

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance.

NEIWPCC WEBINAR MANIFOLDED LINES

11/14/2017

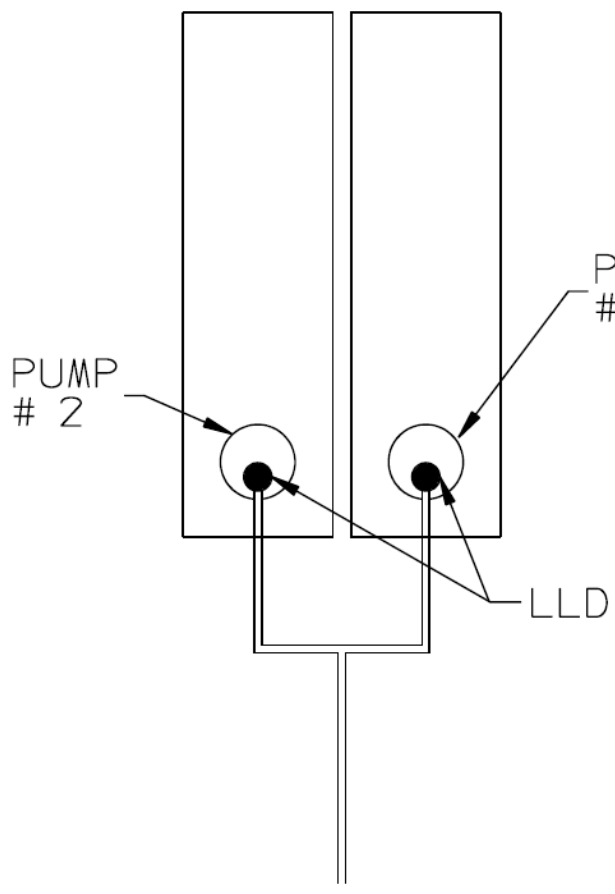
GREG YOUNG

VAPORLESS MANUFACTURING, INC.

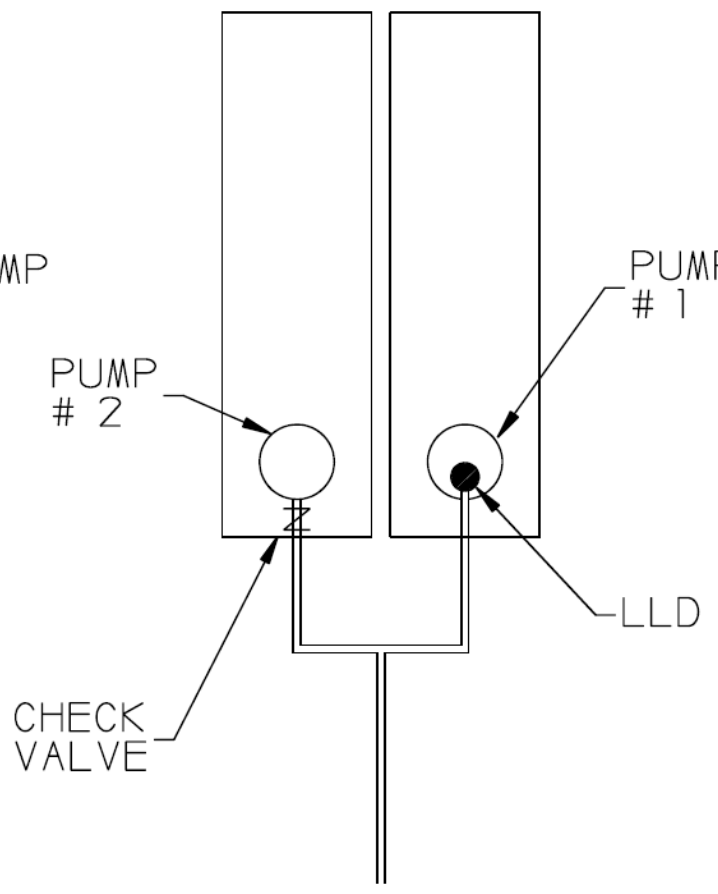
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LEAK DETECTORS AND PROBLEMS ASSOCIATED WITH MANIFOLDED PIPING

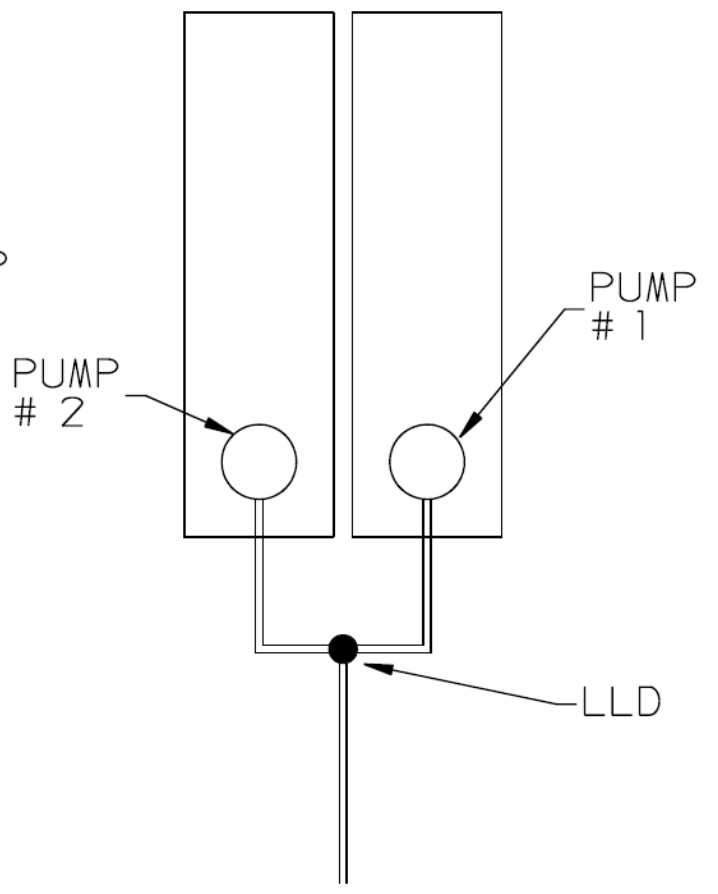
- The following addresses problems typically associated with Automatic Line Leak Detection (ALLD) on manifolded piping systems.
 - Piping systems that consist of multiple turbines manifolded together on the same line and the use of Mechanical Line Leak Detectors (MLLDs) and Electronic Line Leak Detection (ELLD) to meet regulatory compliance.
- These problems are associated with the ability of the MLLDs or ELLD to detect a 3 gallon per hour leak rate. Staging the turbines is required, allowing one turbine and one leak detector to perform line leak detection function prior to energizing additional turbines.
- Multiple MLLDs or ELLDs on the same line require an electronic control system to maintain 3gph at 10psi compliance.
- The drawing on the next slide illustrates three configurations of piping systems and how ALLDs are often used.



