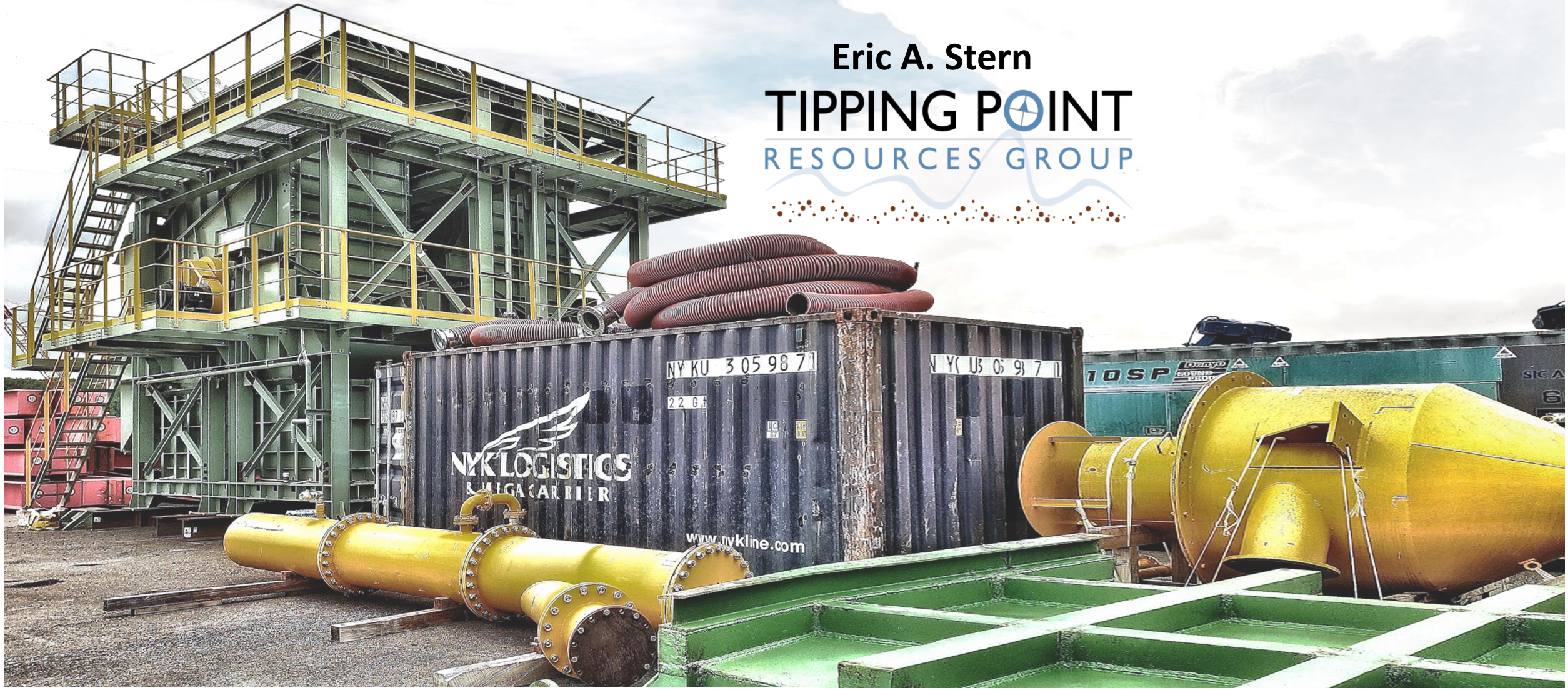
SMWG / USACE ERDC Contaminated Sediments Beneficial Use Workshop

