



An Inside View of Arizona's USTs

National Tanks Conference 2018





Investigation Of Corrosion-Influencing Factors In Underground Storage Tanks With Diesel Service

U.S. Environmental Protection Agency
Office of Underground Storage Tanks

EPA 510-R-16-001
July 2016

“EPA recommends that owners of underground storage tank (UST) systems storing diesel fuel check inside their tanks for corrosion, which research suggests is now appearing on equipment in most tank systems storing diesel fuel.”

EPA conducted internal inspections on 42 operating USTs storing diesel fuel. 83% exhibited moderate to severe corrosion, though less than 25% of the USTs reported corrosion prior to the internal inspection.

AZ Schools

ADEQ reached out to UST owners for 40 school sites

Industry

Tanknology (contracted through ADEQ)

Steel Tank Institute (STI)

Other Equipment Manufacturers

National Experts

Federal EPA

Office of Underground Storage Tanks (OUST)

Office of Research and Development (ORD)



Tank Grading Scale

Grade	Description
A	No issues – Gelcoat intact and no visual cracking, degradation, deformation, or discoloration. The tank looks good.
B	Minimal to Moderate issues – Minor flaking, blistering, deformation, discoloration, or oxidation. Ideally less than 5% of the tank surfaces exhibit signs of degradation. Signs of aging are present. Structural integrity of the tank is unaffected.
C	Moderate to Major issues – Heavy flaking, blistering, corrosion, deformation, or minor cracks. Signs of degradation, stress, or structural integrity being effected. Ideally less than 50% of the tank surfaces exhibit signs of degradation. Further investigation is warranted.
D	Severe issues – Severe cracks or evidence of fuel egress, water ingress, or heavy degradation observed on more than 50% of the tank surfaces. Structural integrity has been compromised. Timely investigation is warranted.
E	Tank unable to be assessed – Too much product, fogging, or too little light.

For this project, Tanknology worked with ADEQ to provide general grades reflecting the observed condition of the tank.

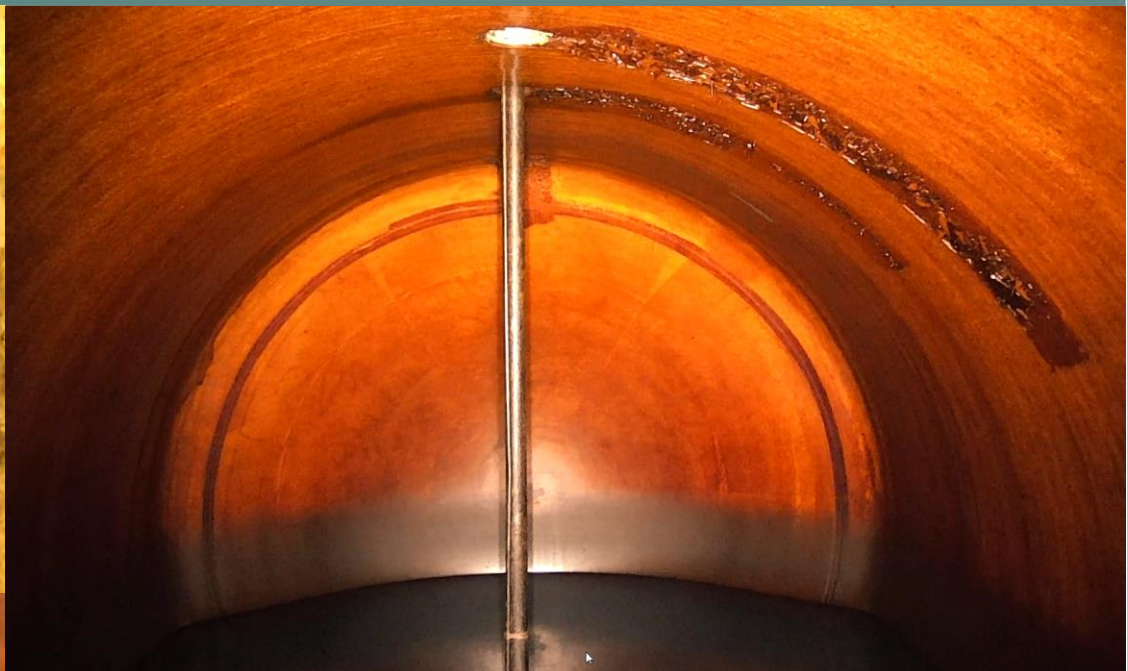
Min. to mod.; Critical fuel quality; 25 years old



Water detected	% RH	Temperature (F)	BS&W % Volume	BS&W Comments
Yes	20	69	50	50% sediment



