UST CERTIFIED CONTRACTOR
COMMON ISSUES OBSERVED

PRESENTED BY: WESLEY MCCAIN

INTRODUCTION

- Show and discuss issues we've been seeing.
- Cover what MDEQ looks at / for and why.
- Propose new forms and explain current ones.
- Go over testing procedures
- Share information

TOPICS

- Notification forms
- Tank & Pipe Installation Issues
- Monthly Groundwater / vapor records
- Monthly Visual Interstitial Records
- MDEQ Position Papers
- Spill Bucket testing
- Overfill Device inspections
- Line Leak Detector testing
- Line tightness testing
- ATG Inspection
- Sensor Testing
- Annual Sump Inspections
- Sump Integrity test
- Cathodic Protection Testing
- Product Compatibility

REMINDER ON WHAT CRITICAL JUNCTURES ARE

"Installation"

- Preparation of the excavation.
- Setting of tanks, piping, tank anchoring devices, backfilling and strapping.
- Any time components of the piping below ground are disconnected or are being disconnected or connected
- All pressure testing performed during installation
- Completion of backfill and filling of excavation

"Alteration"

- Excavation of existing tanks, piping, secondary containment sumps, tank risers, spill buckets or vents.
- Actual performance of the alteration to the tanks, piping below ground, tank risers, or vents
- Anytime the components of the UST system below ground are disconnected or are being disconnected, connected, repaired, or replaced.

NOTIFICATION FORMS FOR INSTALLATION
(WHAT ARE YOU RESPONSIBLE FOR?)

Before:

- Notice of Intent to Install
  - (Donna Phillips, Mike Pigford, Wesley McCain)
- Does it have to be 30 day exact notice?
  - No, but do call to be sure okay to do.
- What about emergency repairs?
  - No notice of intent required unless you plan to take 30 days to mobilize.

After:

- Notification of Underground Storage Tank form
  - Whether signed by Tank Owner or Not.
- Checklist of Required Documentation for UST Modification / Installation and copies of testing.
- "As Built" Drawings to accommodate Notification of UST form

CHECKLIST OF REQUIRED DOCUMENTATION FOR UST

MODIFICATION / INSTALLATION

- To help guide you as to what MDEQ needs to see.

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

CHECKLIST OF REQUIRED DOCUMENTATION FOR UST MODIFICATION / INSTALLATION

This form must be submitted to MDEQ with "Notification for Underground Storage Tanks" form for all UST systems modified or newly installed as listed on "Notice of Planned UST System Modification/Installation" form. All applicable testing performed at installation must be fully completed and attached to checklist.

UST Facility			MDEQ Certified UST Installer	
Facility Name	MDEQ Facility ID #		UST Installer's Name	MDEQ Certification #
Physical Address			Company	
City	County	State MS	City	State
UST Owner			Telephone	Date

Mark all applicable for this UST System modification / installation when competed

1.) New tanks, piping, submersible pumps, dispensers at a new facility.
- ☐ Complete #2 checklist below.
- ☐ Complete #4 checklist below.

2.) New tanks added to an existing facility.
- ☐ Deflection test results. (Fiberglass Tanks Only).
- ☐ Tightness Testing of Tank's Secondary (Interstitial Space).
- ☐ Annual Spill bucket testing.
- ☐ Annual Overfill Prevention Device Inspection.
- ☐ Annual Electronic Interstitial Device Testing (If sensors installed for leak detection).

3.) New tanks at existing facility to replace existing tanks.
- ☐ Complete #2 checklist above.
- ☐ Complete #9 checklist below.
- ☐ Complete #4 or #5 checklists below if applicable to this installation.

4.) New piping at existing facility to replace existing piping. (complete repipe).
- ☐ Precision Line Tightness Testing of Primary Piping.
- ☐ Tightness Testing of Pipe Secondary (Interstitial space).
- ☐ Complete #7 checklist below.
- ☐ Complete #9 checklist below.

5.) New piping added at an existing facility to extend existing piping (New dispenser island).
- ☐ Precision Line Tightness Testing of Primary Piping.
- ☐ Tightness Testing of Pipe Secondary (Interstitial space) for newly installed piping.
- ☐ Complete #7 or #9 checklist below if applicable to this installation.

6.) New piping at an existing facility to partially replace (repair) existing piping.
- ☐ Precision Line Tightness Testing of Primary Piping.
- ☐ Tightness Testing of Pipe Secondary (Interstitial space) if original piping was installed after 10/1/08.

7.) New dispensers to replace existing dispensers (existing piping modified).
- ☐ Annual Shear Valve Inspection. (NA for suction piping)
- ☐ Containment Sump Integrity Testing of Dispenser sumps where piping was modified.
- ☐ Annual Electronic Interstitial Device Testing (If sensors installed for leak detection).

8.) New dispensers to replace existing dispensers (existing piping NOT modified).
- ☐ Annual Shear Valve Inspection. (NA for suction piping)

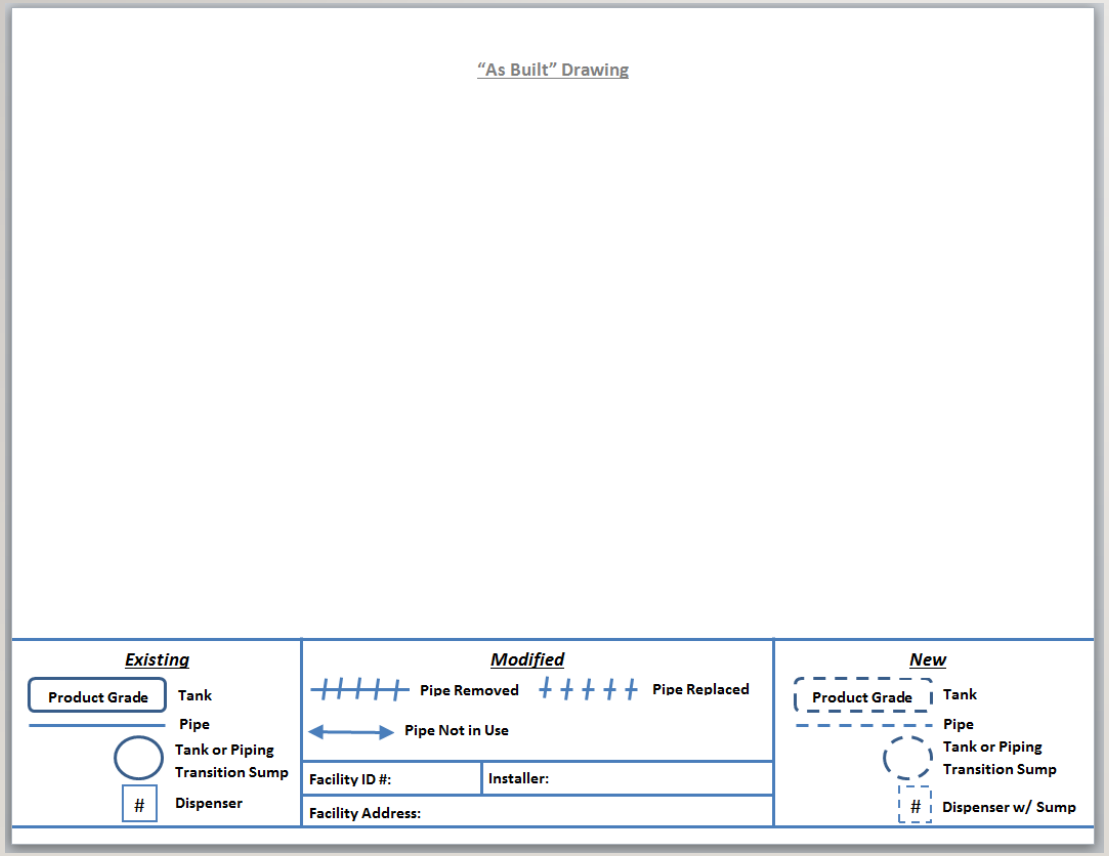
9.) New submersible pumps to replace existing STP's (existing piping modified).
- ☐ Annual Line Leak Detector Testing. (NA for suction piping)
- ☐ Containment Sump Integrity Testing of STP sumps where piping was modified.
- ☐ Annual Electronic Interstitial Device Testing (If sensors installed for leak detection).

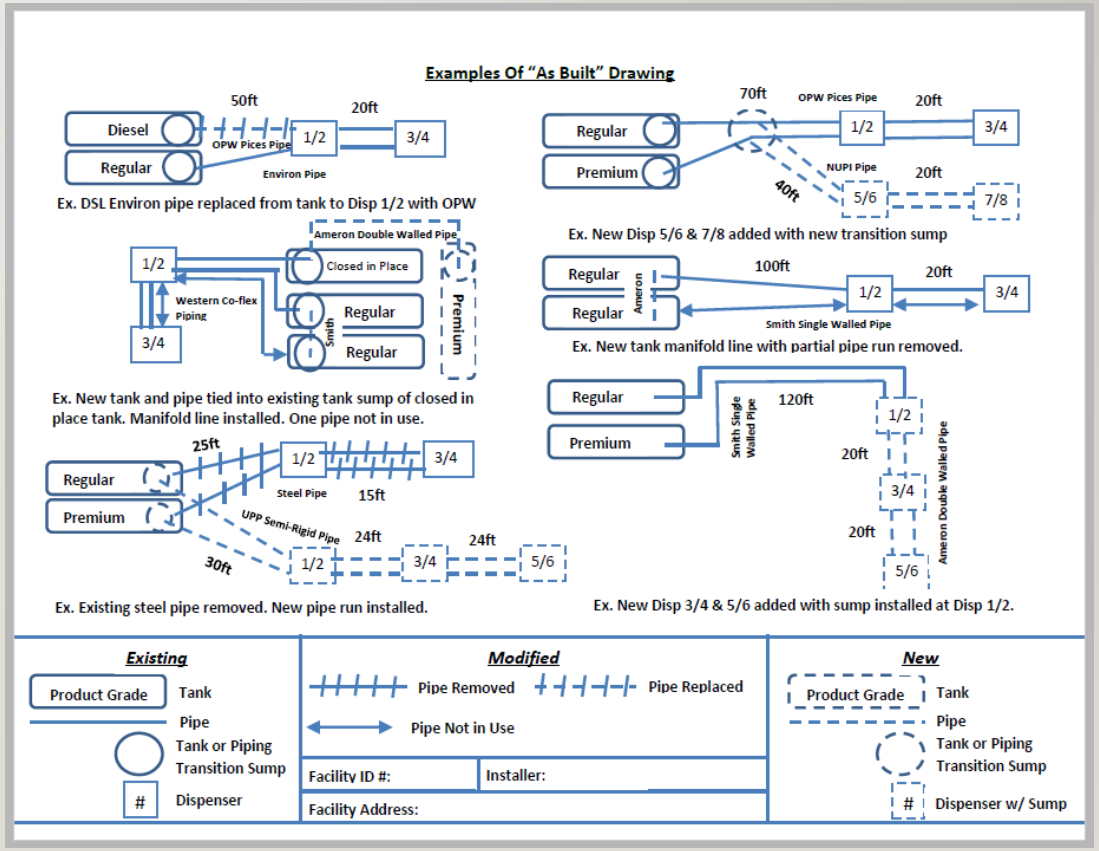
10.) New submersible pumps to replace existing STP's (existing piping NOT modified).
- ☐ Annual Line Leak Detector Testing.

11.) Other: Contact MDEQ for additional information regarding testing required.

“AS BUILT” DRAWING

(ATTACH TO NOTIFICATION FORM TO SHOW WHAT YOU MODIFIED / INSTALLED)





REPLACING DISPENSERS OR STPS

(WHAT IS REQUIRED?)
NOTE: NOT APPLICABLE TO EMERGENCY REPAIRS

DISPENSERS

- If you have to replace any portion of the piping from the shear valve down – secondary containment required.
- If you can replace a dispenser without modifying piping – sumps not required.
- Notice of Planned Installation required.

STPS

- If you replace an STP and the equipment used to connect the STP – Secondary Containment Required.
- If you can replace an STP without replacing ball valves, check valves, flex connectors, etc. – sumps not required.
- Notice of Planned Installation required.

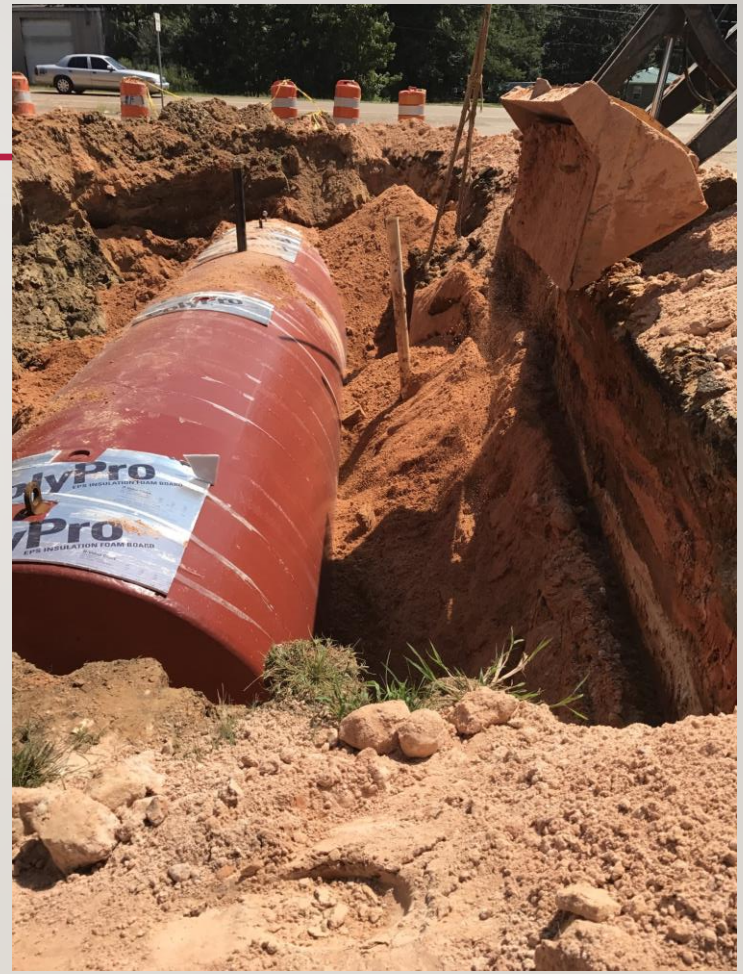
NOTIFICATION FORMS FOR CLOSURE

	CIP	Removal
BEFORE:	Notice of Intent Form	Notice of Intent Form
	Chain of Custody	
	Analytical Results	
	Site Drawing	
	Boring Logs	
AFTER:	Closure Report Form	Closure Report Form
		Chain of Custody
		Analytical Results
		Site Drawing

- **NOTE:** If you remove old piping to install new piping closure is most likely needed. Check with Sandra Dowty.

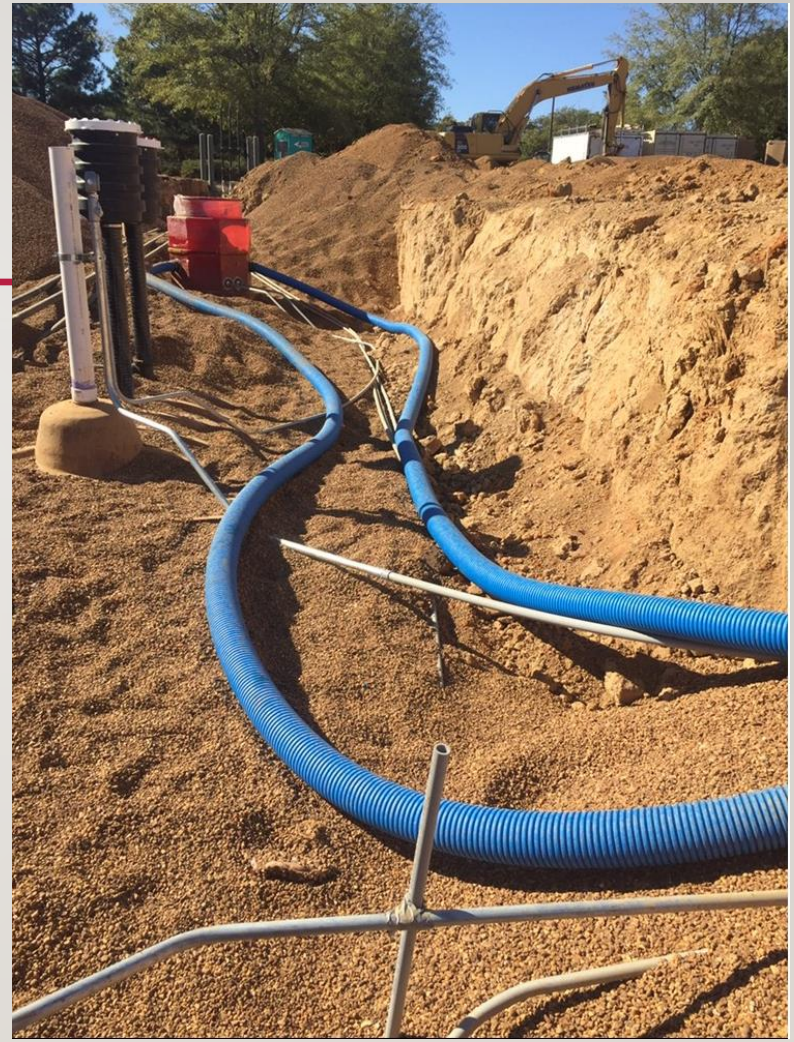
TANK INSTALLATION ISSUES
(BACK FILL REQUIREMENTS AND COMPACTION)

- Check Manufactures Back Fill Specs
  - Pea Gravel, sand, crushed stone
  - Verify type, thickness of subgrade, and spacing
  - Filter fabric
- Compaction
  - Specifically in lower quadrant of tank
  - Compact in layers
  - Verify your workers compaction for each tank installed. Is it adequate?



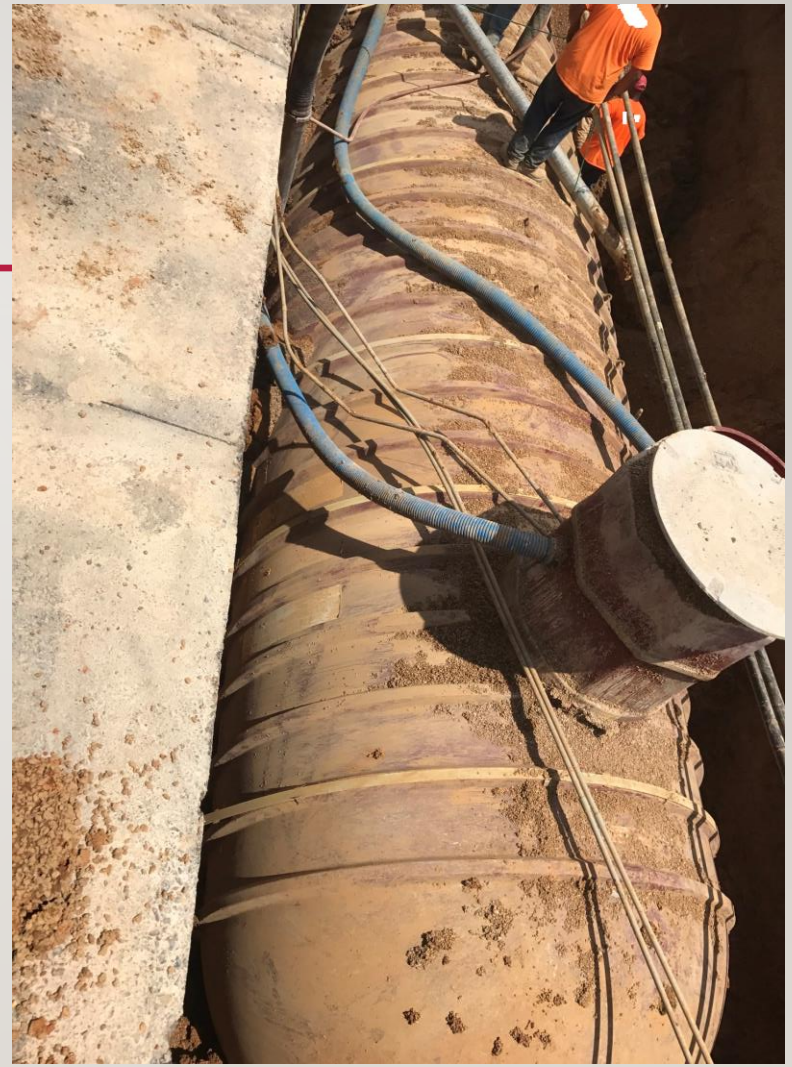
TANK INSTALLATION ISSUES
(CASE STUDY)

- Tank installed November 2016.
- Xerxes brine filled. Dry tank pit.
- What do you see wrong?
  - No filter fabric.
  - Adequate subgrade? Unknown.
  - Adequate compaction? Unknown.
  - Deflection? How can they tell?
    - No riser in middle of tank. Setup for failure.

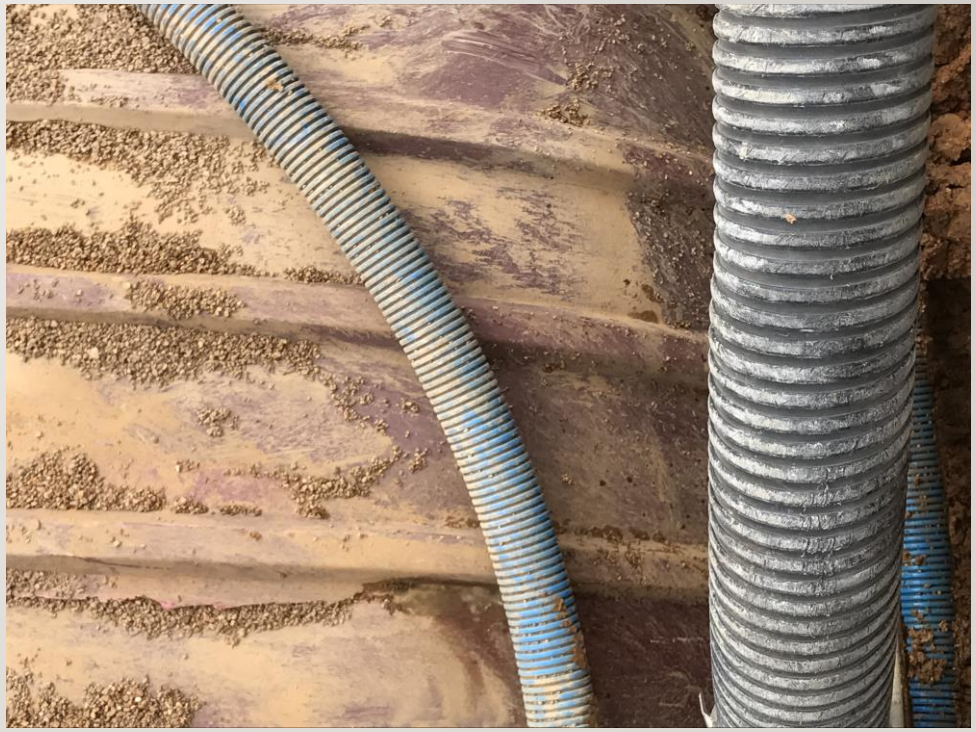


TANK INSTALLATION ISSUES
(CASE STUDY)

- Same tank.
- Low brine level alarm May 2017.
- Tank replaced June 2017.
- What happened?
  - Large overlapping crack in middle of tank thru both primary and secondary at tank top.
  - Fracture of primary tank only close to STP sump.



TANK INSTALLATION ISSUES
(CRACK IN MIDDLE OF TANK)



TANK INSTALLATION ISSUES
(WHAT COULD HAVE PREVENTED IT?)

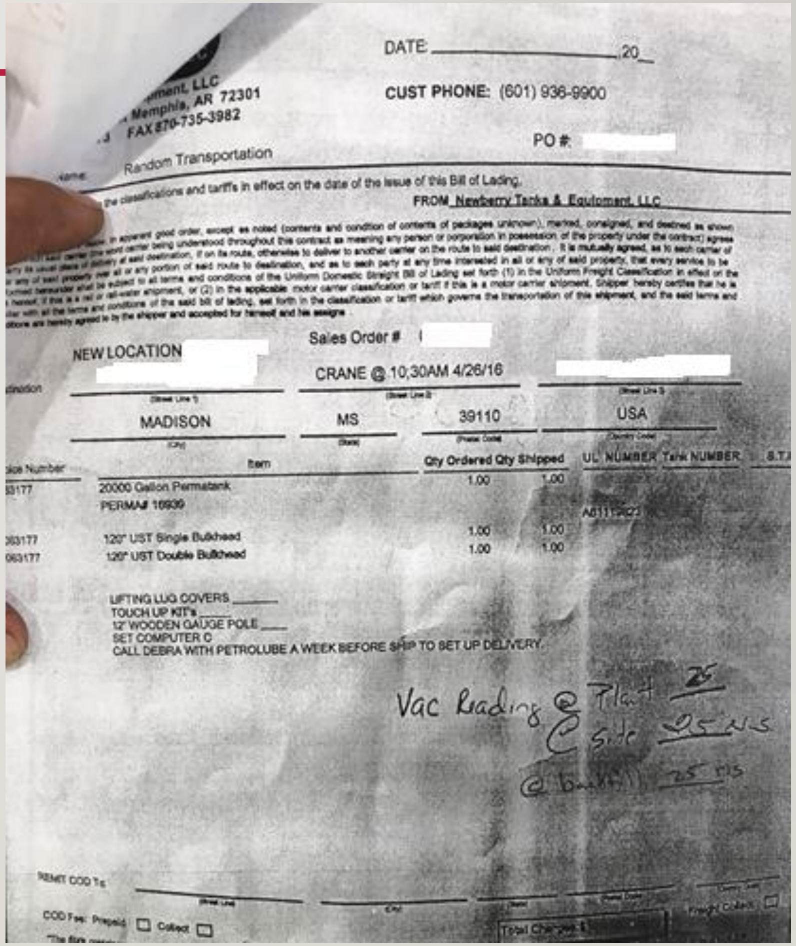
- Tank crumbled upon removal.
- In this case, tank owner rep measured the thicknesses after removal and saw a lot of variation in the layers. So was it just a lemon? Possibly.
- What could have prevented it?
  - Adequate deflection measurements.
  - Adequate subgrade.
  - Filter fabric.
- Can it happen to you? Would you notice?
- Had this tank had a dry Interstice, would company have caught it?

TANK INSTALLATION ISSUES
(DEFLECTION MEASUREMENTS)

- Deflection measurements required for all Fiberglass tanks installed.
- How do you measure it?
- You should:
  - Measure at multiple locations.
  - Most importantly the weakest section of the tank. (Away from all bulk heads, tank top manways)
  - Install riser in weakest point if necessary.
  - Are you done when backfill is done?
    - No. Final measurement taken when concrete is poured. What about after initial delivery?

TANK INSTALLATION ISSUES
(TANK INTERSTITIAL TIGHTNESS TESTING)

- Follow Manufactures Testing Specs carefully
- How do you test it?
- Vacuum monitoring –
  - Some manufactures require it to be monitored throughout install until concrete is poured.
  - Others allow monitoring until backfill is installed up to tank top.
- Air Testing – Follow manufactures procedure or other approved recommended code of practice.



STI R923 – PERMATANK

(EXAMPLE)
NOTE: EACH MANUFACTURE MAY REQUIRE DIFFERENT PROCEDURES

INSTRUCTION SAYS:

2.4 The vacuum gauge, at a minimum, must be read and its reading recorded in the spaces provided on the Installation Checklist for each of the following tank installation events: The vacuum gauge should also be read and recorded after the following events:

- At time of tank delivery
- After backfilling to top of the tank
- During long-term storage activity
- At end of storage period before burial
- After tank placement in excavation
- After installation of monitor pipe extension to grade level
- After tank installation has been completed

BUT CHECKLIST SAYS:

INTERSTITIAL VACUUM GAUGE READINGS AT:

Tank Delivery_____inches (kPa) of Hg Date:_____

Driver signature _____

Installer signature_____Date:_____

after backfill to tank top_____inches (kPa) of Hg _____

other readings obtained_____inches (kPa) of Hg _____

_____

(Signature of Installing Foreman or Project Engineer)

What should you do? Follow instructions. Verify vacuum reading after installation has been completed. Log as other.

QUESTIONS

- Would you like an all in one MDEQ form to document vacuum readings, air test readings, deflection measurements for a tank?

PIPE INSTALLATION ISSUES
(BACK FILL REQUIREMENTS AND COMPACTION)

- Check Manufactures Back Fill Specs
  - Pea Gravel, sand, crushed stone
  - Verify type, thickness of subgrade, and spacing including between piping cross overs
  - Filter fabric?
- Compaction
  - Specifically under sumps.
  - Compact in layers
  - Verify your workers compaction for each pipe installed. Is it adequate?