Panel Discussion: Technology Development Case Studies

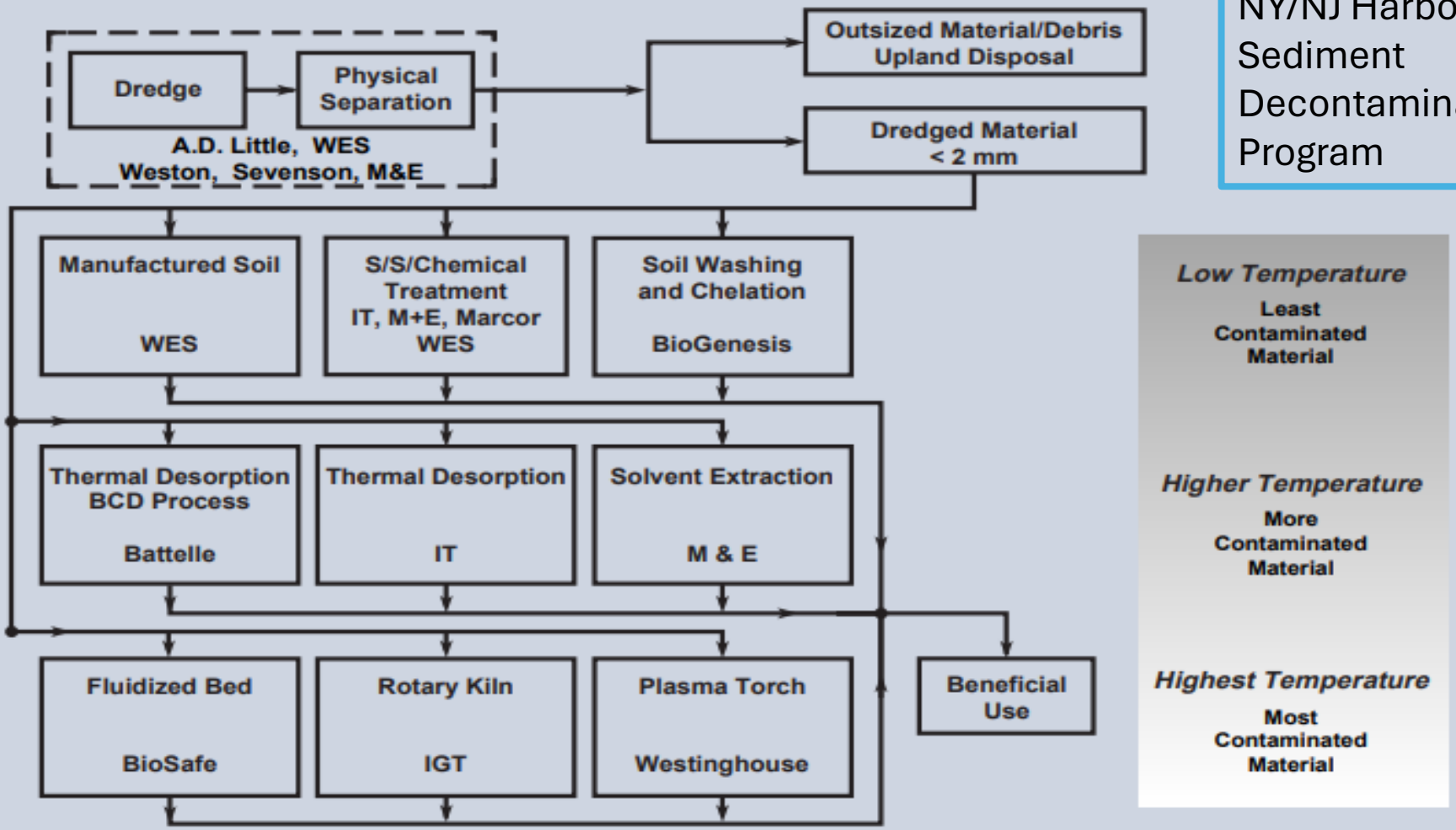


Eric A. Stern

TIPPING POINT
RESOURCES GROUP

Xtra

WRDA Treatment Train



NY/NJ Harbor USEPA Sediment Decontamination Program

Figure 7-2. WRDA Treatment Train. The different technologies tested in the program are displayed according to the temperature used in the processing.

1999 Report to US Congress

NY/NJ Harbor Sediment Decontamination Program Demonstrations : 2005-2007
Processing Facility – (Raritan River, New Jersey)

Navigational Dredged Material

Superfund Contaminated Sediments

Darling International

scow storage January 2005

200 m^3

Raritan River

2,675 m^3

2006

Arthur Kill

6,778 m^3

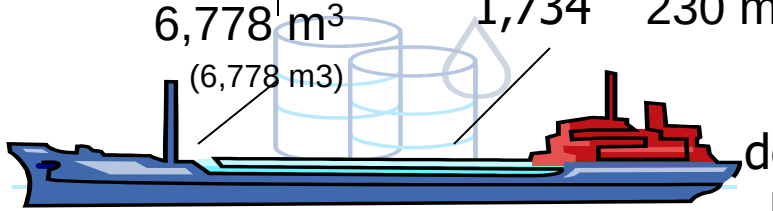
(6,778 m3)

Passaic River, NJ

1,734

230 m^3

Dec. 2005



dewatered

Harbor Resources Environmental Stabilization/OX

BioGenesis Sediment Washing

Cement-Lock Technology Thermo-Chem/Rotary Kiln

Beneficial Use

Geotechnical Fill

Manufactured Soil

Construction Grade Cement – Ecomelt

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The Re-invention – NY/NJ Decontamination Program

- Treatment train (organics/inorganics)
- Integrated / hybrid approaches
  - ❖ Encourage treatment firms working together / teaming agreements
- Basic and Applied Research
  - Phase 1 Toxicity Identification Evaluation (TIE)(specific to a contaminant impact/technology)
- Navigational dredged material and Superfund contaminated sediments
- Siting / Regulatory Permitting / Design/Build engineering plans for treatment processing facilities
- Regional to Global Interests
  - Pilot Scale – Seattle, Baltimore, Port of Venice-Italy, Norway, Latvia, S. Korea..
- Economics have caught up after 25 years as other mainstream disposal costs are increasing
- Bench-Pilot-Full/Commercial Scale Demonstrations (20)
- Continue to work on innovative technologies outside the program in all components of sediment management (treatment train)
- Alternative platforms – barge mounted systems – Regional Processing Facilities
- Beneficial Use
  - Economic redevelopment/revitalization/coastal resiliency
- Multi-Media input (soils, mine tailings, coal combustion residuals,e-waste (high temp)