Min. to mod.; Critical fuel quality; 27 years old



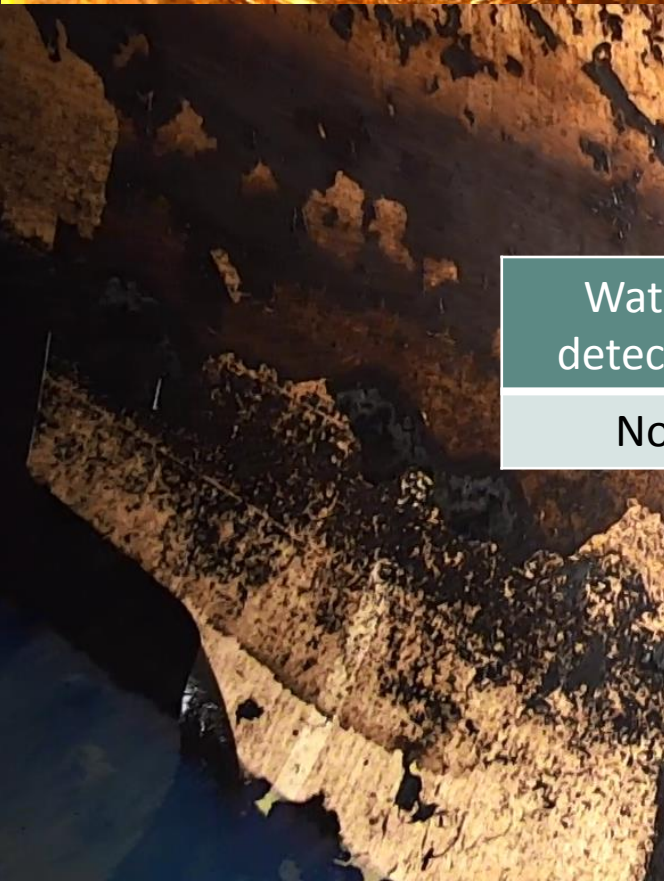
Water detected	%Rel. Humidity	Temp (°F)	BS&W % Vol	BS&W Comments
No	38	74	20	19.5% water



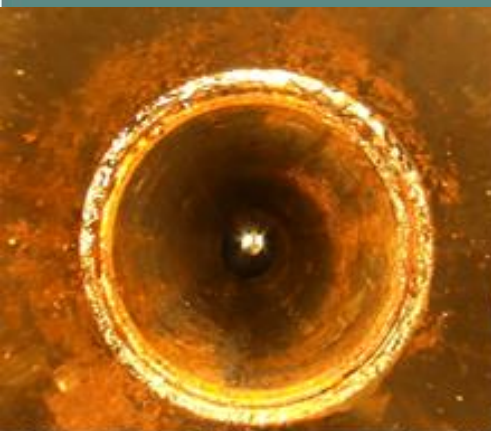
Min. to mod.; Critical fuel quality; 31 years old



Water detected	%Rel. Humidity	Temp (°F)	BS&W % Vol	BS&W Comments
No	29	84	95	94.5% water



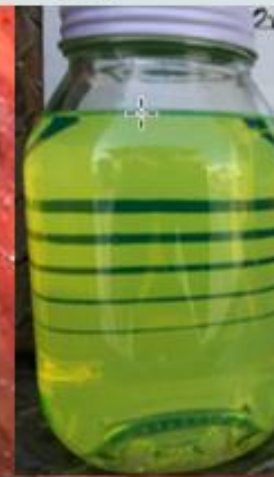
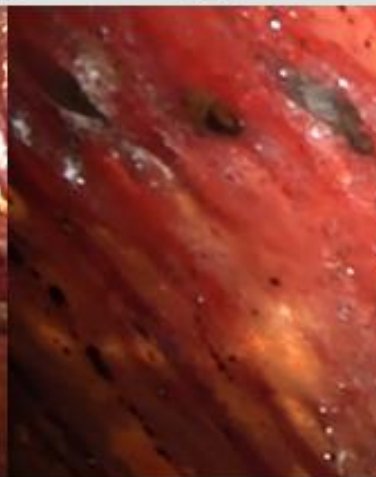
Min. to mod.; Critical fuel quality; 31 years old



2100 ppm
ethanol detected
in tank water
bottom sample



Water detected	% RH	Temperature (F)	BS&W % Volume	BS&W Comments
Yes	26	66	80	80% water



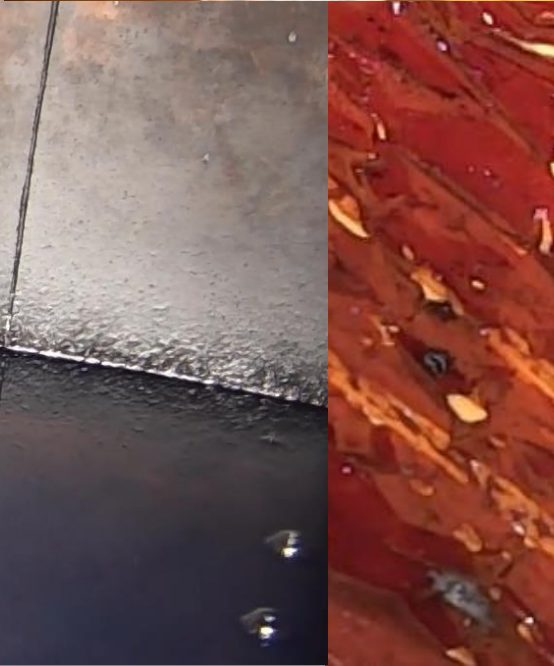
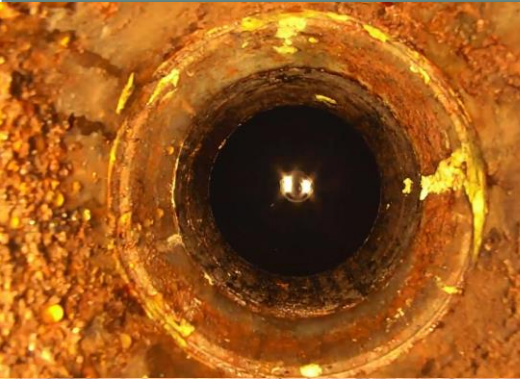
Min. to mod.; Critical fuel quality; 35 years old



