FRP Tank Autopsy

Presented by Mike Pecorelli

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY

ENVIRONMENTAL R & REMEDIATION

Aging Tanks

Are older underground tanks failing because of exposure to their environment and long term use.

Potential Impacts

State Funds

Public

Businesses

Environment

Steel UST Failure

- Site and USTs were being monitored for suspected release but inconclusive.
- Sudden loss occurred: Inventory records showed loss of around 6,000 gallons of gasoline.
- UST Installed March 1985 and taken out of service Aug. 2013.
- All USTs replaced.

Steel UST Failure

- Coating on outside made it hard to find holes.
- Scraped with a shovel.
- Holes under plate for measuring fuel levels from sludge buildup.
- Spent $617,000 so far.

FRP UST Failure

- Installed January 1988 and removed March 2018.
- 10,000 gallon UST.
- Release of 55,000 gallons of gasoline.
- Crack ran down side.
- Cause of the crack unknown.
- ATG gave no alarm.

FRP UST Failure Theory

- Install issue of engineered fill depth over the UST.
- No analysis of the FRP UST before it was crushed.
- Spent $1.6 million so far.

Will's Canyon Stop

Investigation and Tank Autopsy

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ENVIRONMENTAL RESPONSE
& REMEDIATION

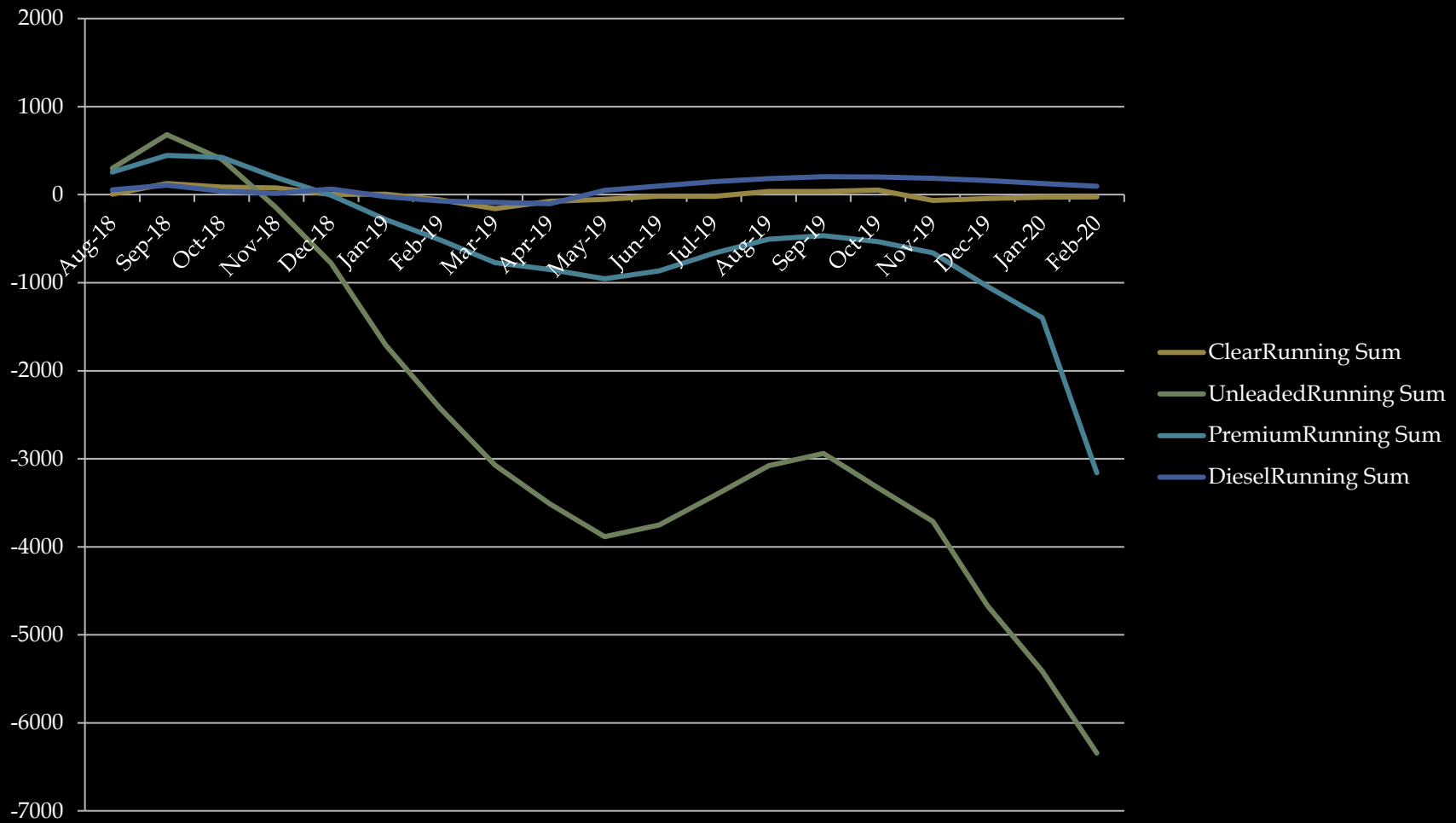
Identifying the release.