PIPE TO DISPENSING
CONFIGURATION 1



PIPE TO DISPENSING
CONFIGURATION 2



PIPE TO DISPENSING
CONFIGURATION 3

CONFIGURATION # 1

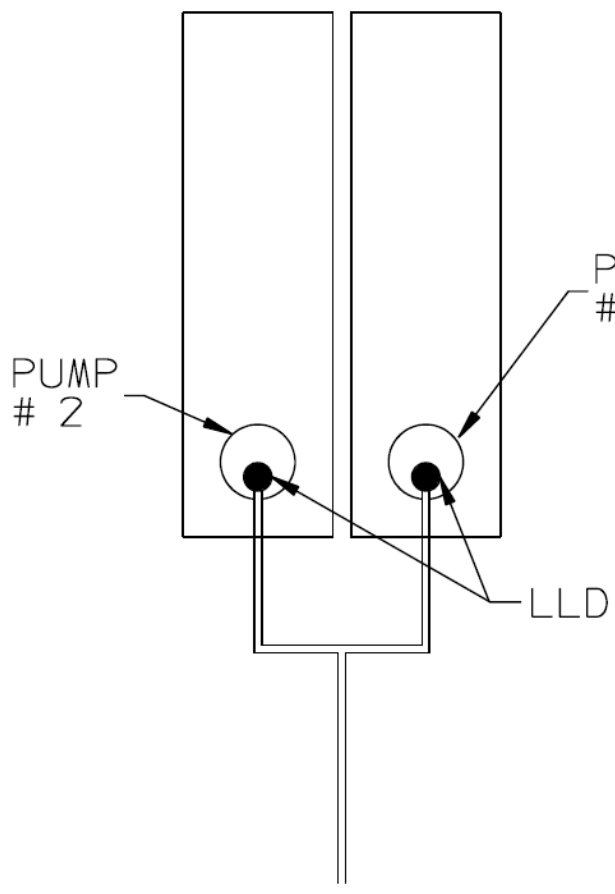
TWO PUMPS/ TWO MLLDS

- THIS CONFIGURATION SHOWS TWO TANKS, EACH WITH ONE TURBINE. EACH TURBINE HAS ONE MLLD. PIPE IS TEE'D TOGETHER TO A SINGLE LINE.
- PROBLEM: EACH MLLD, WHEN IN THE LEAK SEARCH POSITION, ALLOWS 3 GALLONS PER HOUR TO PASS INTO THE LINE. IF BOTH PUMPS COME ON AT THE SAME TIME, EACH LEAK DETECTOR WILL BE TESTING FOR A LEAK AT THE SAME TIME.
- THIS RESULTS IN 6 GALLONS PER HOUR LINE LEAK DETECTION, NOT 3 GPH AS REQUIRED.