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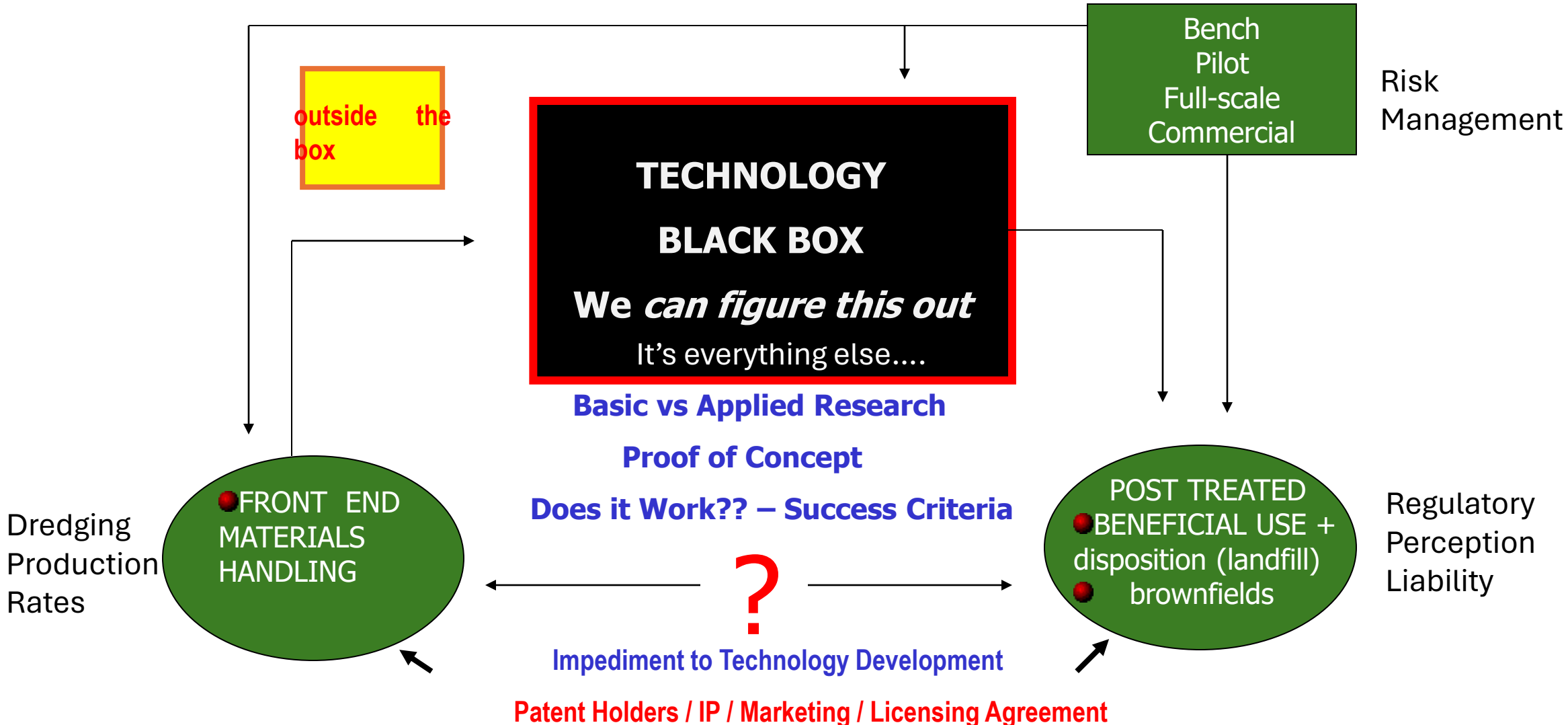
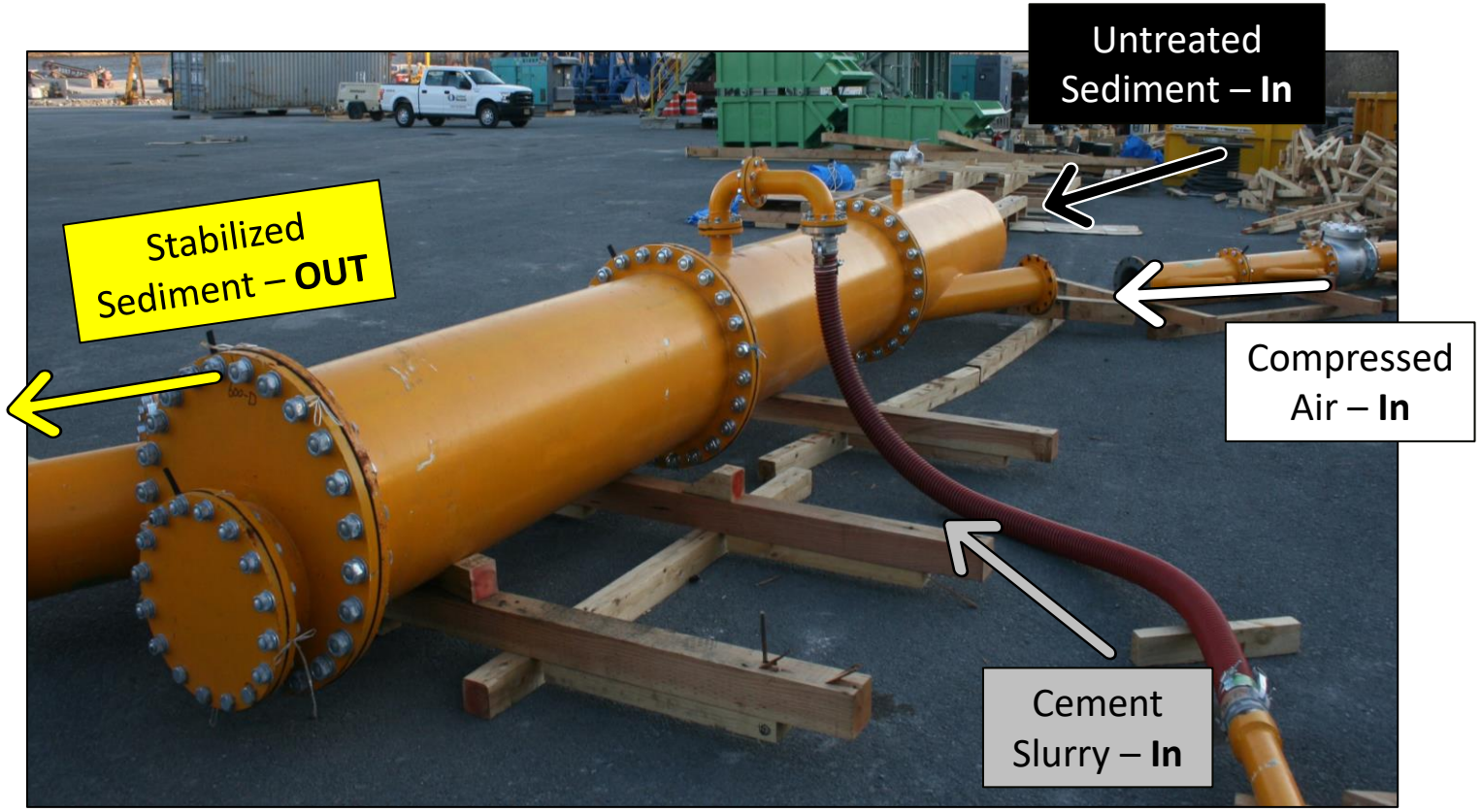