PIPE INSTALLATION ISSUES

(RESULTS OF IMPROPER COMPACTION)

LESS THAN 1YR OLD.

BRACED WITH WOOD.

15 YEARS OLD

PIPE INSTALLATION ISSUES
(HOW LONG DOES IT TAKE TO SETTLE?)

- Depends. Some may take several years but others may catch you in a year.
- Why is it important?
  - Increased stress on the piping and sumps.
  - Increased stress on sump penetration fittings.
  - Premature failure of pipe or fittings.
- Is it 100% preventable?
  - Probably not. It all will settle to some extent but it can be minimized with adequate compaction / backfill material.

PIPE INSTALLATION ISSUES

- Are fiberglass sumps affected by it?
  - Probably so. The voids below the sump are still there and anything is possible with time.
- So pack it well.

PIPE INSTALLATION ISSUES
(TESTING)

- Follow manufactures specifications.
- You must do a Precision Tightness Test on the Primary piping.
- When testing Secondary pipe ALWAYS apply air at one end and gauge it at the opposite end.
  - We see to many that were clearly pressurized and gauged at the same end.
- Why do this?
  - It is the only way to tell if your testing the full run of piping.

PIPE INSTALLATION ISSUES
(WHY PRESSURIZE AND GAUGE AT OPPOSITE ENDS?)

- Restrictions due to improper installation.
- Cross over tube fittings may or may not be installed properly. Do NOT assume!

SECONDARY PIPE IT SPACE / CROSS OVER TUBES

(TWO BASIC TYPES BY DESIGN)

STEM TYPE – SCHRADER VALVE

PLUG TYPE – NO SCHRADER VALVE

SECONDARY PIPE IT SPACE / CROSS OVER TUBES
(IS IT OPEN TO CONTAINMENT SUMPS?)

- If using cross over tubes, pipe IT must be open at both ends of the pipe run.
  - Why? It increases the chance of a leak being discovered faster. Especially if tubes / valves are tampered with after install.
- If no cross over tubes, pipe IT must be open at one end of the pipe run.
- If stem type, you MUST remove the Schrader valve stem. Taking cap off alone doesn't work.

SECONDARY CONTAINMENT TESTING

(IF WE CAN'T SEE HOW IT WAS POSSIBLY TESTED PROPERLY, WE'RE GOING TO QUESTION THE RESULTS)

Factory Installed fitting

Looks good.

Same penetration fitting.
Factory plug not removed.

Not Tested Properly.

Same penetration fitting.
Factory plug resin covered.

Not Tested Properly.

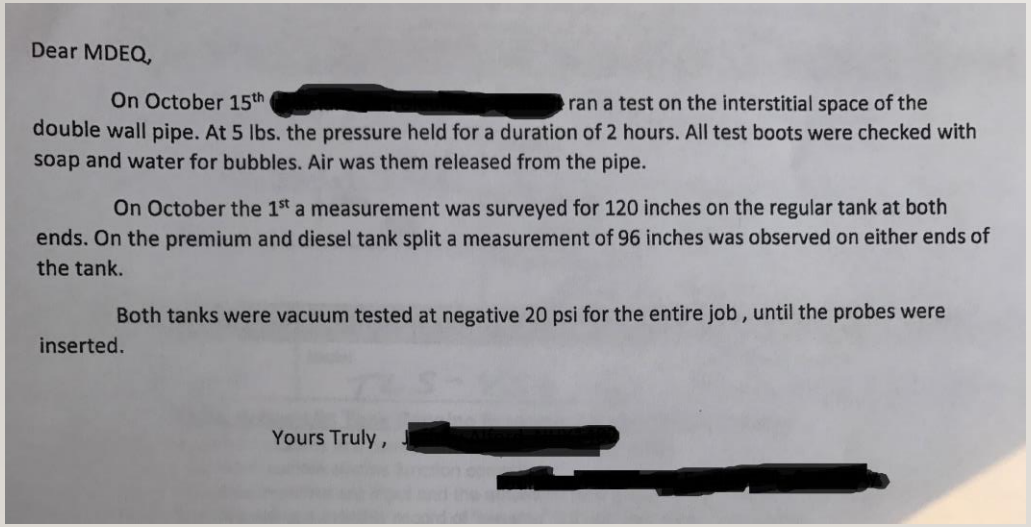
UPP fitting. Appears open right?
It's not. Clear plastic covering it.

Designed to be at end of pipe run.
Did they test IT properly?

SECONDARY CONTAINMENT TESTING
(IF WE CAN'T SEE HOW IT WAS POSSIBLY TESTED AT ALL, WE MAY REJECT THE RESULTS)

DOCUMENTATION
(PIPE SECONDARY CONTAINMENT TESTING)

- You should be able to provide some sort of documentation for air testing of pipe secondary.



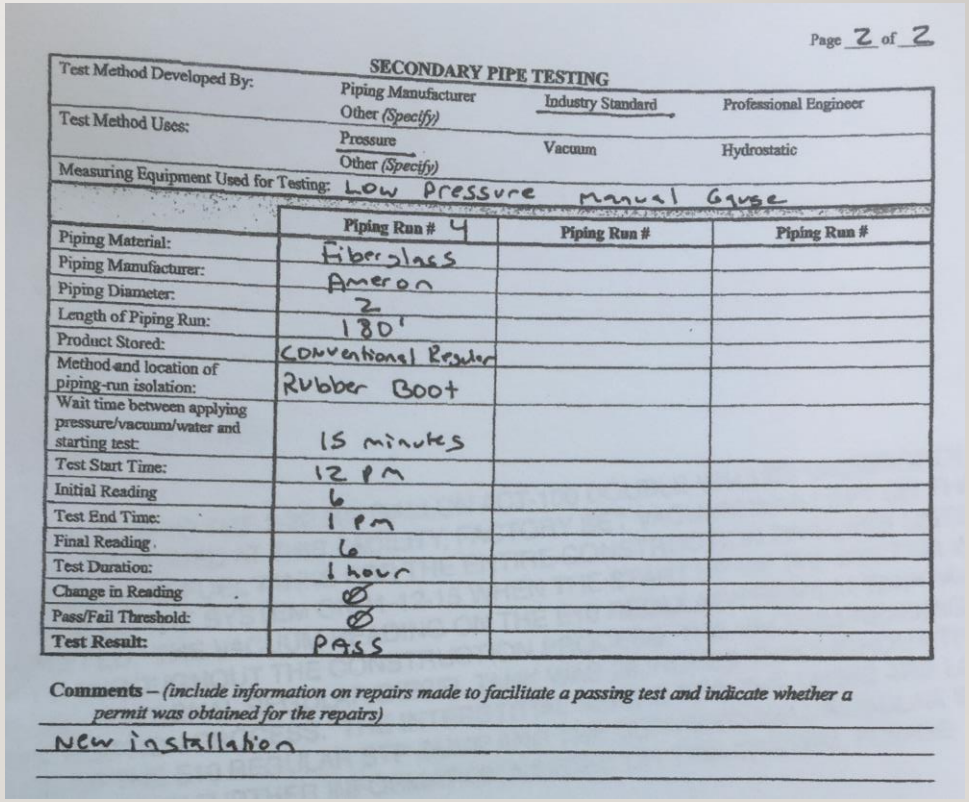
Dear MDEQ,

On October 15th [redacted] ran a test on the interstitial space of the double wall pipe. At 5 lbs. the pressure held for a duration of 2 hours. All test boots were checked with soap and water for bubbles. Air was them released from the pipe.

On October the 1st a measurement was surveyed for 120 inches on the regular tank at both ends. On the premium and diesel tank split a measurement of 96 inches was observed on either ends of the tank.

Both tanks were vacuum tested at negative 20 psi for the entire job , until the probes were inserted.

Yours Truly , [redacted]



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SECONDARY PIPE TESTING

Test Method Developed By: Piping Manufacturer; Other (Specify); Industry Standard; Professional Engineer

Test Method Uses: Pressure; Other (Specify); Vacuum; Hydrostatic

Measuring Equipment Used for Testing: Low Pressure Manual Gauge

	Piping Run # 4	Piping Run #	Piping Run #
Piping Material:	Fiberglass		
Piping Manufacturer:	Ameron		
Piping Diameter:	2		
Length of Piping Run:	180'		
Product Stored:	Conventional Regular		
Method and location of piping-run isolation:	Rubber Boot		
Wait time between applying pressure/vacuum/water and starting test:	15 minutes		
Test Start Time:	12 PM		
Initial Reading	6		
Test End Time:	1 PM		
Final Reading	6		
Test Duration:	1 hour		
Change in Reading	Ø		
Pass/Fail Threshold:	Ø		
Test Result:	PASS		

Comments – *(include information on repairs made to facilitate a passing test and indicate whether a permit was obtained for the repairs)*

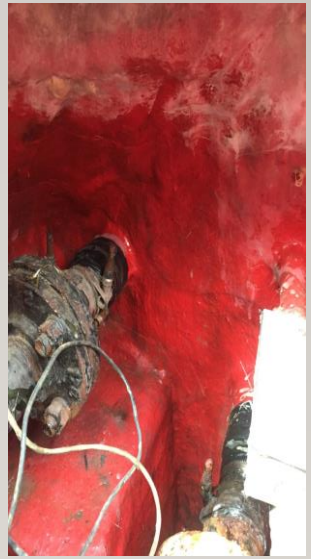
New installation

PIPE INSTALLATION ISSUES
(IMPORTANCE OF PROPER SANDING AND BONDING)

- For fiberglass piping, sumps, and penetration fittings what should be sanded?
  - Anywhere resin will be applied as a seal.
- How much sanding is sufficient?
  - Smooth or Rough?
- The rougher the better. (within reason) More surface area for resin to bond to.

PIPE INSTALLATION ISSUES
(GOOD SANDING / BONDING EXAMPLES)

PIPE INSTALLATION ISSUES
(BAD SANDING / BONDING EXAMPLES)

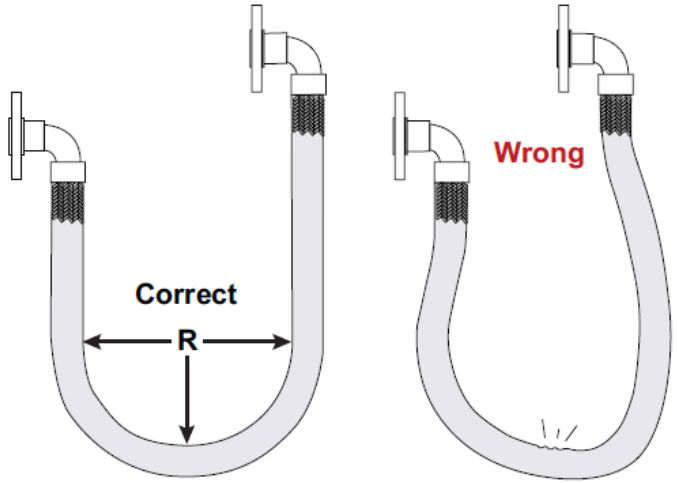


PIPE INSTALLATION ISSUES
(WATCH YOUR ANGLES)

- A pipe entering a sump at an extreme angle will add unnecessary stress to the sump penetration fittings.
- It can leave visible gaps between the fitting and the sump, that should make any inspector question it's integrity.

FLEXIBLE CONNECTORS

- Avoid sharp bends
- Follow manufacturer's guidelines



Minimum Bend Radius from Center-line of Hose

Hose Size	Minimum Bend Radius
¾", 1", 1.5", 2 "	6"
3"	9"
4"	13"

PIPE INSTALLATION ISSUES
(WATCH YOUR ELECTRICIAN)

- Conduit installed at an angle can also lead to overtightening the metal clamp to compensate for the gap.
- Added stress.
- Boot can't handle it.

QUESTIONS OR COMMENTS?

- Would you like an MDEQ form to document air test readings for a pipe?

MONTHLY GROUNDWATER / VAPOR MONITORING

- Depth to water level must be measured from top of well to top of the water.
- If you have to measure from the bottom of the well you must:
  - Calculate what it would be from the top.
  - Specify on the report how it was measured.
- Must have 6" water in the well to bail it.
- Vapor meter readings MUST be recorded in units of ppm hexane

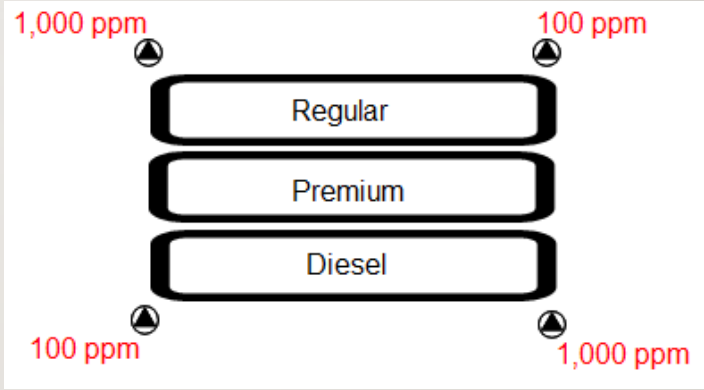
- Vapor meter must be at least bump tested monthly if not more often.
  - Common issues we see:
    - Contractor does NOT have calibration gas needed to do this.
    - Meter takes a long time to respond.
      - Ex: 10 minutes to reach 15% LEL Hexane from the calibration bottle.
      - Indicates you have a bad sensor.
      - You should contact manufacturers rep.

VAPOR MONITORING
(REPORTABLE LIMITS)

- Reportable limits have changed:
  - 100 ppm vapors for Diesel, waste oil.
  - 1,000 ppm vapors for Gasoline
- Anytime you see a substantial increase.

Note: Diesel will only produce 300 – 500 ppm vapors. So what would be a substantial increase for Diesel?

- New procedures to follow for high / elevated vapors.

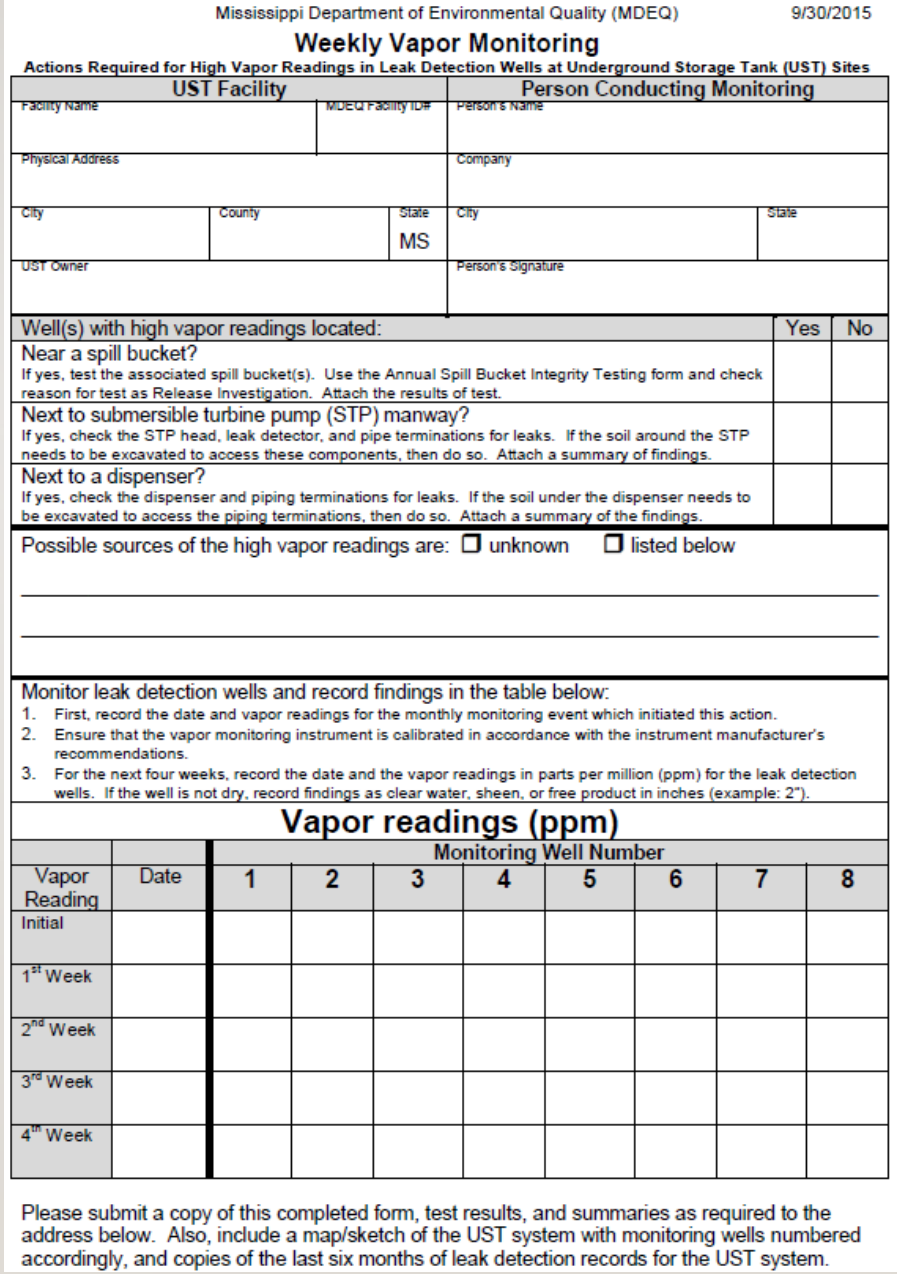


- Example above:
  - All readings shown should be reported.
  - Why? Because of the Diesel tank in the same pit.
- Only exception:
  - If the well (s) have a history of similar ppm readings **AND**
  - The readings have been previously reported to MDEQ.

VAPOR MONITORING
(NEW PROCEDURES IF HIGH VAPORS RECORDED)

- Applies to wells where ppm reaches reportable limits.
- Similar to 10 day bailing program.
- Requires weekly vapor readings. Investigation of potential cause.
- Why? To catch and find the leaks before they can do significant damage to the facilities method of leak detection.
- Procedures listed on MDEQ website as:

Vapor Readings in Dry Tank Pit / Piping Monitoring Wells (Procedures for Evaluating)



Mississippi Department of Environmental Quality (MDEQ) 9/30/2015

Weekly Vapor Monitoring

Actions Required for High Vapor Readings in Leak Detection Wells at Underground Storage Tank (UST) Sites

UST Facility			Person Conducting Monitoring	
Facility Name	MDEQ Facility ID#		Person's Name	
Physical Address			Company	
City	County	State: MS	City	State
UST Owner			Person's Signature	

Well(s) with high vapor readings located:	Yes	No
Near a spill bucket? If yes, test the associated spill bucket(s). Use the Annual Spill Bucket Integrity Testing form and check reason for test as Release Investigation. Attach the results of test.		
Next to submersible turbine pump (STP) manway? If yes, check the STP head, leak detector, and pipe terminations for leaks. If the soil around the STP needs to be excavated to access these components, then do so. Attach a summary of findings.		
Next to a dispenser? If yes, check the dispenser and piping terminations for leaks. If the soil under the dispenser needs to be excavated to access the piping terminations, then do so. Attach a summary of the findings.		

Possible sources of the high vapor readings are: ☐ unknown ☐ listed below

Monitor leak detection wells and record findings in the table below:

1. First, record the date and vapor readings for the monthly monitoring event which initiated this action.
2. Ensure that the vapor monitoring instrument is calibrated in accordance with the instrument manufacturer's recommendations.
3. For the next four weeks, record the date and the vapor readings in parts per million (ppm) for the leak detection wells. If the well is not dry, record findings as clear water, sheen, or free product in inches (example: 2").

Vapor readings (ppm)

		Monitoring Well Number							
Vapor Reading	Date	1	2	3	4	5	6	7	8
Initial									
1st Week									
2nd Week									
3rd Week									
4th Week									

Please submit a copy of this completed form, test results, and summaries as required to the address below. Also, include a map/sketch of the UST system with monitoring wells numbered accordingly, and copies of the last six months of leak detection records for the UST system.

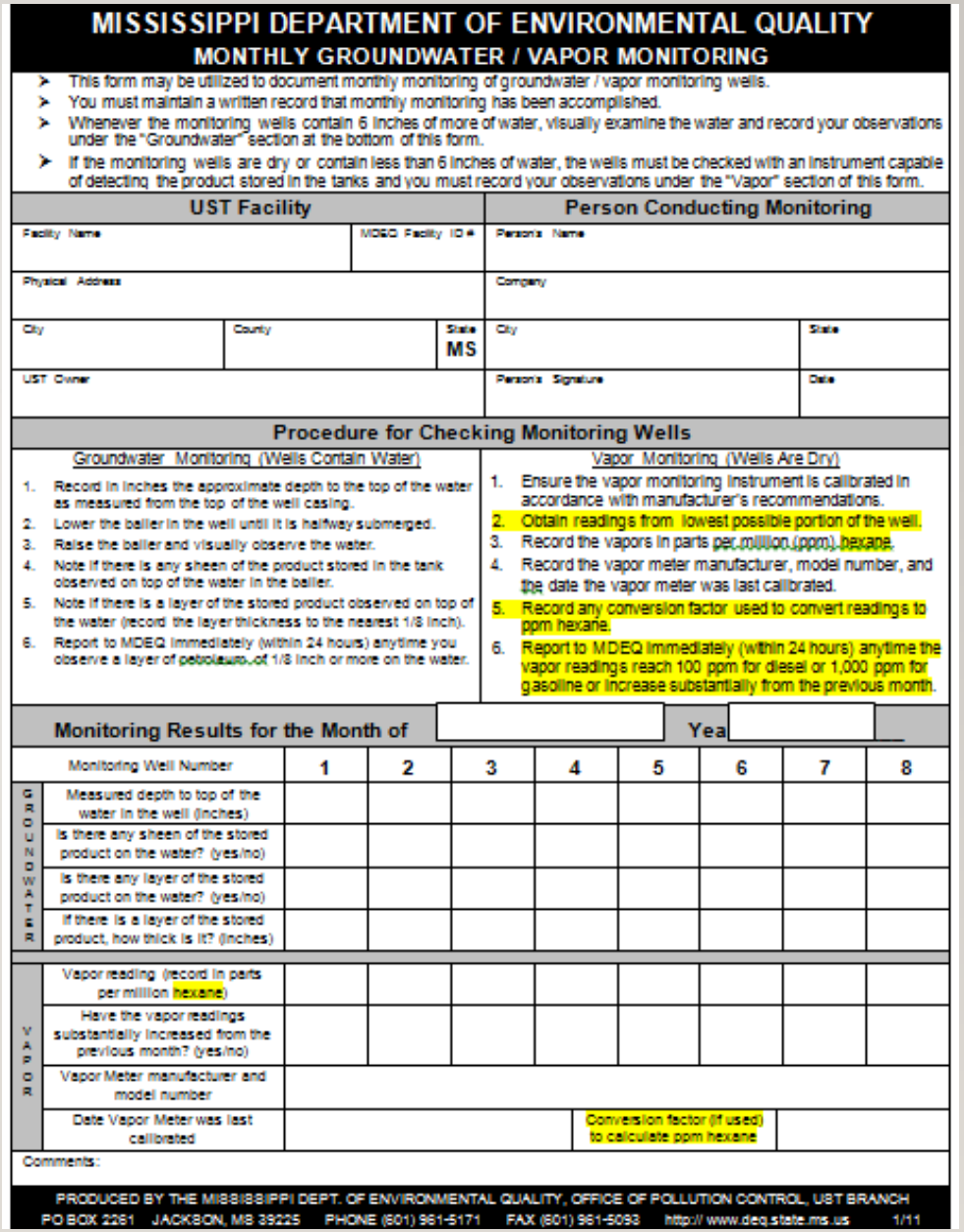
VAPOR METERS

- MDEQ Approved meters:
  - Ion Science ProCheck Tiger PID
  - RKI Eagle 1& II
  - RAE Systems MiniRAE 3000
- Not Approved:
  - Campo Miller
  - RKI GX-2012
  - Warrick 5700
- If you have anything different you need to call us to verify. Does not mean yours is bad or good if not already approved.

- RKI Eagle – Must use O_2 sensor or dilution fitting
  - If you use dilution valve you must double your readings.
  - Readings must be taken from the lowest possible portion of the well. This is critical for diesel that does not volatilize as easy.
  - With the O_2 sensor you can only go midways before the alarm goes off. Any reading below that point there is not enough O_2 to get an accurate reading.
  - So for wells monitoring for a diesel leak you should use the dilution fitting to go as low as you can in the well.

NEW MONTHLY GROUNDWATER / VAPOR MONITORING FORM

- Effective November 1st, 2017
- Vapor readings must be in ppm hexane.
- Directions state: "Report to MDEQ immediately (within 24 hrs)" that means YOU (If you checked the wells).
- MDEQ may pursue enforcement action if not reported by YOU.
- Don't forget to label your wells or have a sketch identifying which well is which for DEQ Inspectors.



MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
MONTHLY GROUNDWATER / VAPOR MONITORING

- This form may be utilized to document monthly monitoring of groundwater / vapor monitoring wells.
- You must maintain a written record that monthly monitoring has been accomplished.
- Whenever the monitoring wells contain 6 inches of more of water, visually examine the water and record your observations under the "Groundwater" section at the bottom of this form.
- If the monitoring wells are dry or contain less than 6 inches of water, the wells must be checked with an instrument capable of detecting the product stored in the tanks and you must record your observations under the "Vapor" section of this form.

UST Facility			Person Conducting Monitoring	
Facility Name	MDEQ Facility ID #		Person's Name	
Physical Address			Company	
City	County	State MS	City	State
UST Owner			Person's Signature	Date

Procedure for Checking Monitoring Wells

Groundwater Monitoring (Wells Contain Water)

1. Record in inches the approximate depth to the top of the water as measured from the top of the well casing.
2. Lower the bailer in the well until it is halfway submerged.
3. Raise the bailer and visually observe the water.
4. Note if there is any sheen of the product stored in the tank observed on top of the water in the bailer.
5. Note if there is a layer of the stored product observed on top of the water (record the layer thickness to the nearest 1/8 inch).
6. Report to MDEQ immediately (within 24 hours) anytime you observe a layer of petroleum of 1/8 inch or more on the water.

Vapor Monitoring (Wells Are Dry)

1. Ensure the vapor monitoring instrument is calibrated in accordance with manufacturer's recommendations.
2. Obtain readings from lowest possible portion of the well.
3. Record the vapors in parts per million (ppm) hexane.
4. Record the vapor meter manufacturer, model number, and the date the vapor meter was last calibrated.
5. Record any conversion factor used to convert readings to ppm hexane.
6. Report to MDEQ immediately (within 24 hours) anytime the vapor readings reach 100 ppm for diesel or 1,000 ppm for gasoline or increase substantially from the previous month.

Monitoring Results for the Month of _____ **Year** _____

	Monitoring Well Number	1	2	3	4	5	6	7	8
GROUNDWATER	Measured depth to top of the water in the well (inches)								
	Is there any sheen of the stored product on the water? (yes/no)								
	Is there any layer of the stored product on the water? (yes/no)								
	If there is a layer of the stored product, how thick is it? (inches)								
VAPOR	Vapor reading (record in parts per million hexane)								
	Have the vapor readings substantially increased from the previous month? (yes/no)								
	Vapor Meter manufacturer and model number								
	Date Vapor Meter was last calibrated				Conversion factor (if used) to calculate ppm hexane				

Comments:

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MONTHLY VISUAL INTERSTITIAL RECORDS
(TANK OR PIPING INTERSTITIAL SPACE)

- If you have 20 spots to check at a facility there should be 20 on MDEQ form.
- Label clearly what you checked
  - Ex. Tank IT, Tank STP sump, Disp ½ sump
- If you can't access it don't certify it. Fail.
- You CANNOT bail or vapor meter the tank IT.
- Fiberglass tanks cannot use visual IT monitoring. Cannot check bottom of IT space
- Steel or composite tanks you must use gauge stick to check bottom of IT space.