Water detected	%Rel. Humidity	Temp (°F)	BS&W % Vol	BS&W Comments
Yes	35	47	60	55% water



Min. to mod.; Sample not analyzed; 29 years old



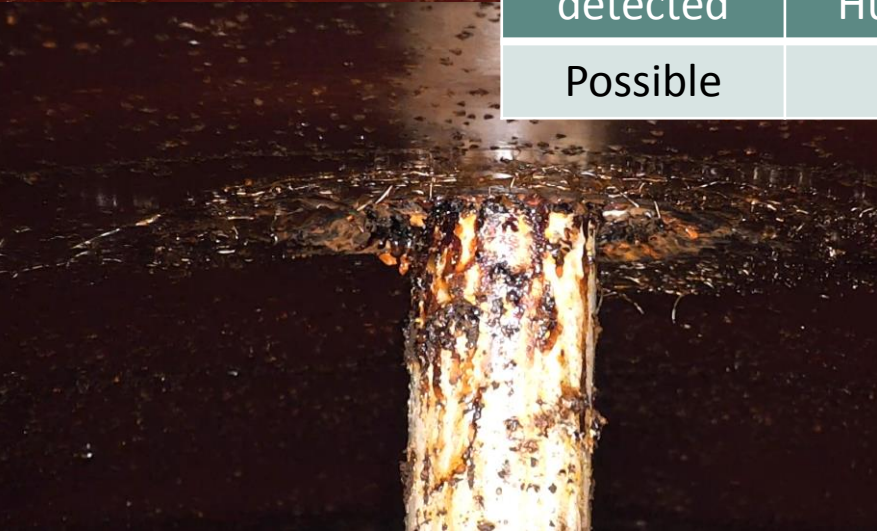
Water detected	%Rel. Humidity	Temp (°F)
No	35	62



Mod. to major; Critical fuel quality; 31 years old



Water detected	%Rel. Humidity	Temp (°F)	BS&W % Vol	BS&W Comments
Possible	31	80	30	29% water

