build-Own-Operate



Alternative Project Staging

Alternative Project Modifications

- 💧 Type 1-Keep Class A process as designed however construct in single project or multiple projects
- 💧 Type 2-Go to Class B process and only add Class A features in the future, if and when needed.

Project Modifications Type 1

- 💧 Combine existing contracts 1 & 2 into a single, large contract.
- 💧 Divide the project into 3 or more segments, e.g. Four (4) Eggs first, then Four (4) more Eggs, then Four (4) Silos later

Project Modifications Type 2

- 💧 Reduce or eliminate elements of current design and provide only for Class B product e.g. Build eight (8) Eggs only without any silos or high temperature stage.

If Class A is needed in the future, consider adding four (4) silos and high temperature stage to produce Class A dewatered product

OR

add thermal drying to produce Class A dried product

Comparison of Project Modifications

💧 Type 1-Single contract for Class A

◆ Pros

- Reduces risk of Contract 2 following Contract 1
- Single contractor responsible for total project
- Reduces site conflicts
- Improved efficiency of construction, startup and operations

◆ Cons

- Limited number of large, interested contractors
- Bonding limitations
- May require alternative project delivery method

Comparison of Project Modifications

💧 Type 1-Three (3) or more contracts for Class A

◆ Pros

- Allows smaller stand alone projects
- Can be sequenced over time
- Can be 4, 8 or 12 vessels per project

◆ Cons

- Could add costs, overhead for total overall project
- Uncertainty of total cost to meet project objectives
- More difficult to manage
- Requires long time to achieve total project

Comparison of Project Modifications

💧 Type 2-Class B Digestion

◆ Pros

- Reduces cost of program
- Simplifies operations
- Destroys about half of the biosolids (versus 2/3 for Class A)
- Produces DiGas for energy production
- Allows flexibility in achieving Class A, if needed in the future by addition of Silos or Driers

◆ Cons

- No reduction in Land Application risks or costs
- Increased odor potential for operations & product
- Reduced opportunities for income generation from sale of products

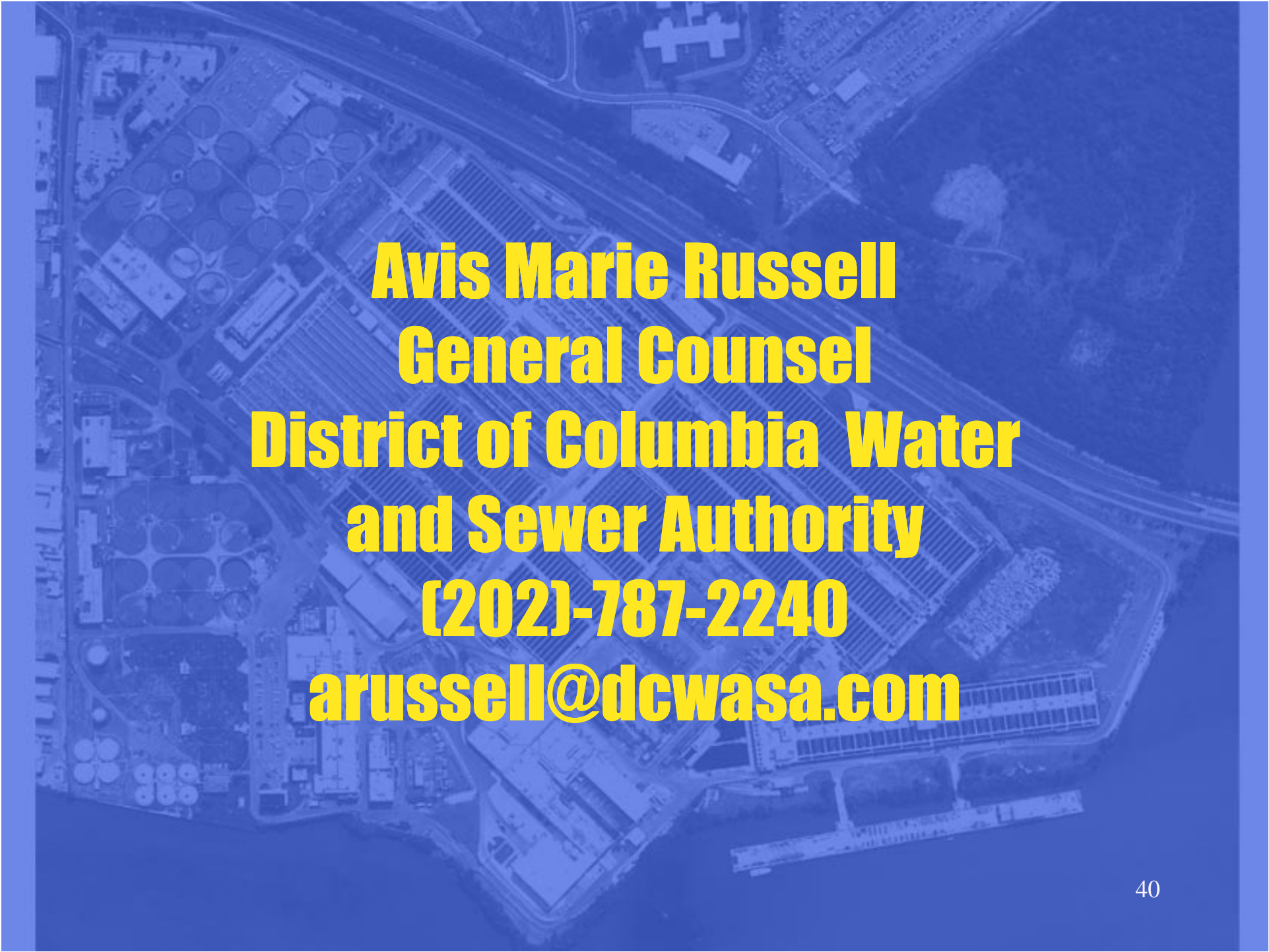
Options Going Forward

Accept Bid

- 💧 Accept bid and proceed as currently planned
 - Negotiate for price/scope reduction

Reject Bid

- 💧 Continue with current practice of lime stabilization and land application
- 💧 Redesign and repackage as soon as possible
- 💧 Bid and build the EDF project at a later date when bidding environment and prices are more favorable
- 💧 Continue existing land application practice while monitoring WASA's financial posture, construction cost and bidding environment, biosolids regulations, and technical advances to optimize BMP



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