MDEQ MONTHLY MONITORING
(INVESTIGATIONS)

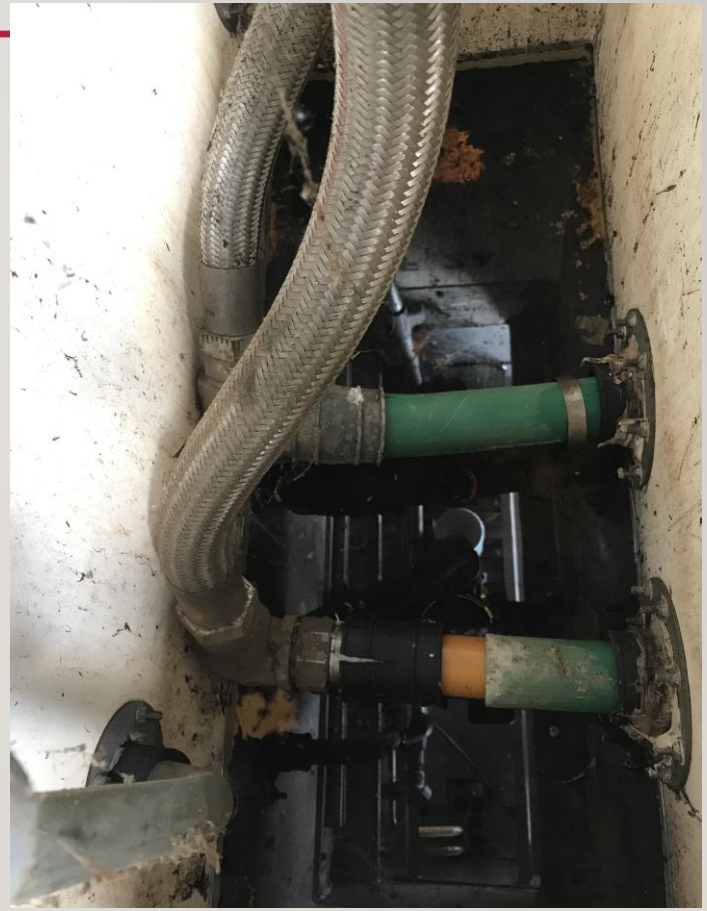
- MDEQ will be implementing a way to verify if records are fraudulent or not, so do not submit a record that was not done.
- We have already fined one contractor a substantial penalty for doing this.
- So talk to / remind your monthly guys to do it right or ask questions if they don't know / understand.
- We don't want that headache.
- Neither do you.

QUESTIONS OR COMMENTS?

C&E POSITION PAPERS

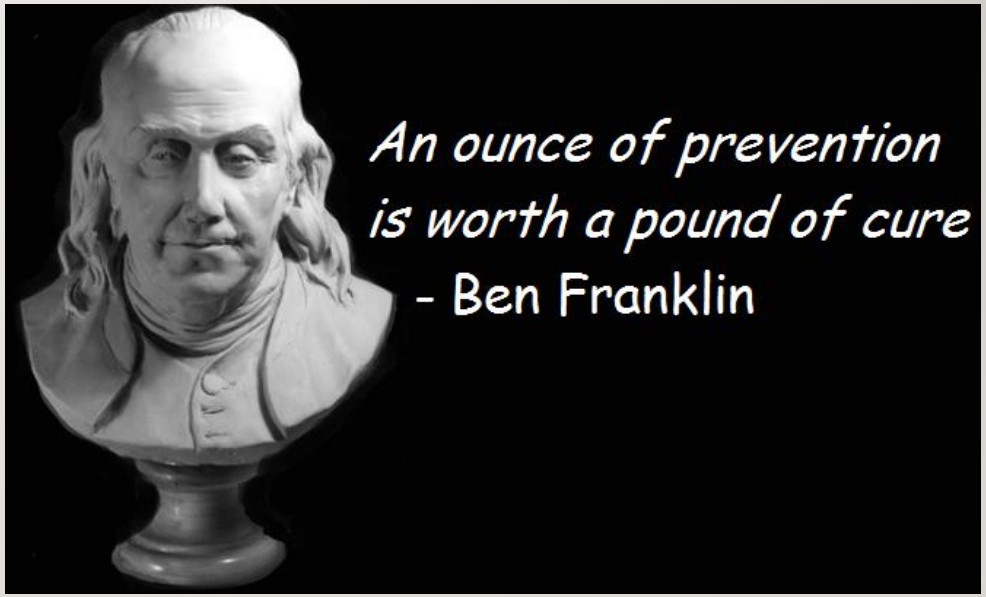
- Environ or Total Containment pipe replaced inside of a chase pipe considered a repair – (This will not be possible after new regulations are in place.)
- Tank Manifold Siphon Lines may be single walled
- Overfill Devices that meet the "Alternative Rule" prior to adoption of new regulations may be grandfathered in.
- See C&E Positions on our website for more info

ENVIRON EXAMPLES

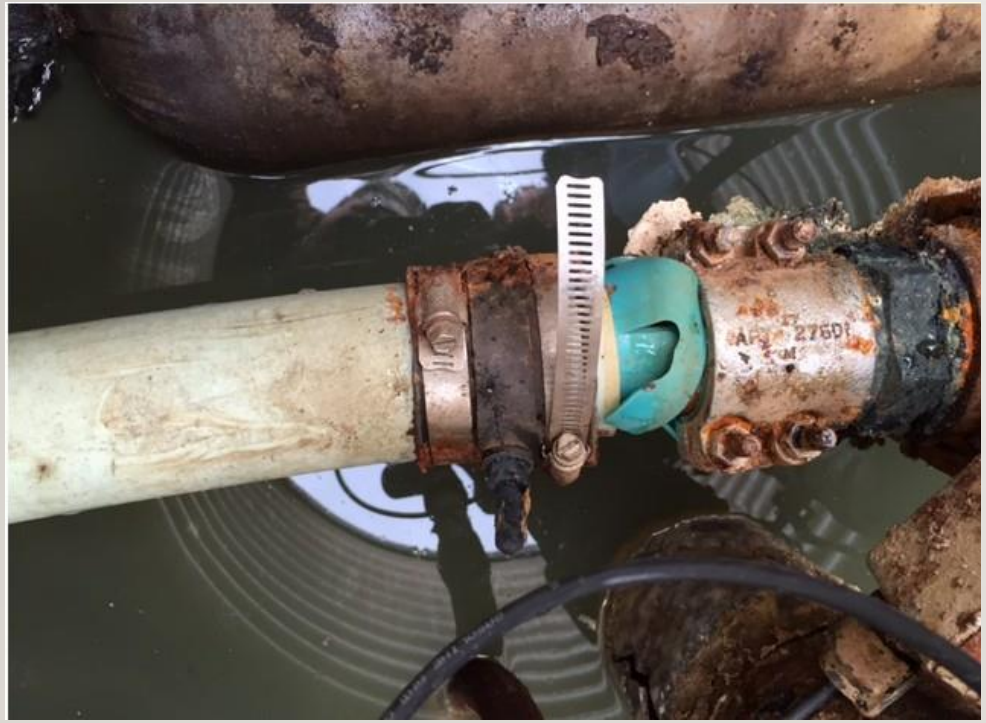


ENVIRON / TCI PIPE
(RECOMMENDATIONS)

- The allowance to repipe without secondary containment will NOT be allowed once new regulations are adopted. So take advantage of it now.
- If you don't meet cut off date for allowance or can't talk the owner into replacing
  - Verify line leak detection method is adequate.
    - Electronic LLDs (setup properly)
    - Monitoring wells (installed properly)
    - SIR (maintained properly)
  - Recommend annual LTT in addition to monthly leak detection to the owner.



APPLIES TO ALL FLEXIBLE PIPING.



NEW SPILL BUCKET TESTING

- Effective November 1st, 2017
- Measure from bottom of spill bucket.
- Vacuum testing of SB interstice

Must attach test protocol.

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL SPILL BUCKET INTEGRITY TESTING

- This form may be utilized to document integrity testing of spill containment buckets.
- Testing of all spill buckets is required at installation and at least once every 12 months thereafter.
- In the absence of an approved 3rd party test procedure or manufacturer's recommended practice, the test method outlined below in the "MDEQ Hydrostatic Test Procedure" section may be utilized.

Date of Test

UST Facility			Person Conducting Test	
Facility Name	MDEQ Facility ID #		Tester's Name	
Physical Address			Company	
City	County	State MS	City	State
UST Owner			Tester's Signature	Date

Spill Bucket Testing

Reason for Test	☐ New Installation ☐ Existing Installation (annual test) ☐ Release Investigation
Construction	☐ Single-Walled ☐ Double-Walled ☐ Spill Bucket Liner ☐ Unknown
Type of Test	☐ Hydrostatic (Complete "Test Data" table below)
	☐ Vacuum (Attach test equipment manufacturer's data sheet/test protocol to this form)
	☐ Other (Specify)

MDEQ Hydrostatic Test Procedure

1. Clean out and properly dispose of all debris, soil and/or fluids from the spill bucket.
2. Visually examine to ensure there are no cracks, holes, or broken seals and the fill cap seals properly. NOTE: If the fill cap does not seal – Remove adapter and drop tube and seal tank fill riser with a plumbers plug.
3. Fill with water to within 1 ½ inches of top and let stand 5 minutes to allow water to reach ambient temperature.
4. After 5 minutes has elapsed, document the initial water level measurement as measured from the bottom of the spill bucket to the nearest 1/16th inch.
5. Leave the spill bucket undisturbed for at least one hour then compare the starting fluid level to the ending level. Note: For accuracy, the location where both the initial and final fluid levels are measured should be the same.
6. If the fluid level is the same or it has changed by 1/8th inch or less the spill bucket passes the test.
7. If the fluid level is different by more than 1/8th inch, the spill bucket fails the test. Note: A leak less than 1/8th of an inch is still critical if the tank is using vapor monitoring as their method of leak detection For tests performed as part of a release investigation, fluid level readings should be taken very carefully.
8. Properly dispose of all test fluids at the conclusion of testing.

Note: MDEQ certification as a UST installer is required to repair or install spill containment devices.

Test Data for the Year ____

Tank ID (product stored)					
Area of Spill Bucket Tested	☐ Single-Walled ☐ Double-Walled	☐ Single-Walled ☐ Double-Walled	☐ Single-Walled ☐ Double-Walled	☐ Single-Walled ☐ Double-Walled	☐ Single-Walled ☐ Double-Walled
Test Start Time					
Test End Time					
Test Beginning Level					
Test Ending Level					
Test Result (Pass/Fail)					

Comments:

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QUESTIONS OR COMMENTS?

OVERFILL DEVICE INSPECTIONS

RESTRICT ALARM SHUT OFF

- Disclaimer: You as the certified contractor are responsible for verifying that the OF device meets both the manufactures specifications as well as MDEQ's requirement of 90% or 95%.
- This section is provided to offer some guidance when evaluating devices.

OVERFILL DEVICE ISSUES
(WHY BRING IT UP NOW?)

- After new regulations adopted a new ball float cannot be installed. So it is financially beneficial to the tank owner to replace all that is needed now.
- Accelerated corrosion / malfunction of internal tank components. Becoming more of an issue.
- Confusing Installation diagrams / instructions.
- MDEQ inspectors have found a substantial number of devices that were NOT set at the correct depth.
- Reduce the chances of hidden overfills occurring. To prevent leaks from tank top fitting or riser pipes damaged by corrosion. Becoming more of an issue.

OVERFILL DEVICES
(WHAT IS APPROXIMATELY 90 OR 95% FOR A CYLINDER)

Diameter	Depth for 90%	Depth for 95%
48	7.5	5.0
60	9.5	6.0
72	11.5	7.0
84	13.5	8
96	15.0	9.5
108	17.0	10.5
120	19.0	12.0
126	19.5	12.5
132	20.5	13
144	22.5	14.0
Note: All measurements in inches. These depths only apply to cylindrical tanks. NOT to fiberglass tanks.		

- **Note:** Table is labeled as approximate for cylinders only.
- Fiberglass tanks are NOT the same as a cylinder and can vary significantly.
- You are responsible for verifying depth using tank charts in all situations.
- For cylinders do these numbers work for all situations? Absolutely NOT.
  - Why?
  - Is there more to account for?

OVERFILL DEVICES
(WHAT MAKES EACH SITUATION DIFFERENT?)

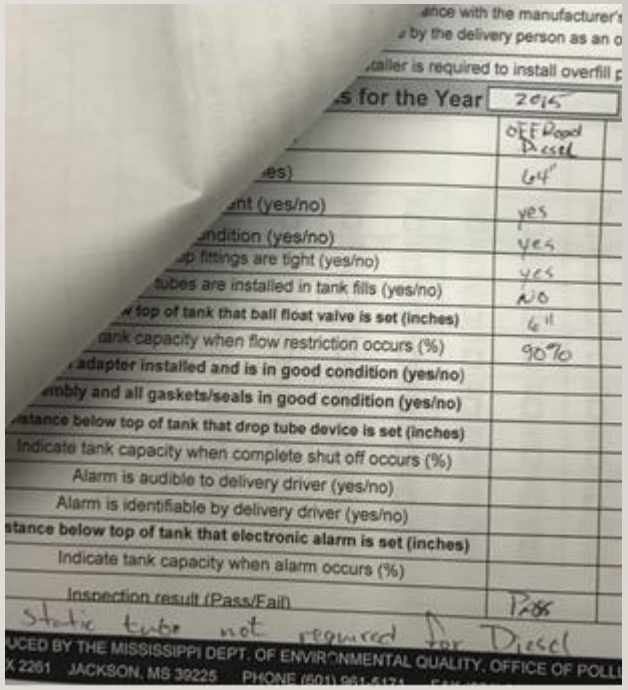
- The type of device. (manufacturer / model)
- Other components of the UST system.
  - Tank manifold lines
  - Remote fills
  - Tank top fittings that must be tight.
- Where and how the device is installed.
  - Tank top versus tank top manway
  - Low or High End of tank
- Tank Tilt or rolling
- Tank Deflection or deformation

BALL FLOAT DEVICES
(ANNUAL INSPECTION)

- Should restrict flow at 90% in all cases.
- Measure the depth from where the ball seats to the threaded section where it screws into the adapter.
- Do you have to pull ball floats to verify function?
  - Yes. It is the only way to verify that the orifice isn't clogged or that the device is not corroded away or significantly damaged.
- If you can't open a vapor recovery cap or ball float cap to access it, it is an automatic **FAIL**.

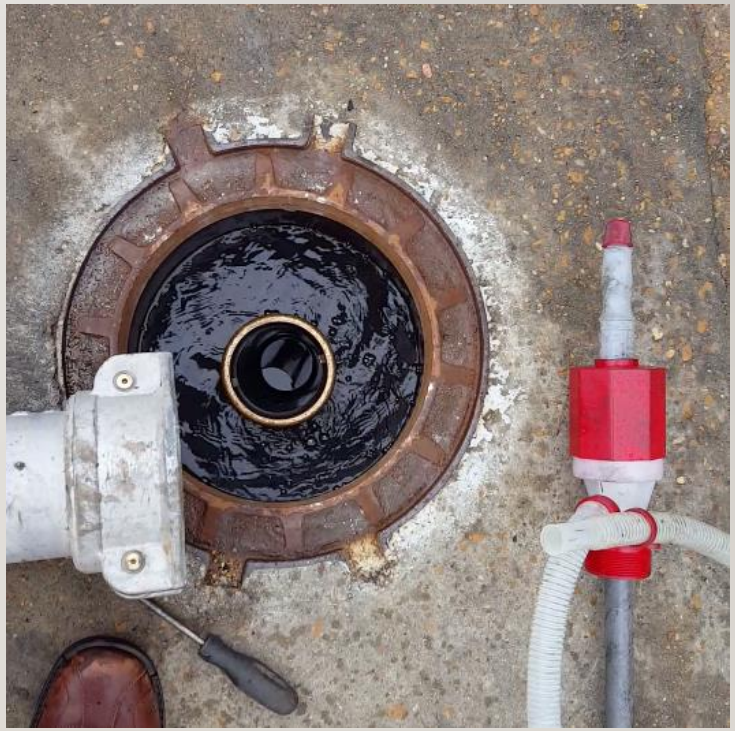
BALL FLOATS
(OTHER NECESSITIES)

- For ball floats you should confirm:
  - All visible tank risers capped.
  - No visible holes in static tube.
  - That it is a static tube present and not and OF drop tube.
  - That the orifice is near the top of the tank and that it is the only visible hole in the ball float.



HIDDEN OVERFILL
(CASE STUDY – COURTESY OF JOSEPH CURRO)

- 10,000 gallon tank
- Ball Float installed.
- Standard Static Drop tube installed
- ATG cap tight.
- Ball Float seated but tank was still overfilled.
  - Gas pushed up thru Ball Float riser
  - Air coming from bottom of tight fill adapter.
- What went wrong?



HIDDEN OVERFILL
(CASE STUDY – WHAT WENT WRONG?)

- Delivery driver did NOT adequately check ullage.
- Ball float possibly not set at 90%.
- Why was air coming from tight fill?
  - Ball Float seated properly. Compressed air in tank to some extent.
  - Tight fill adapter was not tight or sealed.
- Why was gas being pushed up thru ball float riser? (Even after ball seated.)
  - Ball float length was modified with orifice close to the bottom (Instead of near tank top) Never Do This.
  - Loose tight fill adapter allowed tank to fill faster.
  - Other tank top fittings, risers, or the tank itself possibly not tight and allowed tank to fill faster.
- All would allow fuel to reach the orifice. Fuel pushed out by air compressed in tank top.

HIDDEN OVERFILLS
(DROP TUBE DEVICES)

- Can overfills still occur with drop tube devices?
  - Absolutely. Will explain shortly.
- Most overfills occur because of what?
  - Human error / miss management.
  - Some type of UST component failure
- Hidden overfills are more common, less visible, and are still critical even if they don't result in an incident like Biloxi 1998.

DROP TUBE DEVICES
(THE TYPE OF DEVICE AND HOW IT FUNCTIONS MATTERS)

- When does the initial Restriction (R) occur?
- When does the complete shut off (SO) occur?
- When complete shut off occurs depends on what **depth** the device is installed.

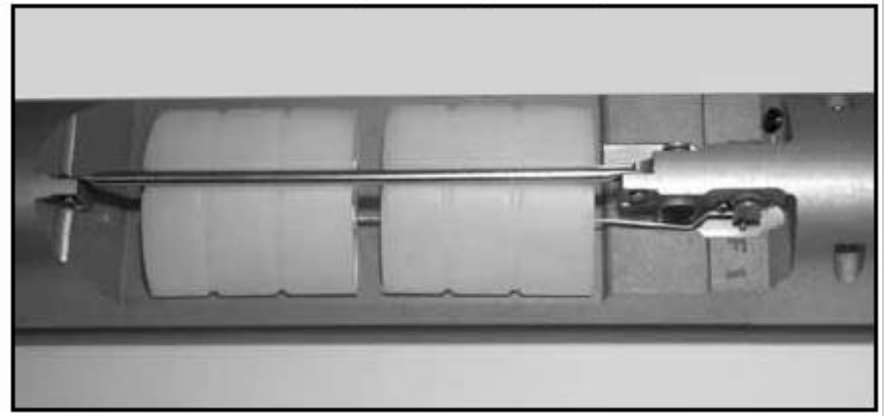
EBW Auto Limiter II	Emco Wheaton Guardian A1100	OPW 61-SO / 71-SO	Universal Model 39	Defender Series
				
R = 92% SO = 95%	R = 93%? SO = 95%	R = 95% SO = 98%	R = ? SO = 95%	R = 92% SO = 95%

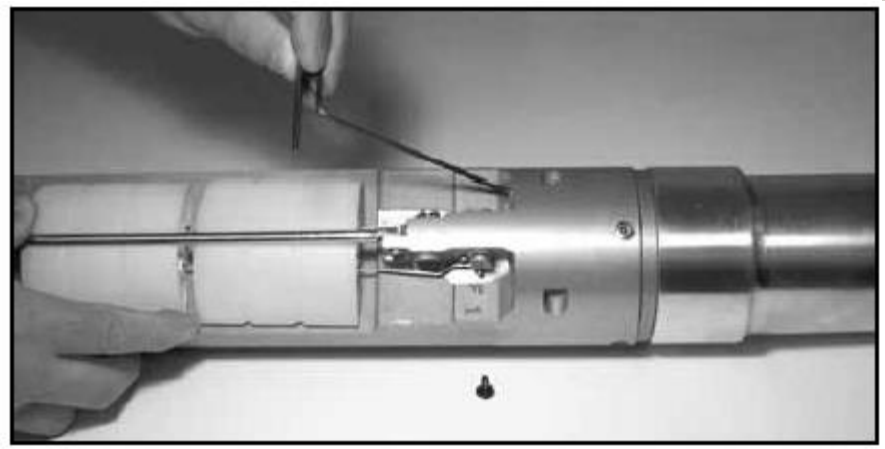
DROP TUBE DEVICES
(HOW DO YOU TELL WHEN SHUT OFF OCCURS?)

- Some are conveniently marked 95% to indicate where complete shut off occurs.
- Does that mean complete shut off occurs at 95% for the tank it's installed in?
  - Absolutely not. Still dependent on **depth** installed.
- How do you tell if it's not marked?
  - Follow manufactures installation instructions
  - Contact manufacture if necessary.

OVERFILL DEVICE TESTING
(EBW AUTO LIMITER)

- Has specific instructions to follow to test operation of the floats.
- Usually labeled where 95% (Stage 2: complete shut off occurs). This is still dependent on depth below tank tops. Label / mark doesn't mean anything if not at proper depth.
- Measure from 95% mark to top of tube. Subtract height of fill riser. Equals depth below tank top.
- Verify % shutoff using tank chart.
- When installed properly Stage 1 should activate at 92% and Stage 2 complete shut off activates at 95%.



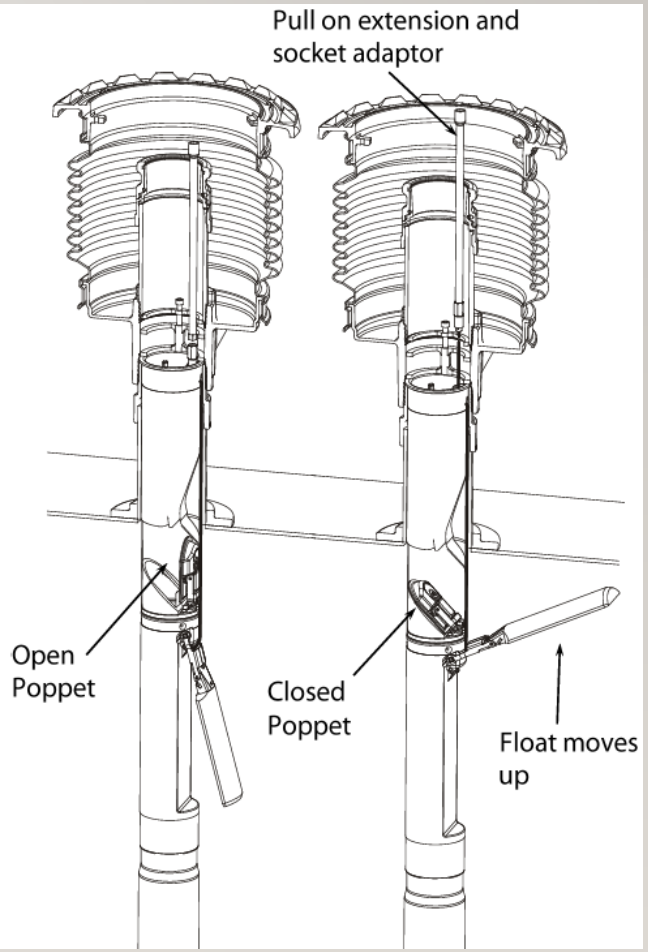


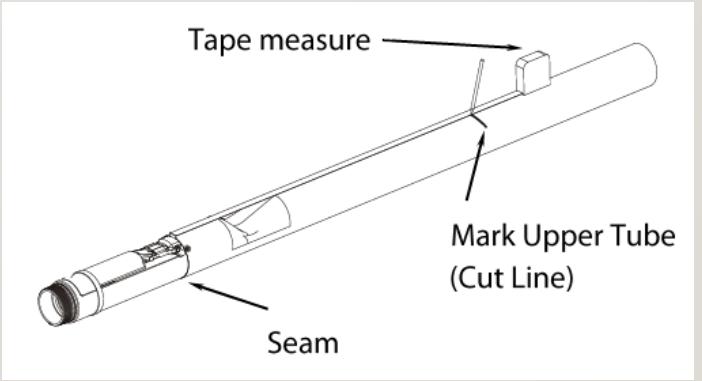
OVERFILL DEVICE
(OPW 61 & 71 SO MODELS)

- Move float up and verify that poppet closes.
- Measure from seam to top of tube. Subtract height of fill riser. Equals depth below tank top (Hopefully at 92% on tank chart)
- Verify % shutoff using tank chart.

Note: If set at 95%, complete shutoff will not occur until 98%. You should verify and note on annual test form if the device meets MDEQ C&E position paper regarding OF prevention.

- All new installs should be set at 92% for complete shutoff at 95%.





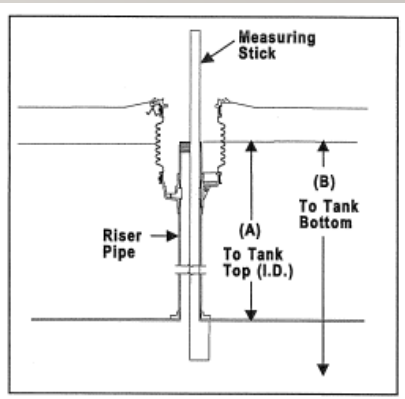
Note: The Table below does NOT show depths equivalent to 92%. It is a simulation to show why 92%.

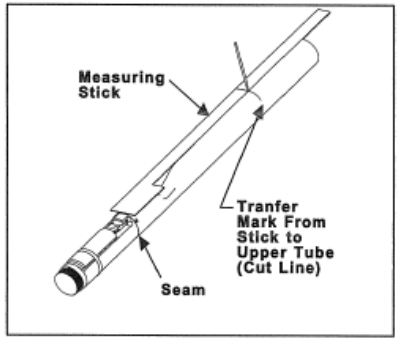
OVERFILL DEVICE

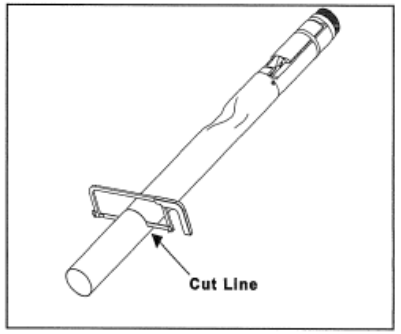
(WHY INSTALL OPW 61 & 71 SO MODELS AT 92%?)

- Manufacturer indicates that if seam is installed at 95% then complete shutoff occurs at 98%.
- The difference between 95% and 98% varies.
- So where complete shut off (Stage 2) occurs is NOT clear.
- Considering those differences, when device is set at 92% complete shut off should occur at 95%. Example below for cylindrical tanks (Note it is just an simulation to show why 92%):

	61 SO Seam Installed @ 95%				Difference
Tank Diameter	**Stage 1**	**% at Stage 1**	**Stage 2**	**% at Stage 2**	**Stage 1 - Stage 2**
72	7.00	95.0	3.75	98.0	3.25
84	8.50	94.7	4.50	97.9	4.00
96	9.50	94.9	5.00	98.0	4.50
120	12.00	94.8	6.50	97.9	5.50
	61 SO Seam Installed @ 92%				**Difference**
Tank Diameter	**Stage1**	**% at Stage 1**	**Stage 2**	**% at Stage 2**	**Stage 1 - Stage 2**
72	10.25	91.3	7.00	95.0	3.25
84	12.50	90.7	8.50	94.7	4.00
96	14.00	91.0	9.50	94.9	4.50
120	17.50	91.0	12.00	94.8	5.50







DROP TUBE DEVICES
(ANNUAL INSPECTION)

- Should be set for complete shutoff at 95%.
- Do you have to pull the tube to verify function?
  - Absolutely. Floats stick and devices become damaged. You must engage the device to be sure it will activate.
  - (Only exception is the newer testable models)
- If you can't pull the tube then the device is an automatic **FAIL**.

DROP TUBE DEVICES
(OTHER NECESSITIES)

- Aside from not being set at 95% why else would one fail?
  - If floats / mechanism are in bad condition.
  - If floats / mechanism are difficult to engage.

  (after all it's a float, should be able to float easily without a lot of force)
  - If 5 gpm bypass valve in the device is bypassed.

    How could it be?
    - Any hole in the upper tube above float mechanism.
    - Any gasket that should be present but isn't.

Welded seams of modified tube

DROP TUBE DEVICES
(UPPER TUBE MUST BE LIQUID TIGHT & SECURE)

QUESTIONS OR COMMENTS?

OVERFILL DEVICES
(ELECTRONIC ALARMS)

- Should be set to alarm at 90% capacity.
- You MUST pull the ATG probe and raise the float to simulate an overfill to verify function.
- The alarm must be BOTH audible and visible to the delivery driver. (Not just on the ATG itself)
- You should attach the ATG alarm report generated to the OF device test for documentation of function.

