Utilization of an Ultra-Lightweight Foamed Glass Aggregate (UL-FGA®)as a Floating Cover for Emission Reductions at a Superfund Site.

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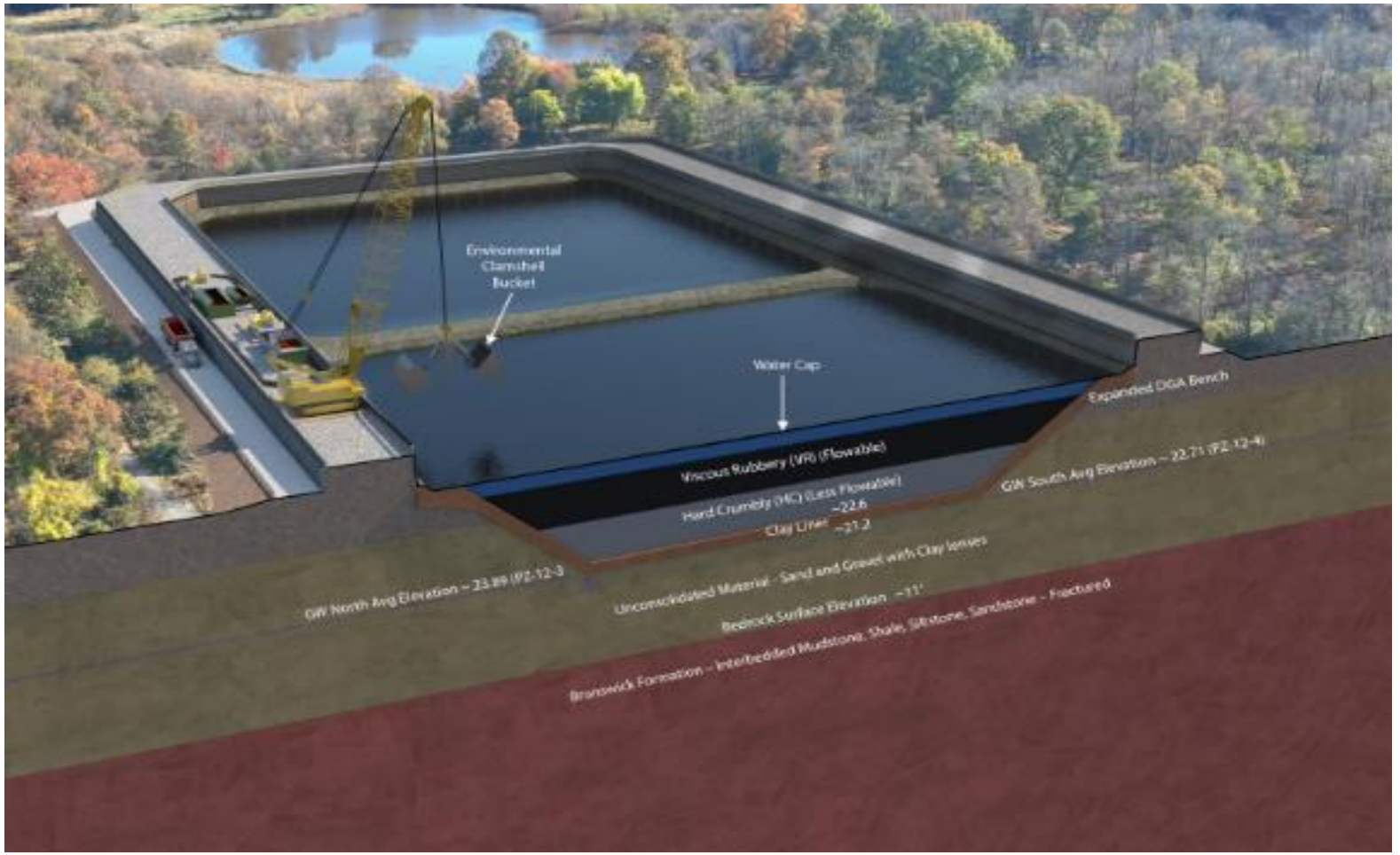
Background

