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WATER TREATMENT ASSOCIATED WITH CONTAMINATED SEDIMENT DEWATERING

Presented by Randy Pit

CLEAN WATER SOLUTIONS

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WHY WATER TREATMENT?

1. Critical to properly handling dredged material impacted by contaminants
2. Prevents contaminants from being returned to the water body
3. Necessary to a successful sediment remediation project

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VARIABLES TO CONSIDER

- Contaminants present
- Flow (both instantaneous rate and total daily volume)
- Final treated water specifications or discharge requirements
- Receiving water body characteristics
- Site conditions
- Volume and type of treatment residual(s) produced
- Operator experience and qualifications
- Cost

CONTAMINANT TYPES

- Solids (particulates, can carry or screen chemical contaminants as well)
- Dissolved inorganics (such as lead, mercury, other heavy metals)
- Dissolved organics (PCBs, PFAS/PFOA, PAHs)

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FLOW

- Volume of water mixed with the sediment during the dredging process
- Backwash/residuals produced by water treatment operations
- Stormwater input
- Flow restrictions are often limited to an instantaneous rate (gpm) and a total daily volume (gpd)

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DISCHARGE RESTRICTIONS (PERMIT LIMITS)

- Level of treatment required, complexity and number of processes
- Driven by the limitations or restrictions on treated water discharge
- Limits are given in a permit or authorization from the local, state, or federal government
- Examples: Industrial Pretreatment Program (municipal sewer), NPDES, General Permit for Dredging Operations
- Monitoring and reporting components

RECEIVING WATER BODY

- Not always the same water body where the dredged material originated
- Determines the concentration and type of discharge limits imposed
- Some can accept higher levels of contaminants than others due to mixing zones, higher flow rates and overall health of the water body
- Discharge to a sanitary sewer, where water will be treated again, discharge flows are likely to be restricted – but contaminant limitations may be higher than those in a General or NPDES permit

SITE CONDITIONS

- Available space for equipment, including any height restrictions (overhead lines?)
- Availability of line power
- Weather (storm water input, temperatures)

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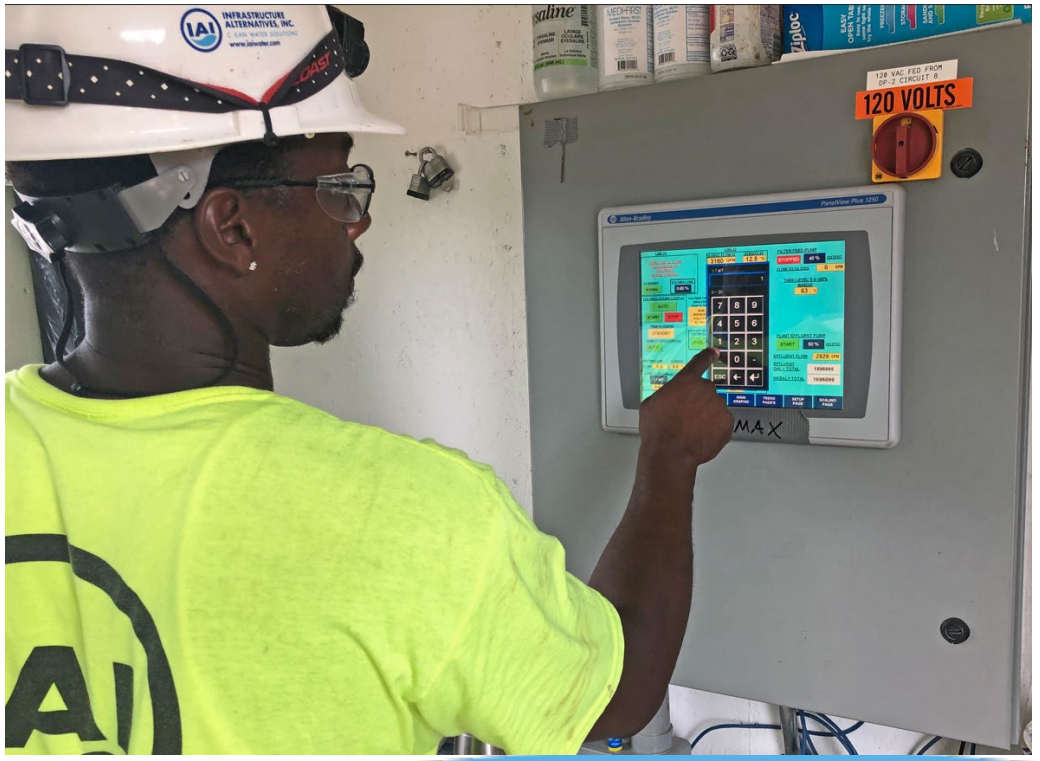
OPERATOR QUALIFICATIONS & EXPERIENCE