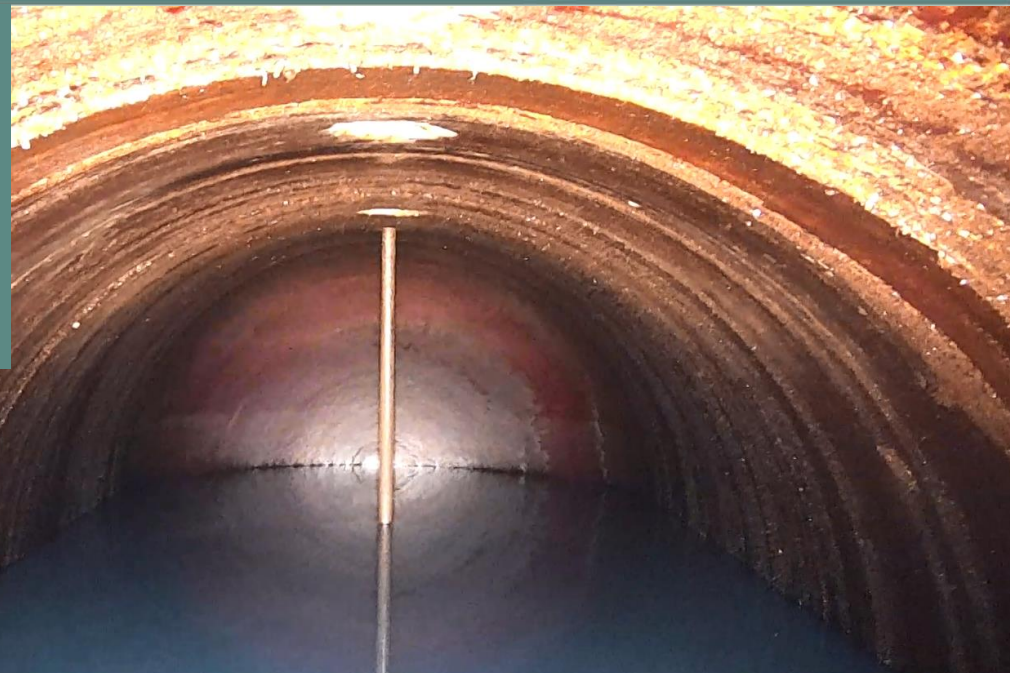


Mod. to major; Critical fuel quality; 34 years old

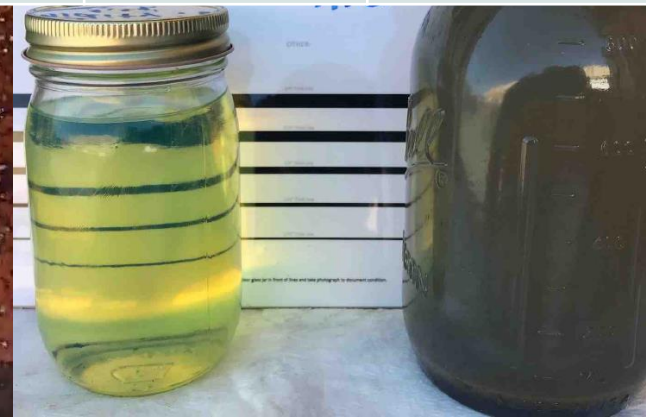


Bacteria count:
100,000/mL at 1:10
dilution

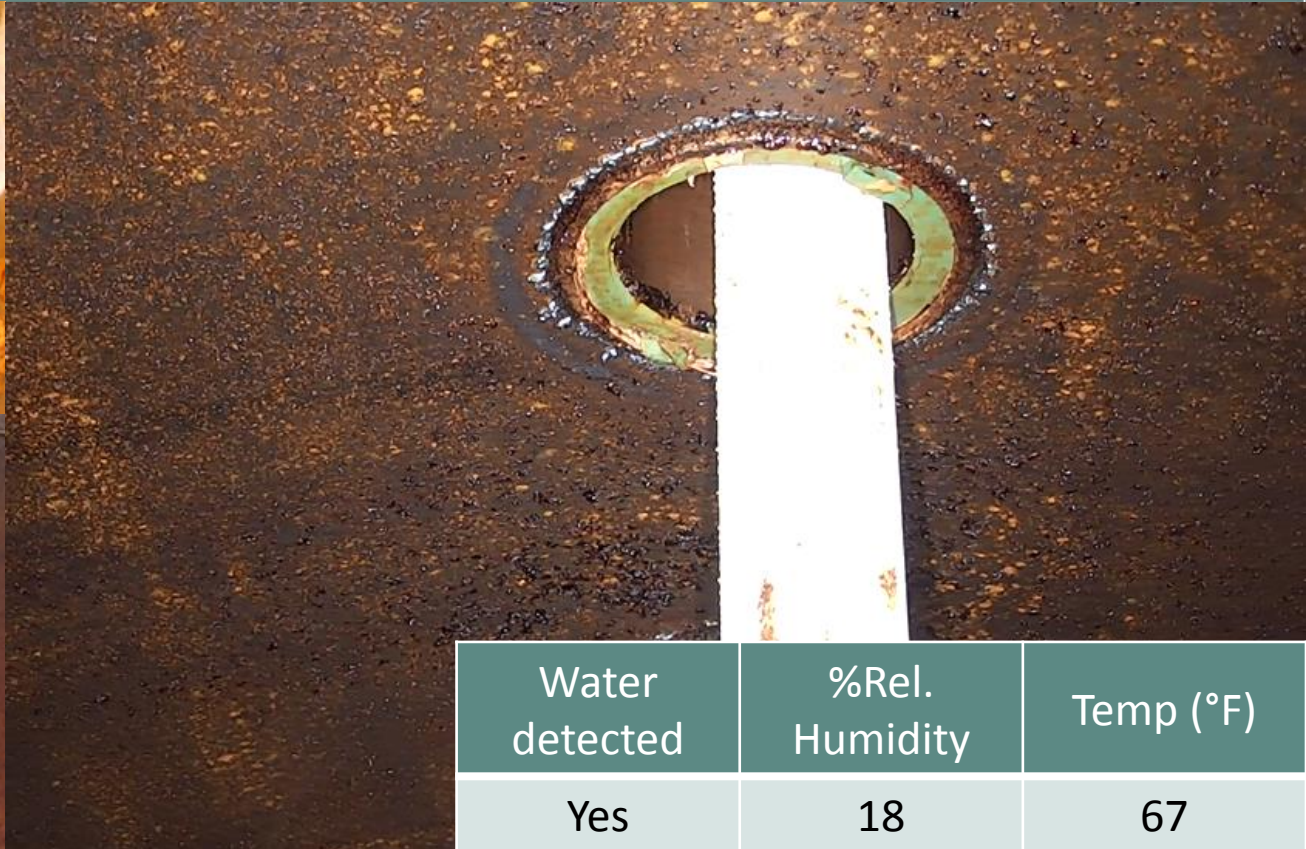
Copper strip test: 3B
(high tarnish)



Water detected	%Rel. Humidity	Temp (°F)	BS&W % Vol	BS&W Comments
Possible	41	87	15	10% water



Min. to mod.; 25 years old; Unleaded



Water detected	%Rel. Humidity	Temp (°F)
Yes	18	67



Min. to mod.; 31 years old; Unleaded



Water detected	%Rel. Humidity	Temp (°F)
No	49	67



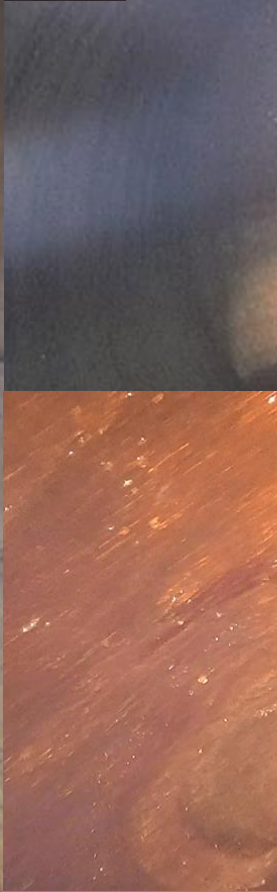
Min. to mod.; 45 years old; Unleaded



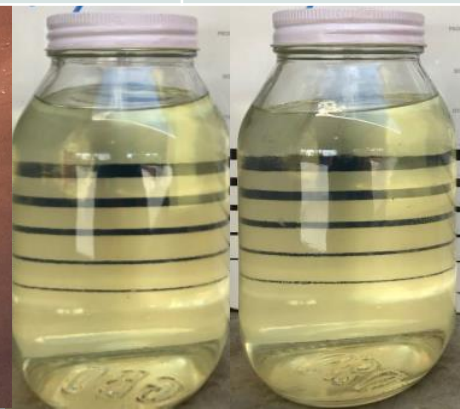
Water detected	%Rel. Humidity	Temp (°F)
No	30	76