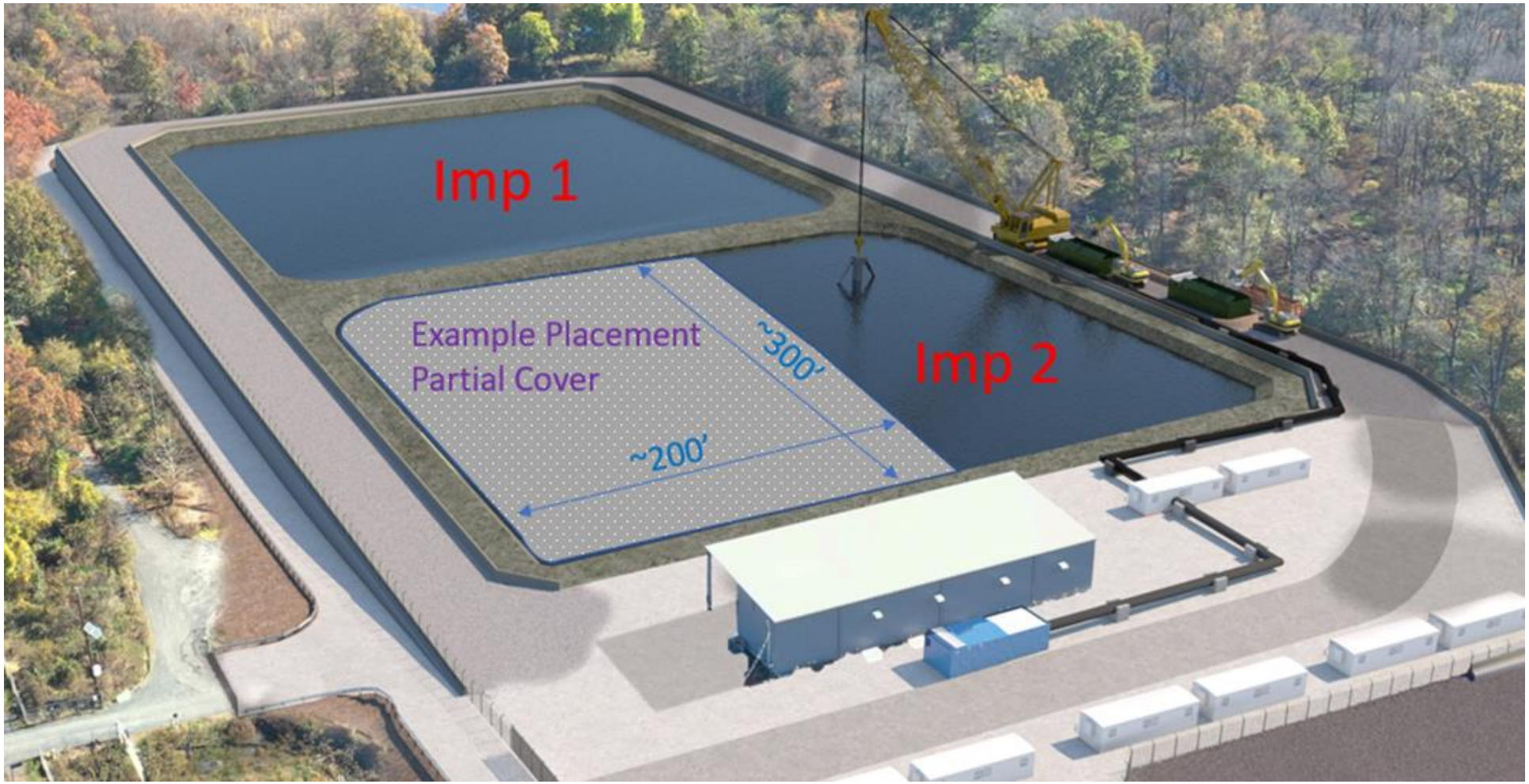
- **Confidential Client – Large Superfund Site in NJ**
- **Two Acid Tar Impoundments**
- **Constructed between 1947 and 1956 - used until 1965**
- **Approximately 54,500 cubic yards of Acid Tar - containing VOC's primarily benzene**
- **Water Cap to Reduce VOC Emissions**
- **AT Removed Mechanically**