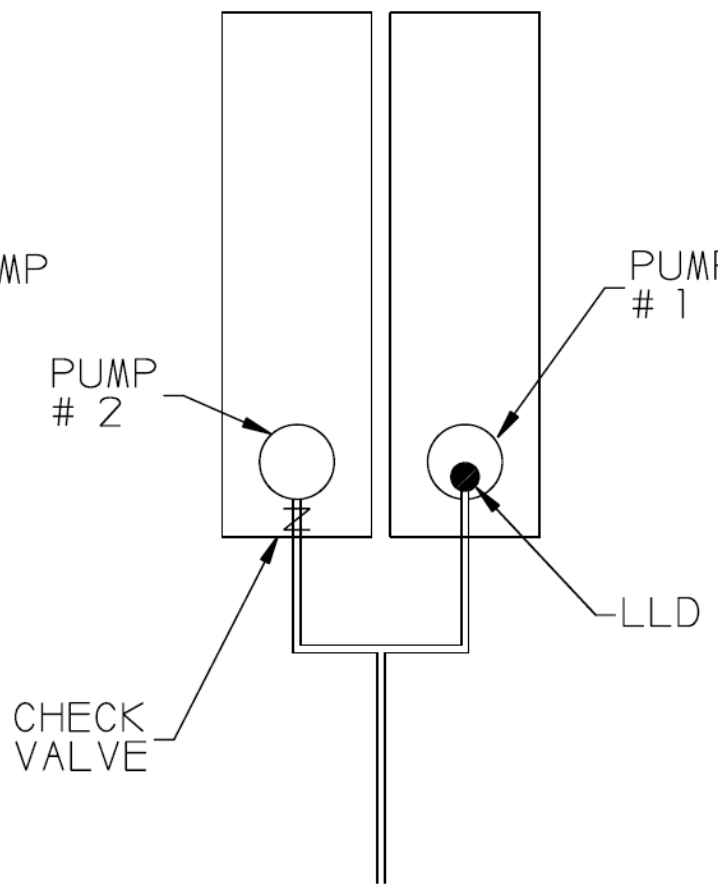
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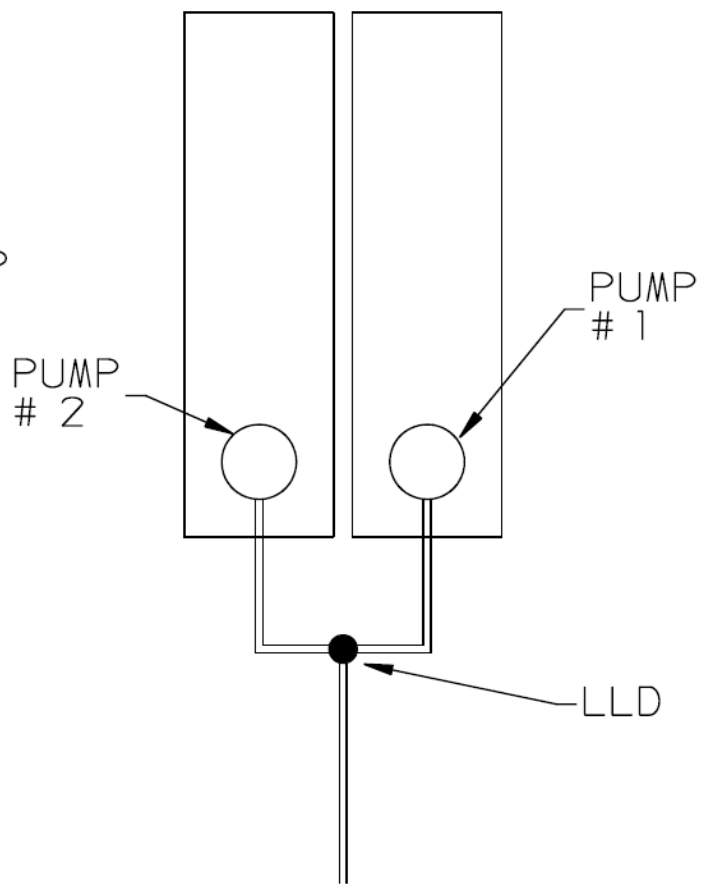
- ONLY ONE PUMP MAY START AND PERFORM LINE LEAK DETECTION. THE LEAD PUMP & MLLD SEARCH FOR A LEAK, THEN ACTIVATE THE SECOND PUMP IF NEEDED.
 - VMI ISM-4080 ELECTRONICS PERFORM THIS FUNCTION
 - 3RD PARTY CERTIFIED AND NWGLDE LISTED
 - SUBMERSIBLE PUMP SHUTDOWN IN THE EVENT OF DETECTED LEAK
 - ONE OR MORE SUBMERSIBLES MAY RUN AFTER LEAK DETECTION PASS
- THE TURBINES CAN ALTERNATE, OR A SINGLE TURBINE CAN BE DEDICATED LEAD.
- THE SECOND TURBINE IS ALLOWED TO TEST THE LINE IF THE FIRST SYSTEM DOES NOT OPEN THE MLLD.