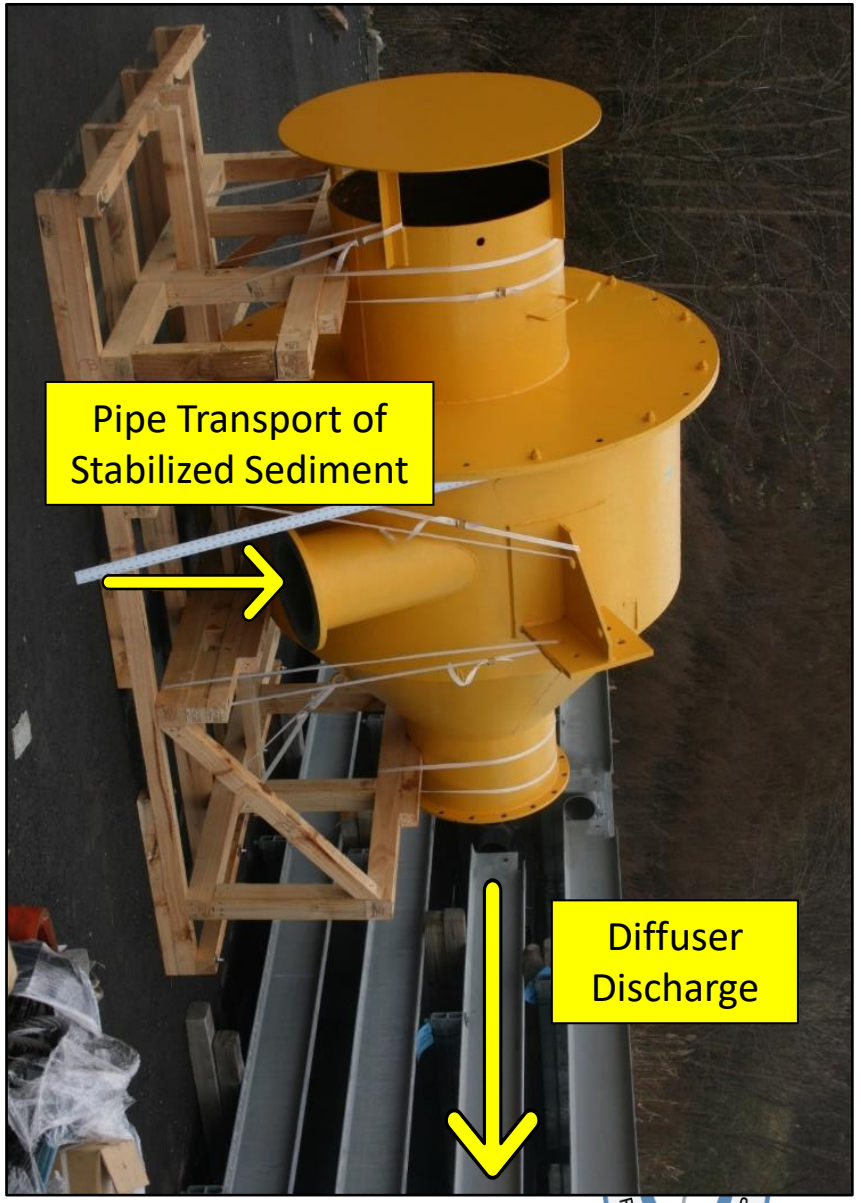
Sediment Innovation Treatment Train Impediment / Driving towards Commercial Implementation