Thanks to the owner doing inventory control the release was identified.

Release reported Feb 2020 and UST installed January 1998.

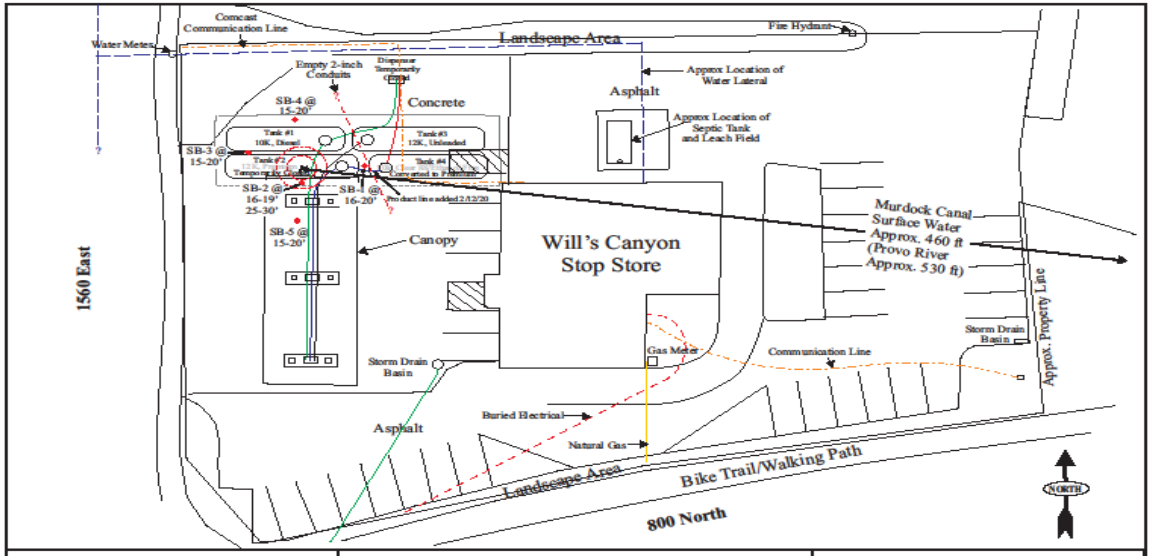
Called a UST tester who confirmed the release.

Inventory chart



Maps


Untitled Map
Write a description for your map.
Legend
E-970-N-St
E-920-N
E-880-N-St
E-840-N-St
E-820-N
N-1560 E
Site
Murdock Canal
Provo River Parkway
Provo Canyon Rd
189
N


Comcast Communication Line
Water Meters
Landscape Area
Fire Hydrant
Empty 2-inch Conduits
Dispenser Temporarily Capped
Approx Location of Water Lateral
Asphalt
Concrete
SB-4 @ 15-20'
Approx Location of Septic Tank and Leach Field
Tank #1 10K, Diesel
Tank #3 12K, Unleaded
SB-3 @ 15-20'
Tank #2 Temporarily Closed
Tank #4 Currently in Production
SB-2 @ 16-19' 25-30'
SB-1 @ 16-20'
Product line added 2/12/20
SB-5 @ 15-20'
Canopy
Will's Canyon Stop Store
Murdock Canal Surface Water Approx. 460 ft (Provo River Approx. 530 ft)
1560 East
Storm Drain Basin
Gas Meter
Communication Line
Storm Drain Basin
Approx. Property Line
Asphalt
Buried Electrical
Natural Gas
Landscape Area
Bike Trail/Walking Path
800 North
NORTH
LEGEND
Soil Boring Sample Location
Approximate Tank Basin Excavation Area
Estimated area of release
Site Map with Soil Boring Locations
approx. scale in feet
Will's Canyon Stop
1565 E. 800 N.
Orem, UT 84097
Fac. ID #1000453
Date: February 24, 2020
By: RJH
FIGURE 2

Before Closure

- View of UST location.
- Larger property.