ALARM HISTORY REPORT

---- IN-TANK ALARM ----

T 1:REGULAR 20K

HIGH WATER ALARM
APR 2, 2012 11:03 AM
NOV 22, 2011 11:39 AM
APR 20, 2010 5:29 AM

OVERFILL ALARM
JUN 25, 2014 12:07 PM
APR 21, 2014 10:48 PM
NOV 10, 2013 4:38 PM

LOW PRODUCT ALARM
JUN 1, 2014 9:01 PM
FEB 9, 2014 9:47 PM
FEB 8, 2014 6:34 PM

HIGH PRODUCT ALARM
JUN 5, 2012 9:38 AM
APR 2, 2012 10:52 AM
NOV 22, 2011 11:30 AM

INVALID FUEL LEVEL
JUN 1, 2014 11:04 PM
FEB 8, 2014 7:02 PM
NOV 27, 2013 5:12 PM

PROBE OUT
APR 2, 2012 11:53 AM
APR 2, 2012 10:50 AM
NOV 22, 2011 12:47 PM

HIGH WATER WARNING
APR 2, 2012 11:03 AM
NOV 22, 2011 11:39 AM
APR 20, 2010 5:29 AM

DELIVERY NEEDED
AUG 30, 2014 4:32 PM
AUG 29, 2014 7:12 PM
AUG 5, 2014 6:02 PM

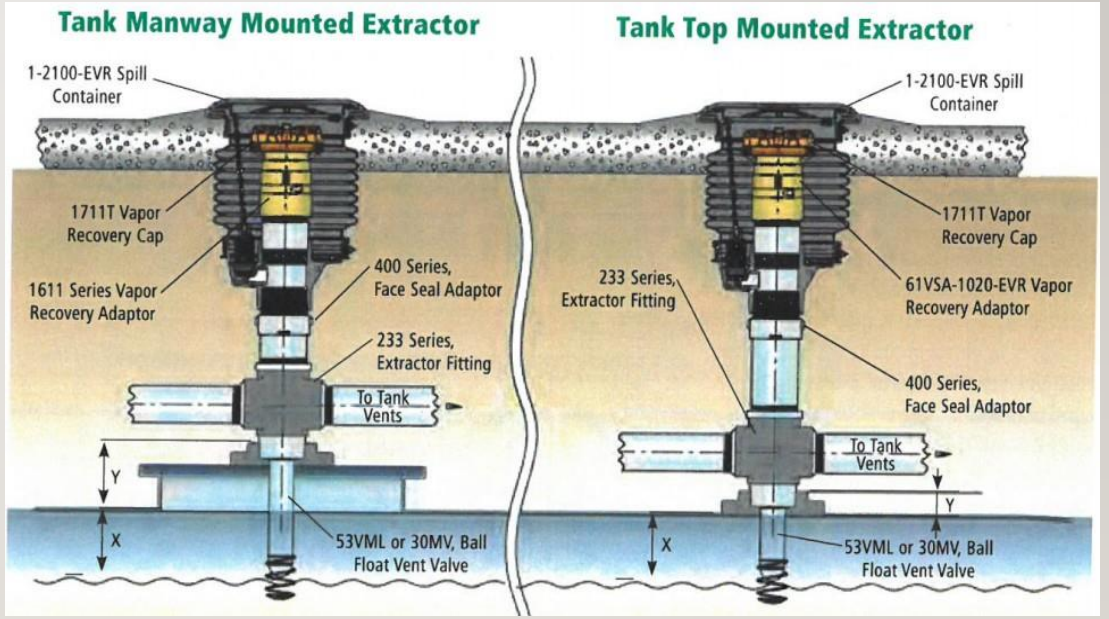
MAX PRODUCT ALARM
APR 2, 2012 10:53 AM
NOV 22, 2011 11:30 AM
APR 20, 2010 5:20 AM

LOW TEMP WARNING
NOV 22, 2011 12:48 PM
APR 20, 2010 5:48 AM
APR 7, 2009 5:05 AM

Should show annual testing

OVERFILL DEVICES
(WHAT IS COMMONLY NOT ACCOUNTED FOR)

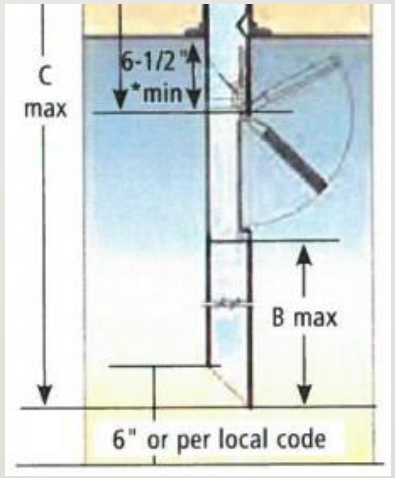
- If drop tube shutoff device and ball float is installed, which is primary?
  - Always the drop tube device @ 95%. Ball float should be installed above 95%.
- If device is installed on top of a tank manway did you account for the height of the manway? (Manway usually 2 – 5" above tank top)

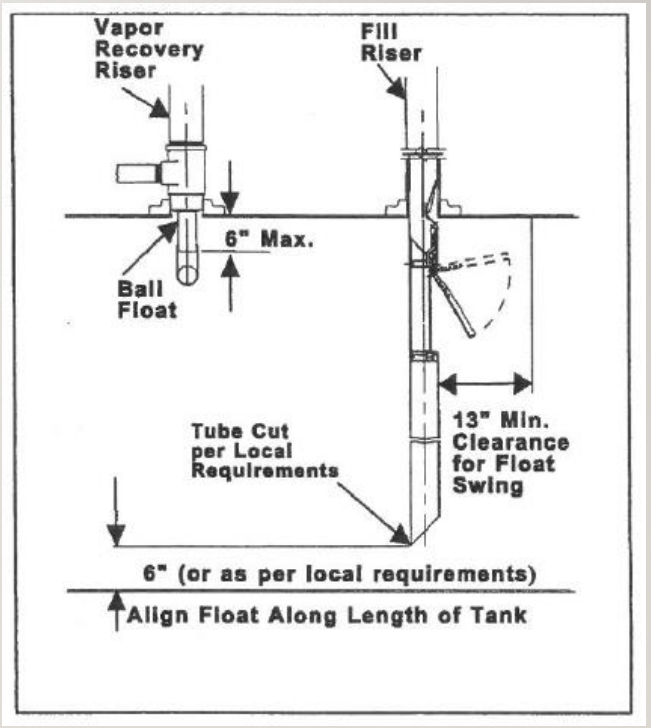


Note: Image is for Ball Float but it also applies to drop tube devices installed on tank top manways.

OVERFILL DEVICES
(WHAT ELSE IS COMMONLY NOT ACCOUNTED FOR)

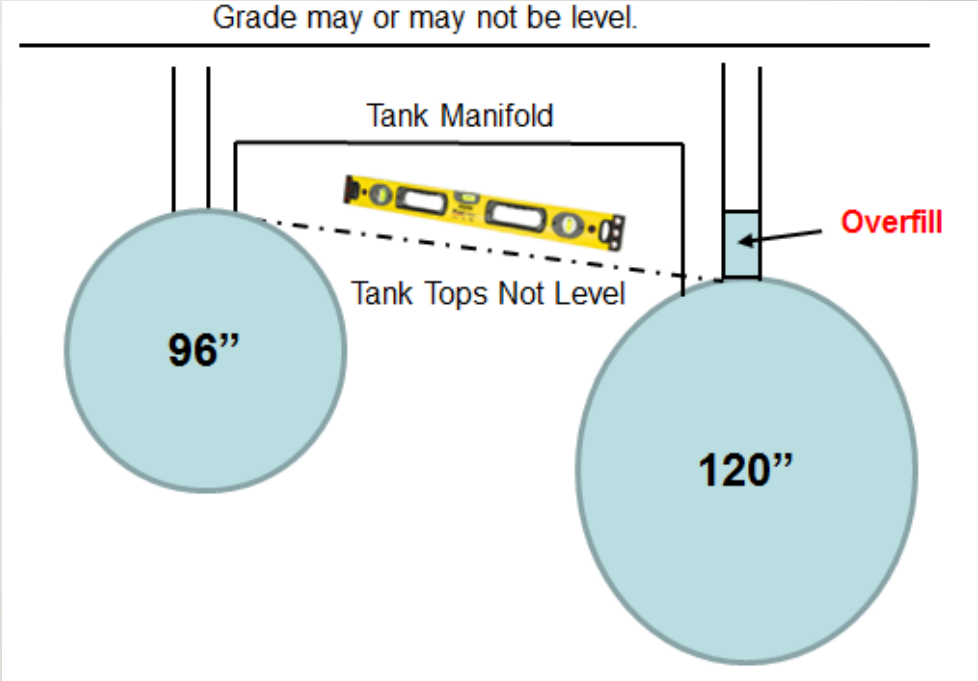
- Complete shutoff (flapper type) devices must be oriented length wise with the tank.
- Flapper type devices also need 13” - 14” to open… so if your fill riser is next to the end of the tank or another tank riser (Ex. ATG) which direction should the flapper be facing?
  - Always away from any structure or riser that may bind it.





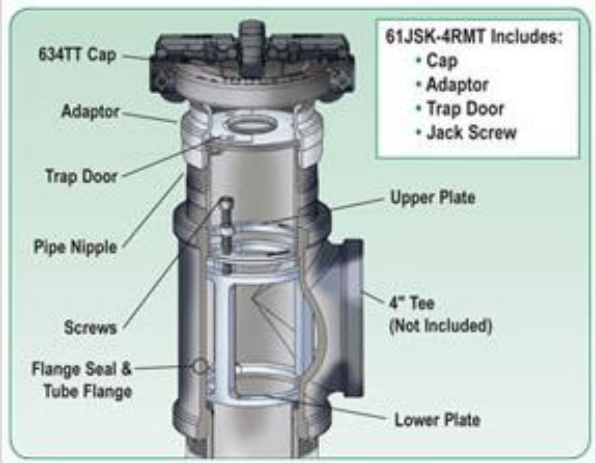
OVERFILL DEVICES
(TANK MANIFOLD LINES)

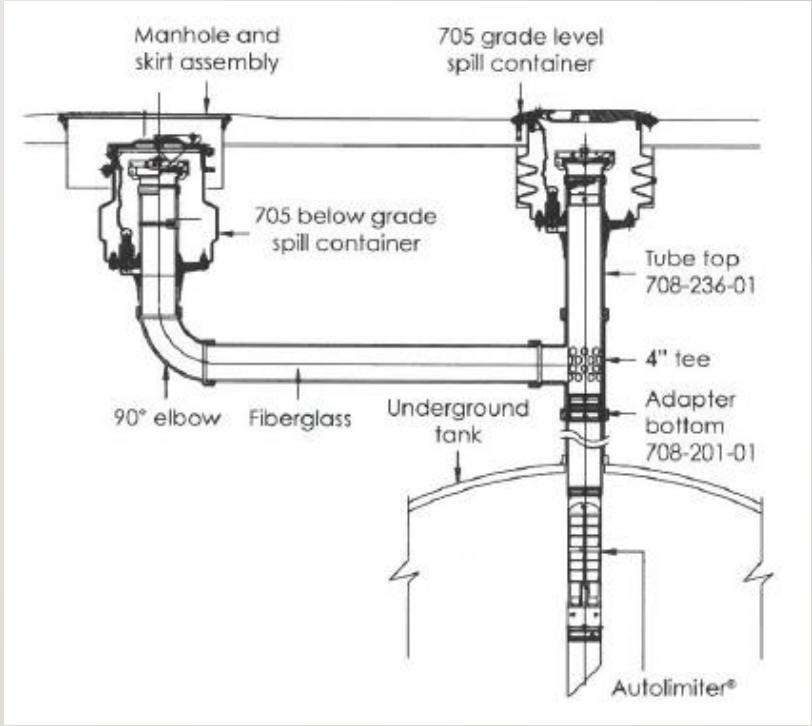
- Manifold lines, if not accounted for with OF devices will cause an overfill.
- Whether a new tank is being added or two existing tanks are being manifolded
  - the tank tops MUST be level.
  - or the OF devices must be level with one another.
- OF devices should be complete shut off devices for tanks that are manifolded. Why?
  - Not all tank top fittings are tight. Suction pipe.



OVERFILL DEVICES
(REMOTE FILL LINES)

- Fill port at the tank must be equipped with a functional trap door type lid.
- Fill riser must have a static drop tube or an overfill drop tube made for remote fills.





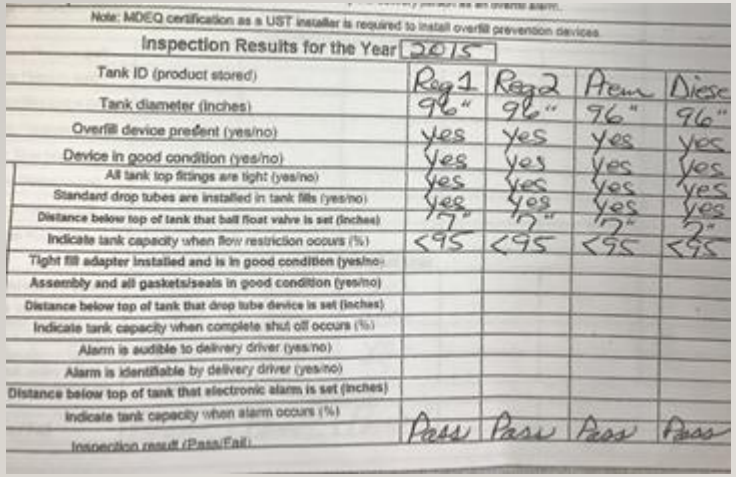
OVERFILL DEVICES
(DIAMETER MEASUREMENTS ,WHAT ELSE CAN THEY TELL YOU?)

- Diameter measurements are an easy way to check a tanks deflection long term.
- Particularly with fiberglass tanks.
- A substantial difference between measurements in a years time can indicate upcoming tank failure (if its not already failing)
- Issues may continue as more ethanol is introduced and ran thru the system.
- Consult with tank manufacturer. Each has its on allowable deflection. Example below:

Tank Diameter	Allowable Deflection
4'	1/2"
6'	3/4"
8'	1 1/8"
10'	1 1/2"
12'	1 3/4"

OVERFILL DEVICES
(BAD EXAMPLE TESTS)

Reasonable, but not 95%.



Note: MDEQ certification as a UST installer is required to install overfill prevention devices.

Inspection Results for the Year 2015

Tank ID (product stored)	Reg 1	Reg 2	Prem	Diese
Tank diameter (inches)	96"	96"	96"	96"
Overfill device present (yes/no)	yes	yes	yes	yes
Device in good condition (yes/no)	yes	yes	yes	yes
All tank top fittings are tight (yes/no)	yes	yes	yes	yes
Standard drop tubes are installed in tank fills (yes/no)	yes	yes	yes	yes
Distance below top of tank that ball float valve is set (inches)	7"	7"	7"	7"
Indicate tank capacity when flow restriction occurs (%)	<95	<95	<95	<95
Tight fill adapter installed and is in good condition (yes/no)				
Assembly and all gaskets/seals in good condition (yes/no)				
Distance below top of tank that drop tube device is set (inches)				
Indicate tank capacity when complete shut off occurs (%)				
Alarm is audible to delivery driver (yes/no)				
Alarm is identifiable by delivery driver (yes/no)				
Distance below top of tank that electronic alarm is set (inches)				
Indicate tank capacity when alarm occurs (%)				
Inspection result (Pass/Fail)	Pass	Pass	Pass	Pass

Not even close. Tank diameter actually 48".

Note: MDEQ certification as a UST installer is required to install overfill pr

Inspection Results for the Year 2016

Tank ID (product stored)		Diesel
Tank diameter (inches)		92
Overfill device present (yes/no)		yes
Device in good condition (yes/no)		yes
Ball Float Valve	All tank top fittings are tight (yes/no)	na
	Standard drop tubes are installed in tank fills (yes/no)	na
	Distance below top of tank that ball float valve is set (inches)	na
	Indicate tank capacity when flow restriction occurs (%)	na
Drop Tube Device	Tight fill adapter installed and is in good condition (yes/no)	yes
	Assembly and all gaskets/seals in good condition (yes/no)	yes
	Distance below top of tank that drop tube device is set (inches)	55
	Indicate tank capacity when complete shut off occurs (%)	90
Electronic Alarm	Alarm is audible to delivery driver (yes/no)	yes
	Alarm is identifiable by delivery driver (yes/no)	yes
	Distance below top of tank that electronic alarm is set (inches)	30
	Indicate tank capacity when alarm occurs (%)	95
Inspection result (Pass/Fail)		pass

Comments:

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So which is it? None are at 90 or 95%.

Note: MDEQ certification as a UST installer is required to install overfill prevention devices.

Inspection Results for the Year 2017

		T1 Diesel	T2 Diesel	T3 Regular	T4 Premium
Tank ID (product stored)					
Tank diameter (inches)		124"	124"	120"	96"
Overfill device present (yes/no)		Yes	Yes	Yes	Yes
Device in good condition (yes/no)		Yes	Yes	Yes	Yes
Ball Float Valve	All tank top fittings are tight (yes/no)	Yes	Yes	Yes	Yes
	Standard drop tubes are installed in tank fills (yes/no)	Yes	Yes	Yes	Yes
	Distance below top of tank that ball float valve is set (inches)	3"	3"	3"	3"
	Indicate tank capacity when flow restriction occurs (%)	90	90	90	90
Drop Tube Device	Tight fill adapter installed and is in good condition (yes/no)	Yes	Yes	Yes	Yes
	Assembly and all gaskets/seals in good condition (yes/no)	Yes	Yes	Yes	Yes
	Distance below top of tank that drop tube device is set (inches)	6"	6"	6"	6"
	Indicate tank capacity when complete shut off occurs (%)	95	95	95	95
Electronic Alarm	Alarm is audible to delivery driver (yes/no)	Yes	Yes	Yes	Yes
	Alarm is identifiable by delivery driver (yes/no)	Yes	Yes	Yes	Yes
	Distance below top of tank that electronic alarm is set (inches)	6"	6"	6"	6"
	Indicate tank capacity when alarm occurs (%)	95	95	95	95
Inspection result (Pass/Fail)		Pass	Pass	Pass	Pass

Comments:

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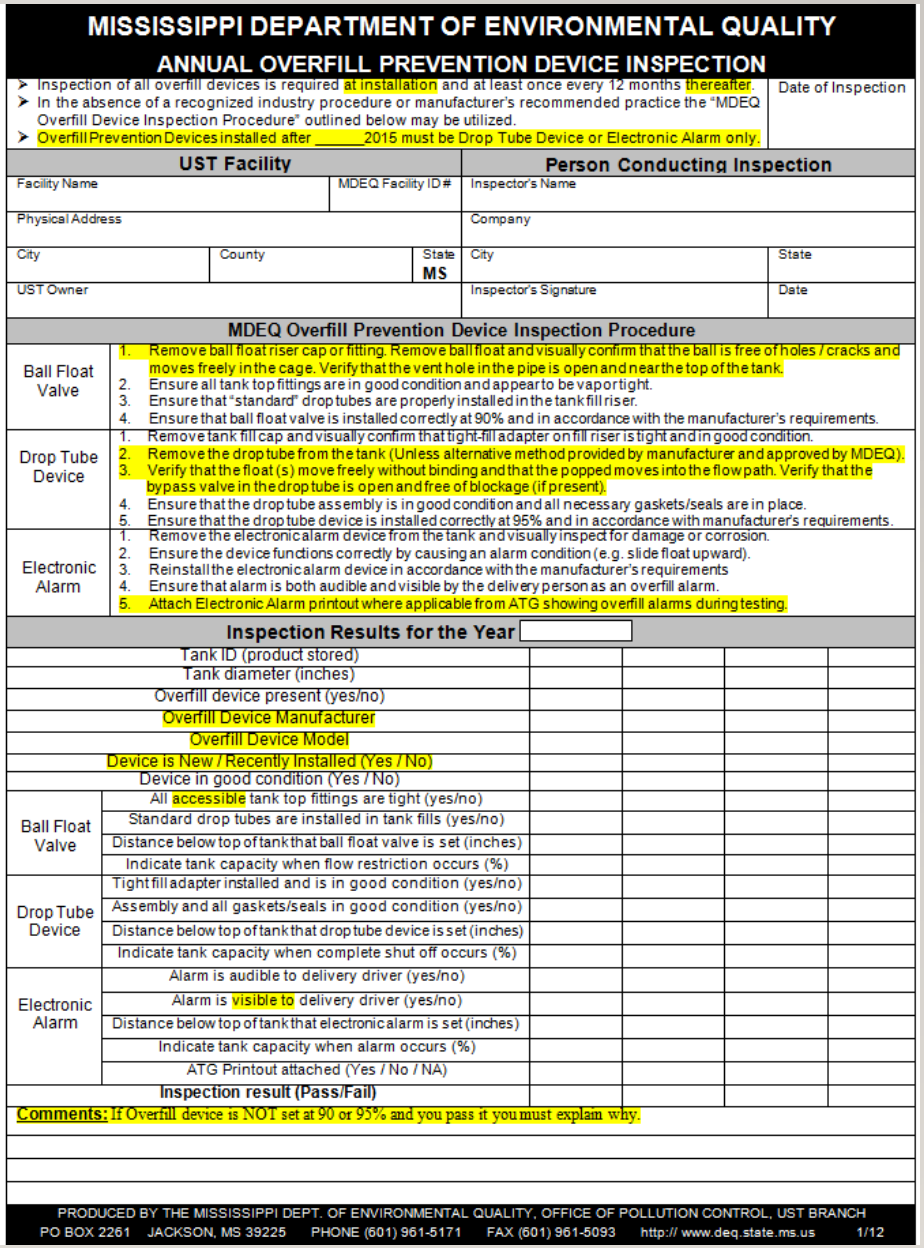
NEW OVERFILL DEVICE INSPECTION FORM

- Effective November 1st, 2017
- Modified instructions.
- Must list OF device manufacture / model



MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL OVERFILL PREVENTION DEVICE INSPECTION

- Inspection of all overfill devices is required at installation and at least once every 12 months thereafter.
- In the absence of a recognized industry procedure or manufacturer's recommended practice the "MDEQ Overfill Device Inspection Procedure" outlined below may be utilized.
- Overfill Prevention Devices installed after _____2015 must be Drop Tube Device or Electronic Alarm only.

Date of Inspection

UST Facility			Person Conducting Inspection	
Facility Name	MDEQ Facility ID #		Inspector's Name	
Physical Address			Company	
City	County	State MS	City	State
UST Owner			Inspector's Signature	Date

MDEQ Overfill Prevention Device Inspection Procedure

Ball Float Valve	1. Remove ball float riser cap or fitting. Remove ball float and visually confirm that the ball is free of holes / cracks and moves freely in the cage. Verify that the vent hole in the pipe is open and near the top of the tank. 2. Ensure all tank top fittings are in good condition and appear to be vapor tight. 3. Ensure that "standard" drop tubes are properly installed in the tank fill riser. 4. Ensure that ball float valve is installed correctly at 90% and in accordance with the manufacturer's requirements.
Drop Tube Device	1. Remove tank fill cap and visually confirm that tight-fill adapter on fill riser is tight and in good condition. 2. Remove the drop tube from the tank (Unless alternative method provided by manufacturer and approved by MDEQ). 3. Verify that the float (s) move freely without binding and that the popped moves into the flow path. Verify that the bypass valve in the drop tube is open and free of blockage (if present). 4. Ensure that the drop tube assembly is in good condition and all necessary gaskets/seals are in place. 5. Ensure that the drop tube device is installed correctly at 95% and in accordance with manufacturer's requirements.
Electronic Alarm	1. Remove the electronic alarm device from the tank and visually inspect for damage or corrosion. 2. Ensure the device functions correctly by causing an alarm condition (e.g. slide float upward). 3. Reinstall the electronic alarm device in accordance with the manufacturer's requirements 4. Ensure that alarm is both audible and visible by the delivery person as an overfill alarm. 5. Attach Electronic Alarm printout where applicable from ATG showing overfill alarms during testing.

Inspection Results for the Year _____

Tank ID (product stored)					
Tank diameter (inches)					
Overfill device present (yes/no)					
Overfill Device Manufacturer					
Overfill Device Model					
Device is New / Recently Installed (Yes / No)					
Device in good condition (Yes / No)					
Ball Float Valve	All accessible tank top fittings are tight (yes/no)				
	Standard drop tubes are installed in tank fills (yes/no)				
	Distance below top of tank that ball float valve is set (inches)				
	Indicate tank capacity when flow restriction occurs (%)				
Drop Tube Device	Tight fill adapter installed and is in good condition (yes/no)				
	Assembly and all gaskets/seals in good condition (yes/no)				
	Distance below top of tank that drop tube device is set (inches)				
	Indicate tank capacity when complete shut off occurs (%)				
Electronic Alarm	Alarm is audible to delivery driver (yes/no)				
	Alarm is visible to delivery driver (yes/no)				
	Distance below top of tank that electronic alarm is set (inches)				
	Indicate tank capacity when alarm occurs (%)				
	ATG Printout attached (Yes / No / NA)				
Inspection result (Pass/Fail)					

Comments: If Overfill device is NOT set at 90 or 95% and you pass it you must explain why.

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QUESTIONS OR COMMENTS?

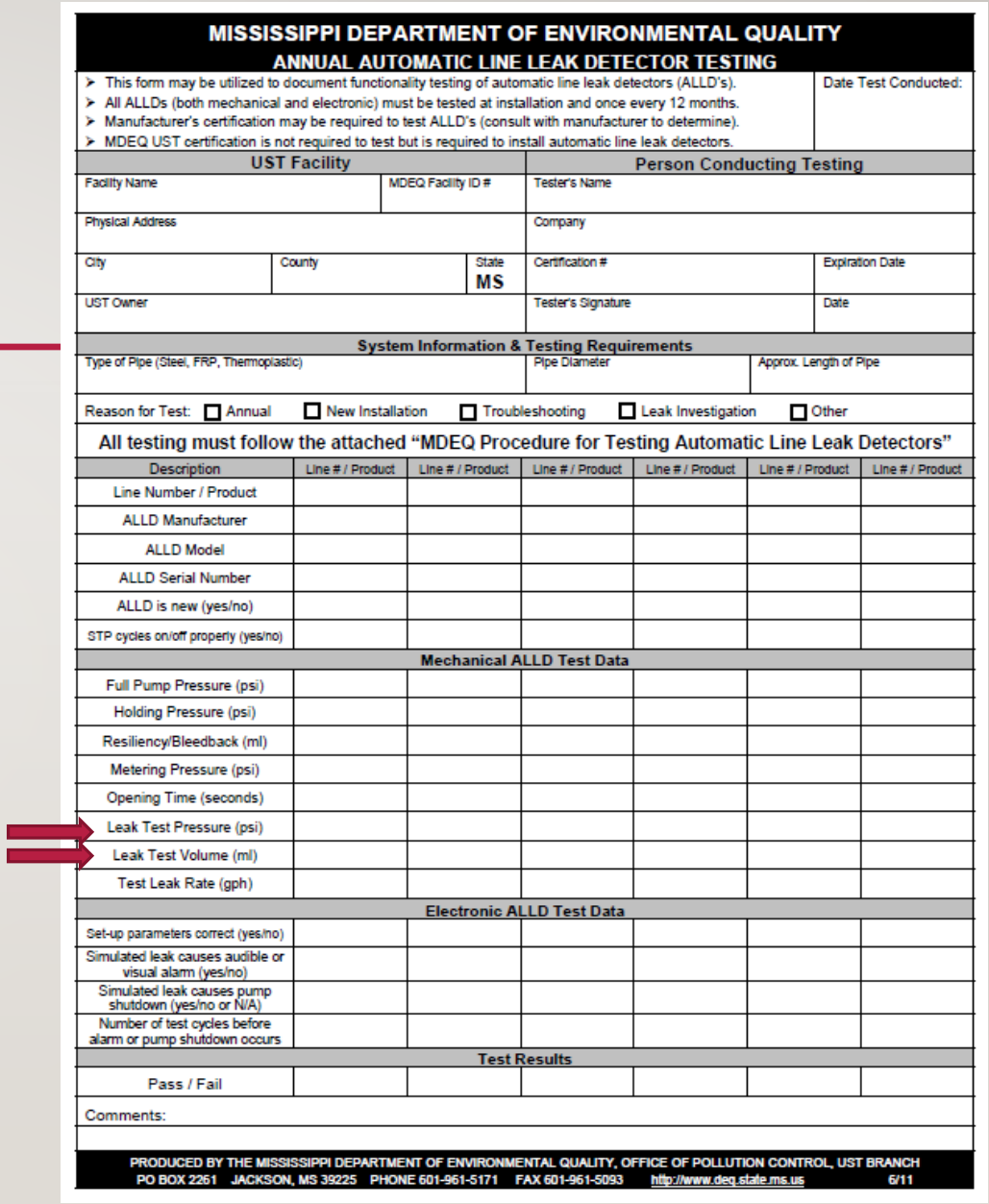
LINE LEAK DETECTORS

(IS MDEQ'S TEST FORM CONFUSING TO YOU?)

- No matter what test equipment you use to run the test you should be able to record:
  - The leak test pressure of the MLLD when you simulate the leak.

    (Metering Pressure)
  - The volume of the leak that you simulate.

    (Use graduated cylinder or other device)
- **Note:** Some LLD test equipment manufacturers may require calibration or periodic checks of the leak test volume of their equipment, instead of at each test. As a tester you should:
  - Still record an accurate "Leak Test Volume" and "Test Leak Rate" for the test that you simulate



MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL AUTOMATIC LINE LEAK DETECTOR TESTING

- This form may be utilized to document functionality testing of automatic line leak detectors (ALLD's).
- All ALLDs (both mechanical and electronic) must be tested at installation and once every 12 months.
- Manufacturer's certification may be required to test ALLD's (consult with manufacturer to determine).
- MDEQ UST certification is not required to test but is required to install automatic line leak detectors.