Pneumatic Flow Tube Mixing



PFTM2000 Mixing Tool - 2,000 CY/day (8-hr shift)



PFTM Cyclone Discharge Diffuser

Example: Innovation / Start-up / Platform Development

Onsite Cement Silos

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Internal controls measures water content and binder dosing real time

Slurry Plant

Water Tank

Generator

Vibratory Grizzly Screener

Loader

Feedback Loop System

Screened Sediment Through Transport Pipes

PFTM Tool

Sediment Pump

Gamma Ray Densiometer

Check Valve

Treated Sediment

Generator

Air Compressors

Mixing and Treated Sediment Transport Pipes

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PFTM Pilot Land Based Option – NJDOT/OMR - Rutgers University (2016)

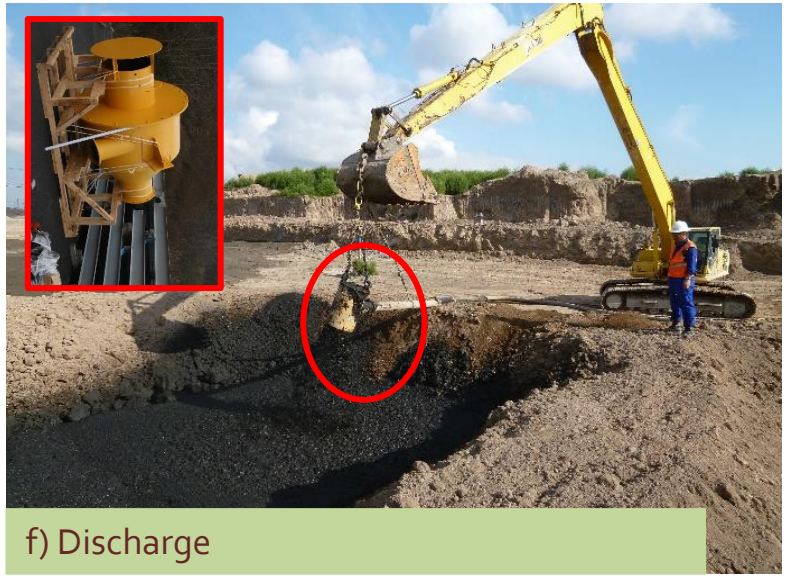
a) Grizzly/vibrator, screen, and mixing plant