FRP Tank Analysis

- Fiberglass USTs are difficult to remove intact. Usually crushed for removal and loss of information why it leaked or failed.
- Additional cost to remove intact and not always successful.
- Visual observation can be very hard to find a crack or reason for the leak.

Collecting information

- Develop a list of items to inspect and record.
- Work with the consultant and remover to follow the list.

Collecting information

- This investigation was possible due to the cooperation of the owner, consultant, remover, staff, and local officials.
- Slows down the removal and increases the cost.

Collecting information - Video

- Consultant using a GoPro
- Utah County Health reached out to the local sewer district to see if they could help scope the tank.
- Sent a camera and the necessary equipment. This enabled an inside view of all of the tanks and saved to flash drive.

Vac Truck of Pea Gravel

- Pea gravel was removed using a vacuum truck that had to be emptied frequently.
- This removal helps prevent damage to the FRP USTs.
- Adds significant time to removal.

Storage of the UST

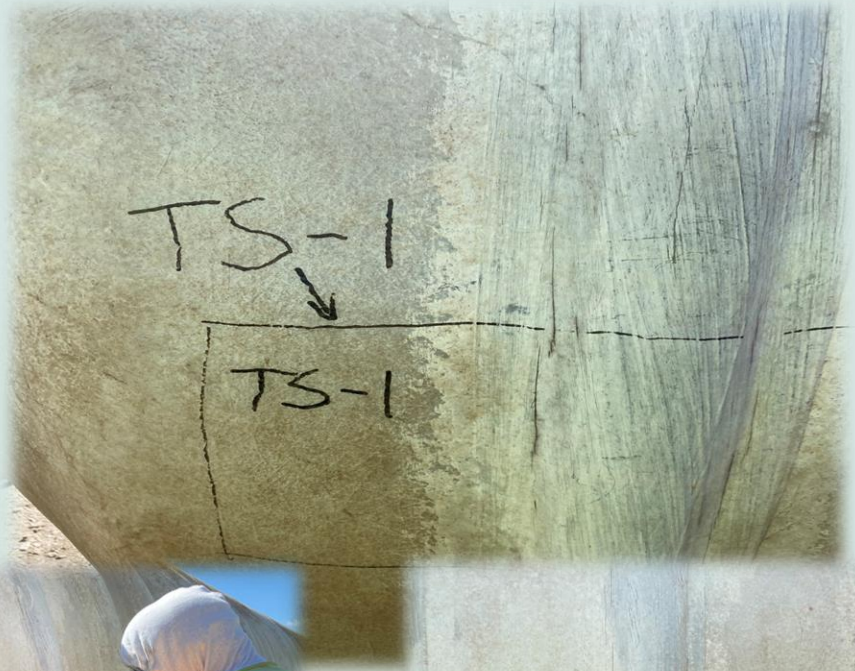
- After removal of UST what are you going to do with it? Location, location, location.
- Store on site if possible.
- Block tank from rolling and cover with a tarp if possible.
- Photos to document how the tank was moved and stored.

Video - Soap and Air Test

- Sealed the UST and used a small blower to help identify the location of the leak.