Date Test Conducted:

UST Facility			Person Conducting Testing	
Facility Name	MDEQ Facility ID #		Tester's Name	
Physical Address			Company	
City	County	State MS	Certification #	Expiration Date
UST Owner			Tester's Signature	Date

System Information & Testing Requirements

Type of Pipe (Steel, FRP, Thermoplastic)	Pipe Diameter	Approx. Length of Pipe

Reason for Test: ☐ Annual ☐ New Installation ☐ Troubleshooting ☐ Leak Investigation ☐ Other

All testing must follow the attached "MDEQ Procedure for Testing Automatic Line Leak Detectors"

Description	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product
Line Number / Product						
ALLD Manufacturer						
ALLD Model						
ALLD Serial Number						
ALLD is new (yes/no)						
STP cycles on/off properly (yes/no)						
Mechanical ALLD Test Data						
Full Pump Pressure (psi)						
Holding Pressure (psi)						
Resiliency/Bleedback (ml)						
Metering Pressure (psi)						
Opening Time (seconds)						
Leak Test Pressure (psi)						
Leak Test Volume (ml)						
Test Leak Rate (gph)						
Electronic ALLD Test Data						
Set-up parameters correct (yes/no)						
Simulated leak causes audible or visual alarm (yes/no)						
Simulated leak causes pump shutdown (yes/no or N/A)						
Number of test cycles before alarm or pump shutdown occurs						
Test Results						
Pass / Fail						

Comments:

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LINE LEAK DETECTORS
(METERING PRESSURE AND LEAK TEST VOLUME)

- Both of these determine whether or not you hit the infamous "Equivalent10 psi 3 gph leak rate". Take both readings and look at the chart provided on our form.
  - Ex. My metering pressure was 27 psi and my measured leak volume was 315 mL in the cylinder.
    - I'm reasonably close to the 311 mL on the chart. I ran a good test.
  - If I measured 420 mL in the cylinder then my leak volume does not reasonably match what is on the chart as an equivalent leak .
    - I have to adjust and re-simulate the leak.

Table 1 - Volume that must be discharged within indicated time frame to be equivalent to a leak rate of 3 gph @ 10 psi:

Line Pressure	15 seconds	60 seconds		Line Pressure	15 seconds	60 seconds
5 psi	33 ml	134 ml		30 psi	82 ml	328 ml
6 psi	37 ml	147 ml		31 psi	83 ml	333 ml
7 psi	40 ml	158 ml		32 psi	85 ml	338 ml
8 psi	42 ml	169 ml		33 psi	86 ml	344 ml
9 psi	45 ml	179 ml		34 psi	87 ml	349 ml
10 psi	47 ml	189 ml		35 psi	89 ml	354 ml
11 psi	50 ml	198 ml		36 psi	90 ml	359 ml
12 psi	52 ml	207 ml		37 psi	91 ml	364 ml
13 psi	54 ml	216 ml		38 psi	92 ml	369 ml
14 psi	56 ml	224 ml		39 psi	94 ml	374 ml
15 psi	58 ml	232 ml		40 psi	95 ml	378 ml
16 psi	60 ml	239 ml		41 psi	96 ml	383 ml
17 psi	62 ml	247 ml		42 psi	97 ml	388 ml
18 psi	64 ml	254 ml		43 psi	98 ml	392 ml
19 psi	65 ml	261 ml		44 psi	99 ml	397 ml
20 psi	67 ml	268 ml		45 psi	100 ml	401 ml
21 psi	69 ml	274 ml		46 psi	102 ml	406 ml
22 psi	70 ml	281 ml		47 psi	103 ml	410 ml
23 psi	72 ml	287 ml		48 psi	104 ml	415 ml
24 psi	73 ml	293 ml		49 psi	105 ml	419 ml
25 psi	75 ml	299 ml		50 psi	106 ml	423 ml
26 psi	76 ml	305 ml		51 psi	107 ml	427 ml
27 psi	78 ml	311 ml		52 psi	108 ml	431 ml
28 psi	79 ml	317 ml		53 psi	109 ml	436 ml
29 psi	81 ml	322 ml		54 psi	110 ml	440 ml

Adjust size of test apparatus leak orifice until the indicated flow rate is achieved

LINE LEAK DETECTORS
(LEAK TEST RATE)

- So what is the leak test rate?
  - My metering pressure was 27 psi.
  - My leak test volume was 315 mL.
- My leak test rate is <u>4.9 gph.</u>
  - That is equivalent to the 10 psi 3 gph leak rate.
- **Note:** If your measured "Leak Test Volume" does NOT reasonably match your metering pressure (Table 1) MDEQ inspectors may reject your test.

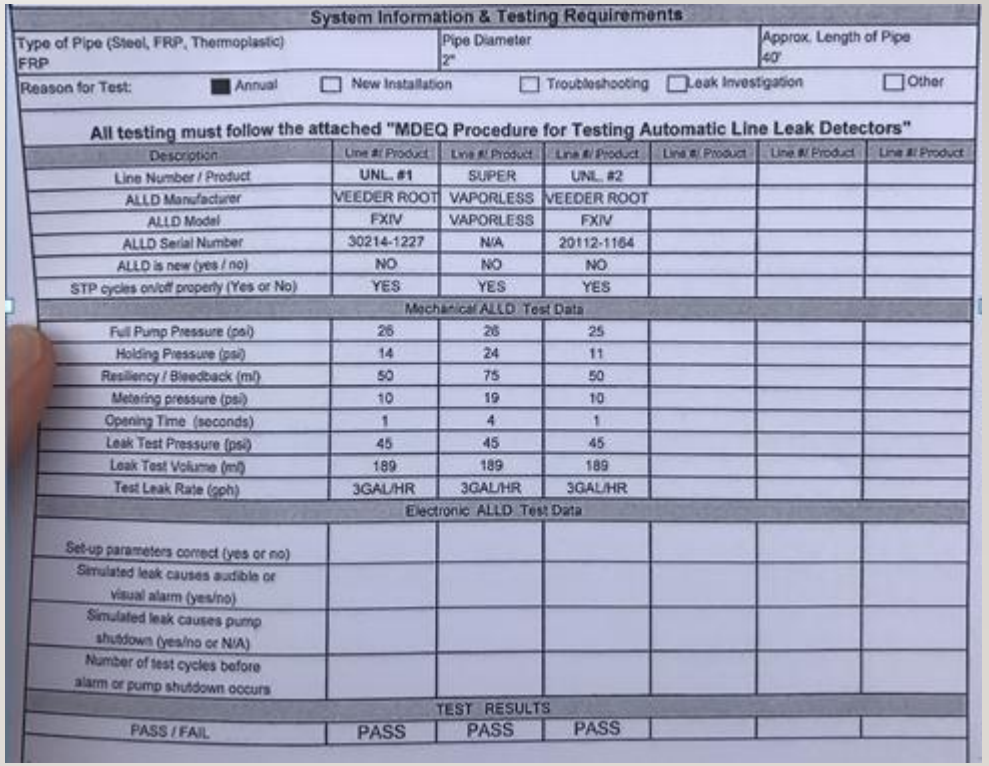
Table 2 – Conversion of leak rate from milliliters per minute (ml/min) to gallons per hour (gph)

Leak Rate (ml/min)	Leak Rate (gph)		Leak Rate (ml/min)	Leak Rate (gph)		Leak Rate (ml/min)	Leak Rate (gph)
134	2.1		281	4.5		374	5.9
147	2.3		287	4.6		378	6.0
158	2.5		293	4.7		383	6.1
169	2.7		299	4.7		388	6.2
179	2.8		305	4.8		392	6.2
189	3.0		311	4.9		397	6.3
198	3.1		317	5.0		401	6.4
207	3.3		322	5.1		406	6.4
216	3.4		328	5.2		410	6.5
224	3.5		333	5.3		415	6.6
232	3.7		338	5.4		419	6.6
239	3.8		344	5.5		423	6.7
247	3.9		349	5.5		427	6.8
254	4.0		354	5.6		431	6.8
261	4.1		359	5.7		436	6.9
268	4.2		364	5.8		440	7.0
274	4.3		369	5.9		445	7.1

Note: 1 gallon per hour = 63.06 milliliters per minute

LLD TEST EXAMPLE

- Leak test pressure (45psi) recorded appears to be from LTT contractor ran.



System Information & Testing Requirements

Type of Pipe (Steel, FRP, Thermoplastic)	Pipe Diameter	Approx. Length of Pipe
FRP	2"	40'

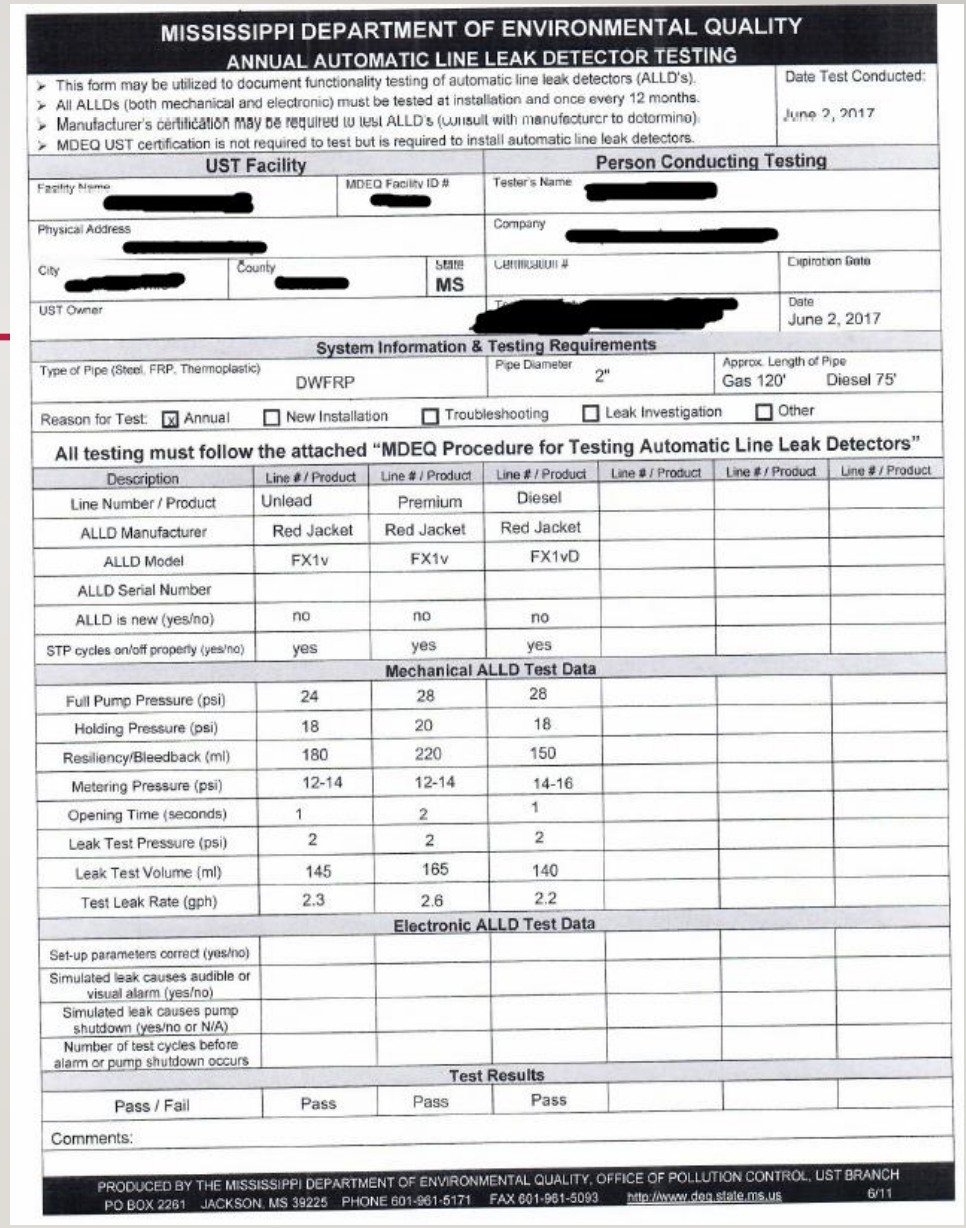
Reason for Test: ■ Annual ☐ New Installation ☐ Troubleshooting ☐ Leak Investigation ☐ Other

All testing must follow the attached "MDEQ Procedure for Testing Automatic Line Leak Detectors"

Description	Line #/ Product	Line #/ Product	Line #/ Product	Line #/ Product	Line #/ Product	Line #/ Product
Line Number / Product	UNL. #1	SUPER	UNL. #2			
ALLD Manufacturer	VEEDER ROOT	VAPORLESS	VEEDER ROOT			
ALLD Model	FXIV	VAPORLESS	FXIV			
ALLD Serial Number	30214-1227	N/A	20112-1164			
ALLD is new (yes / no)	NO	NO	NO			
STP cycles on/off properly (Yes or No)	YES	YES	YES			
Mechanical ALLD Test Data						
Full Pump Pressure (psi)	26	26	25			
Holding Pressure (psi)	14	24	11			
Resiliency / Bleedback (ml)	50	75	50			
Metering pressure (psi)	10	19	10			
Opening Time (seconds)	1	4	1			
Leak Test Pressure (psi)	45	45	45			
Leak Test Volume (ml)	189	189	189			
Test Leak Rate (gph)	3GAL/HR	3GAL/HR	3GAL/HR			
Electronic ALLD Test Data						
Set-up parameters correct (yes or no)						
Simulated leak causes audible or visual alarm (yes/no)						
Simulated leak causes pump shutdown (yes/no or N/A)						
Number of test cycles before alarm or pump shutdown occurs						
TEST RESULTS						
PASS / FAIL	PASS	PASS	PASS			

LLD TEST EXAMPLE

- What exactly is the metering pressure?
- What is the leak test pressure?
- Not at 10 psi 3 gph.



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ANNUAL AUTOMATIC LINE LEAK DETECTOR TESTING

- This form may be utilized to document functionality testing of automatic line leak detectors (ALLD's).
- All ALLDs (both mechanical and electronic) must be tested at installation and once every 12 months.
- Manufacturer's certification may be required to test ALLD's (consult with manufacturer to determine).
- MDEQ UST certification is not required to test but is required to install automatic line leak detectors.

Date Test Conducted: June 2, 2017

UST Facility		Person Conducting Testing	
Facility Name [redacted]	MDEQ Facility ID # [redacted]	Tester's Name [redacted]	
Physical Address [redacted]		Company [redacted]	
City [redacted]	County [redacted] State MS	Certification #	Expiration Date
UST Owner [redacted]			Date June 2, 2017

System Information & Testing Requirements

Type of Pipe (Steel, FRP, Thermoplastic)	Pipe Diameter	Approx. Length of Pipe
DWFRP	2"	Gas 120' Diesel 75'

Reason for Test: ☒ Annual ☐ New Installation ☐ Troubleshooting ☐ Leak Investigation ☐ Other

All testing must follow the attached "MDEQ Procedure for Testing Automatic Line Leak Detectors"

Description	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product
Line Number / Product	Unlead	Premium	Diesel			
ALLD Manufacturer	Red Jacket	Red Jacket	Red Jacket			
ALLD Model	FX1v	FX1v	FX1vD			
ALLD Serial Number						
ALLD is new (yes/no)	no	no	no			
STP cycles on/off properly (yes/no)	yes	yes	yes			
Mechanical ALLD Test Data						
Full Pump Pressure (psi)	24	28	28			
Holding Pressure (psi)	18	20	18			
Resiliency/Bleedback (ml)	180	220	150			
Metering Pressure (psi)	12-14	12-14	14-16			
Opening Time (seconds)	1	2	1			
Leak Test Pressure (psi)	2	2	2			
Leak Test Volume (ml)	145	165	140			
Test Leak Rate (gph)	2.3	2.6	2.2			
Electronic ALLD Test Data						
Set-up parameters correct (yes/no)						
Simulated leak causes audible or visual alarm (yes/no)						
Simulated leak causes pump shutdown (yes/no or N/A)						
Number of test cycles before alarm or pump shutdown occurs						
Test Results						
Pass / Fail	Pass	Pass	Pass			

Comments:

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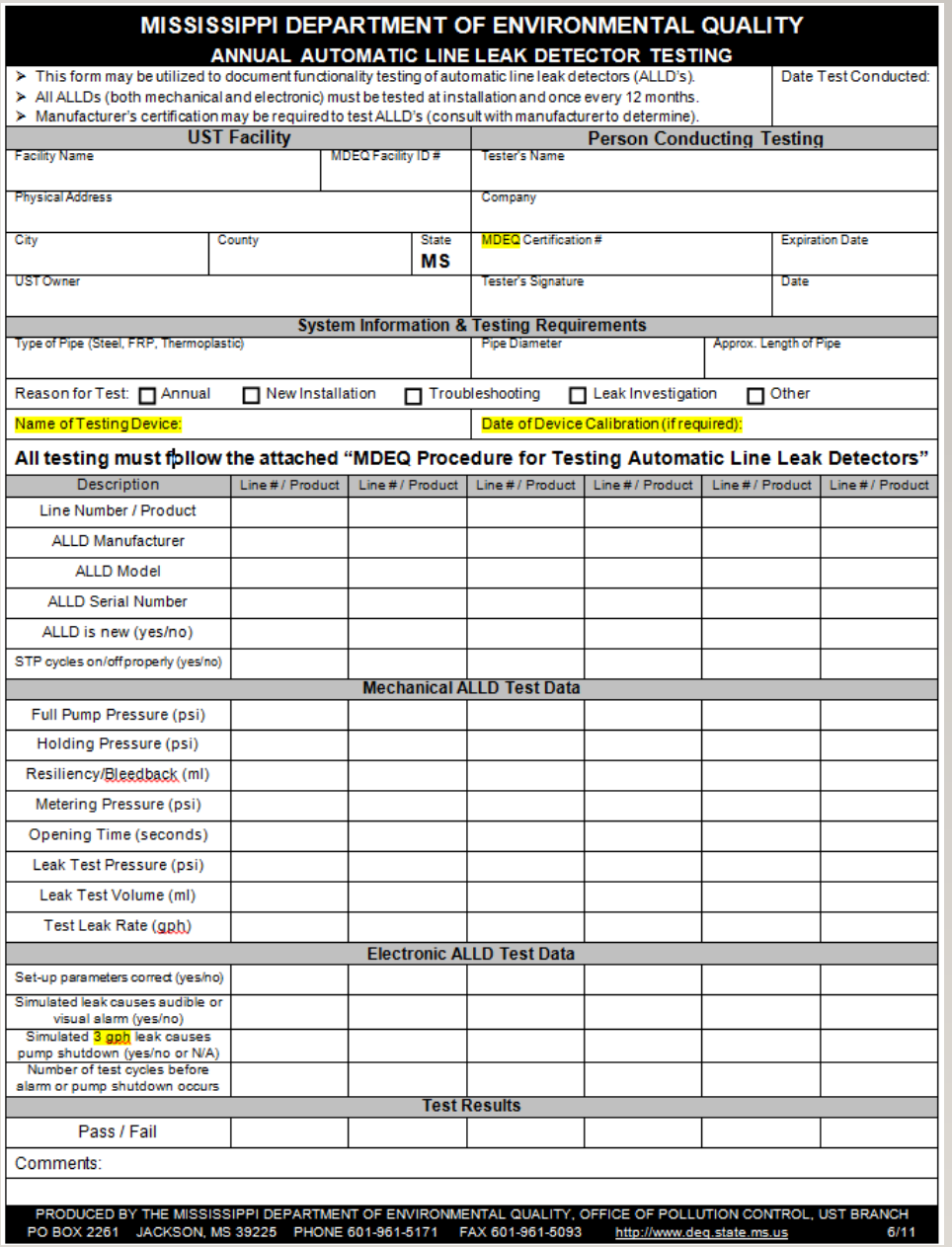
NEW ANNUAL AUTOMATIC LINE LEAK DETECTOR TESTING FORM

- Effective November 1st, 2017
- List name of testing device used. (manufacturer / model)
- Record the last known date of calibration for the equipment if required by manufacturer.



MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL AUTOMATIC LINE LEAK DETECTOR TESTING

- This form may be utilized to document functionality testing of automatic line leak detectors (ALLD's).
- All ALLDs (both mechanical and electronic) must be tested at installation and once every 12 months.
- Manufacturer's certification may be required to test ALLD's (consult with manufacturer to determine).

Date Test Conducted:

UST Facility			Person Conducting Testing	
Facility Name	MDEQ Facility ID #		Tester's Name	
Physical Address			Company	
City	County	State MS	MDEQ Certification #	Expiration Date
UST Owner			Tester's Signature	Date

System Information & Testing Requirements

Type of Pipe (Steel, FRP, Thermoplastic)	Pipe Diameter	Approx. Length of Pipe

Reason for Test: ☐ Annual ☐ New Installation ☐ Troubleshooting ☐ Leak Investigation ☐ Other

Name of Testing Device:	Date of Device Calibration (if required):

All testing must follow the attached "MDEQ Procedure for Testing Automatic Line Leak Detectors"

Description	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product	Line # / Product
Line Number / Product						
ALLD Manufacturer						
ALLD Model						
ALLD Serial Number						
ALLD is new (yes/no)						
STP cycles on/off properly (yes/no)						
Mechanical ALLD Test Data						
Full Pump Pressure (psi)						
Holding Pressure (psi)						
Resiliency/Bleedback (ml)						
Metering Pressure (psi)						
Opening Time (seconds)						
Leak Test Pressure (psi)						
Leak Test Volume (ml)						
Test Leak Rate (gph)						
Electronic ALLD Test Data						
Set-up parameters correct (yes/no)						
Simulated leak causes audible or visual alarm (yes/no)						
Simulated 3 gph leak causes pump shutdown (yes/no or N/A)						
Number of test cycles before alarm or pump shutdown occurs						
Test Results						
Pass / Fail						

Comments:

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QUESTIONS OR COMMENTS?

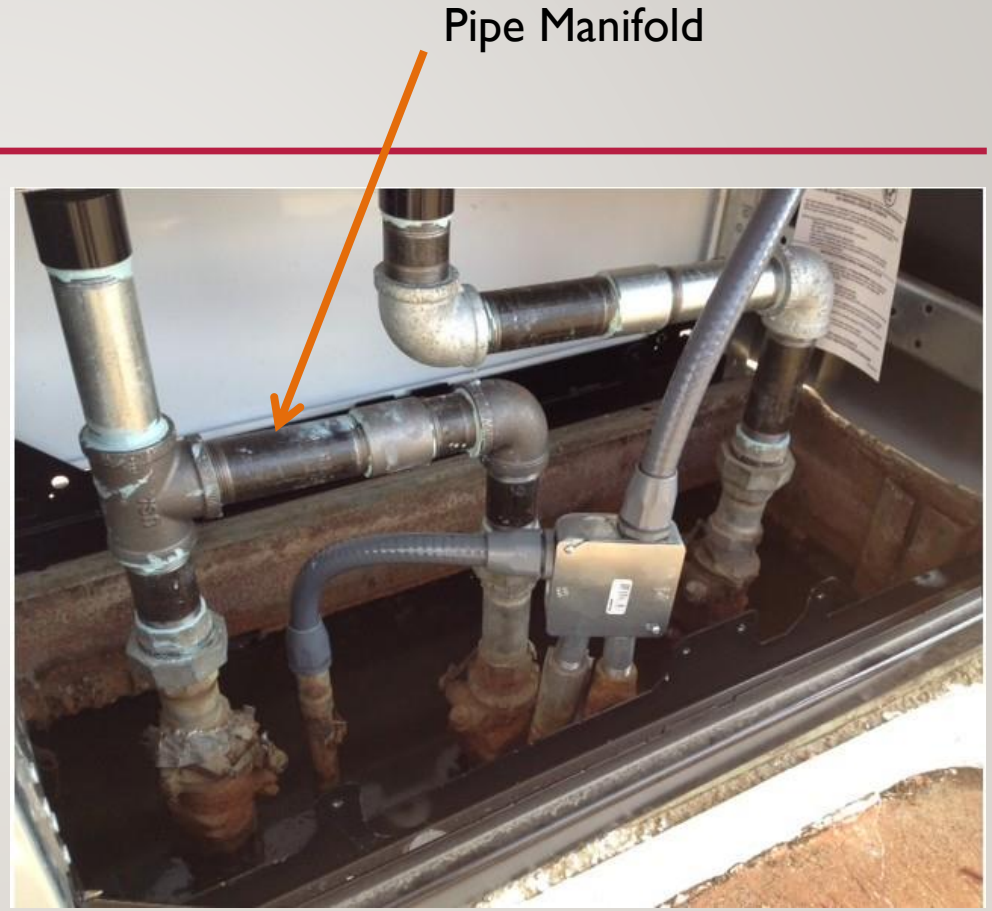
LINE LEAK DETECTORS
(SOLENOID VALVES)

- MDEQ inspectors are still finding these.
- They prevent the Diesel Satellite lines from being seen by the Line Leak Detectors.
- Find them before we do.
- Always test from the furthest Diesel Satellite shear valve.
- Verify visually that all dispensers along the fueling lane are the same model dispensers and / or piped the same internally.

Satellite Dispenser
Where is the valve?

LINE LEAK DETECTORS
(PIPING MANIFOLDS)

- Product lines still being installed like this.
- Issue is 2 or more STPs cycling ON at the same time. The MLLDs can only see a 6 gph leak rate or greater.
- When simulating your leak, if you have to shut off one of the STPs or close a ball valve to simulate a 3 gph leak rate that the MLLD can see, then this IS a problem.
- When running a line leak detector test at NO time should you have to close a valve or shut off an STP to test the other.
- If the site has a control box cycling them, then the control box should prevent the other STP from cycling on to begin with (when leak is simulated) and there is NO need in manually doing it.
- For pipe manifolds with electronic line leak detector, it MUST be setup to shut down ALL STPs associated with the piping.

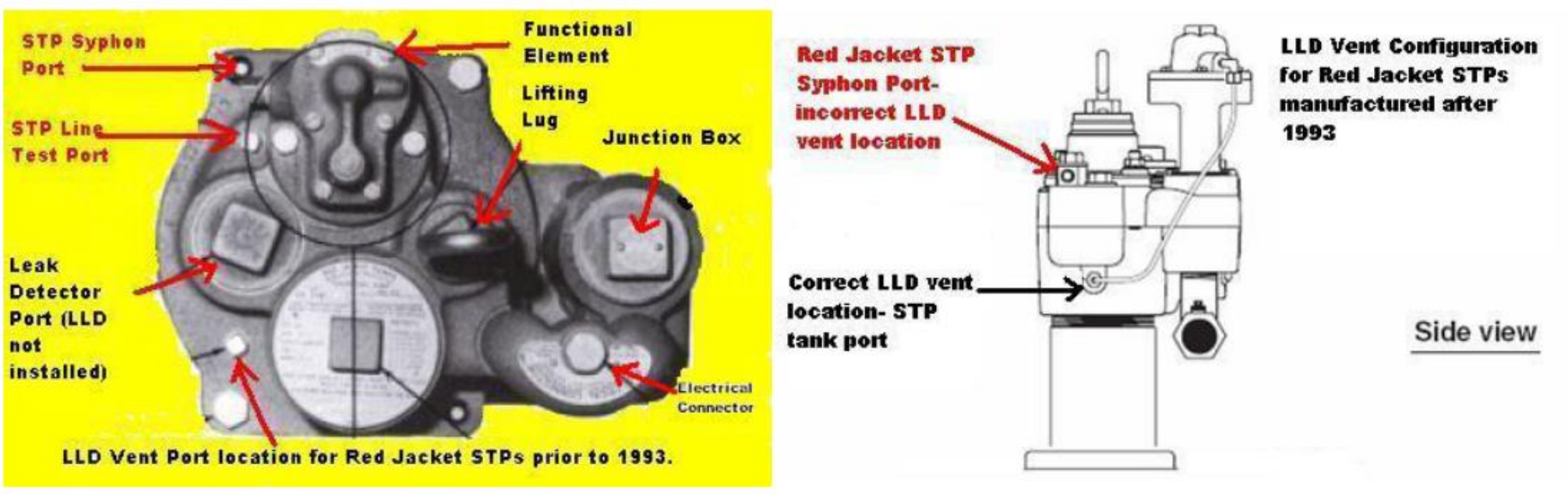


LINE LEAK DETECTORS
(PIPE MANIFOLD EXAMPLES)

MLLD VENT TUBE ON SYPHON PORT
(FE PETRO)

- You should not be able to run a good LLD test if vent tube is hooked up wrong.
- Always run a LLD test for any MLLD that you install to verify operation.
- If LLD is made for a vent tube it should have one installed. (Inspectors cite this as a leak at the STP when found.)
- Vent tube should be open (not crimped) or visibly damaged.