Mod. to major; 20 years old; Unleaded



Water detected	%Rel. Humidity	Temp (°F)
No	20	85



Mod. to major; 35 years old; Unleaded

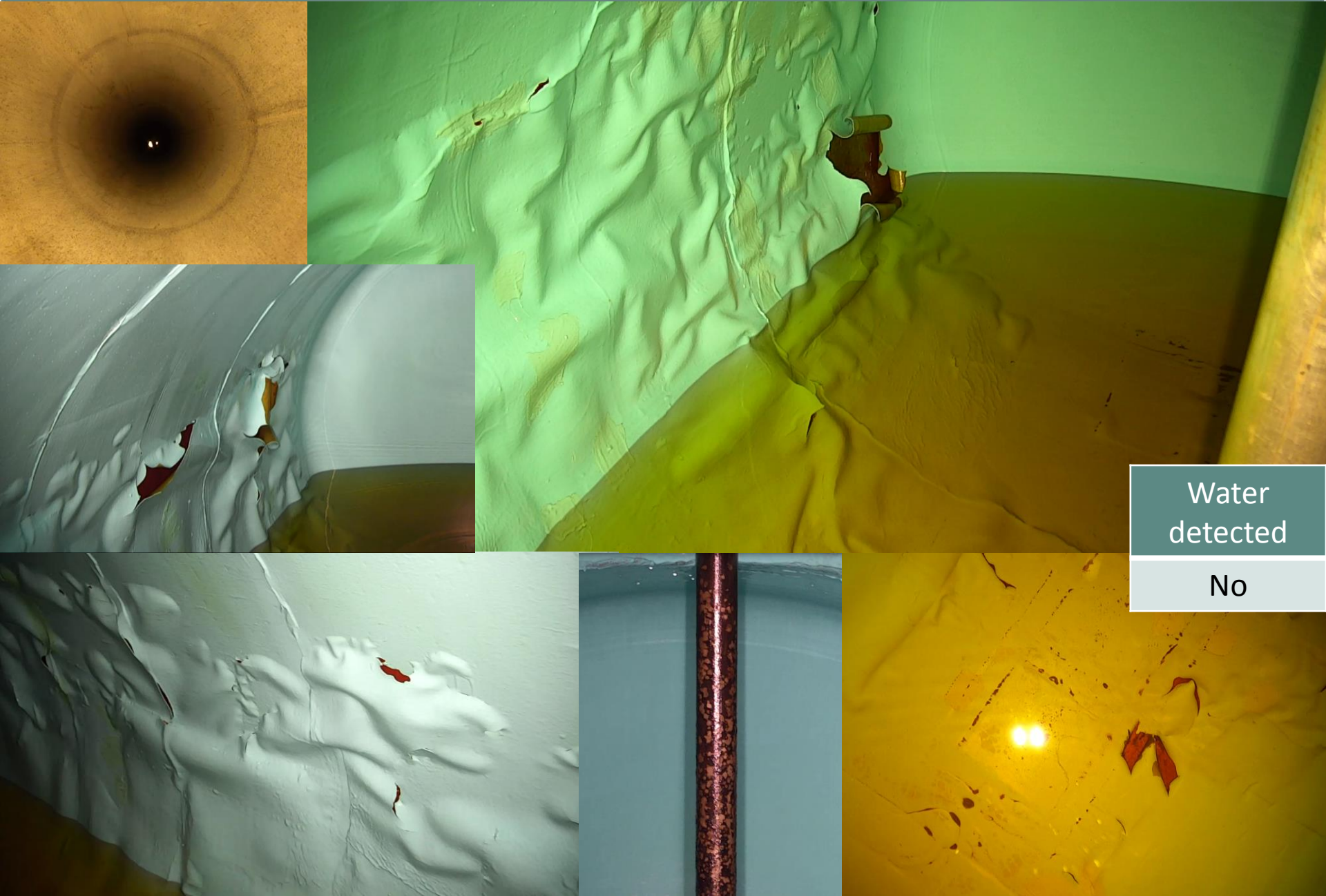


Water
detected

Yes



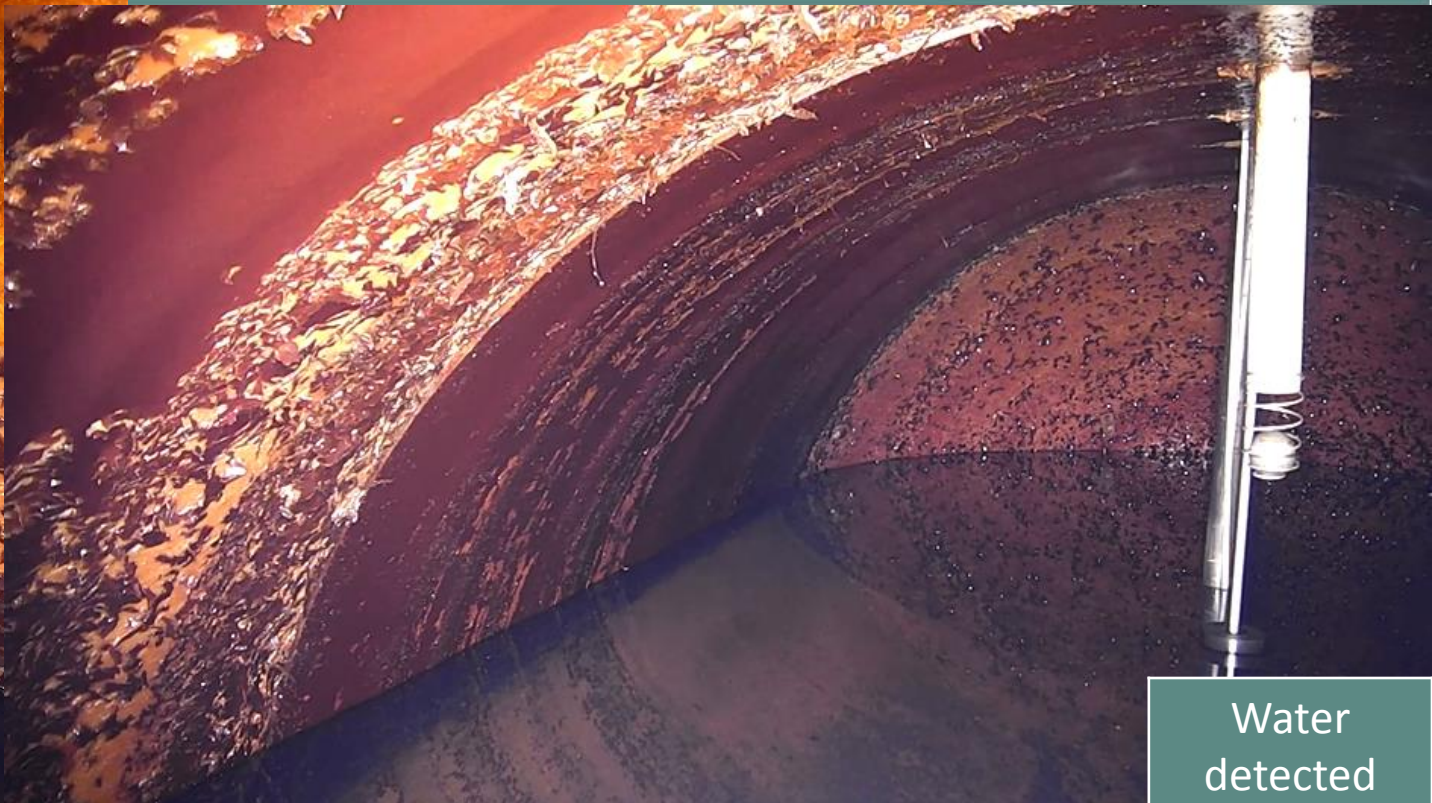
Severe; 27 years old; Unleaded



Water
detected

No

Severe; 31 years old; Unleaded

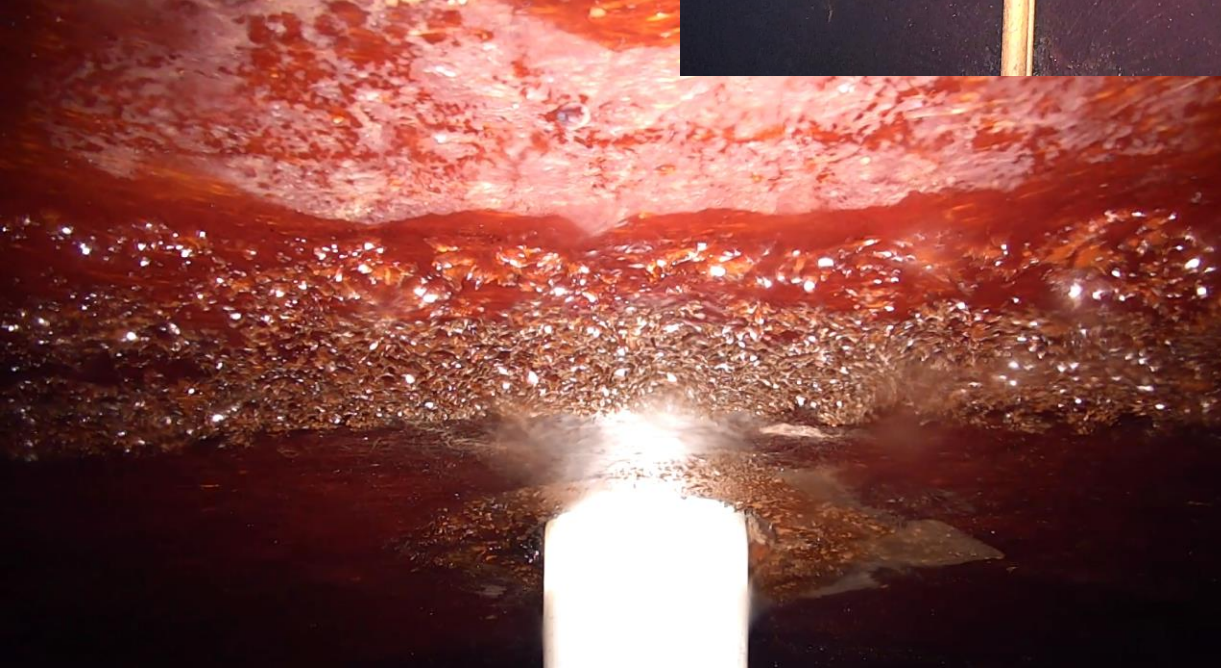