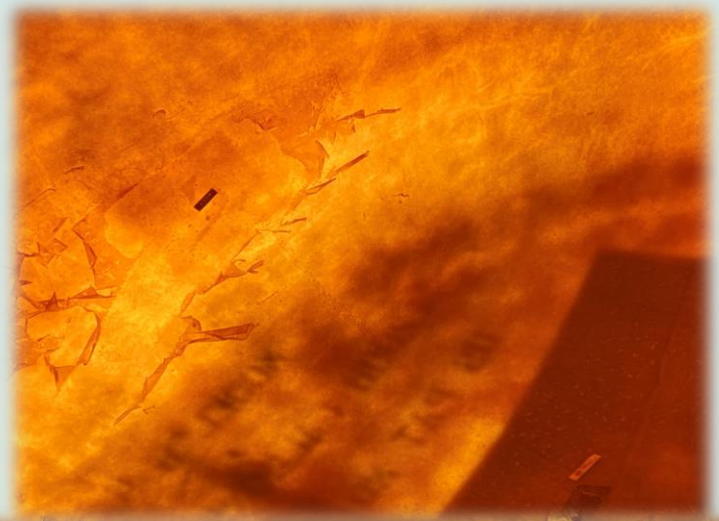
Sampling the Tank

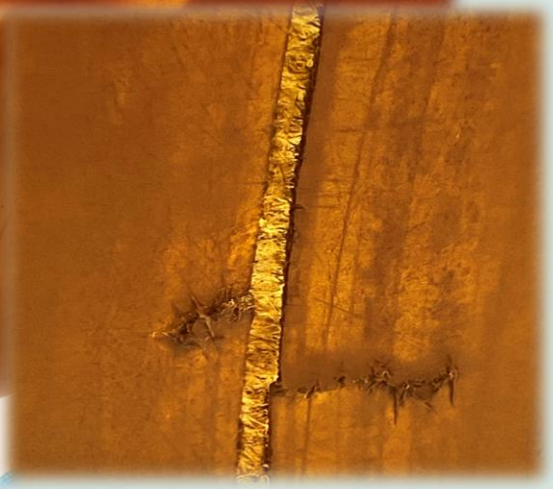
- Locations for sampling are marked, labeled, and photographed.
- Samples use a chain of custody.
- Hard to cut into a FRP tank. Sawzall met it's match. Used a masonry grinding wheel.
- Need safety equipment because of fiberglass particles and silica used in FRP tanks.



Inside View Near the Location of the Failure

- Flaking gel coat.
- Fairly large groove.





Groove in the UST

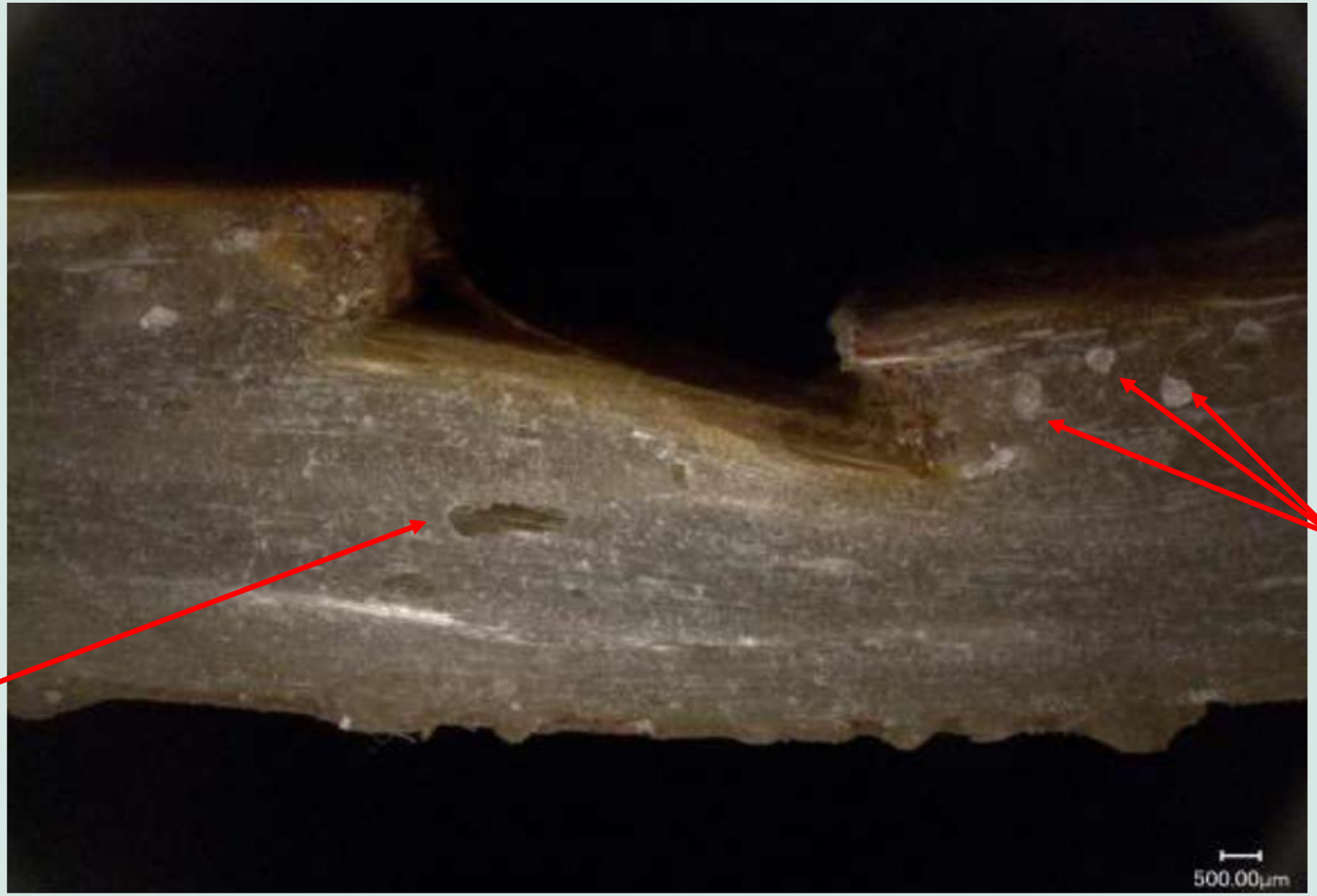
Thin gel coat. Fiberglass fibers are visible.