PIPE TO DISPENSING
CONFIGURATION 1



PIPE TO DISPENSING
CONFIGURATION 2



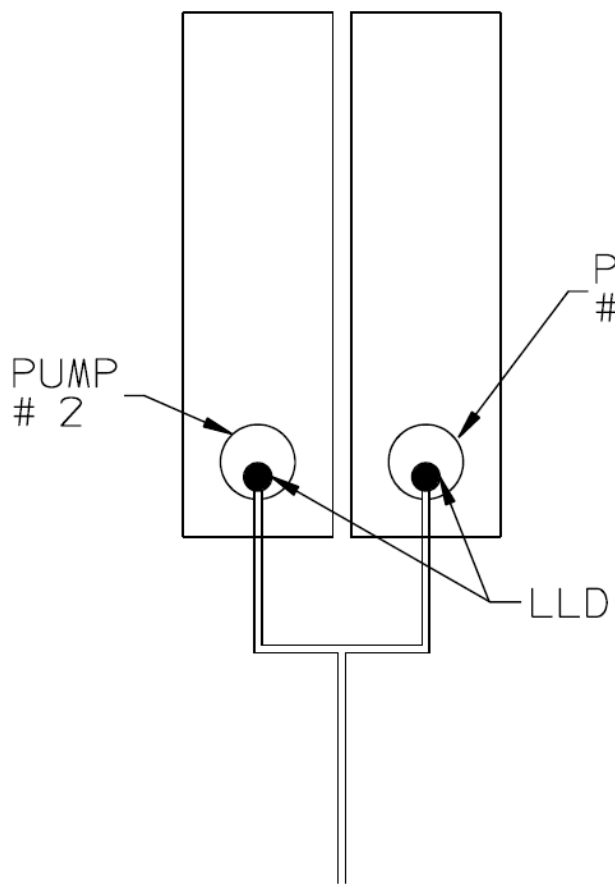
PIPE TO DISPENSING
CONFIGURATION 3

CONFIGURATION # 2

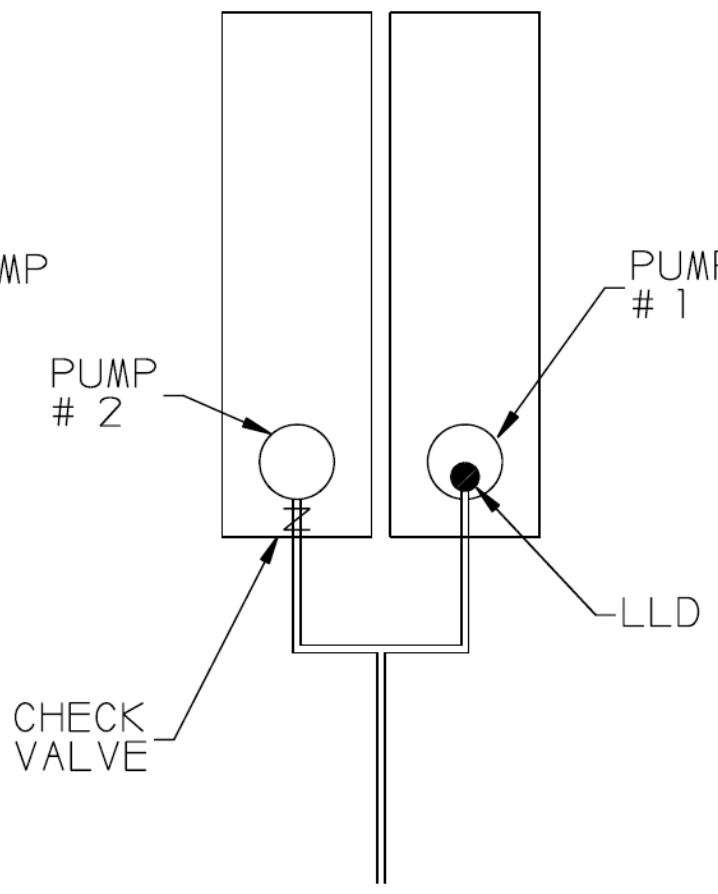
TWO PUMPS / ONE LEAK DETECTOR

EITHER 1 MLLD OR 1 ELLD

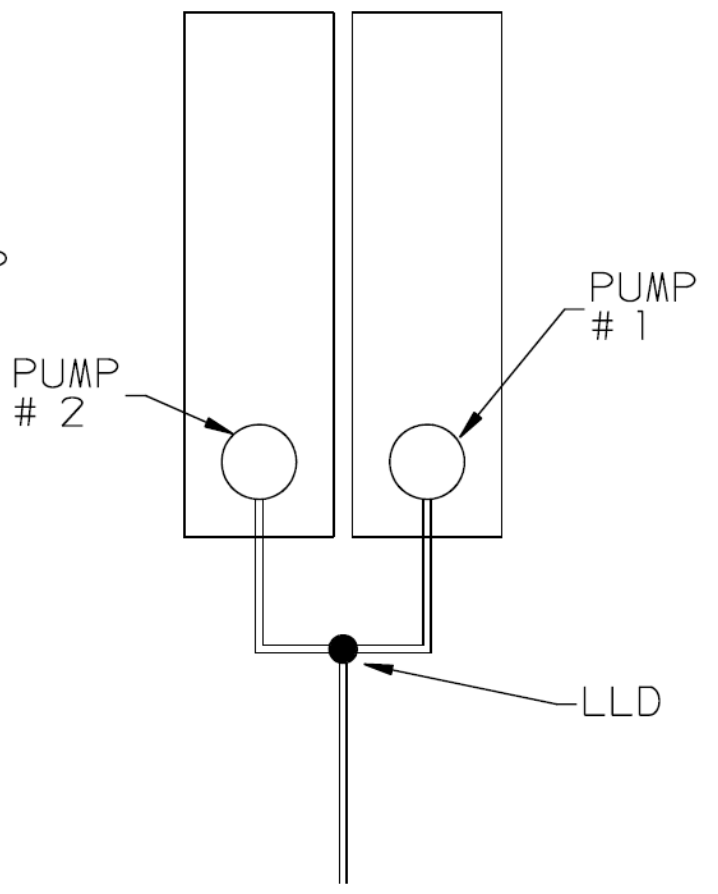
- THIS CONFIGURATION IS A TWO TURBINE INSTALLATION WITH ONE TURBINE / LEAK DETECTOR AND ONE TURBINE / CHECK VALVE.
- ONLY ONE PUMP IS RESPONSIBLE FOR LINE LEAK DETECTION, PUMP # 1.
- THE INSTALLATION OF A CHECK VALVE AT THE DISCHARGE OF PUMP # 2 IS REQUIRED (MORE ON THIS LATER).
- PUMP # 2 IS PREVENTED FROM RUNNING UNLESS THE MLLD IN PUMP # 1 PASSES THE LINE SYSTEM. **VMI ISM-4080 AND VMI LD-2000 MLLD'S PERFORMS THIS FUNCTION AS WELL AS ELLD**
- ELLD PERFORMS LINE LEAK DETECTION AFTER THE LAST AUTHORIZATION GOES AWAY. ONLY PUMP #1 RUNS FOR LINE LEAK DETECTION. IF THERE IS A LEAK DETECTED, PUMP #2 DOES NOT RUN.