Background


Environmental Clamshell Bucket
Water Cap
Viscous Rubbery (VR) (Flowable)
Hard Crumbly (HC) (Less Flowable)
Clay Liner
Expanded DGA Bench
GW South Avg Elevation – 22.71 (PZ-12-4)
GW North Avg Elevation – 23.89 (PZ-12-3
Unconsolidated Material - Sand and Gravel with Clay lenses
Bedrock Surface Elevation

Floating Cover Systems Evaluated

- Typical Floating Cover System
- Ball System
- Hexagonal Floating Tiles
- UL-FGA (Aero-Aggregate)


Imp 1
Example Placement
Partial Cover
~300'
~200'
Imp 2

What is Ultra-Lightweight Foamed Glass Aggregate (UL-FGA®)

- **Ultra-Lightweight Foam Glass Aggregate**
- **Produced from post consumer recycled glass**
- **100% recycled material content**
- **Average particle size 1.0’-1.5”**
- **Dry bulk density 15 lb/ft^3 (max.)**
  - **Crushed Glass = 100 lb/ft3**
  - **Water = 62.4 lb/ft3**
- **Chemically inert**
- **Made in the USA by Aero-Aggregates of North America**

UL-FGA® Uses

- Primarily used as lightweight fill for infrastructure projects
  - Pipe backfill
  - Low earth pressures (MSE walls)
  - Light-weight fill
  - 2023 I-95 Bridge Collapse

- Multiple environmental applications
  - Floating cover for evaporation reduction
  - Thermal insulation of landfill lining systems
  - Water and air filtration
  - Coating for odor control and hydrocarbon absorption

Why Are We Using It at a Superfund Site?

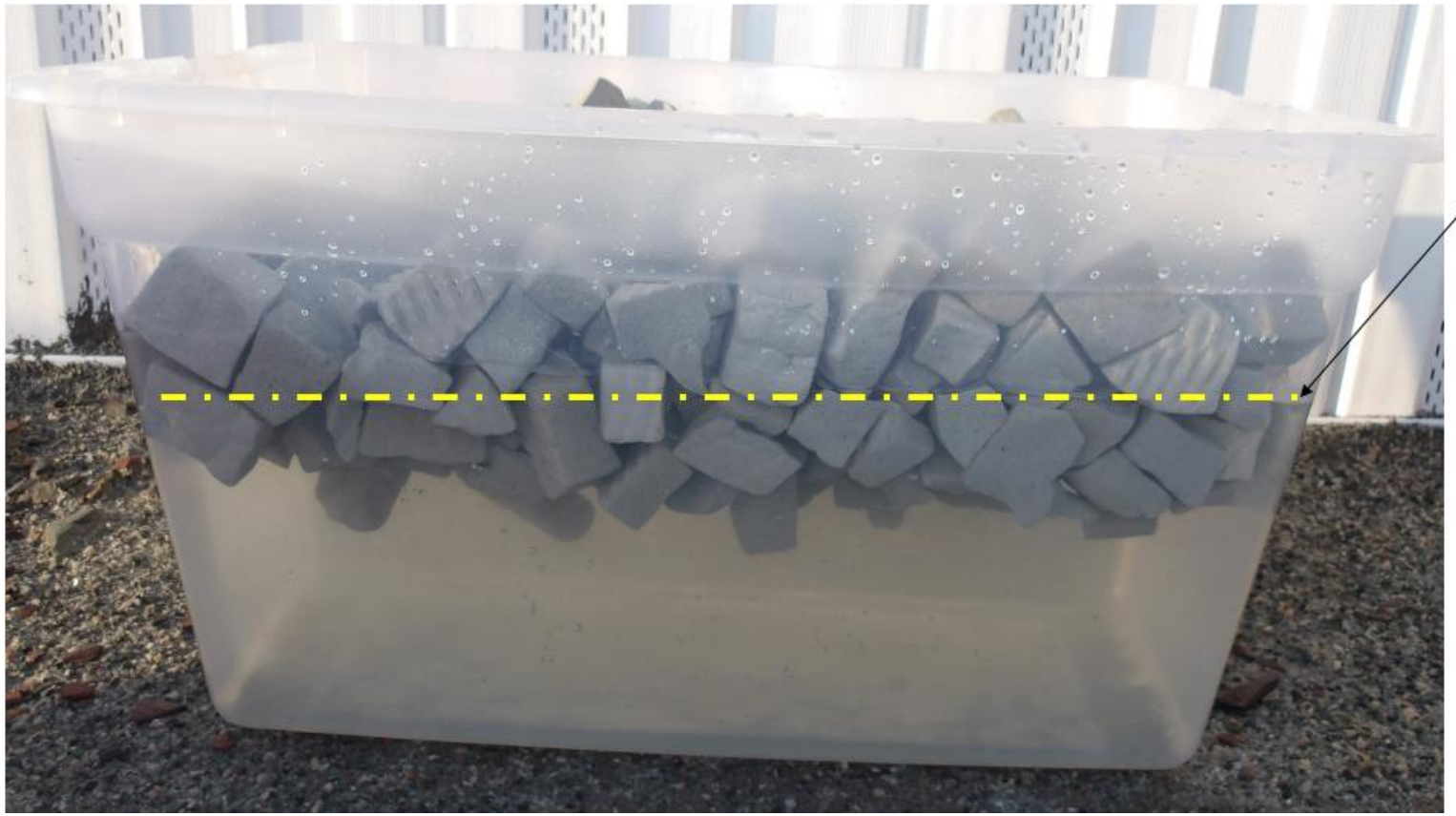
- Floating cover.
- Easily moveable cover preferred.
- Light color - reduced solar heat absorption.
- Added Benefit - future ISS working platform.