Thicker gel coat.

Groove with gel coat in the groove. Separation of the UST and spray coated with gel coat.

Groove provides a pathway for fuel to permeate in the UST wall and damage integrity.

Groove Cross Section

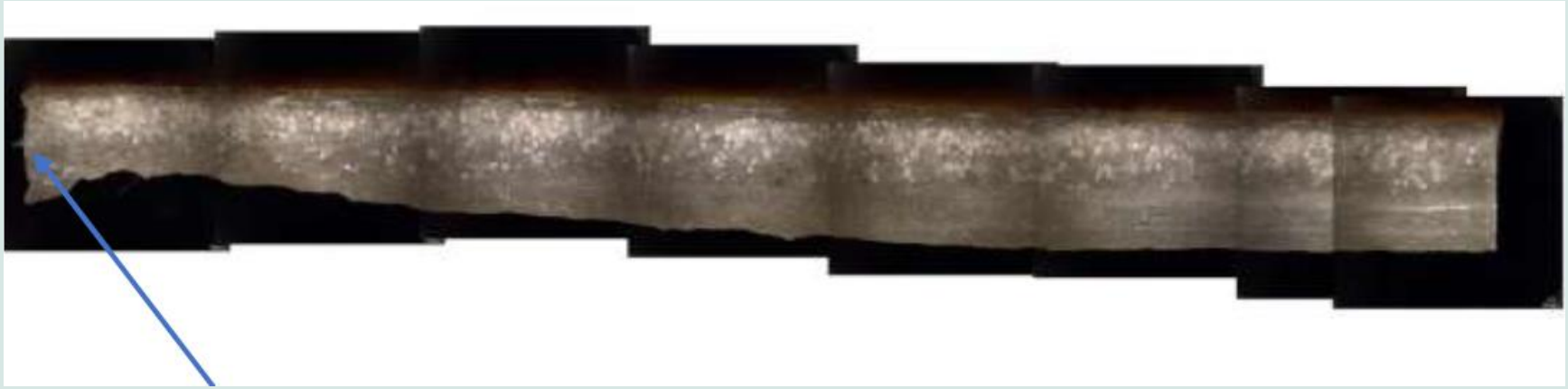


Void space that can weaken UST.

Sand particles. Should be more sand particles and not as close to surface.

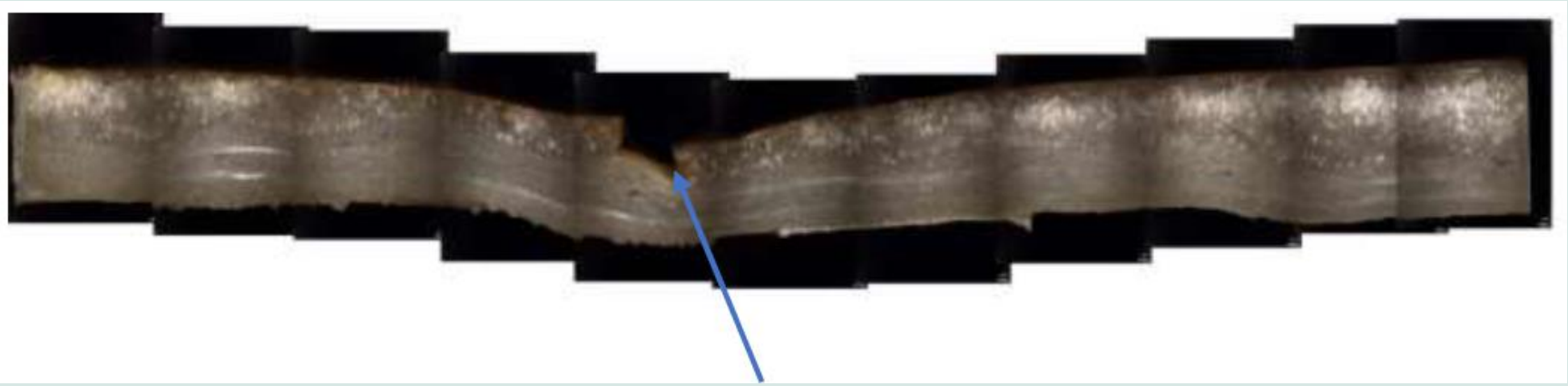
Groove is approximately ¼ of the UST thickness on the right.