PIPE TO DISPENSING
CONFIGURATION 1



PIPE TO DISPENSING
CONFIGURATION 2



PIPE TO DISPENSING
CONFIGURATION 3

CONFIGURATION # 3

TWO PUMPS/ ONE LEAK DETECTOR AT TEE MANIFOLD

- THIS ILLUSTRATION SHOWS TWO TURBINES PIPED TO A TEE CONNECTION WHERE THE LEAK DETECTOR IS INSTALLED, AN MLLD OR ELLD. A SINGLE PIPE CONTINUES TO THE DISPENSING AREA.
- PROBLEM: WITHOUT DOUBLE WALL PIPING AND SUMP CONTAINMENT, ANY LEAK BETWEEN THE PUMPS AND THE LEAK DETECTOR WILL GO UNDETECTED.
- THIS CONFIGURATION IS ACCEPTABLE ONLY IF BOTH TURBINES AND THE LEAK DETECTOR ARE IN THE SAME SUMP.
- ADDITIONALLY, IN THIS CONFIGURATION THE LEAK DETECTION EQUIPMENT NEEDS TO BE SIZED TO HANDLE THE FLOW CAPACITY OF BOTH TURBINES COMBINED.

IF TWO OR MORE PUMPS ARE DELIVERING FUEL INTO A COMMON LINE, THERE ARE SOME SPECIFICS TO BE AWARE OF

- A SINGLE HIGHER PRESSURE CHECK VALVE, 50/65 PSI IS RECOMMENDED **OR**
- TWO CHECK VALVES IN SERIES (LD-2000 AND STANDARD SUBMERSIBLE CHECK VALVE), TO PREVENT FUEL FROM GOING BACK IN TO A DIFFERENT TANK (FLOW-THROUGH).
- IT IS RECOMMENDED THAT THE ATG BE SET UP TO TURN OFF THE PUMPS IN THE EVENT THE PRODUCT LEVEL RISES ABOVE 95%. THIS IS TO PREVENT AN OVERFILL IN THE EVENT ONE OF THE CHECK VALVES FAILS.

TESTING IS THE SINGLE MOST IMPORTANT COMPONENT TO DETERMINE IF A MANIFOLDED LINE SYSTEM IS PROTECTED

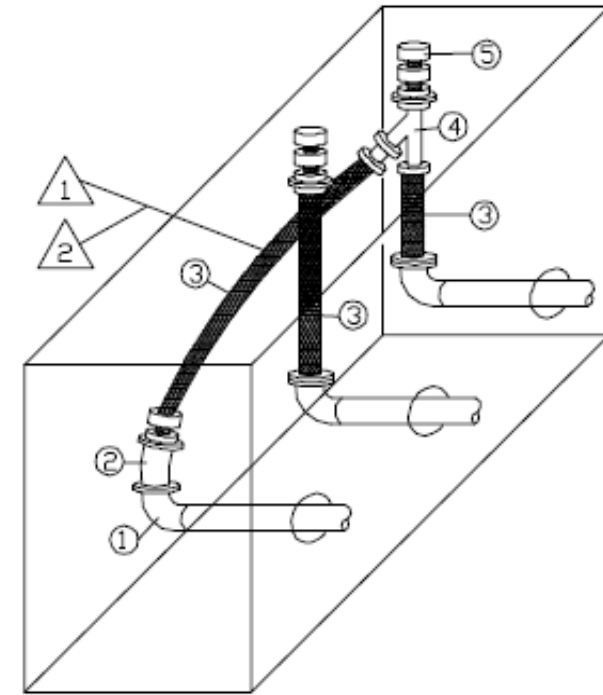
- ANNUAL TEST WITH ELECTRONIC CONTROL IN AUTOMATIC. DO NOT MANUALLY OR ELECTRONICALLY TEST PUMPS / LEAK DETECTORS ISOLATED
- TEST FROM THE HIGHEST DISPENSER OR THE FURTHEST DISPENSER OF THE LINE SYSTEM
 - THIS IS THE ONLY WAY TO DETERMINE IF THE SYSTEM HAS CHECK VALVES (OR OTHER VALVES) THAT ARE PREVENTING THE ALLD FROM FINDING LEAKS

MANIFOLDING BELOW THE SHEAR VALVES VS MANIFOLDING ABOVE THE SHEAR VALVES

TANK END VS DISPENSER END

TWICE THE FLOW, TWICE THE PRESSURE ON THE SHEAR VALVE MAKING IT MORE DIFFICULT FOR THE VALVE TO WORK.

A PIPE IN THE CONTAINMENT SUMP THAT IS MORE LIKELY TO BE DAMAGED IF AN IMPACT OCCURS DUE TO CROSS OVER AND LOCATION IN SUMP. THE PIPE IS NOT PROTECTED BY SHEAR PROTECTION.