- Treatment complexity must match operator's ability and qualifications
- Not likely to produce desired results when treatment exceeds operators' qualifications and experience
- Conversely, a simple system can produce results beyond what is expected, when run by a qualified operator



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TREATABILITY TESTING

- Provide peace of mind that design is properly sized and equipped, to produce desired results
- Can range from single bench tests to multiple tests in sequence, involving several chemical and physical process simulations
- Provides the most benefit to the full-scale project, when it is conducted with an understanding of real-world field conditions, and project constraints
- Can develop a body of data that predicts water quality in the field and aids in the design of the treatment system
- Data can also be used to support process control decisions during performance of the project
- Much less expensive and lower stakes than mobilizing/operating potentially unnecessary equipment
- Improves outcomes

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TREATABILITY TESTING

TOTAL SUSPENDED SOLIDS (TSS)

- Physical contaminant versus chemical
- Any solid particle that is carried along in flow of water
- Could be inert (clay, silt, sediment)
- Could be chemical contaminant in solid form
- Can carry chemical contaminant(s)
- Will shield dissolved chemical contaminants from treatment process

REMOVING TSS

- Clarification (by gravity)
- Filtration (physical straining)
- Multiple processes in series can be very effective
- Target largest diameter solids first, get progressively smaller

CLARIFICATION

- Settling by gravity; simple process
- Can be accomplished in a tank or in a lined basin, depending on the flow volume to be treated
- Requires little maintenance
- Detention time (low velocity) allows solids to settle
- Structure to allow clarified water to overflow (weir)
- Method for removing settled solids, as needed
- May be aided by chemical additives (flocculants, coagulants, and metal salts)

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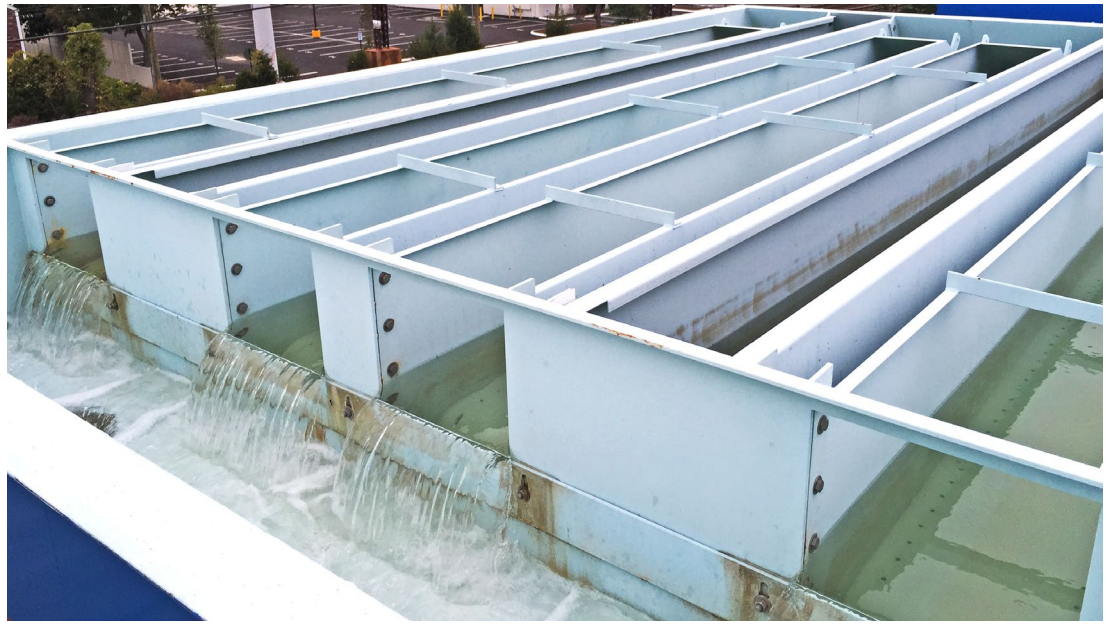
CLARIFICATION