Composite Photo with Crack



Area of the crack.
Thinner area of
UST.

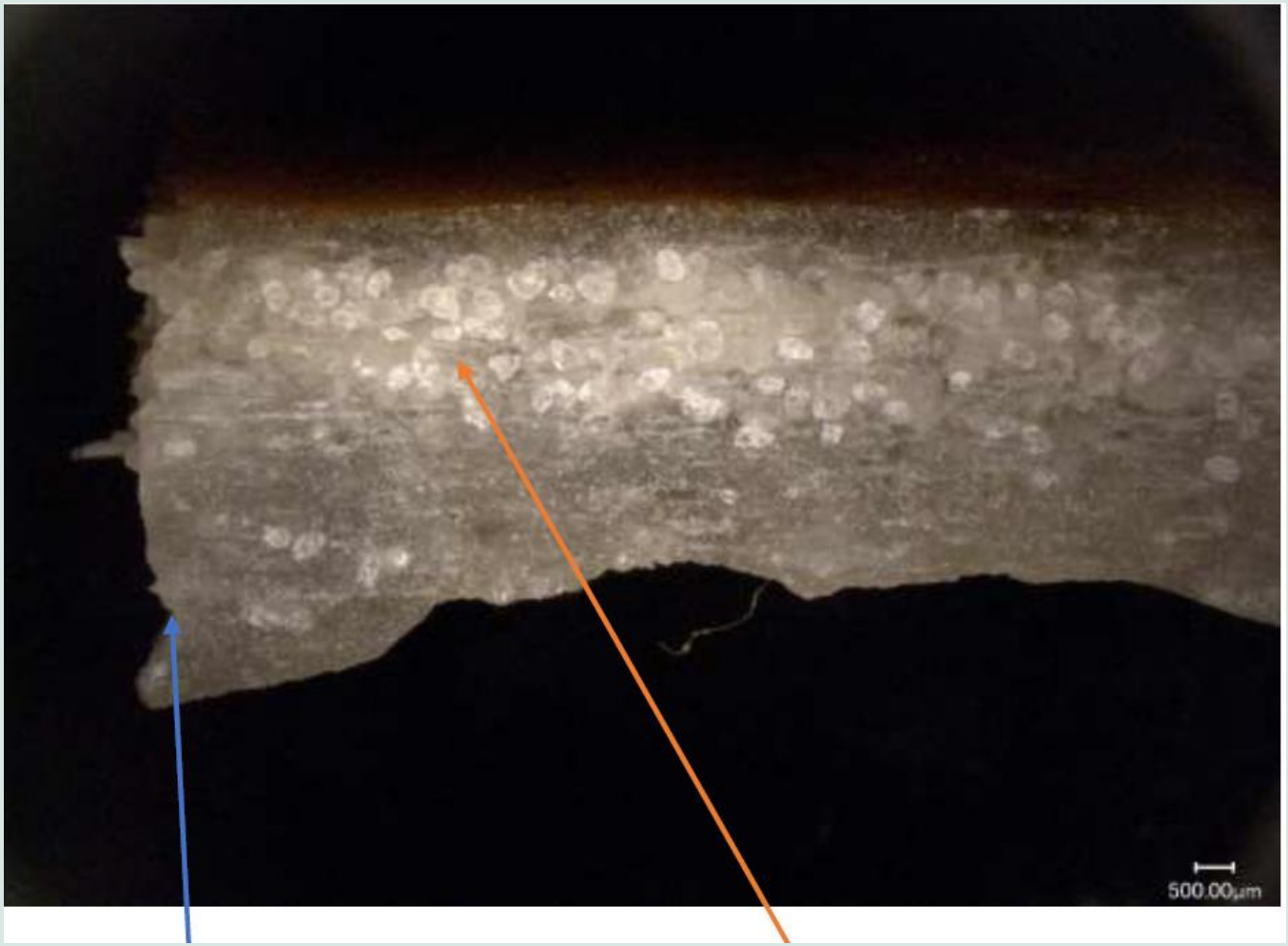
Composite Photo with Crack



UST has a bow in it near the groove. Likely from stress.