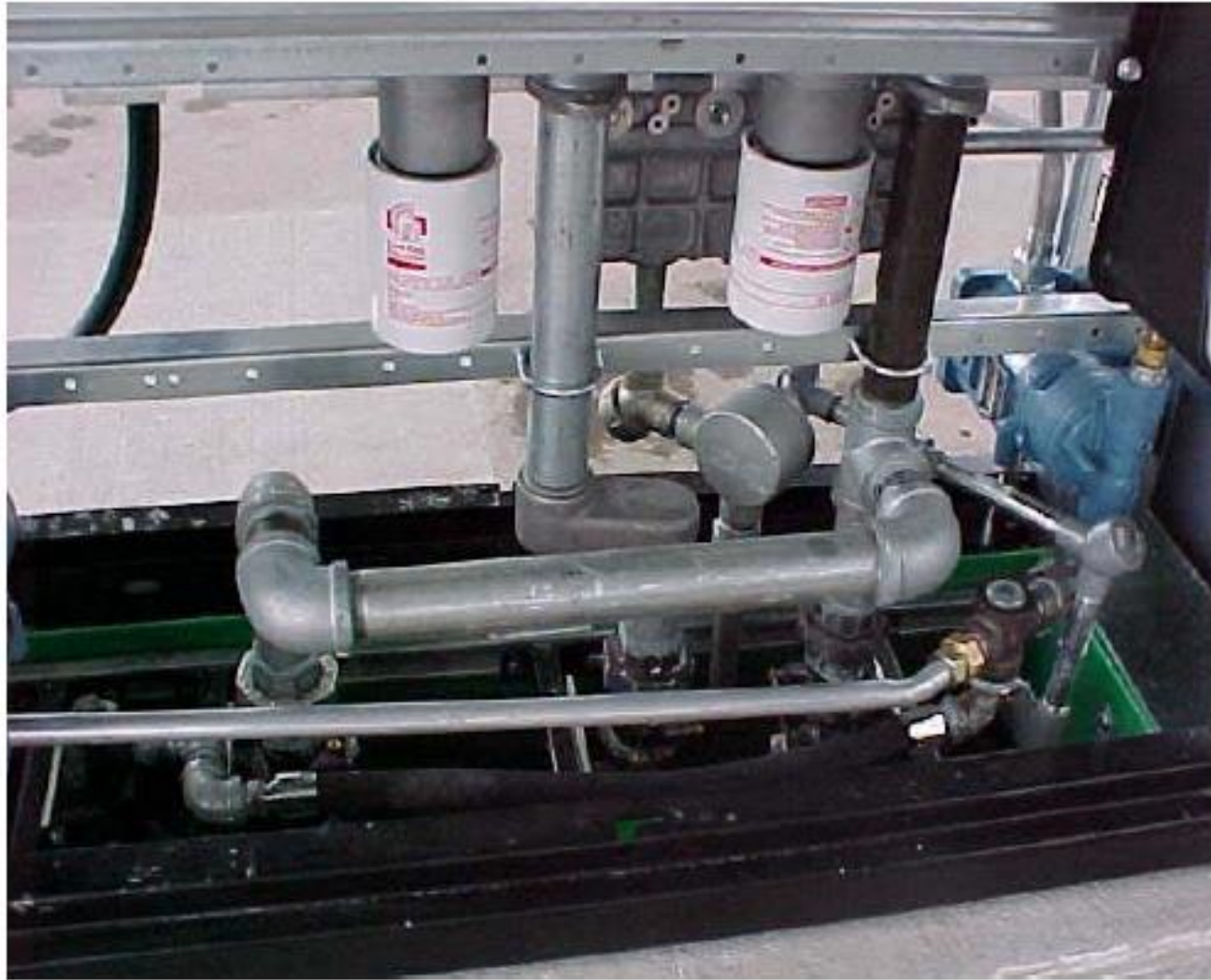


Schedule	
Mark	Description
1	Existing thread adapter
2	45° street ell - 150#
3	1 ½' flex connector - measure to fit
4	1 ½' 45° lateral 150# fitting or 'T'
5	union top shear valve - anchor securely to frame

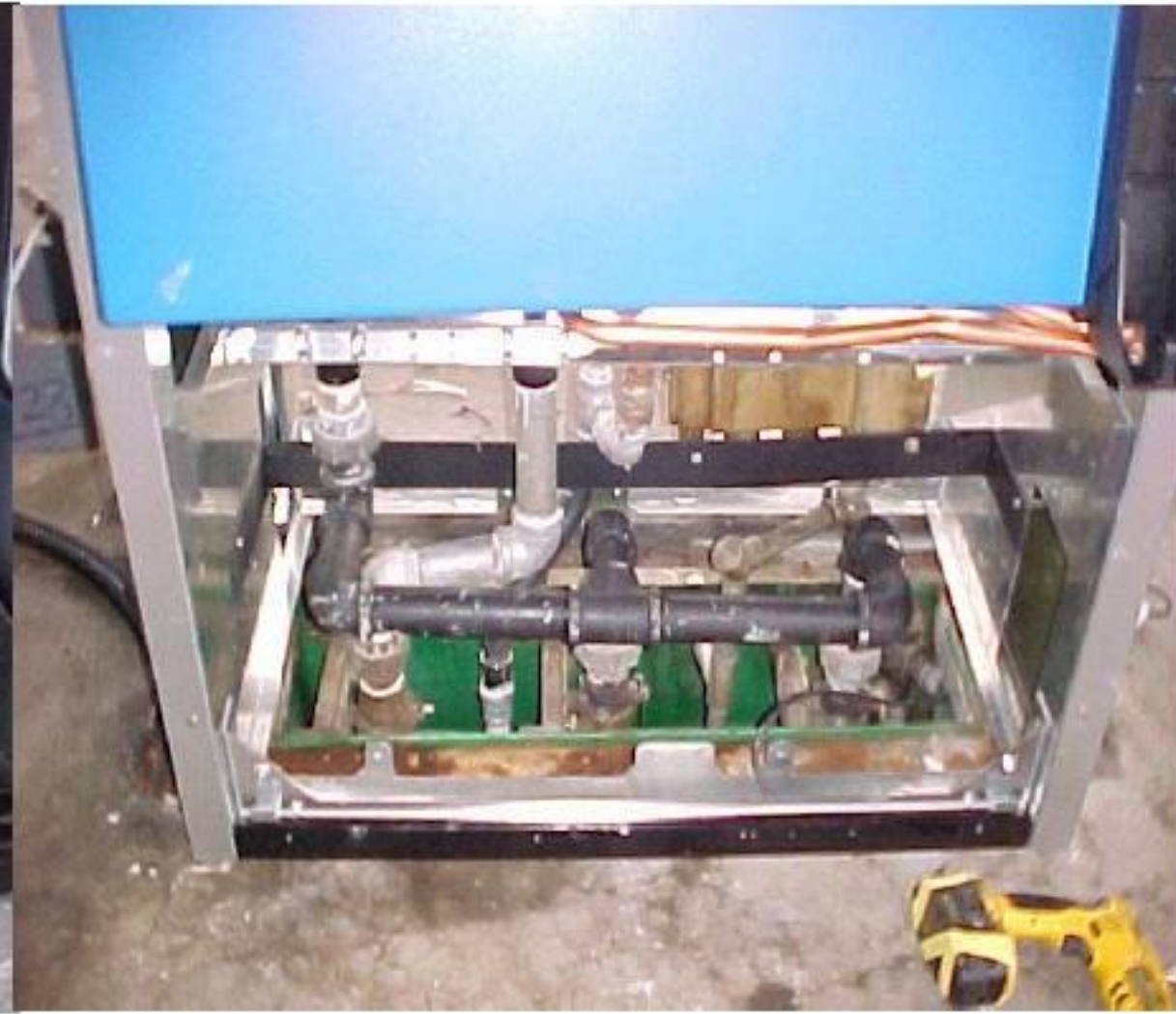
△ 1 Pipes shall not touch at rest or during operating motion