MLLD VENT TUBE ON SYPHON PORT
(RED JACKET)



REMOVING MLLDS
(IS IT REALLY A FAULTY CHECK VALVE?)

- Under NO circumstance should you remove a LLD without having a LLD on site to replace it.
- Why? Can you honestly say it's just a check valve issue and not a line leak?
  - NO. Even if you did a LTT you can't certify that the line won't develop a leak while the LLD is removed.
- If caught MDEQ will pursue enforcement action.
- The same applies if you tamper with an STP contact relay box to keep the STP "ON".

LINE TIGHTNESS TESTS

- If your NOT certified by the manufacturer to use the equipment then you need to get certified or recertified.
- If the manufacturer requires recertification of the equipment then it must be recertified.

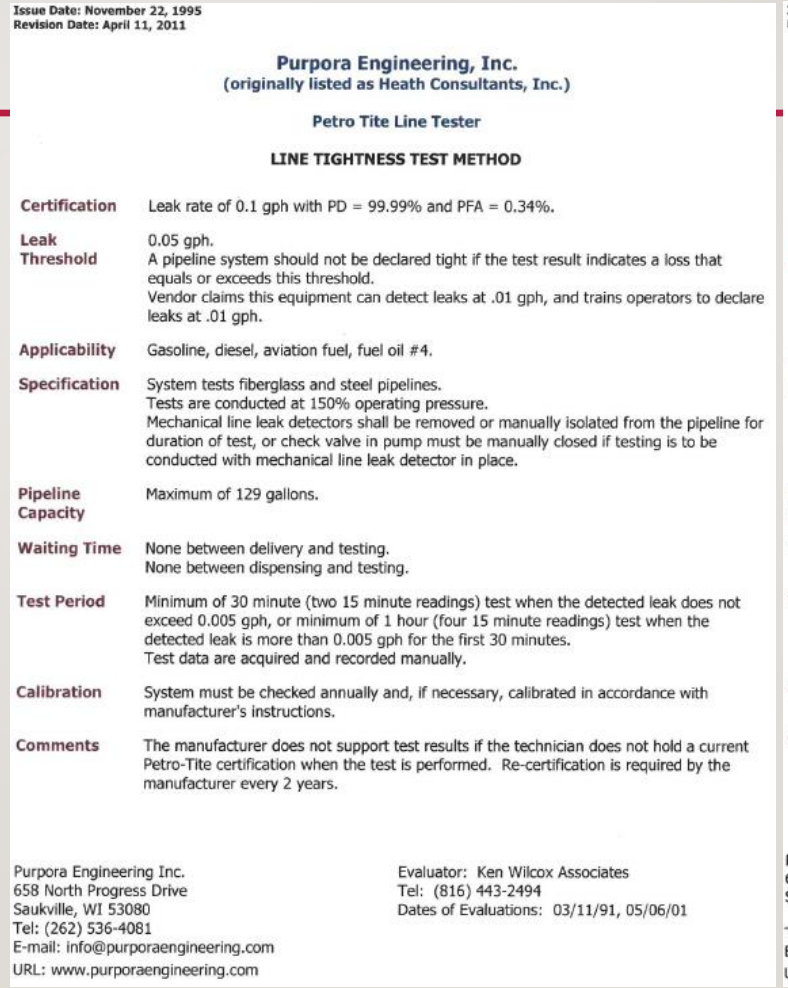
LINE TIGHTNESS TESTING
(ISSUES WE SEE)

- All tests must be done at 1.5 times the operating pressure of the STP. The test pressure should be clearly stated on the form that you use.
- Know the limitations / restrictions of your test equipment. Ex:
  - Line Capacity.
  - Pre-test requirements
  - Minimum wait time between delivery and testing.
- If you test multiple lines together is your test still valid?
- Can you test gas lines with diesel lines on the same test? No.
- Is the test procedure your following the same one evaluated and okayed by a certified 3rd party?
- Check the National Work Group of Leak Detection Evaluations (NWGLDE) for 3rd party certifications of testing equipment.

LINE TIGHTNESS TESTING
(PETRO-TITE)

		TIME		PASS START	PASS END	VOL. START	VOL. END	VOL NET CHANGE		
TankID	1	9:15 AM	1st Reading	90	90	0.0180	0.0180	0.0000	Line Type	Environ
LineID	1	9:30 AM	2nd Reading	90	90	0.0180	0.0180	0.0000	Pretest BleedBack	0.021
Product	Unleaded	9:45 AM	3rd Reading	61	60	0.0810	0.0815	0.0005	Line Test Rate	0.0005
Start Time	9:00 AM	10:00 AM	4th Reading	60	60	0.0825	0.0825	0.0000	Line Test Result	Pass
		10:15 AM	5th Reading	60	60	0.0825	0.0825	0.0000	Ending BleedBack	0.022
		10:30 AM	6th Reading	60	60	0.0825	0.0825	0.0000		
		TIME								
TankID	2	9:16 AM	1st Reading	90	90	0.0180	0.0180	0.0000	Line Type	Environ
LineID	2	9:31 AM	2nd Reading	90	90	0.0180	0.0180	0.0000	Pretest BleedBack	0.019
Product	Premium	9:46 AM	3rd Reading	62	60	0.0815	0.0820	0.0005	Line Test Rate	0.0005
Start Time	9:01 AM	10:01 AM	4th Reading	60	60	0.0825	0.0825	0.0000	Line Test Result	Pass
		10:16 AM	5th Reading	60	60	0.0825	0.0825	0.0000	Ending BleedBack	0.009
		10:31 AM	6th Reading	60	60	0.0825	0.0825	0.0000		
		TIME								
TankID	3	9:17 AM	1st Reading	90	90	0.0180	0.0180	0.0000	Line Type	Environ
LineID	3	9:32 AM	2nd Reading	90	90	0.0180	0.0180	0.0000	Pretest BleedBack	0.023
Product	Diesel	9:47 AM	3rd Reading	61	60	0.0820	0.0825	0.0005	Line Test Rate	0.0005
Start Time	9:02 AM	10:02 AM	4th Reading	60	60	0.0825	0.0825	0.0000	Line Test Result	Pass
		10:17 AM	5th Reading	60	60	0.0825	0.0825	0.0000	Ending BleedBack	0.006
		10:32 AM	6th Reading	60	60	0.0825	0.0825	0.0000		

- If pretest is required by manufacturer it should be shown on test form.
- Petro-Tite has a new test protocol requiring 5 min readings. Verify procedure with Purpora Engineering.



Issue Date: November 22, 1995
Revision Date: April 11, 2011

Purpora Engineering, Inc.
(originally listed as Heath Consultants, Inc.)

Petro Tite Line Tester

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.99% and PFA = 0.34%.

Leak Threshold 0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Vendor claims this equipment can detect leaks at .01 gph, and trains operators to declare leaks at .01 gph.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4.

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detectors shall be removed or manually isolated from the pipeline for duration of test, or check valve in pump must be manually closed if testing is to be conducted with mechanical line leak detector in place.

Pipeline Capacity Maximum of 129 gallons.

Waiting Time None between delivery and testing.
None between dispensing and testing.

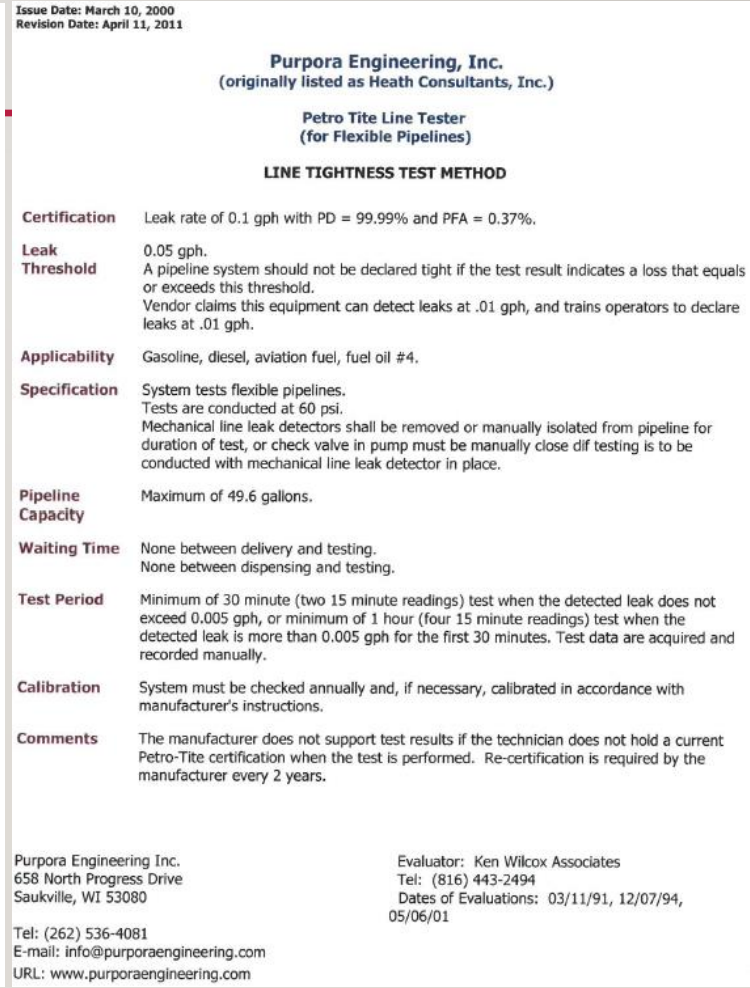
Test Period Minimum of 30 minute (two 15 minute readings) test when the detected leak does not exceed 0.005 gph, or minimum of 1 hour (four 15 minute readings) test when the detected leak is more than 0.005 gph for the first 30 minutes.
Test data are acquired and recorded manually.

Calibration System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments The manufacturer does not support test results if the technician does not hold a current Petro-Tite certification when the test is performed. Re-certification is required by the manufacturer every 2 years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 03/11/91, 05/06/01



Issue Date: March 10, 2000
Revision Date: April 11, 2011

Purpora Engineering, Inc.
(originally listed as Heath Consultants, Inc.)

Petro Tite Line Tester
(for Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.99% and PFA = 0.37%.

Leak Threshold 0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Vendor claims this equipment can detect leaks at .01 gph, and trains operators to declare leaks at .01 gph.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4.

Specification System tests flexible pipelines.
Tests are conducted at 60 psi.
Mechanical line leak detectors shall be removed or manually isolated from pipeline for duration of test, or check valve in pump must be manually close dif testing is to be conducted with mechanical line leak detector in place.

Pipeline Capacity Maximum of 49.6 gallons.

Waiting Time None between delivery and testing.
None between dispensing and testing.

Test Period Minimum of 30 minute (two 15 minute readings) test when the detected leak does not exceed 0.005 gph, or minimum of 1 hour (four 15 minute readings) test when the detected leak is more than 0.005 gph for the first 30 minutes. Test data are acquired and recorded manually.

Calibration System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.

Comments The manufacturer does not support test results if the technician does not hold a current Petro-Tite certification when the test is performed. Re-certification is required by the manufacturer every 2 years.

Purpora Engineering Inc.
658 North Progress Drive
Saukville, WI 53080
Tel: (262) 536-4081
E-mail: info@purporaengineering.com
URL: www.purporaengineering.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 03/11/91, 12/07/94, 05/06/01

LINE TIGHTNESS TESTING
(ACURITE)

Issue Date: November 22, 1995
Revision Date: November 19, 2010

Training and Services Corp.
(originally listed as Hasstech)

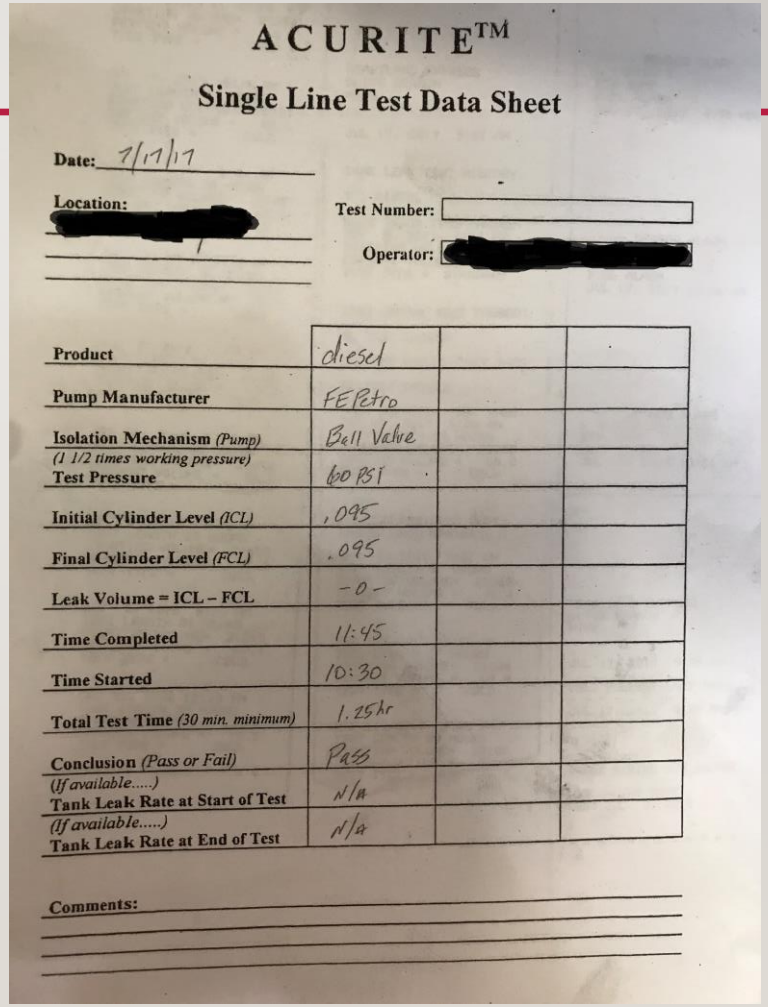
AcuRite
(for Rigid and Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification	Leak rate of 0.1 gph with PD = 100% and PFA = 0%.
Leak Threshold	0.01 gph. A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.
Applicability	Gasoline, diesel, aviation fuel, fuel oil #4.
Specification	System tests rigid and flexible pipelines. Tests are conducted at 150% operating pressure. Mechanical line leak detectors shall be removed or manually isolated from the pipeline for duration of test, or check valve in pump must be manually closed if testing is to be conducted with mechanical line leak detector in place.
Pipeline Capacity	Maximum of 150 gallons.
Waiting Time	Minimum of 6 hours between delivery and testing. Minimum of 30 minutes between dispensing and testing.
Test Period	Minimum of 30 minutes. Test data are acquired and recorded manually. Manual calculations are performed by the operator on site.
Calibration	System must be checked annually and, if necessary, calibrated in accordance with manufacturer's instructions.
Comments	Operating instructions include specific procedures for flexible pipelines. Formerly manufactured by Hasstech.

Training and Services Corp.
501 Bains St., Suite 113
Brookshire, TX 77423
Tel: (281) 934-3839

Evaluator: Lamar University
Tel: (409) 880-8788
Dates of Evaluations: 03/25/91, 04/02/01



ACURITE™

Single Line Test Data Sheet

Date: 7/17/17

Location: [redacted]

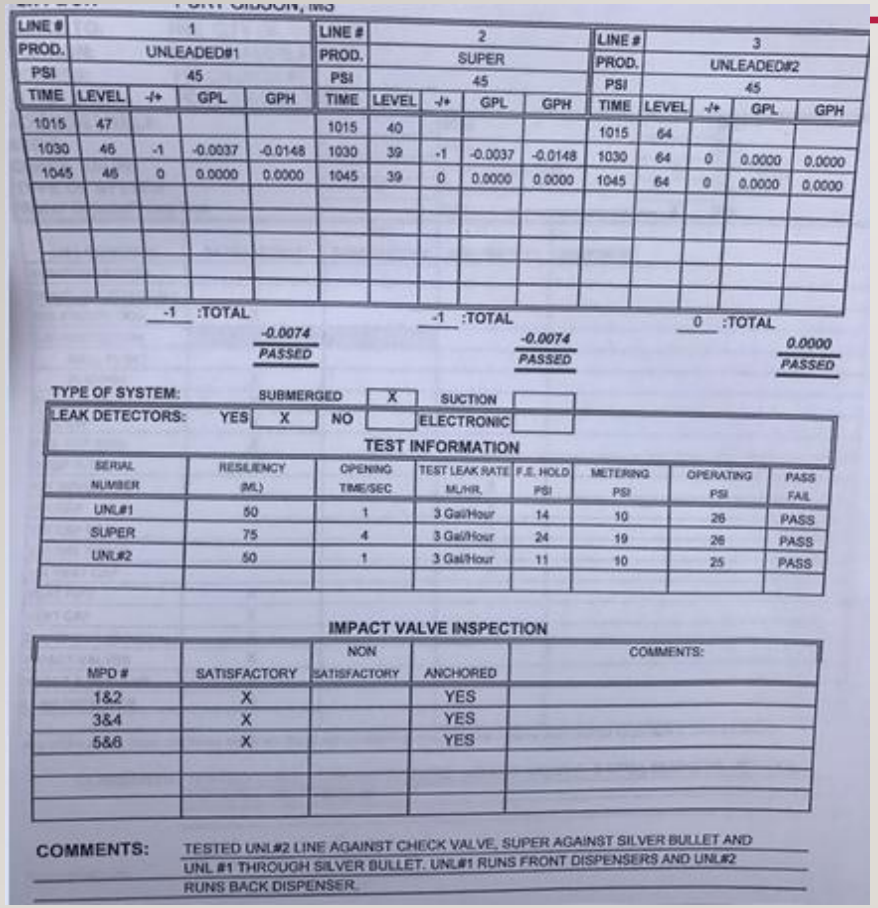
Test Number:

Operator: [redacted]

Product	diesel		
Pump Manufacturer	FEPetro		
Isolation Mechanism *(Pump)*	Ball Valve		
(1 1/2 times working pressure) Test Pressure	60 PSI		
Initial Cylinder Level *(ICL)*	.095		
Final Cylinder Level *(FCL)*	.095		
Leak Volume = ICL – FCL	-0-		
Time Completed	11:45		
Time Started	10:30		
Total Test Time *(30 min. minimum)*	1.25hr		
Conclusion *(Pass or Fail)*	Pass		
(If available.....) Tank Leak Rate at Start of Test	N/A		
(If available.....) Tank Leak Rate at End of Test	N/A		

Comments:

LINE TIGHTNESS TESTING
(ESTABROOKS)



LINE #	1				LINE #	2				LINE #	3			
PROD.	UNLEADED#1				PROD.	SUPER				PROD.	UNLEADED#2			
PSI	45				PSI	45				PSI	45			
TIME	LEVEL	-/+	GPL	GPH	TIME	LEVEL	-/+	GPL	GPH	TIME	LEVEL	-/+	GPL	GPH
1015	47				1015	40				1015	64			
1030	46	-1	-0.0037	-0.0148	1030	39	-1	-0.0037	-0.0148	1030	64	0	0.0000	0.0000
1045	46	0	0.0000	0.0000	1045	39	0	0.0000	0.0000	1045	64	0	0.0000	0.0000

-1 :TOTAL -0.0074 PASSED

-1 :TOTAL -0.0074 PASSED

0 :TOTAL 0.0000 PASSED

TYPE OF SYSTEM: SUBMERGED X SUCTION

LEAK DETECTORS: YES X NO ELECTRONIC

TEST INFORMATION

SERIAL NUMBER	RESILIENCY (ML)	OPENING TIME/SEC	TEST LEAK RATE ML/HR.	F.E. HOLD PSI	METERING PSI	OPERATING PSI	PASS FAIL
UNL#1	50	1	3 Gal/Hour	14	10	26	PASS
SUPER	75	4	3 Gal/Hour	24	19	26	PASS
UNL#2	50	1	3 Gal/Hour	11	10	25	PASS

IMPACT VALVE INSPECTION

MPD #	SATISFACTORY	NON SATISFACTORY	ANCHORED	COMMENTS:
1&2	X		YES	
3&4	X		YES	
5&6	X		YES	

COMMENTS: TESTED UNL#2 LINE AGAINST CHECK VALVE, SUPER AGAINST SILVER BULLET AND UNL #1 THROUGH SILVER BULLET. UNL#1 RUNS FRONT DISPENSERS AND UNL#2 RUNS BACK DISPENSER.

Issue Date: November 22, 1995
Revision Date: September 2, 2008

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek Manual Line Leak Detector (for Rigid Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 98.0% and PFA = 1%.

Leak Threshold 0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4.

Specification System tests fiberglass and steel pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed or manually isolated from pipeline for duration of test, or if testing is to be conducted with mechanical line leak detector in place, check valve in pump must be manually closed.

Pipeline Capacity Maximum of 426 gallons.

Waiting Time None between delivery and testing. None between dispensing and testing.

Test Period Under ideal conditions, 30 minutes; actual test time will depend on line size and temperature conditions at the site.
Data are collected every 15 minutes.
Three consecutive consistent readings are required for a valid test, with the first reading taken at zero time.
Test data are acquired and recorded manually.
Manual calculations performed by the operator on site.

Calibration No temperature sensors used.
No calibration required.
System must be checked annually in accordance with manufacturer's instructions.
Technicians must be certified by the manufacturer prior to using this equipment and recertified every two years.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 07/09/92, 05/21/08

Issue Date: October 13, 2006
Revision Date: September 2, 2008

Estabrook EZY CHEK Systems
(originally listed as Horner EZY CHEK)

EZY-Chek Manual Line Leak Detector (for Flexible Pipelines)

LINE TIGHTNESS TEST METHOD

Certification Leak rate of 0.1 gph with PD = 99.8% and PFA = 0.2%.

Leak Threshold 0.05 gph.
A pipeline system should not be declared tight if the test result indicates a loss that equals or exceeds this threshold.

Applicability Gasoline, diesel, aviation fuel, fuel oil #4.

Specification System tests flexible pipelines.
Tests are conducted at 150% operating pressure.
Mechanical line leak detector must be removed or manually isolated from pipeline for duration of test, or if testing is to be conducted with mechanical line leak detector in place, check valve in pump must be manually closed.

Pipeline Capacity Maximum of 101 gallons (example: 275 feet of 3 inch line).

Waiting Time None between delivery and testing. None between dispensing and testing.

Test Period Under ideal conditions, 30 minutes; actual test time will depend on line size and temperature conditions at the site.
Data are collected every 15 minutes.
Three consecutive consistent readings are required for a valid test.
Data from the evaluation suggests that the actual minimum test time for a line this size is 2 hours.
Test data are acquired and recorded manually.
Manual calculations performed by the operator on site.

Calibration No temperature sensors used.
No calibration required.
System must be checked annually in accordance with manufacturer's instructions.
Technicians must be certified by the manufacturer prior to using this equipment, and recertified every two years.

Estabrook EZY CHEK Systems
1505 Woodside Ave.
Essexville, MI 48732
Tel: (989) 891-9868
E-mail: sales@ezychek.com
URL: www.ezychek.com

Evaluator: Ken Wilcox Associates
Tel: (816) 443-2494
Dates of Evaluations: 07/09/92, 09/05/06

QUESTIONS

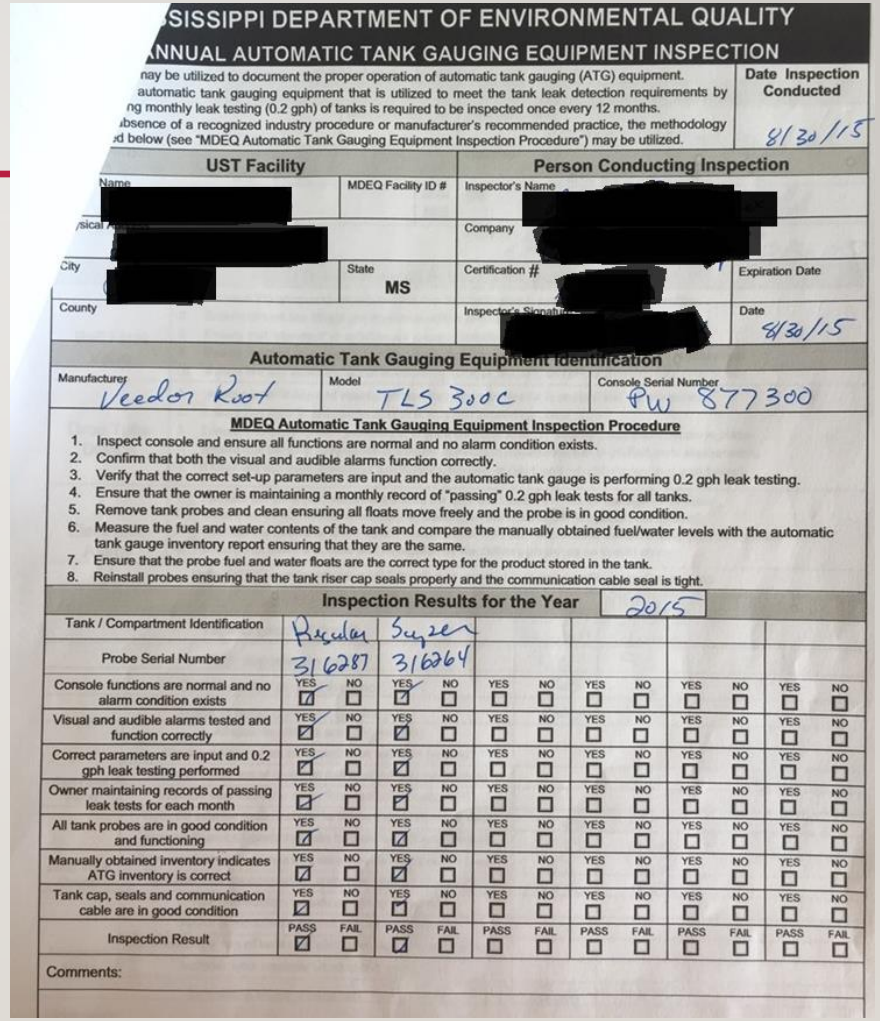
- Would you like an MDEQ formatted form to document LTTs?

TANK TIGHTNESS TESTS

- If you're NOT certified by the manufacturer to use the equipment then you need to get certified or recertified.
- If the manufacturer requires recertification of the equipment then it must be recertified.

ANNUAL ATG INSPECTIONS
(WHAT SHOULD YOU BE CHECKING?)

- Basically anything that may affect the leak detection tests including but not limited to:
  - Tank diameter & Capacity
  - Product stored thermal coefficient
- You should be printing off the Setup information to verify the above. Attach the setup info to the MDEQ test form.
- Do you have to pull the probe to verify?
  - Yes. You have to verify that all floats will operate freely and show up properly on the ATG.



SISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

NNUAL AUTOMATIC TANK GAUGING EQUIPMENT INSPECTION

nay be utilized to document the proper operation of automatic tank gauging (ATG) equipment. automatic tank gauging equipment that is utilized to meet the tank leak detection requirements by ng monthly leak testing (0.2 gph) of tanks is required to be inspected once every 12 months. bsence of a recognized industry procedure or manufacturer's recommended practice, the methodology d below (see "MDEQ Automatic Tank Gauging Equipment Inspection Procedure") may be utilized.

Date Inspection Conducted: 8/30/15

UST Facility

Name: [redacted]

MDEQ Facility ID #:

City: [redacted]

State: MS

County:

Person Conducting Inspection

Inspector's Name: [redacted]

Company: [redacted]

Certification #: [redacted]

Expiration Date:

Inspector's Signature: [redacted]

Date: 8/30/15

Automatic Tank Gauging Equipment Identification

Manufacturer	Model	Console Serial Number
Veeder Root	TLS 300C	PW 877300

MDEQ Automatic Tank Gauging Equipment Inspection Procedure

1. Inspect console and ensure all functions are normal and no alarm condition exists.
2. Confirm that both the visual and audible alarms function correctly.
3. Verify that the correct set-up parameters are input and the automatic tank gauge is performing 0.2 gph leak testing.
4. Ensure that the owner is maintaining a monthly record of "passing" 0.2 gph leak tests for all tanks.
5. Remove tank probes and clean ensuring all floats move freely and the probe is in good condition.
6. Measure the fuel and water contents of the tank and compare the manually obtained fuel/water levels with the automatic tank gauge inventory report ensuring that they are the same.
7. Ensure that the probe fuel and water floats are the correct type for the product stored in the tank.
8. Reinstall probes ensuring that the tank riser cap seals properly and the communication cable seal is tight.