b) Grout Plant

c) Control system / feedback loop

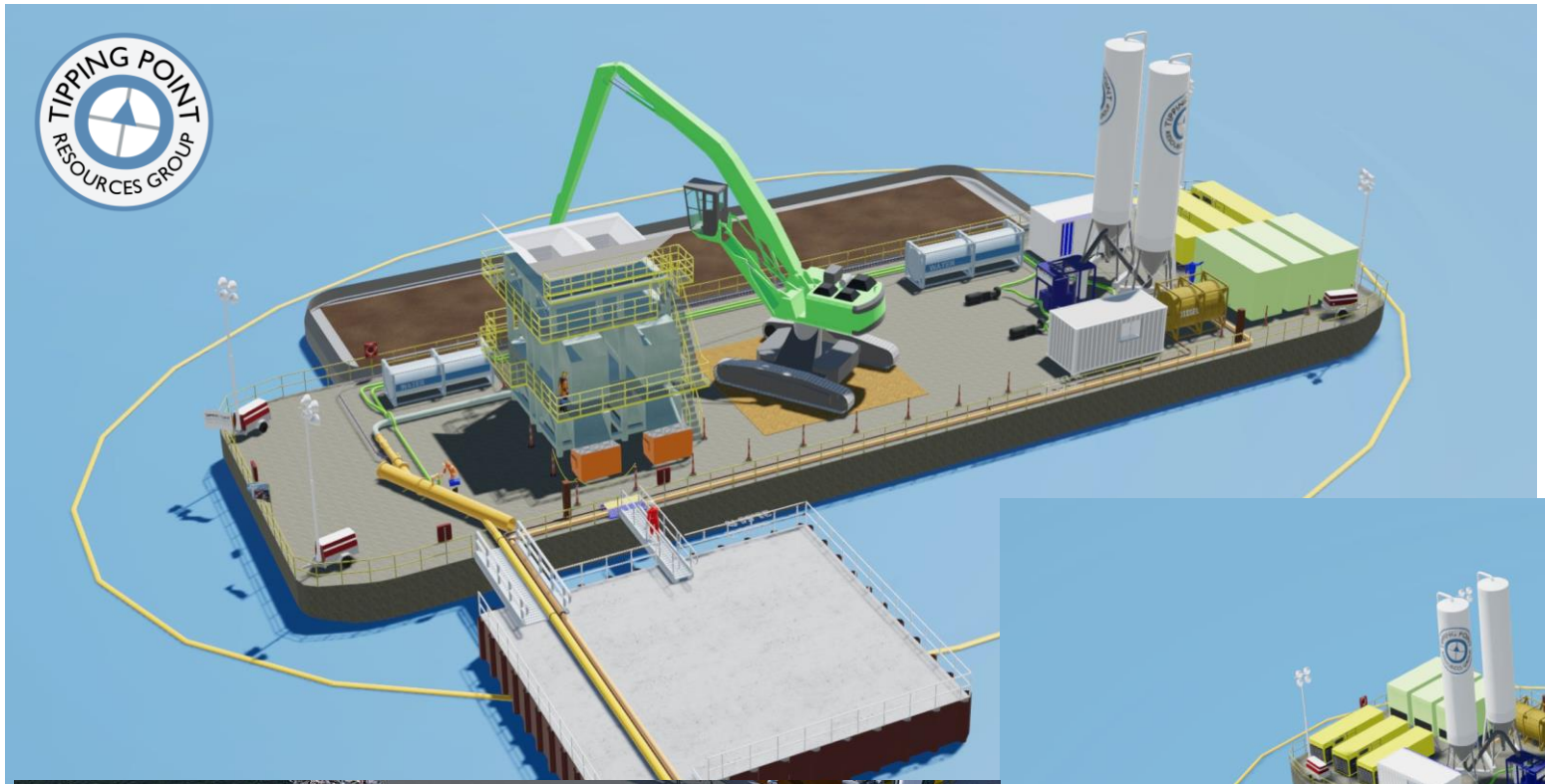
d) PFTM Mixing Tool

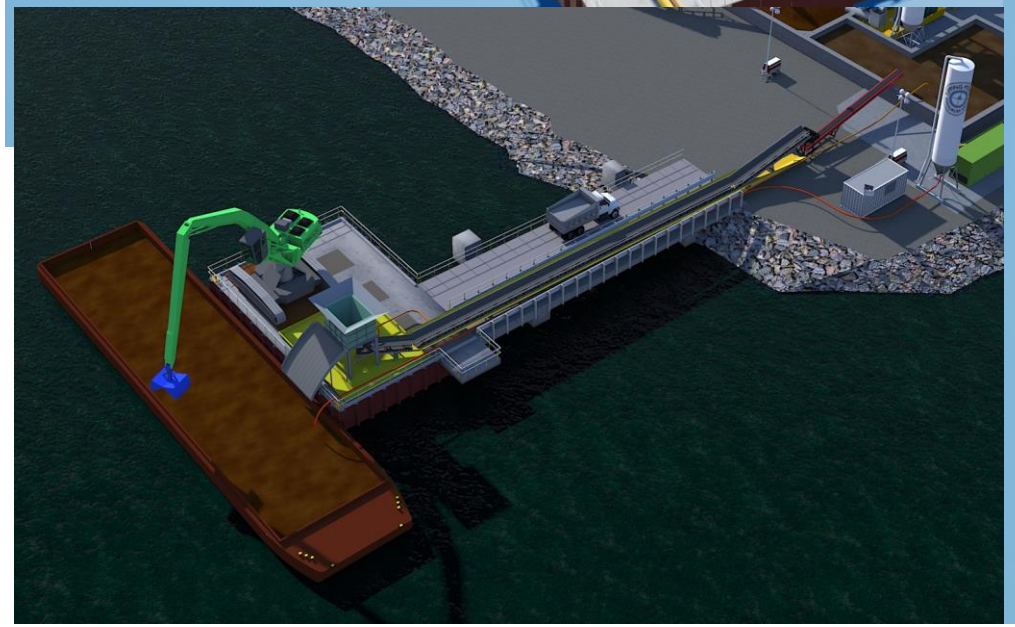
e) Transporting pipeline (up to 3000 feet)