△ 2 Product order will vary with site and blending dispenser configuration

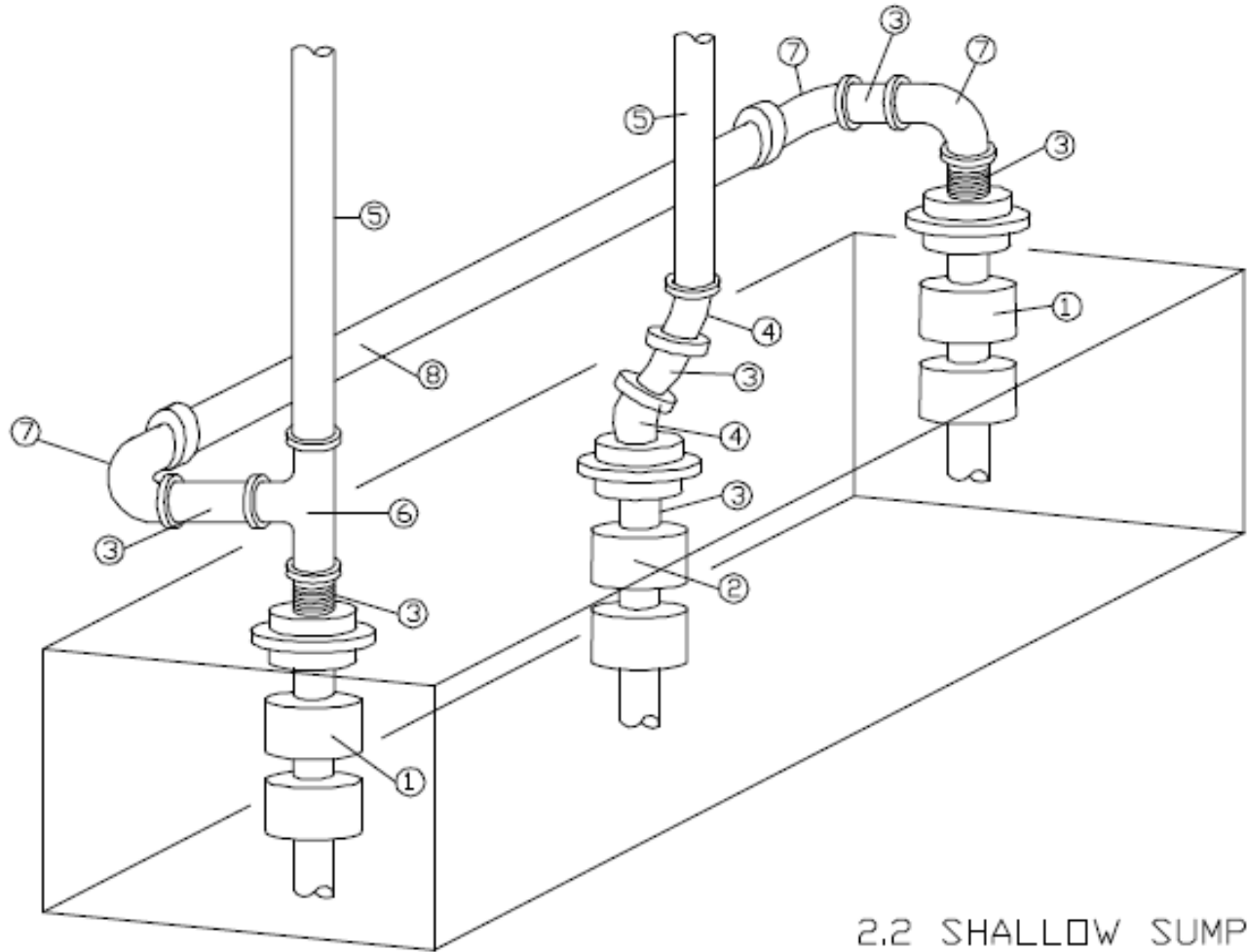
Method two manifolds piping above the existing shear valves. Piping is routed around other shear valves as show in the following photos.



Wayne Vista Blender (new)



Gilbarco Advantage Blender



Schedule	
Mark	Description
1	Union top shear valve - remove top poppet
2	Union top shear valve
3	Short nipple 1 1/2"
4	45° fitting 1 1/2"
5	1 1/2" inlet pipe to meter
6	1 1/2" tee
7	90° elbow 1 1/2"
8	1 1/2" pipe

⚠ Shear valves must be single poppet or have the top poppet removed for this option to work. Double poppet on Supreme/Super + may remain.