Notice irregularity in the sand reinforcement locations near the surface. Sand should be more towards the middle. Very little sand near the groove.

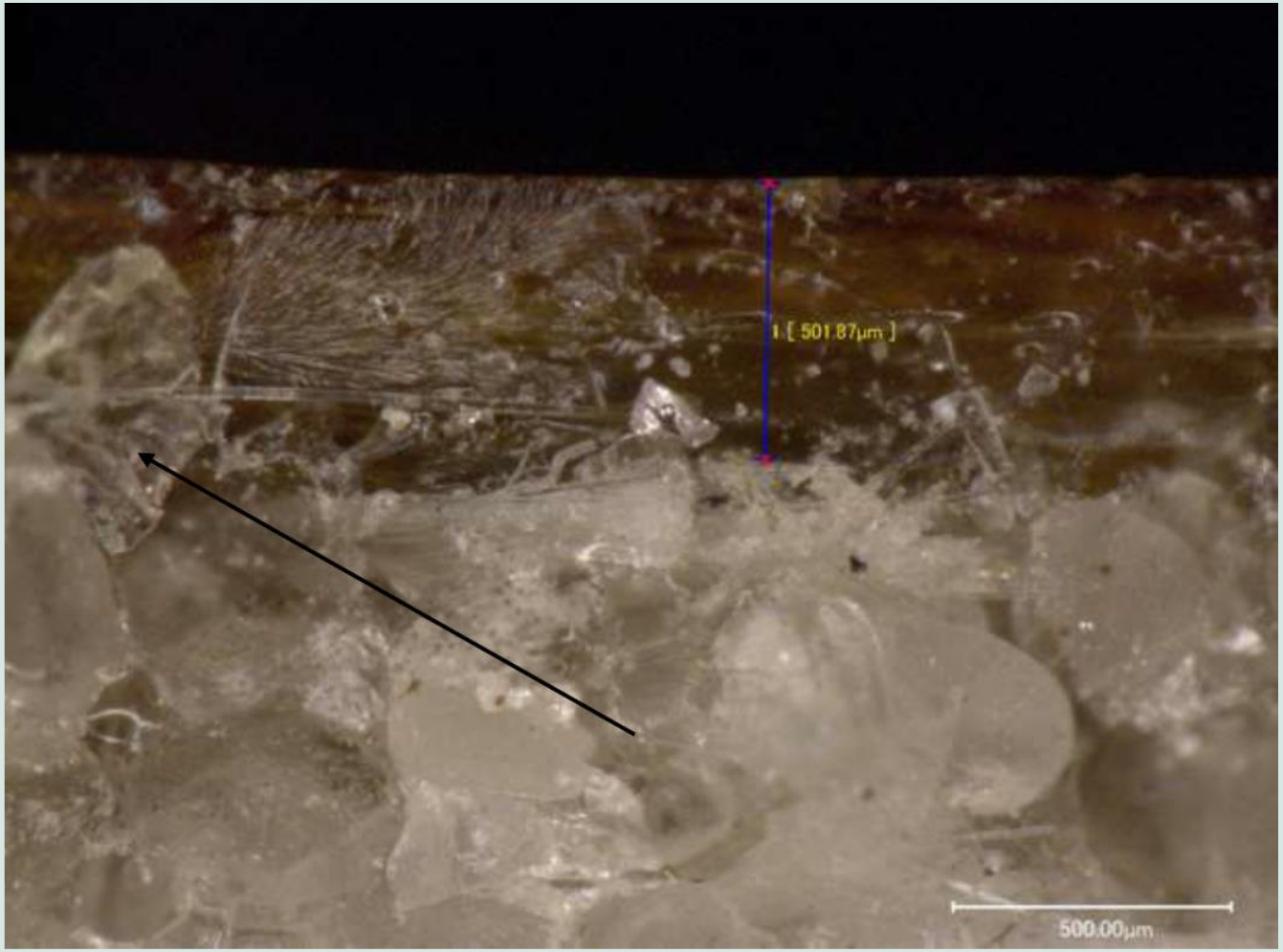
Crack in the UST



Location of the crack.