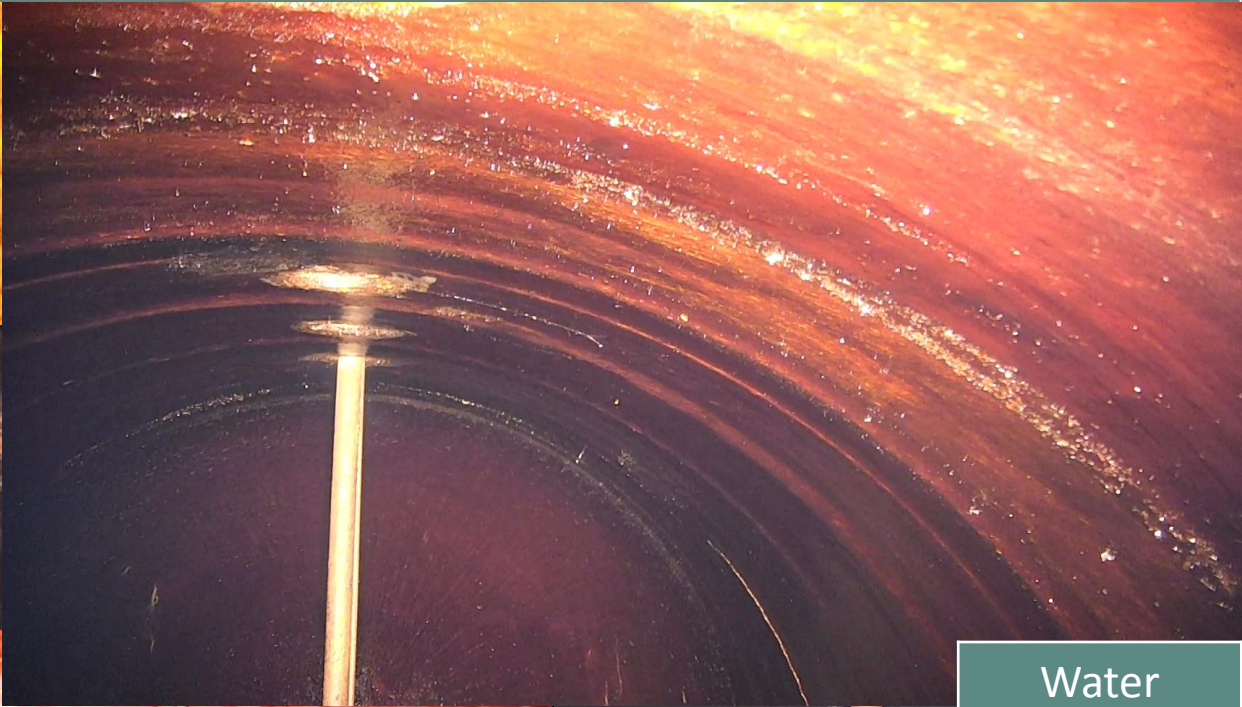
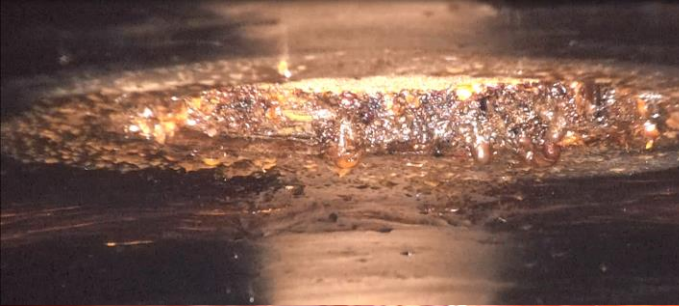


Water
detected

No



Severe; 34 years old; Unleaded



Water
detected

No

What are We Finding?

Currently, 79 tanks have been inspected:

		Tank Grade				
Fuel Type	Number of Tanks	A	B	C	D	E
Gasoline	31		48%	29%	23%	
Diesel	48	4%	86%	8%		2%

Construction	Number of Tanks	A	B	C	D	E
Steel (asphalt-coated or bare steel)	6		5	1		
Composite (steel/fiberglass)	7		5	2		
Fiberglass Reinforced Plastic (FRP)	66	2	46	10	7	1

Average “age” of school-owned tanks is approximately 28 years since installation. The average of all AZ tanks is approximately 23 years since installation.

Diesel Fuel Quality Snapshot

Diesel fuel samples were collected from 23 tanks.