- Used once to reduce emission from a manure lagoon.
- No empirical data existed.

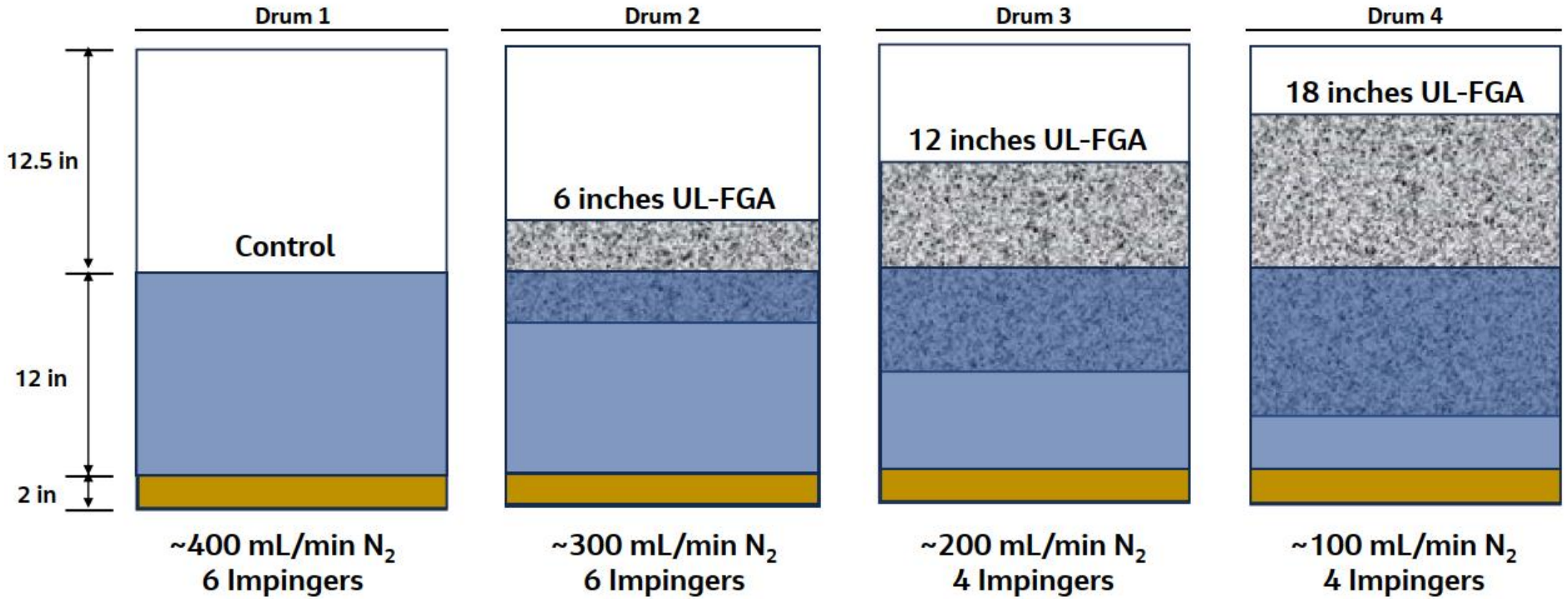
Need to determine VOC mass transfer, percent transfer reduction and overall cover thickness.