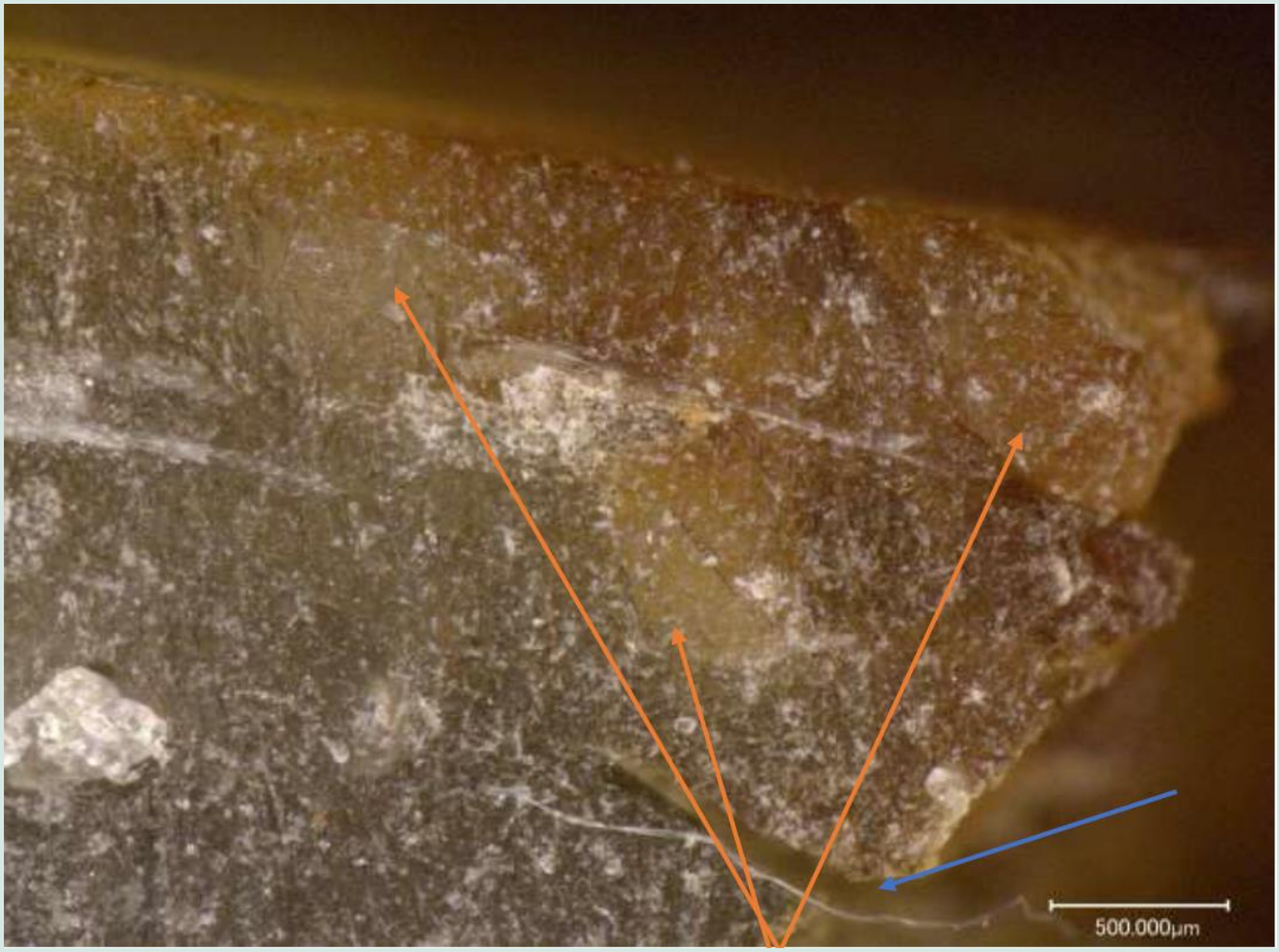
Sand is not uniform from other parts of the UST and close to inner wall.

Gel Coat



View of gel coat (amber color) and sand grains. Black arrow shows sand grain in the gel coat lowering the gel coat thickness. That is a weak point.

Permeation at Crack Location



Orange arrows show where gasoline has permeated the gel layer changing the color. Notice color near the crack vs to the left. Blue arrow is another crack perpendicular.

What Did We Learn?

- This release was attributed to manufacturing errors.
- Discoloration and flaking of the gel coat are signs of incompatibility issues.
- Additional analysis with fiberglass USTs is needed.
- Would do this again if conditions present themselves.
- A tank autopsy takes coordination from everyone involved to be done successfully.

Going Forward

- Questions unanswered: How common are these issues? What impact could these aging tanks have on the State Fund?
- Spent about $257,000 on this release so far and considered to relatively less costly because it was caught with an estimated release of 500 gallons.
- This release is near being closed out after remediation was finished this summer.

Questions?

Time for Questions

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