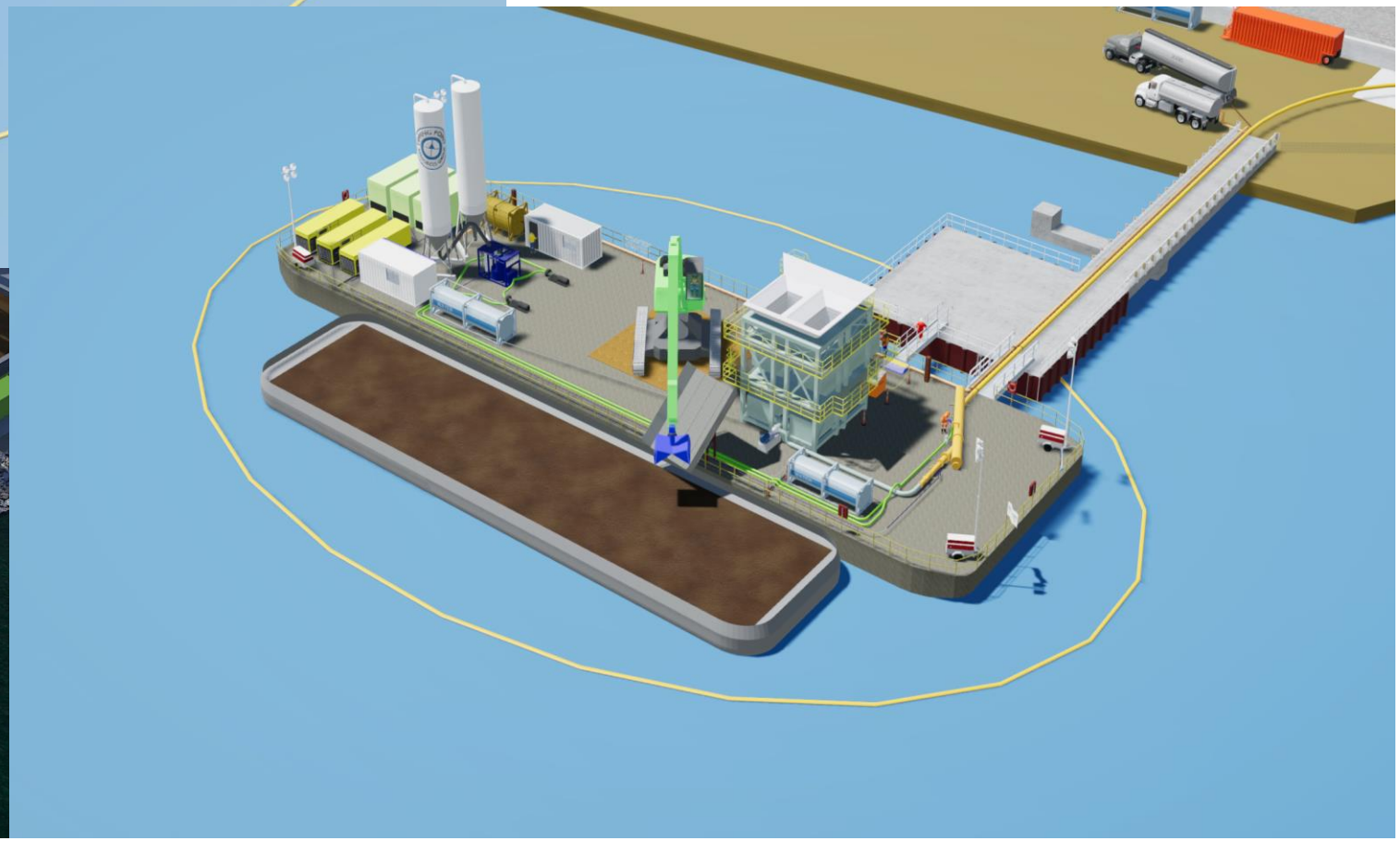


f) Discharge

Mobile Operation Sediment Engineering System







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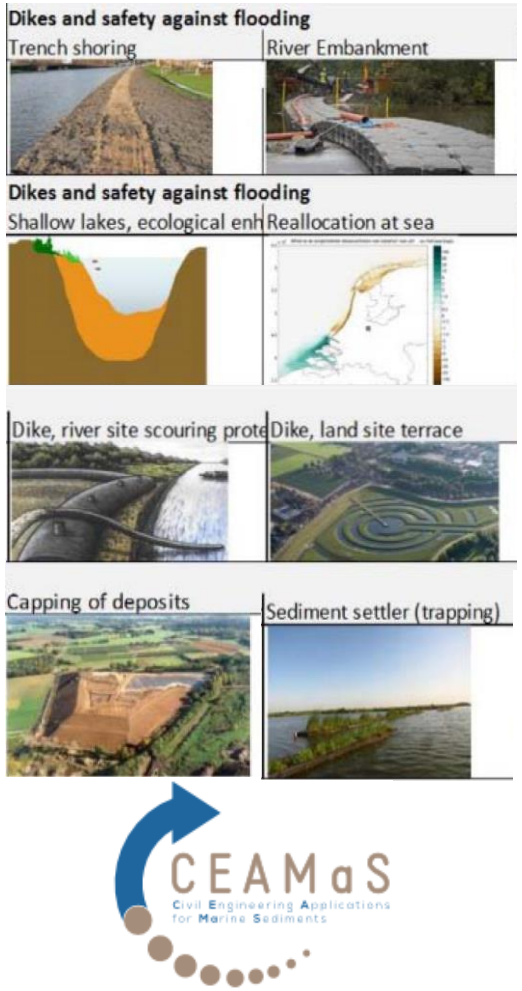
Stabilized Sediment Beneficial Use Applications



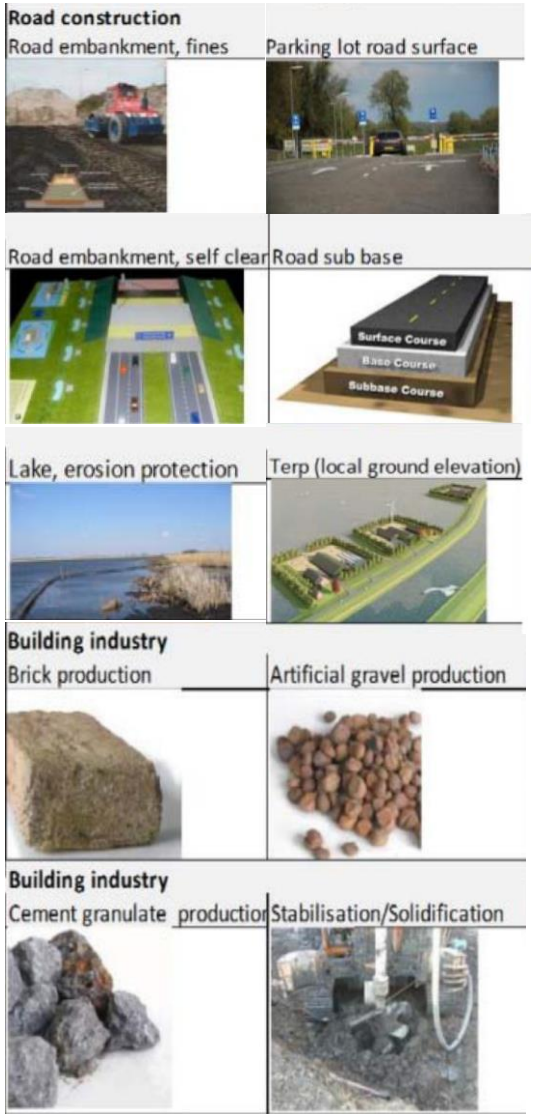
CEAMaS
Civil Engineering Applications for Marine Sediments