FILTRATION

- Many types of filtration
- More than one type may be utilized in series, to achieve better solids removal
- Strains out suspended solids by catching them in media as water flows through it
- Sand used since ancient times
- More modern media types include straw-like semi-permeable membranes that filter down to a fraction of a micron

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FILTRATION

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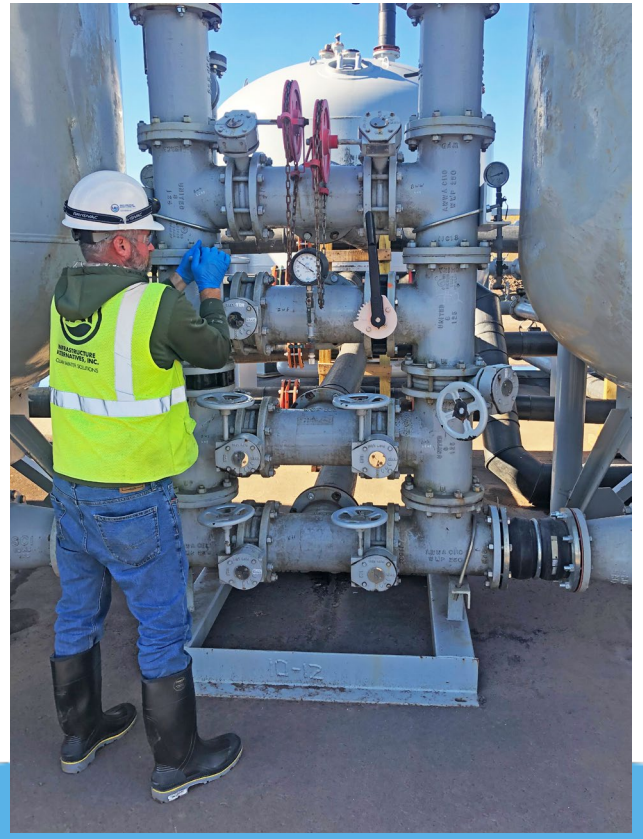
REMOVING DISSOLVED CONTAMINANTS

- Type of treatment utilized depends on the type of dissolved contaminants present
- Inorganic contaminants like metals can usually be addressed in a simple process of pH adjustment
- Dissolved organics, however, can be more difficult to address and are often a contaminant of concern in sediment remediation
- Dissolved organics are often treated with specialized media or activated carbon
- Interact on a molecular level with the dissolved contaminants
- Bind the contaminant on media surface



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ROLE OF THE OPERATOR

- Water treatment requires professional oversight and control by experienced operators
- Must thoroughly understand system, treated water specifications, project
- Maximize efficiency and performance of the overall system, and thereby, the project
- Operate the treatment process, such that it does not negatively impact dredging activities, or violate treated water requirements

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QUESTIONS?

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