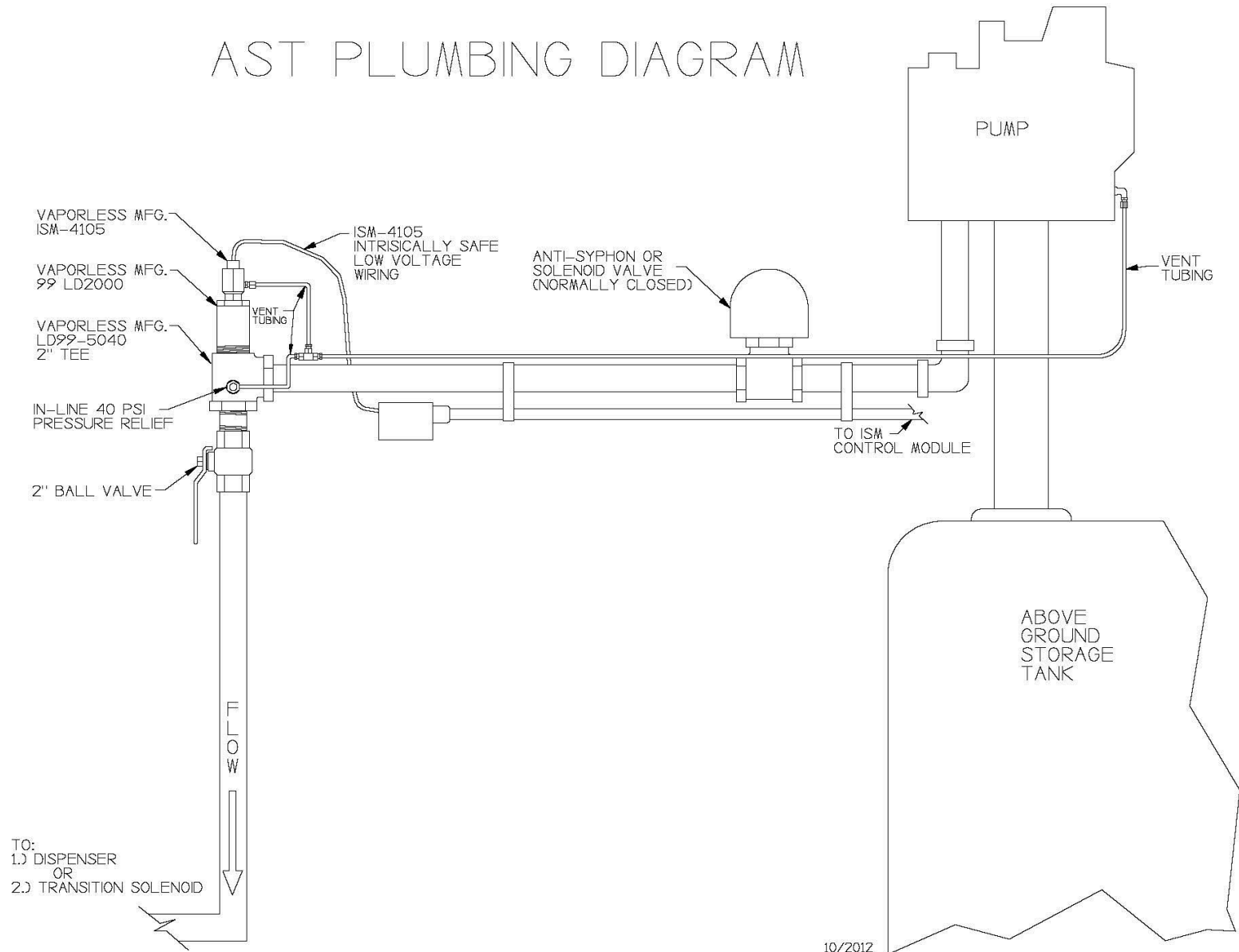
2.2 SHALLOW SUMP EXISTS - MODIFY PIPING ABOVE EXISTING SHEAR VALVES

PIPE IS MORE ABOVE GRADE, MORE SUSCEPTIBLE TO VEHICLE DAMAGE DURING IMPACT
 LESS LIKELY FOR BOTH SHEAR VALVES TO OPERATE AS DESIGNED
 DOUBLE POPPET VALVES CANNOT BE USED
 WRONG FLOW PATH, PRESSURE FROM ABOVE PUSHING DOWN ON SHEAR VALVE
MAKE FUEL CONNECTION AT TANK END TO DELIVER ONE, NOT TWO LINES OF REGULAR

Testing ASTs or Any Downhill Piping Run (Negative Slope)

- Is AST above the dispenser?
Siphoning may occur.
- Is there an anti-siphon valve downstream of the leak detector?
Should be located before leak detection equipment.

AST PLUMBING DIAGRAM



Master-Satellite Dispenser

- Test from Satellite first.
 - If pass from Satellite, entire line is protected.
 - If fail from Satellite, test from Master.
- If Test passes from Master and not Satellite, no protection to Satellite.
 - Incomplete leak detection installation.

- **REMEMBER**
- **MANIFOLDED VENTING OF GASOLINE LINES IS OKAY.**
- **MANIFOLDED VENTING OF GASOLINE AND DIESEL LINES IS NOT OKAY**

Need to Establish Replace By Date for Components Before They Fail

- Mechanical line leak detectors
- Electronic line leak detectors
 - Pressure Transducers
- Tank Gauging Probes
- Sensors

- ALWAYS TEST FROM END OF LINE, HIGHEST, FARTHEST

**INFORMATION ON FUEL MANIFOLDING AT TANK
VS DISPENSERS IS FROM:**

PETER ROLLO - ENGINEER

**DELAWARE DEPARTMENT OF NATURAL
RESOURCES AND ENVIRONMENTAL CONTROL
(DNREC)**

TANK MANAGEMENT BRANCH