General results are summarized below:

Tank Grade

Lab Results	Number of Tanks	A	B	C	D	E
Critical	7		5	2		
Reportable	8		6	1		1
Normal	8		8			



Critical



Reportable



Normal

Critical Fuel Results (Diesel):

Approximately 30% of the fuel samples were identified as “Critical” by the laboratory. Below are some additional details for those tank samples:

Tank No.	Tank Age (years)	Water detected	% RH	Temperature (F)	BS&W % Volume	BS&W Comments
1	27	No	38	74	20	19.5% water
2	30	No	29	84	95	94.5% water
3	35	Yes	35	47	60	55% water
4	31	<i>Possible</i>	31	80	80	79.5% water
5*	33	<i>Possible</i>	41	87	15	10% water
6**	30	Yes	26	66	80	80% water
7	25	Yes	20	69	50	50% sediment

5* Bacteria results positive: bacteria count/mL at 1:10 dilution – 100,000.

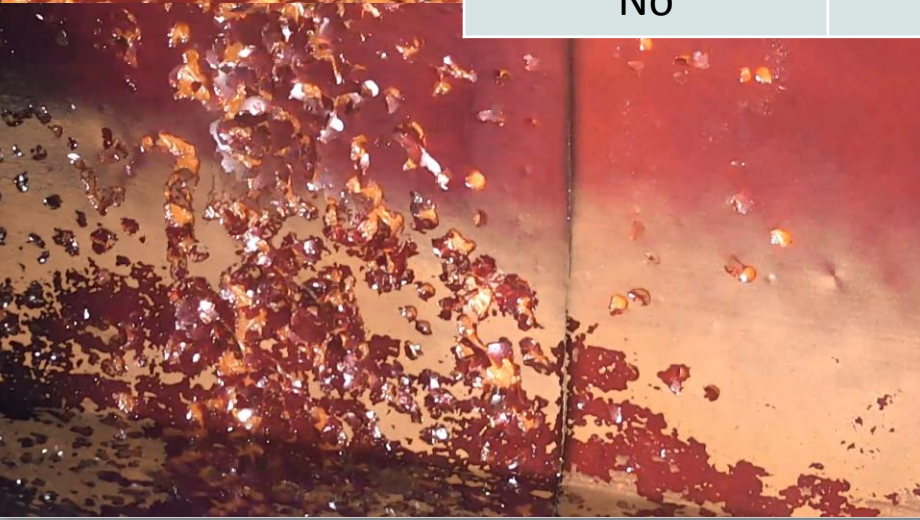
6** water collected from tank bottom: 2,100 ppm ethanol

Comparing EPA's and ADEQ's Study Results

- EPA: Corrosion Of Metal Components In UST Systems Storing Diesel Appears To Be Common
 - ADEQ: 94% (45/48) of diesel tanks had evidence of corrosion/degradation
- EPA: The Corrosion Is Geographically Widespread, Affects UST Systems With Steel Tanks And With Fiberglass Tanks, And Poses A Risk To Most Internal Metal Components
 - ADEQ: Tanks scoped were located throughout Arizona and 96% (76/79) of all tanks had evidence of corrosion/degradation
- EPA: The Quality Of Diesel Fuel Stored In USTs Was Mixed
 - ADEQ: Diesel fuel quality test results were about equal among the 23 samples analyzed (30% critical, 35% reportable, and 35% normal)

ADEQ's study results aligns with EPA's study results.

What's Next?



Water detected	Grade	Tank Age	Product
No	Severe	30 years old	Unleaded



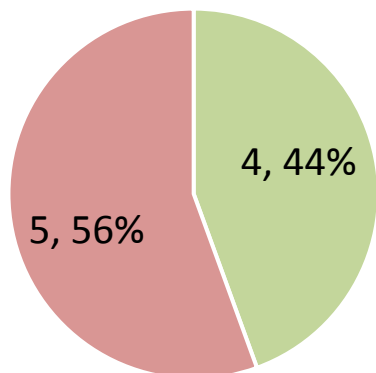
What's Next? (continued)



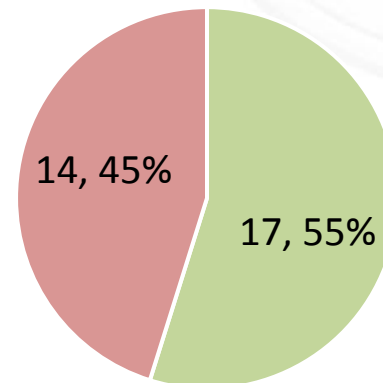
Are Tank Age and Confirmed Releases Related?

- PEI Journal – 3rd Quarter 2018: *1988 Called...And It Says Your Tank Warranties Are Up*
- Based on data from our State Lead Noncorrective Action Program:

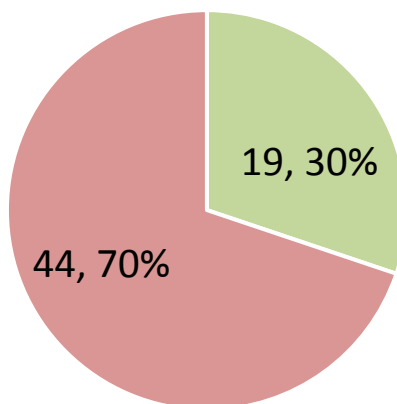
Tank was Less Than 20 Years Old at
Time of Sampling (9)



Tank was Between 20 to 30 Years Old at
Time of Sampling (31)



Tank was Greater Than 30 Years Old at
Time of Sampling (63)



■ No Release Confirmed
■ Release Confirmed

Questions?



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