Environmental

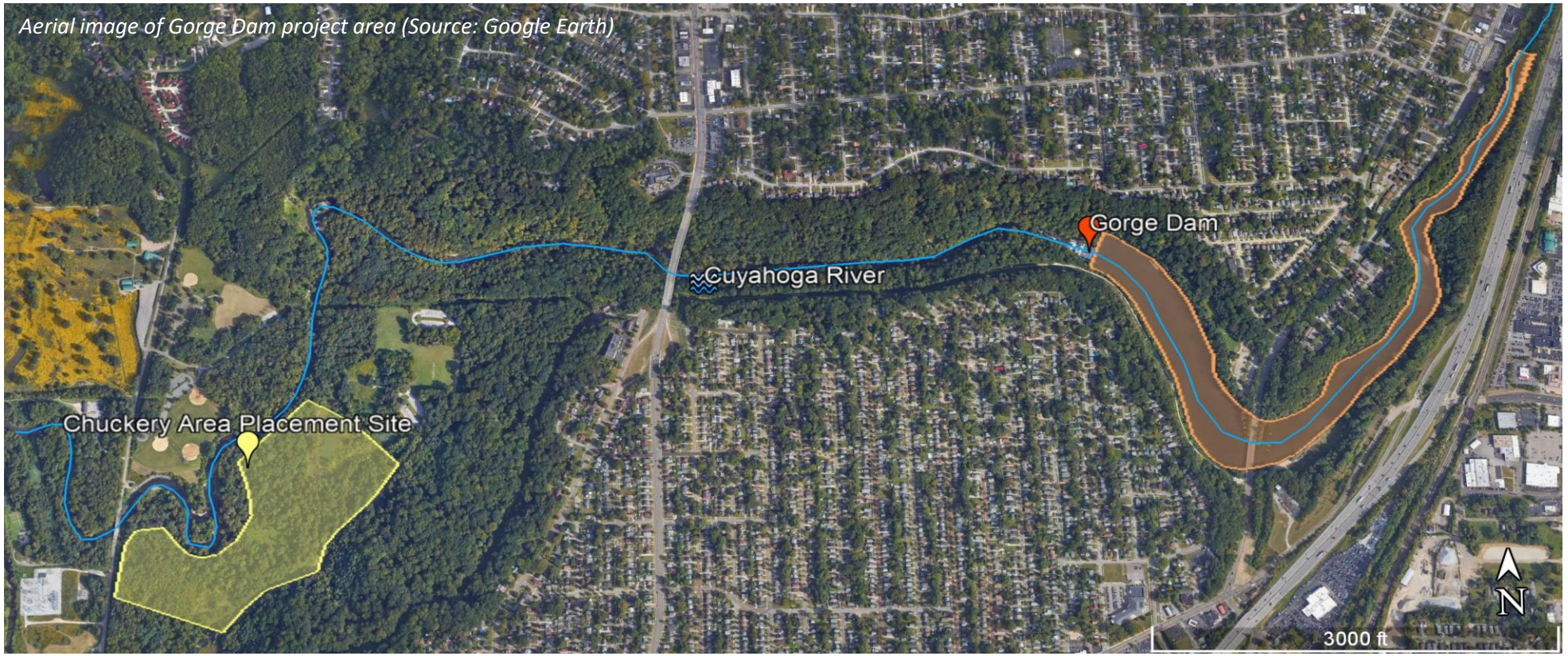
- Brownfield Redevelopment
- Coastal Restoration
- Haz Waste Remediation (Superfund)
- Landfill Cover
- Mine Tailings Management
- Coal Ash Residuals

Structural

- Waterfront Bulkhead & Trench Fill
- Berm & Road Construction
- Land Reclamation
- Ecological Landscaping
- Structural Capping
- Coastal Resilience (Elevation)
- Port Expansion



Case Study: Gorge Dam – Cuyahoga River, Ohio (2024)



- Mass stabilization of sediments to produce an **engineered structural fill: Pneumatic Flow Tube Mixing (PFTM)**
- **Upland placement of stabilized sediment** at 35-acre former landfill (Chuckery Area Placement Site) adjacent to river, located 2.1 km from Gorge Dam pool
- Capping and revegetation with native grasses and trees

Cultural Inertia –What we learned

- Siloed/localized vs.Holistic/integrated:adaptive
  - Economic recovery/revitalization of blighted urban environments are dependent on functional healthy systems
  - Siloed approaches bring only partial solutions
  - ✓ **Investing costly in the short-term will get to the long-term remediation and restoration goal/visions with multiple net benefits**
  - ❑ **Use existing (cross) programs with more efficient integration that cuts across multiple visions/goals and objectives (dredging/Superfund)**
  - ❑ **Understand better the relationship between academia, NGO's, consulting and marine construction community and what is important to policy and political decision makers – do they really care about sediments if it's only sediments *(sediment only solutions…)***
- Requires a National Public – Public Private Partnership (PPP) / Policy with a broader and more inclusive approach to **environmental management – beneficial use** / innovations

✓ Technologies do not fall out of sky and hit the ground running

- Need to build a *Platform* including technical marketing (several years) No one wants to be first or even second

✓ **Needs a CHAMPION (2024) / Program Driven (similar to EU / SedNet)**

Xtra

(2024) – What we learned and how to move technologies forward – high level

- Technologies do not fall out of sky and hit the ground running
  - Need to build a *Platform* including technical marketing (several years) – do not over promise under deliver
    - No one wants to be first or even second in technology roll-out
- Work with a design engineering consultant(s) in long-term technology development to push *niche* opportunities / not a one-off for a proposal chase
- Work with marine constructors in value engineering to improve the treatment train and materials handling process / they know better……
  - Acknowledge the risk management/trepidation that goes along with applying new technologies A successful outcome will open up new opportunities to contractors and consultants not realized under their Business Development existing operations
- Educate clients that beneficial use could be applied to their project-property. Significant cost savings
- Work with regulatory agencies in supporting technologies with BU – supporting commercial scale pilots with initial subsidy to get it out of the gate and gain support / overcome perception

❑ Solid waste classification of dredged materials is always problematic – more States are moving away from this

- Don’t rely on that one processing option thinking it will be around forever – there is room for more

❑ Regional Dredged Material Environmental Manufacturing Facility(s) are necessary- Integrate with Blue Tech Innovation Centers

❑ Cost Effectiveness can be met in comparison to long-haul transport and disposal

- ❑ Difficulty has been incremental funding and loss of technology interest if another (standard) alternative comes on-line.

❑ Find a Champion

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