Inspection Results for the Year 2015

Tank / Compartment Identification	Regular	Super										
Probe Serial Number	316287	316264										
Console functions are normal and no alarm condition exists	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
Visual and audible alarms tested and function correctly	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
Correct parameters are input and 0.2 gph leak testing performed	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
Owner maintaining records of passing leak tests for each month	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
All tank probes are in good condition and functioning	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
Manually obtained inventory indicates ATG inventory is correct	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
Tank cap, seals and communication cable are in good condition	YES ☑	NO ☐	YES ☑	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐	YES ☐	NO ☐
Inspection Result	PASS ☑	FAIL ☐	PASS ☑	FAIL ☐	PASS ☐	FAIL ☐	PASS ☐	FAIL ☐	PASS ☐	FAIL ☐	PASS ☐	FAIL ☐

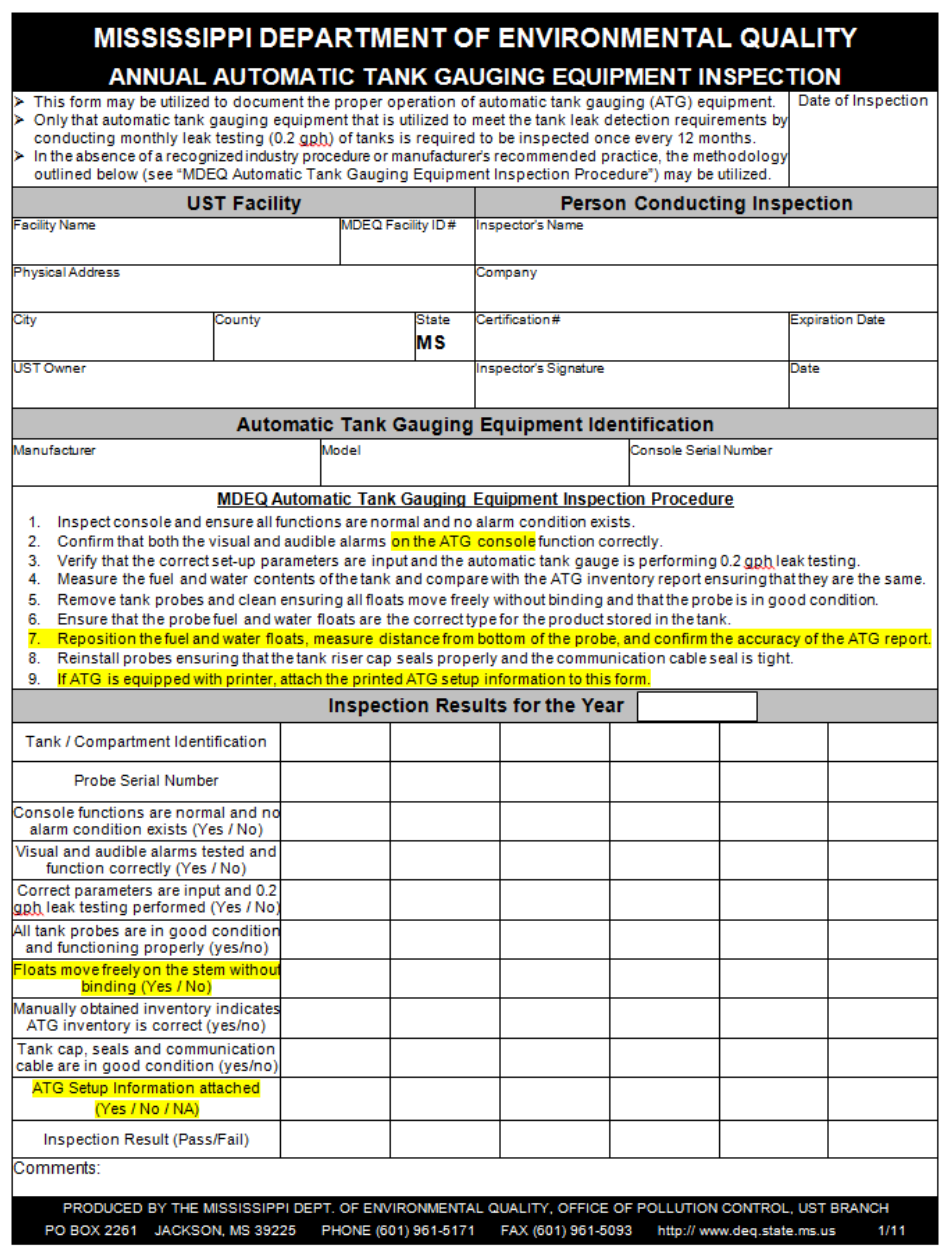
Comments:

NEW AUTOMATIC TANK GAUGING EQUIPMENT INSPECTION FORM

Effective November 1st, 2017

Removed requirement that you verify the tank owner is keeping up with the 0.2 gph leak test records.

Remember: On 0.2 gph CSLDs, tank owner must have print out monthly showing that their checking it.



MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL AUTOMATIC TANK GAUGING EQUIPMENT INSPECTION

- This form may be utilized to document the proper operation of automatic tank gauging (ATG) equipment.
- Only that automatic tank gauging equipment that is utilized to meet the tank leak detection requirements by conducting monthly leak testing (0.2 gph) of tanks is required to be inspected once every 12 months.
- In the absence of a recognized industry procedure or manufacturer's recommended practice, the methodology outlined below (see "MDEQ Automatic Tank Gauging Equipment Inspection Procedure") may be utilized.

Date of Inspection

UST Facility			Person Conducting Inspection	
Facility Name	MDEQ Facility ID #		Inspector's Name	
Physical Address			Company	
City	County	State MS	Certification #	Expiration Date
UST Owner			Inspector's Signature	Date

Automatic Tank Gauging Equipment Identification

Manufacturer	Model	Console Serial Number

MDEQ Automatic Tank Gauging Equipment Inspection Procedure

1. Inspect console and ensure all functions are normal and no alarm condition exists.
2. Confirm that both the visual and audible alarms on the ATG console function correctly.
3. Verify that the correct set-up parameters are input and the automatic tank gauge is performing 0.2 gph leak testing.
4. Measure the fuel and water contents of the tank and compare with the ATG inventory report ensuring that they are the same.
5. Remove tank probes and clean ensuring all floats move freely without binding and that the probe is in good condition.
6. Ensure that the probe fuel and water floats are the correct type for the product stored in the tank.
7. Reposition the fuel and water floats, measure distance from bottom of the probe, and confirm the accuracy of the ATG report.
8. Reinstall probes ensuring that the tank riser cap seals properly and the communication cable seal is tight.
9. If ATG is equipped with printer, attach the printed ATG setup information to this form.

Inspection Results for the Year ____

Tank / Compartment Identification						
Probe Serial Number						
Console functions are normal and no alarm condition exists (Yes / No)						
Visual and audible alarms tested and function correctly (Yes / No)						
Correct parameters are input and 0.2 gph leak testing performed (Yes / No)						
All tank probes are in good condition and functioning properly (yes/no)						
Floats move freely on the stem without binding (Yes / No)						
Manually obtained inventory indicates ATG inventory is correct (yes/no)						
Tank cap, seals and communication cable are in good condition (yes/no)						
ATG Setup Information attached (Yes / No / NA)						
Inspection Result (Pass/Fail)						

Comments:

PRODUCED BY THE MISSISSIPPI DEPT. OF ENVIRONMENTAL QUALITY, OFFICE OF POLLUTION CONTROL, UST BRANCH

PO BOX 2261 JACKSON, MS 39225 PHONE (601) 961-5171 FAX (601) 961-5093 http:// www.deq.state.ms.us 1/11

QUESTIONS?

- Anyone have a good way to pull a probe without damaging the wire connection?

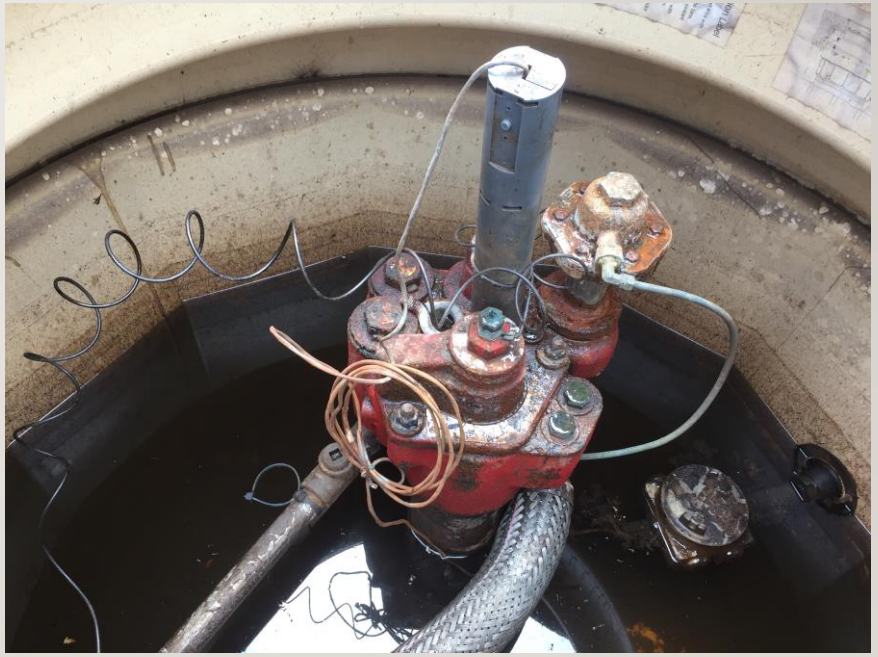
ANNUAL SENSOR TESTING

- If the sensors do not activate both audible and visible alarms on the ATG console then it is a **FAIL**.
- You should attach the sensor alarms printed from the ATG and attach to the MDEQ test form.
- Sensors do become stuck / corroded. It maybe necessary to jar a sensor / flip it to get it to activate. Is that good enough for a test?
  - Ideally it should be submerged in fluid or another approved method by the manufacture.
- The position of the sensor matters:
  - For Fiberglass tanks you cannot use a bell or float type sensor. Sensor must be pulled around to the bottom of the tank IT.
  - For float sensors, they typically require about 1" to be submerged to activate. For sumps they should be installed1 – 2" from the bottom.

SENSOR POSITIONING

FLOAT SENSOR IN FRP TANK, NO GOOD

LIKE WISE, WHAT GOOD IS THIS ONE DOING?



ANNUAL SENSOR TESTING
(EXAMPLES)

Looks good at first….

But look closer.

Test Rejected

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

ANNUAL ELECTRONIC INTERSTITIAL MONITORING DEVICE TESTING

- This form may be utilized to document functionality testing of electronic interstitial monitoring devices.
- Testing of electronic interstitial monitoring devices is required at least once every 12 months.
- In the absence of an approved 3rd party test procedure or manufacturer's recommended practice, the "MDEQ Electronic Monitoring Device Test Procedure" outlined below may be utilized.

Date of Test: June 2, 2017

UST Facility			Person Conducting Test	
Facility Name [redacted]	MDEQ Facility ID # [redacted]		Tester's Name [redacted]	
Physical Address [redacted]			Company [redacted]	
City [redacted]	County [redacted]	State MS	Certification #	Expiration Date
UST Owner			Tester's Signature [redacted]	Date June 2, 2017

Electronic Interstitial Monitoring Device Testing

Reason for Test	☐ New Installation ☒ Existing Installation (annual test)
Type of Sensor	☒ Float Switch (☐ discriminating ☒ non-discriminating)
	☐ Optical Sensor
	☐ Electrical Resistance Sensor
	☐ Pressure / Vacuum Monitoring Device
	☐ Other (specfy)

MDEQ Electronic Monitoring Device Test Procedure

1. Confirm that the electronic monitoring device is properly installed.
2. Visually examine the device to ensure that it is not damaged or corroded and any moving parts are free.
3. Cause a condition that should trigger the sensor to alarm (e.g. submerge sensor in appropriate fluid).
4. Ensure that the alarm condition causes the appropriate response (e.g. alarm sounds, STP shutdown, etc.…).
5. Note in the facility alarm history records that this alarm was the result of an annual functionality test.
6. Ensure that the electronic interstitial monitoring device is properly installed.

Test Data for the Year 2017

Sensor ID (product stored or dispenser number)	L1	L2	L3	L4	L5	L6	L7	
Sensor Installed Correctly (yes/no)	yes	yes	yes	yes	yes	yes	yes	
Sensor in Good Condition (yes/no)	yes	yes	yes	yes	yes	yes	yes	
Sensor Functioning Correctly (yes/no)	yes	yes	yes	yes	yes	yes	yes	
Test Result (Pass/Fail)	Pass	Pass	Pass	Pass	Pass	Pass	Pass	

Comments:

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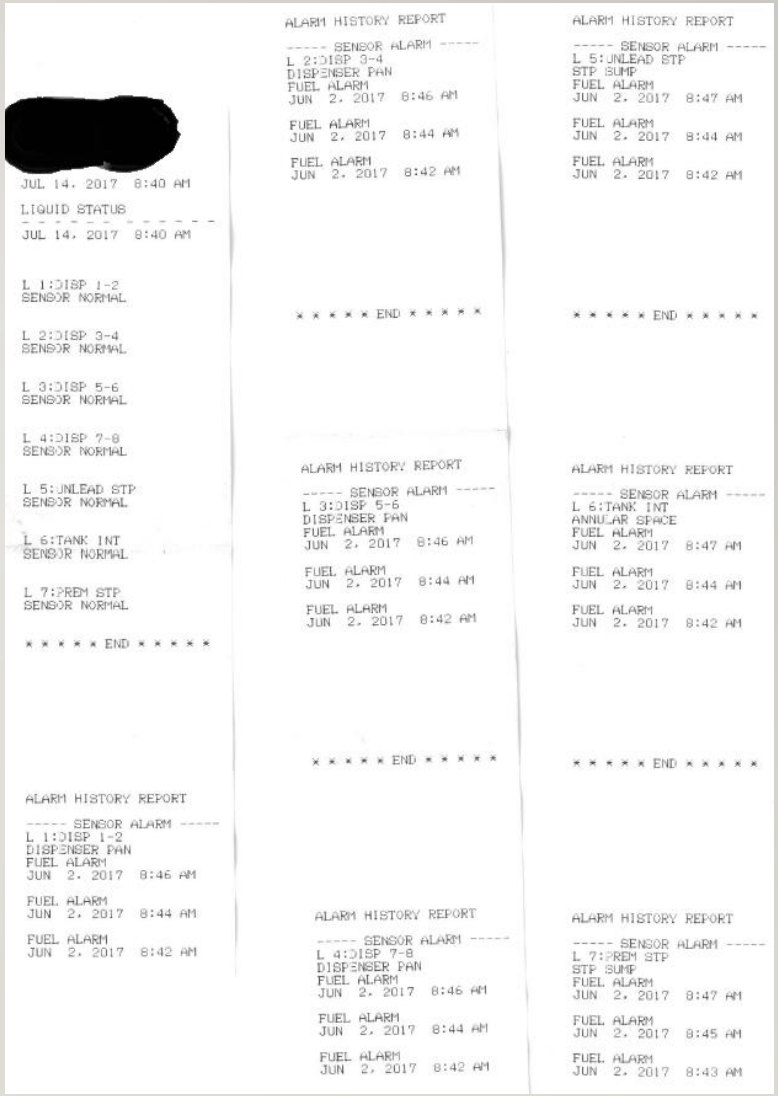
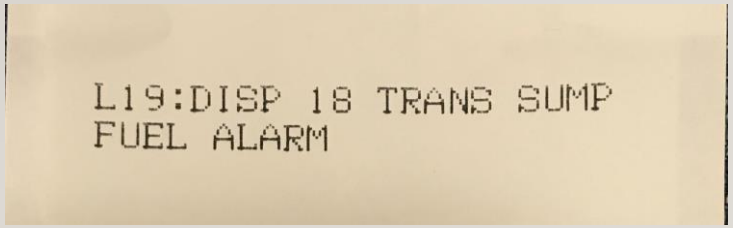


NEW ANNUAL ELECTRONIC INTERSTITIAL MONITORING DEVICE TESTING FORM

- Effective November 1st, 2017
- Attach alarm report generated from test. (either each alarm or the full history to document testing)
- Examples:



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ANNUAL ELECTRONIC INTERSTITIAL MONITORING DEVICE TESTING

- This form may be utilized to document functionality testing of electronic interstitial monitoring devices.
- Testing of electronic interstitial monitoring devices is required at least once every 12 months.
- In the absence of an approved 3rd party test procedure or manufacturer's recommended practice, the "MDEQ Electronic Monitoring Device Test Procedure" outlined below may be utilized.

Date of Test

UST Facility			Person Conducting Test	
Facility Name	MDEQ Facility ID#		Tester's Name	
Physical Address			Company	
City / County / State (MS)			Certification#	Expiration Date
UST Owner			Tester's Signature	Date

Electronic Interstitial Monitoring Device Testing

Reason for Test	☐ New Installation ☐ Existing Installation (annual test)
Type of Sensor	☐ Float Switch (☐ discriminating ☐ non-discriminating)
	☐ Optical Sensor ☐ Electrical Resistance Sensor
	☐ Pressure / Vacuum Monitoring Device ☐ Other (specfy)_____

MDEQ Electronic Monitoring Device Test Procedure

1. Confirm that the electronic monitoring device is properly installed and labeled properly.
2. Visually examine the device to ensure that it is not damaged or corroded and any moving parts are free.
3. Cause a condition that should trigger the sensor to alarm (submerge sensor in appropriate fluid).
4. Ensure that the alarm condition causes the appropriate response (e.g. visual and audible alarms, STP shutdown, etc)
5. Note in the facility alarm history records that this alarm was the result of an annual functionality test.
6. Ensure that the electronic interstitial monitoring device is reinstalled properly.
7. If ATG is equipped with printer, attach the printed alarms reports that resulted from sensor testing to this form.

Test Data for the Year								
Sensor ID (product stored or dispenser number)								
Sensor Installed Correctly (Yes / No)								
Sensor in Good Condition (Yes / No)								
When placed in test fluid, does the sensor trigger an alarm (Yes / No)								
Visual and audible alarms function correctly (Yes / No)								
Sensor labeled properly (Yes / No)								
Alarm reports printed and attached (Yes / No / NA)								
Test Result (Pass/Fail)								

Comments:

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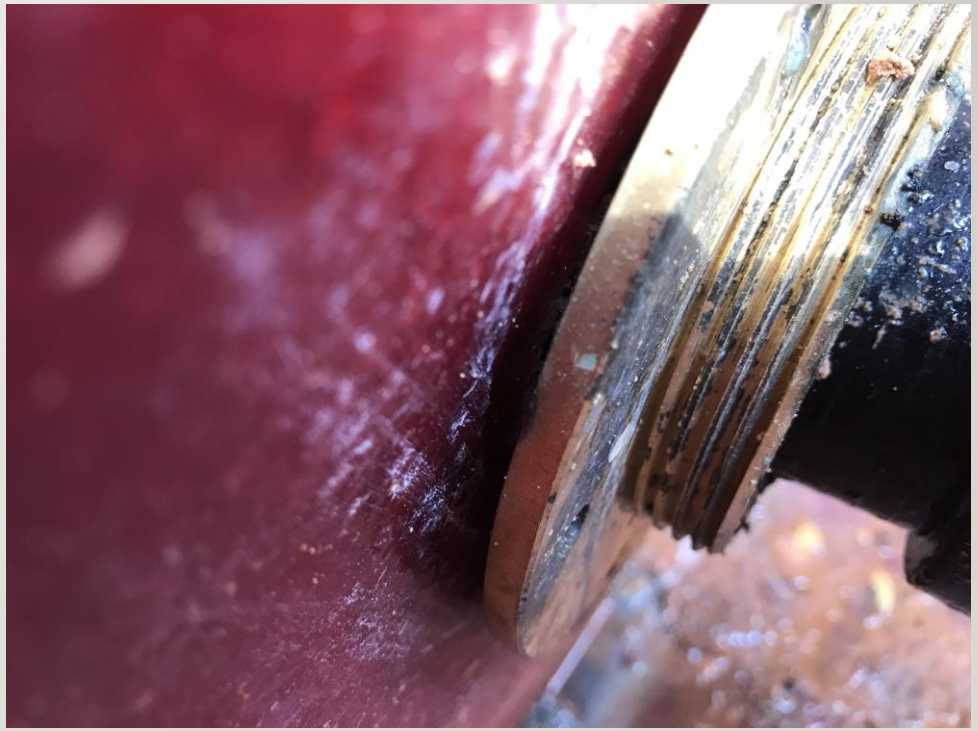
QUESTIONS OR COMMENTS?

ANNUAL SUMP INSPECTIONS
(WHAT IS A FAILING SUMP INSPECTION?)

- If water is in the sump, it is a FAIL.
- Are any boots (including conduit boots) cracked or not sealed properly?
- Are all electrical conduits visibly liquid tight?
- If you question the sumps integrity, you should fail it.
- Failing sump inspections should be followed by an Integrity test to confirm it as tight.
- MDEQ inspectors look for these so you should be also.

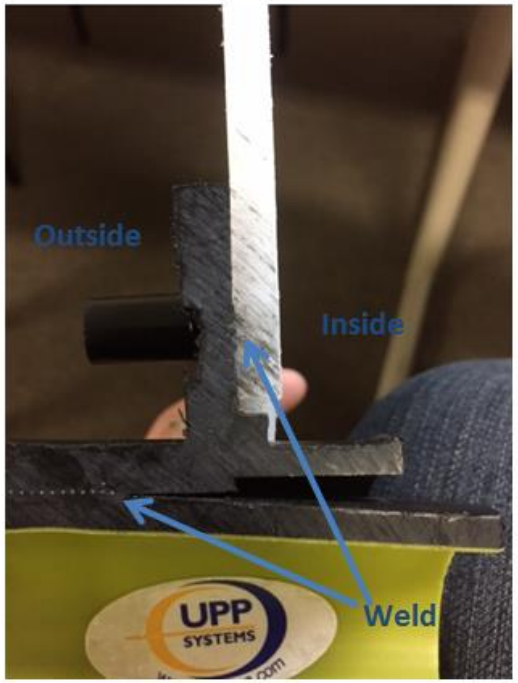
EXAMPLES

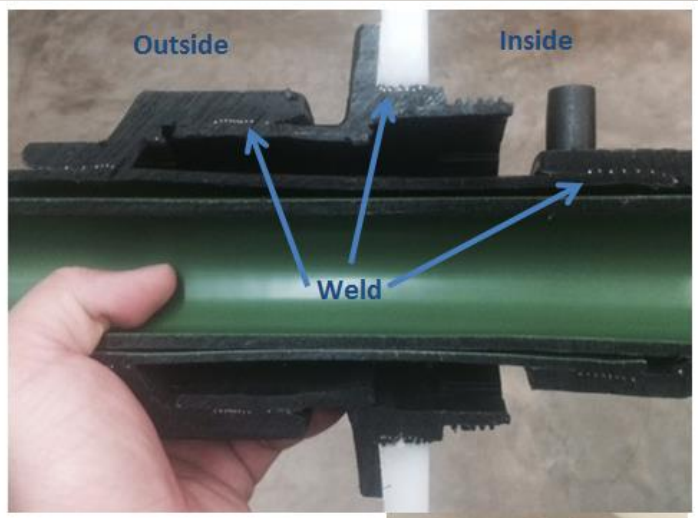
MORE EXAMPLES



SOME NOT SO VISIBLE EXAMPLES

(NUPI / UPP WELDED FITINGS)



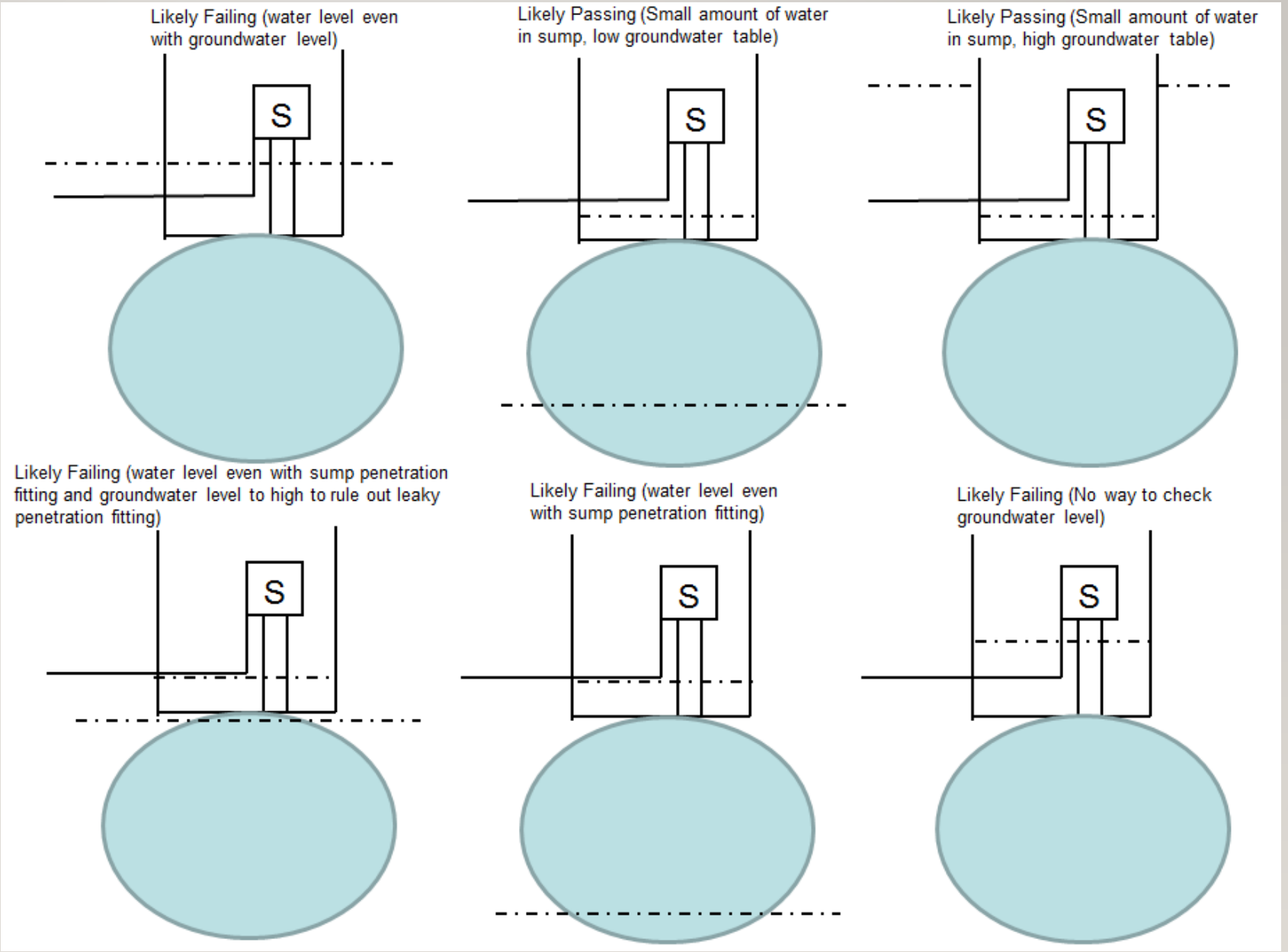


ANNUAL SUMP INSPECTION

(TIPS)

- If water is present in the sump and in contact with any penetration fitting or seam. Look closely at fitting were top of water is.
- Verify groundwater level
- What does groundwater level tell you?