Typical UL-FGA Particles

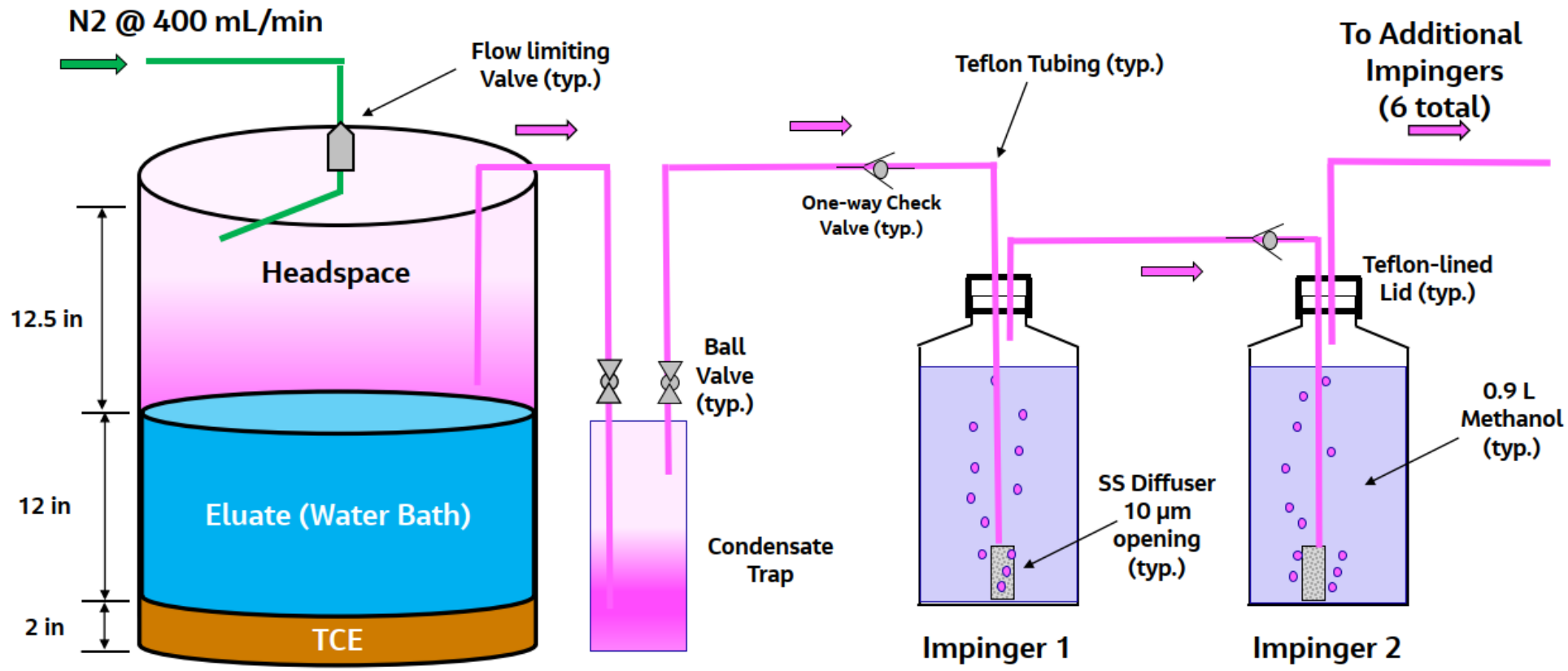
UL-FGA Floating Cover Installation



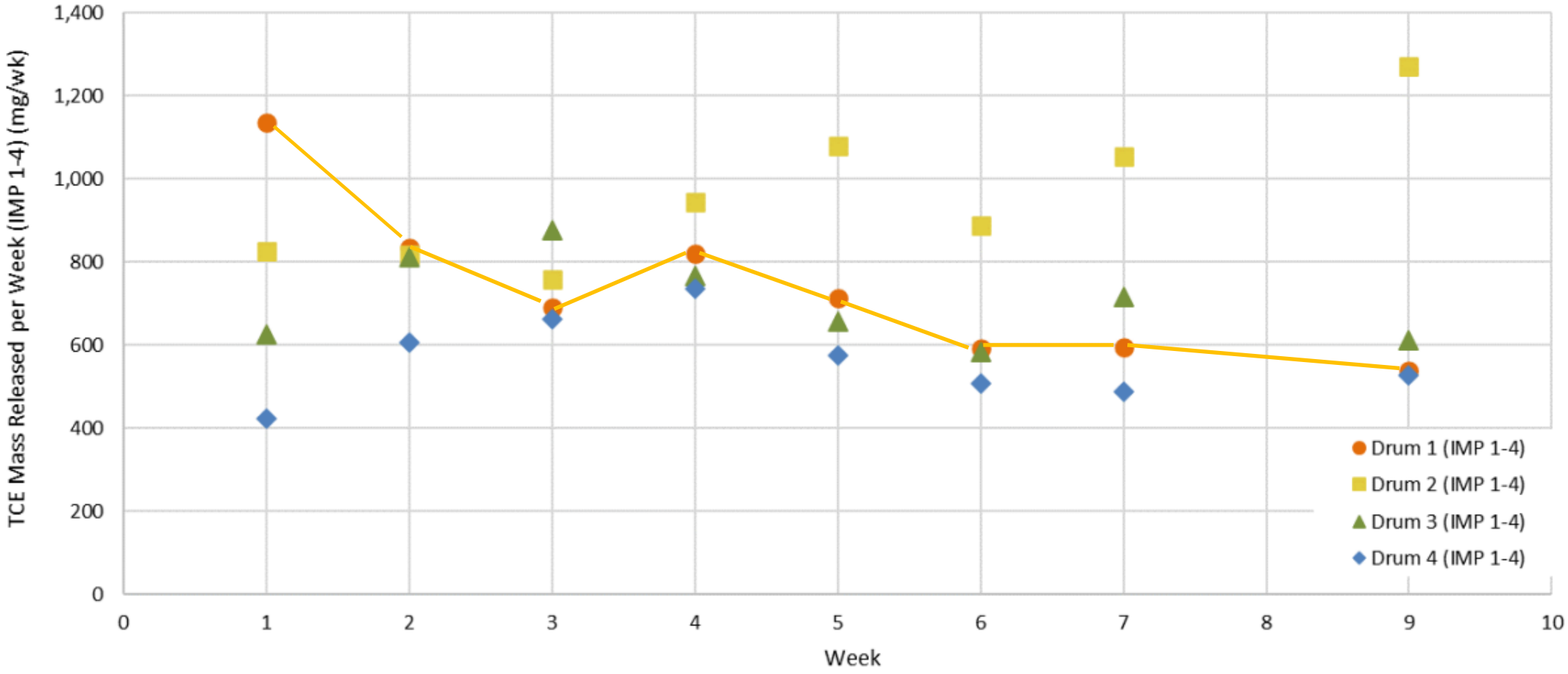
Bence-Scale Testing Set-Up



Bench-Scale Impinger Set-Up



Results – Mass Transfer



Results - Findings

- TCE provided a strong gradient for mass transfer.
- “Control” results were compromised.
- TCE attacked the “Control” drum liner.
  - Film formation on the water surface
  - Reduced TCE mass transfer
- At 30% porosity, the 6-inch layer matched the Mass Transfer numerical simulation.

Conclusions & Recommendations

- The relative benefit increased significantly from 6 to 12 inches.
- Diminishing results were noted at a thickness of 18 inches.
- Anticipated mass transfer reduction was determined to be 70 percent.
- A cover thickness of 9 to 12 inches was recommended.
- Additional field testing is required to determine the overall effectiveness of UL-FGA as a floating cover.

Aero-Aggregate Cover Installed

Thank you!

Jacobs