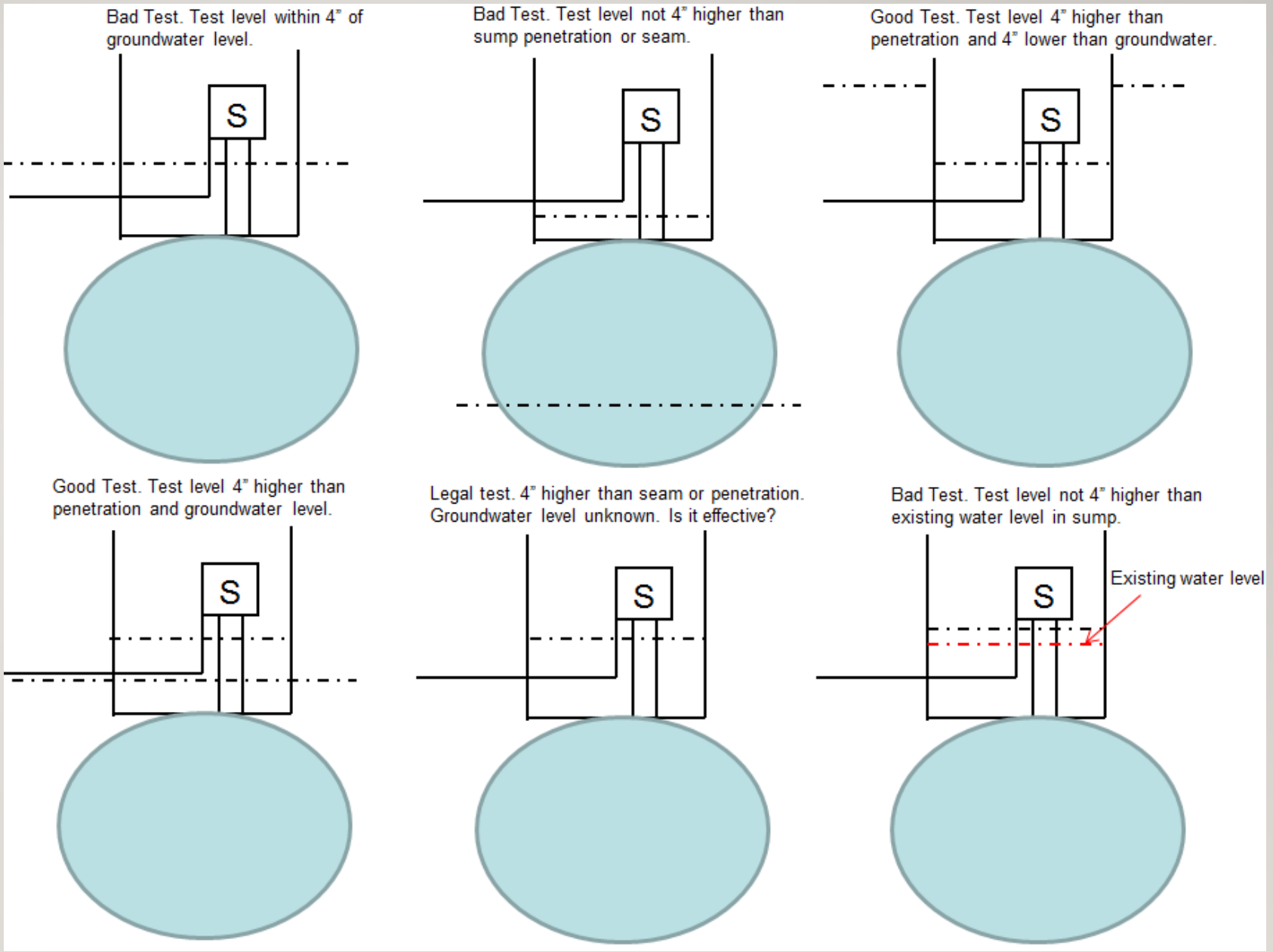
- So you see water during an annual sump inspection, what does that tell you?
  - Fail.
- Is there any guarantee that the water came from the lid and not a sump penetration or seam?
  - No.
- It's still a fail, regardless of the scenario and should require an Integrity test to be done.
- Can you be confident that it's going to pass or fail an integrity test.
  - Absolutely but it still is a fail and requires an integrity test.



SUMP INTEGRITY TESTS
(SOON TO BE 3 YEAR REQUIREMENT)

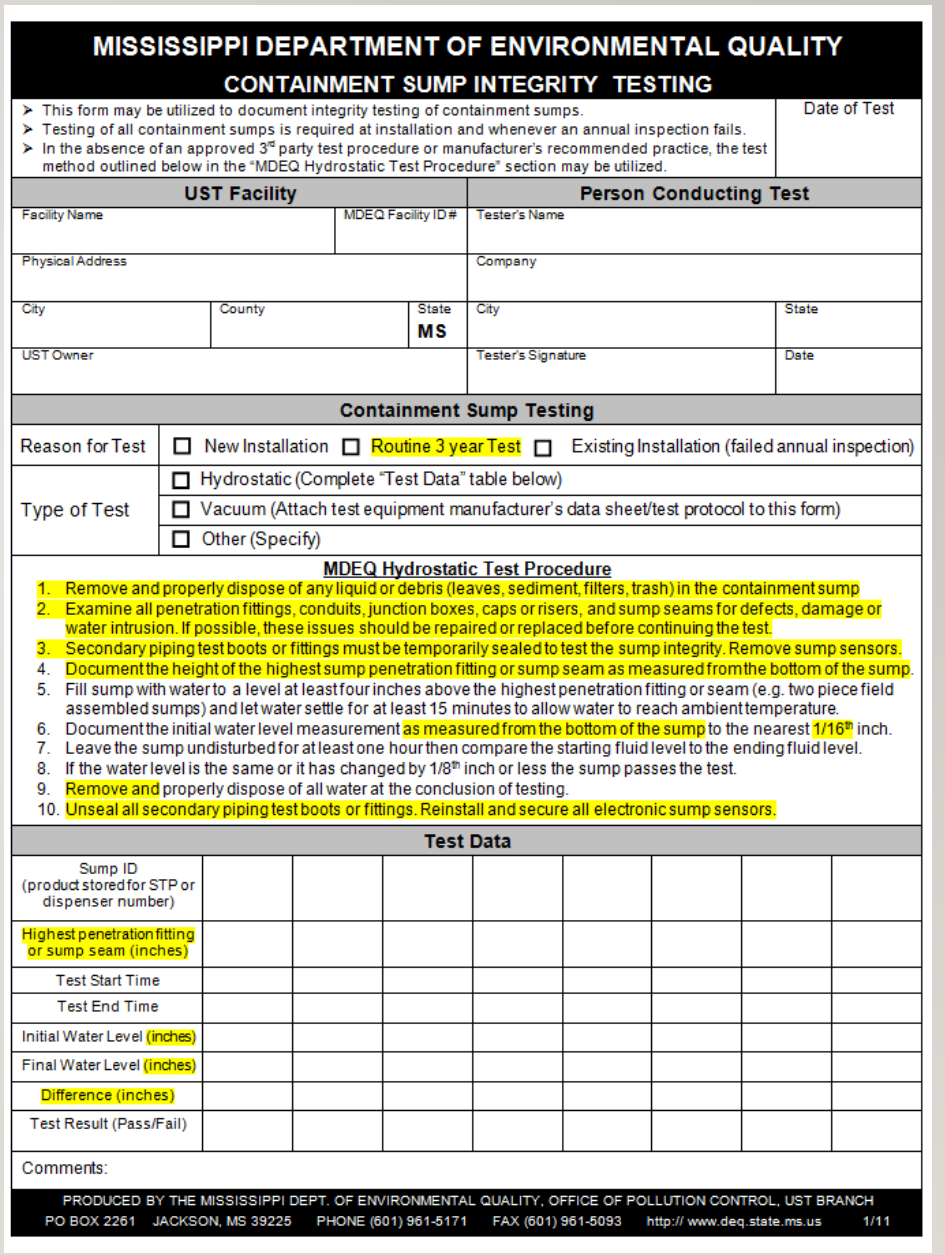
- Currently applicable to all New Installations and any time a sump fitting is repaired or replaced.
- MDEQ Recommendation:
  - Existing installs after 10/1/08 do annual sump inspections.
  - Look closely. You can catch and fix most issues before the 3 yr. integrity test requirement.
  - Will increase your sump passing rate and decrease your headache.

- How effective is your integrity test?
- Why is the groundwater level important?
- Point being, run an effective test to the best of your ability.
- We don't expect a leveling survey but just common sense testing.
- Gasoline drains at a rate 2X faster than water under same amount of pressure
- So even if your sump passes at (<1/8"). How critical would that be if it were gas in there and not water?
- Same concept applies to spill buckets testing



NEW CONTAINMENT SUMP INTEGRITY TESTING FORM

- Effective November 1st, 2017
- Requires measurement of height of highest penetration fitting or sump seam.



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CONTAINMENT SUMP INTEGRITY TESTING

- This form may be utilized to document integrity testing of containment sumps.
- Testing of all containment sumps is required at installation and whenever an annual inspection fails.
- In the absence of an approved 3rd party test procedure or manufacturer's recommended practice, the test method outlined below in the "MDEQ Hydrostatic Test Procedure" section may be utilized.

Date of Test

UST Facility			Person Conducting Test	
Facility Name	MDEQ Facility ID #		Tester's Name	
Physical Address			Company	
City	County	State MS	City	State
UST Owner			Tester's Signature	Date

Containment Sump Testing

Reason for Test	☐ New Installation ☐ Routine 3 year Test ☐ Existing Installation (failed annual inspection)
Type of Test	☐ Hydrostatic (Complete "Test Data" table below)
	☐ Vacuum (Attach test equipment manufacturer's data sheet/test protocol to this form)
	☐ Other (Specify)

MDEQ Hydrostatic Test Procedure

1. Remove and properly dispose of any liquid or debris (leaves, sediment, filters, trash) in the containment sump
2. Examine all penetration fittings, conduits, junction boxes, caps or risers, and sump seams for defects, damage or water intrusion. If possible, these issues should be repaired or replaced before continuing the test.
3. Secondary piping test boots or fittings must be temporarily sealed to test the sump integrity. Remove sump sensors.
4. Document the height of the highest sump penetration fitting or sump seam as measured from the bottom of the sump.
5. Fill sump with water to a level at least four inches above the highest penetration fitting or seam (e.g. two piece field assembled sumps) and let water settle for at least 15 minutes to allow water to reach ambient temperature.
6. Document the initial water level measurement as measured from the bottom of the sump to the nearest 1/16th inch.
7. Leave the sump undisturbed for at least one hour then compare the starting fluid level to the ending fluid level.
8. If the water level is the same or it has changed by 1/8th inch or less the sump passes the test.
9. Remove and properly dispose of all water at the conclusion of testing.
10. Unseal all secondary piping test boots or fittings. Reinstall and secure all electronic sump sensors.

Test Data

Sump ID (product stored for STP or dispenser number)								
Highest penetration fitting or sump seam (inches)								
Test Start Time								
Test End Time								
Initial Water Level (inches)								
Final Water Level (inches)								
Difference (inches)								
Test Result (Pass/Fail)								

Comments:

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SUMP WATER INTRUSION FROM LIDS
(MITIGATION TIPS)

New Installations:

- Layer the backfill material with top layer being pea gravel or crushed stone.
  - Check with Tank Manufacturer.
  - Install Filter Fabric.
- Raise the grade a few feet if you know / suspect the site will have water issues due to extremely high water table.
- Slope concrete properly

Existing Installations:

(Surface Water Intrusion)

- Periodically clean out soil around lid.
- Create a trough around sump lip with filter fabric / gravel to increase drainage area.
- Manway mats

(Extremely high water table)

- Retrofit sump lid.
- Raise the height of the sump.

SURFACE WATER INTRUSION
(PRODUCTS ARE AVAILABLE)

Note: MDEQ does not promote these products nor are we aware as to how effective they are.

QUESTIONS OR COMMENTS?

CP TESTING
(BOOTS AND SUMPS)

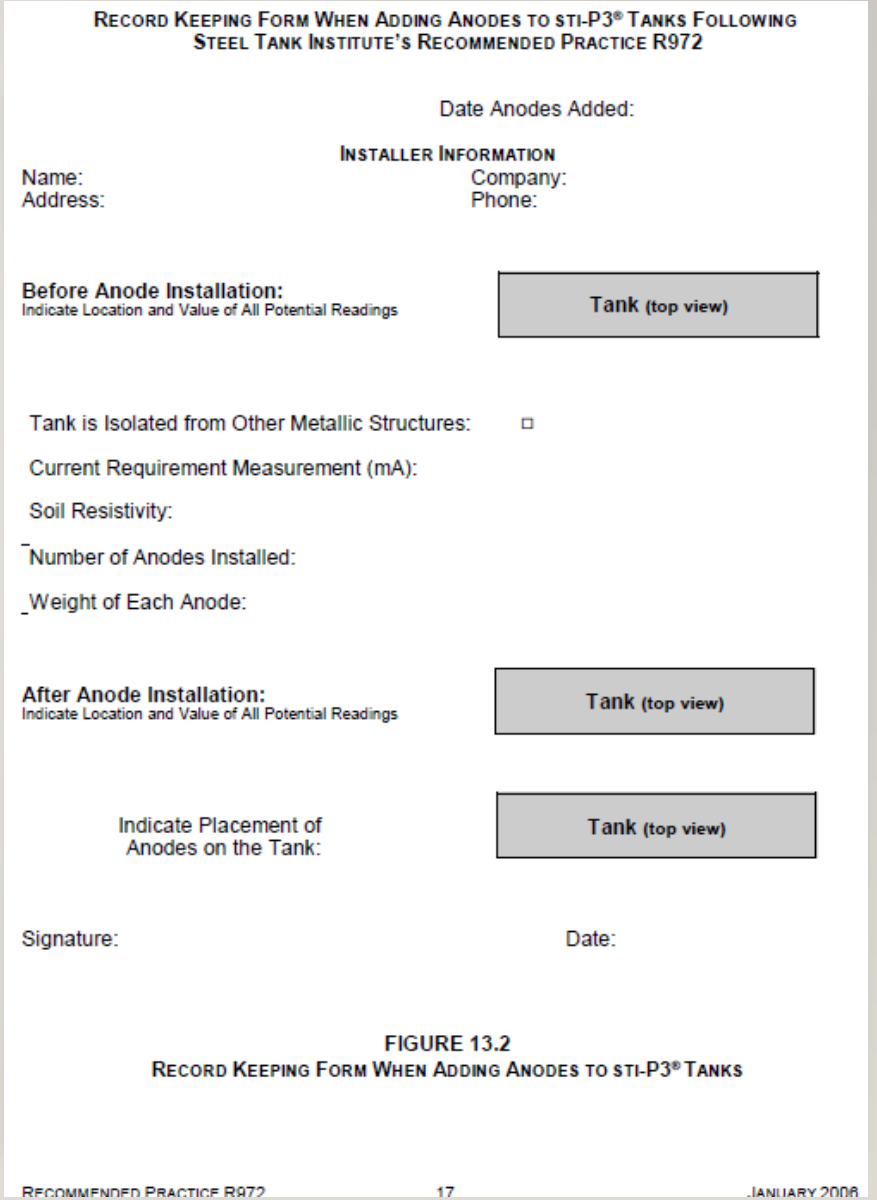
- CP test is meant for you to verify the condition and protection of all metallic UST components.
- Just because registration says its booted or contained in sumps doesn't mean that it is.
  - You should verify the presence and condition of all boots (within reason).
  - You should verify that water intrusion doesn't appear to be an issue with any containment sumps.
  - If you can't confirm it you should fail it.
- Zipper boots if submerged or if high water level in piping trench (monitoring wells) should be failed.

CP TESTING
(GALVANIC CP ERRORS)

- Test your remote by moving it. If both remotes within 10mV of each other you have a good remote.
- Locals should be taken away from any visible anodes in Dispenser or STP manways.
- Both local and remote must be >850 mV.
- What can a good remote tell you?
  - Continuity between structures.
  - Shorting out of galvanic anodes:
    - Ex. -1100 mV local, -750 mV remote
    - You should check continuity of canopy, conduits, water lines, etc. for the short.

ADDING GALVANIC ANODES TO A CP SYSTEMS
(STIP3 TANKS)

If you install new anodes on a STIp3 tank without a corrosion expert you must provide MDEQ with this checklist to document that STI R972 was followed.



RECORD KEEPING FORM WHEN ADDING ANODES TO STI-P3® TANKS FOLLOWING STEEL TANK INSTITUTE'S RECOMMENDED PRACTICE R972

Date Anodes Added:

INSTALLER INFORMATION

Name: Company:
Address: Phone:

Before Anode Installation:
Indicate Location and Value of All Potential Readings

Tank (top view)

Tank is Isolated from Other Metallic Structures: ☐

Current Requirement Measurement (mA):

Soil Resistivity:

Number of Anodes Installed:

Weight of Each Anode:

After Anode Installation:
Indicate Location and Value of All Potential Readings

Tank (top view)

Indicate Placement of Anodes on the Tank:

Tank (top view)

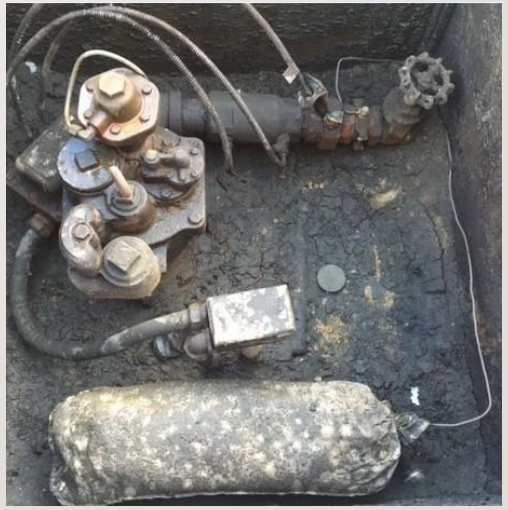
Signature: Date:

FIGURE 13.2
RECORD KEEPING FORM WHEN ADDING ANODES TO STI-P3® TANKS

RECOMMENDED PRACTICE R972 17 JANUARY 2006

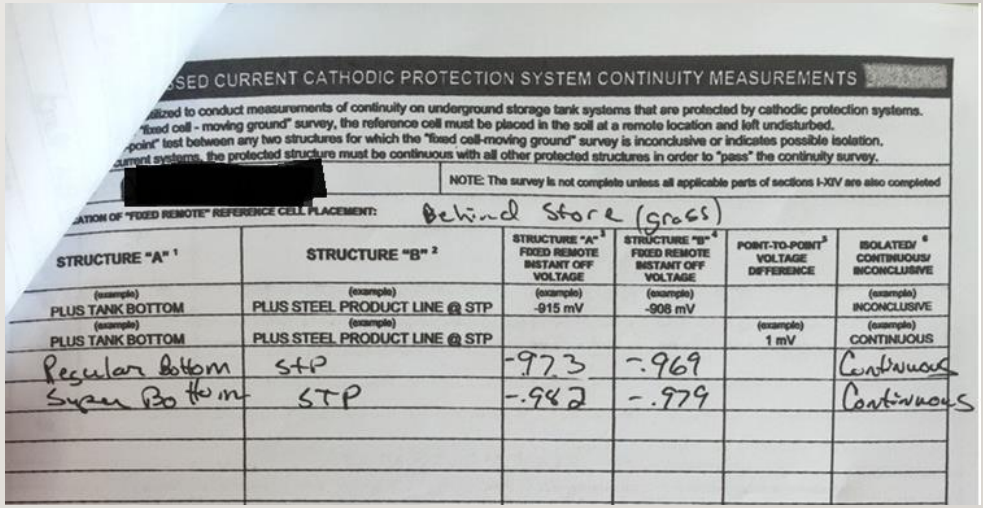
ADDING GALVANIC ANODES TO A CP SYSTEMS
(PIPING AND PIPE TERMINATIONS)

- If you install new anodes for a pipe or pipe termination you should follow similar steps as STI R972 publication and take care to confirm isolation from all other structures.
- All anodes installed MUST be at least One (1) foot below the structure being protected.



CP TESTING
(IMPRESSED CURRENT SYSTEM ERRORS)

- How important is continuity?
  - Tested with IC system OFF
  - All structures protected should be confirmed as continuous with rectifier.
    - Not just fill risers and STP.
    - Includes all pipe terminations.
  - All should be documented on the CP test.
  - If component is NOT continuous it is failing regardless of the readings you get. Unless component is galvanically protected or booted.
- Local reading only. Taken directly above the structure being tested. Drill holes if necessary.



SED CURRENT CATHODIC PROTECTION SYSTEM CONTINUITY MEASUREMENTS

...ilized to conduct measurements of continuity on underground storage tank systems that are protected by cathodic protection systems. ..."fixed cell - moving ground" survey, the reference cell must be placed in the soil at a remote location and left undisturbed. ...-point" test between any two structures for which the "fixed cell-moving ground" survey is inconclusive or indicates possible isolation. ...current systems, the protected structure must be continuous with all other protected structures in order to "pass" the continuity survey.

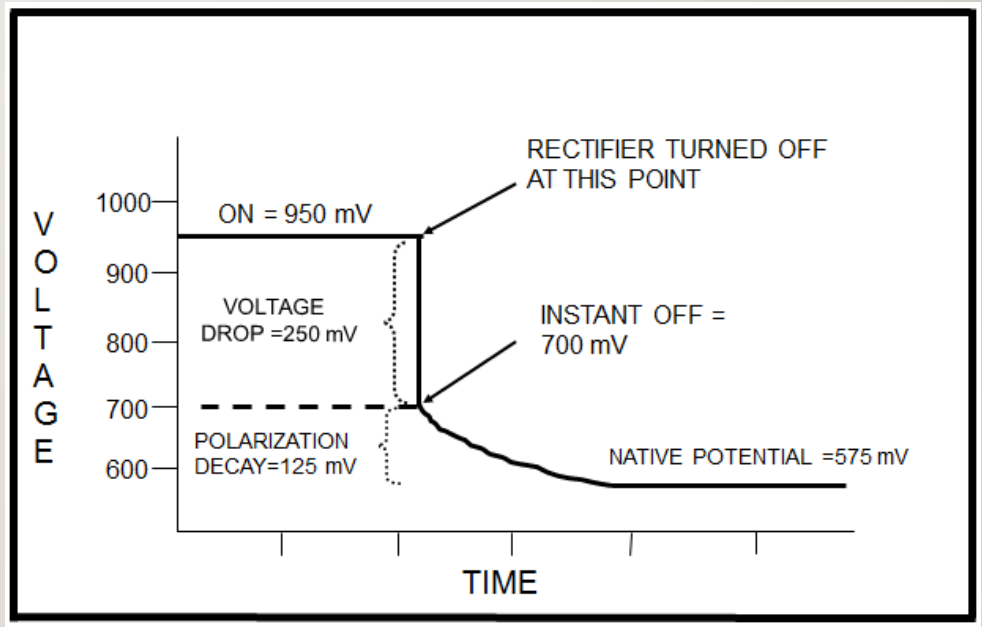
NOTE: This survey is not complete unless all applicable parts of sections I-XIV are also completed

...ATION OF "FIXED REMOTE" REFERENCE CELL PLACEMENT: Behind Store (grass)

STRUCTURE "A" [1]	STRUCTURE "B" [2]	STRUCTURE "A" [3] FIXED REMOTE INSTANT OFF VOLTAGE	STRUCTURE "B" [4] FIXED REMOTE INSTANT OFF VOLTAGE	POINT-TO-POINT [5] VOLTAGE DIFFERENCE	ISOLATED/ [6] CONTINUOUS/ INCONCLUSIVE
(example) PLUS TANK BOTTOM	(example) PLUS STEEL PRODUCT LINE @ STP	(example) -915 mV	(example) -908 mV		(example) INCONCLUSIVE
(example) PLUS TANK BOTTOM	(example) PLUS STEEL PRODUCT LINE @ STP			(example) 1 mV	(example) CONTINUOUS
Regular Bottom	STP	-.973	-.969		Continuous
Super Bottom	STP	-.982	-.979		Continuous

CP TESTING
(IMPRESSED CURRENT SYSTEM ERRORS)

- Common misconception >100mV polarization
  - This is 100 mV below your instant off reading.
- If component is continuous with rectifier, it should not have a galvanic anode attached to it unless it is in a sump. If you suspect that it does:
  - Verify that component is polarized > 100 mV. If so its cool.
  - If NOT polarized 100 mV, or if reading rises [becomes more (-)] the galvanic anode is affecting the reading. Anode should be removed, retest component, and pass or fail.



CP TESTING
(MIXED SYSTEMS)

- Mixed systems being a combination of galvanic components, IC components, or jacketed components.
- Testing revolves around the rectifier.
- Verify continuity of ALL UST components to the rectifier to see what is what. Document all on CP survey.
- Test all galvanic components (isolated from rectifier) with a local and remote. Rectifier should be OFF when you do.
- Cycle the rectifier ON / OFF and watch what happens to the voltage on the galvanic or jacketed components.
  - If reading changes (+ / -) it indicates interference from the IC system onto that component.
  - That component should be tied into IC system to prevent stray current from damaging it.

CP TESTING
(RECAP OF REASONS TO FAIL CP)

- If you can't verify all boots during survey.
- If you can't verify or suspect that sumps routinely hold water.
- If you can't get -850 mV instant off or 100mV polarization on IC system component.
- If any component of IC system is isolated (> 6 mV difference) from the rectifier negative.
- If you can't get -850 mV for both Local and Remote on a Galvanic component.
- If any component of a mixed system appears to be receiving stray current from the rectifier.

CP TESTING
(WHEN IS CORROSION EXPERT NEEDED)

- Anytime you have to adjust a rectifier's output voltage.
- If you can't get passing readings but believe the component is passing.
- Anytime the anode ground bed of an IC system has to be modified.
- If you add anodes to a STIp3 tank and don't follow a recommended practice.
- Anytime you run a test and get questionable results beyond your scope of expertise.

CP TESTING CERTIFICATION

(APPROVED COURSES)

- Alabama Petroleum Equipment Contractors (ALPEC)
- Georgia Tank & Equipment Contractors Cathodic Protection Course (GTEC)
- Petcon, Inc. - Alex Ralston
- National Association of Corrosion Engineers (NACE)
- Steel Tank Institute (STI)

CP TESTING
(UPCOMING CHANGES)

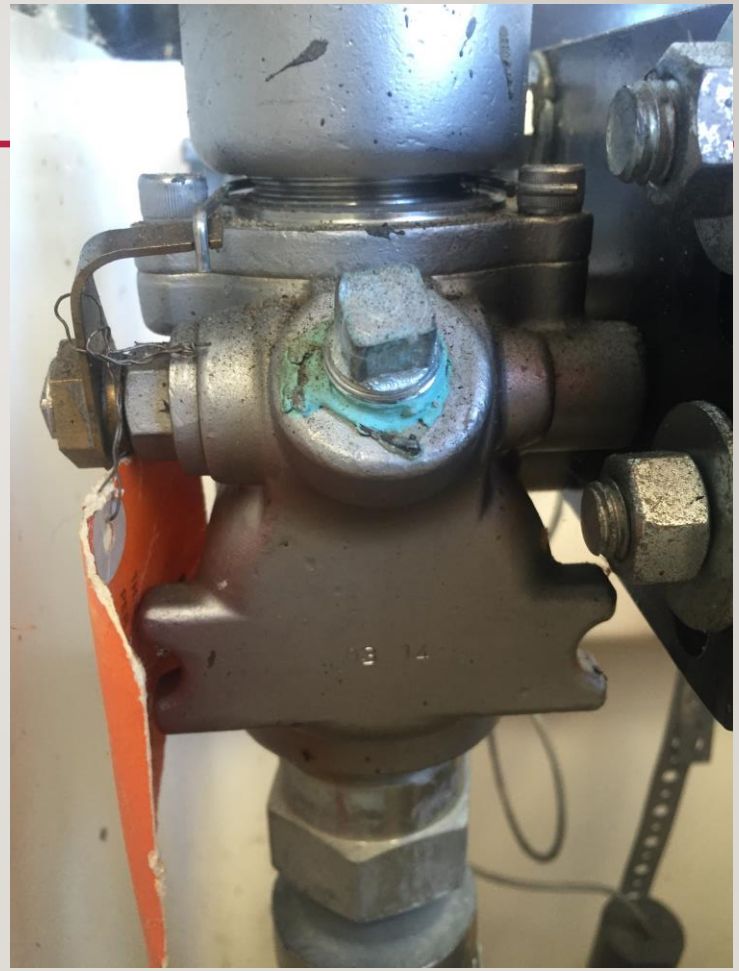
- MDEQ will be adopting 3 changes to it's current CP policy and requirements for testing.

1. Two remote readings for galvanic UST components. (3 total readings)
2. Three readings for IC system components.
3. ON / OFF readings for galvanic anodes in containment sumps.

QUESTIONS OR COMMENTS?

PRODUCT COMPATIBILITY

- Per new regulations… Who must demonstrate it?
  - Fuel containing > 10% ethanol.
  - Diesel containing > 20% biodiesel.
- What does it apply to?
  - Tank, tank linings, piping, flexible connectors
  - Spill buckets, Overfill Prevention, Line Leak Detectors
  - STPs and components, Containment sumps, fill and riser caps, shear valves
  - Release detection floats, sensors and probes
  - Fill and riser caps; shear valves,
- What should you do to prepare? Your homework…
  - https://www.epa.gov/ust/emerging-fuels-and-underground-storage-tanks-usts#determine
  - Begin identifying equipment at your sites. Replace if necessary to comply.



PRODUCT COMPATIBILITY
(IS STILL AN ISSUE WHEN ONLY USING E10)

- What products are out there to help?
  - Zerust
  - The Iron Ox
  - Wilkes Fuel N2R Tank Defender
- What may help?
  - Stainless Steel vent tubes.
  - Using vent pipes to vent vapors from sumps
  - Protect STP components in sumps with water / cathodic protection if installed prior to 10/1/08. May help isolate STP from vapors.
  - Reduce water in the tank.
  - Biocide or other fuel additives

Note: MDEQ does not promote these products or procedures nor are we aware as to how effective they are.

USEFUL LINKS

- Flexible Piping ID Guide
  - http://www.nwglde.org/downloads/flexpipeid_guide.pdf
- OPW – Install Instructions and Technical Manuals
  - http://www.opwglobal.com/opw-retail-fueling/tech-support/instructions-and-manuals/installation-instructions---below-groundFranklin Fuling Systems Pro University
- Franklin Fueling Systems – Download Library
  - http://www.franklinfueling.com/americas/more/resources/en/download-library
- Franklin Fueling Systems – Online Training
  - https://university.ffspro.com/

QUESTIONS

Please contact us if you have any.