ALTERNATIVE FUELS – CHALLENGING OUR LEAK DETECTION TECHNOLOGY

Kevin Henderson
Kevin Henderson Consulting, LLC

NEIWPCC WEBINAR

March 13, 2013

What are the issues?

1. Compatibility
    a. Metals (corrosion)
    b. Elastomers/Polymers

2. Bio-fouling
    a. Sludge/Slime

3. Detecting Water Ingress
    a. Automatic Tank Gauging
    b. SIR / Inventory Control / Manual Tank Gauging
    c. Precision Tightness Testing

COMPATIBILITY – METALS (E10)

COMPATIBILITY – METALS (ULSD)

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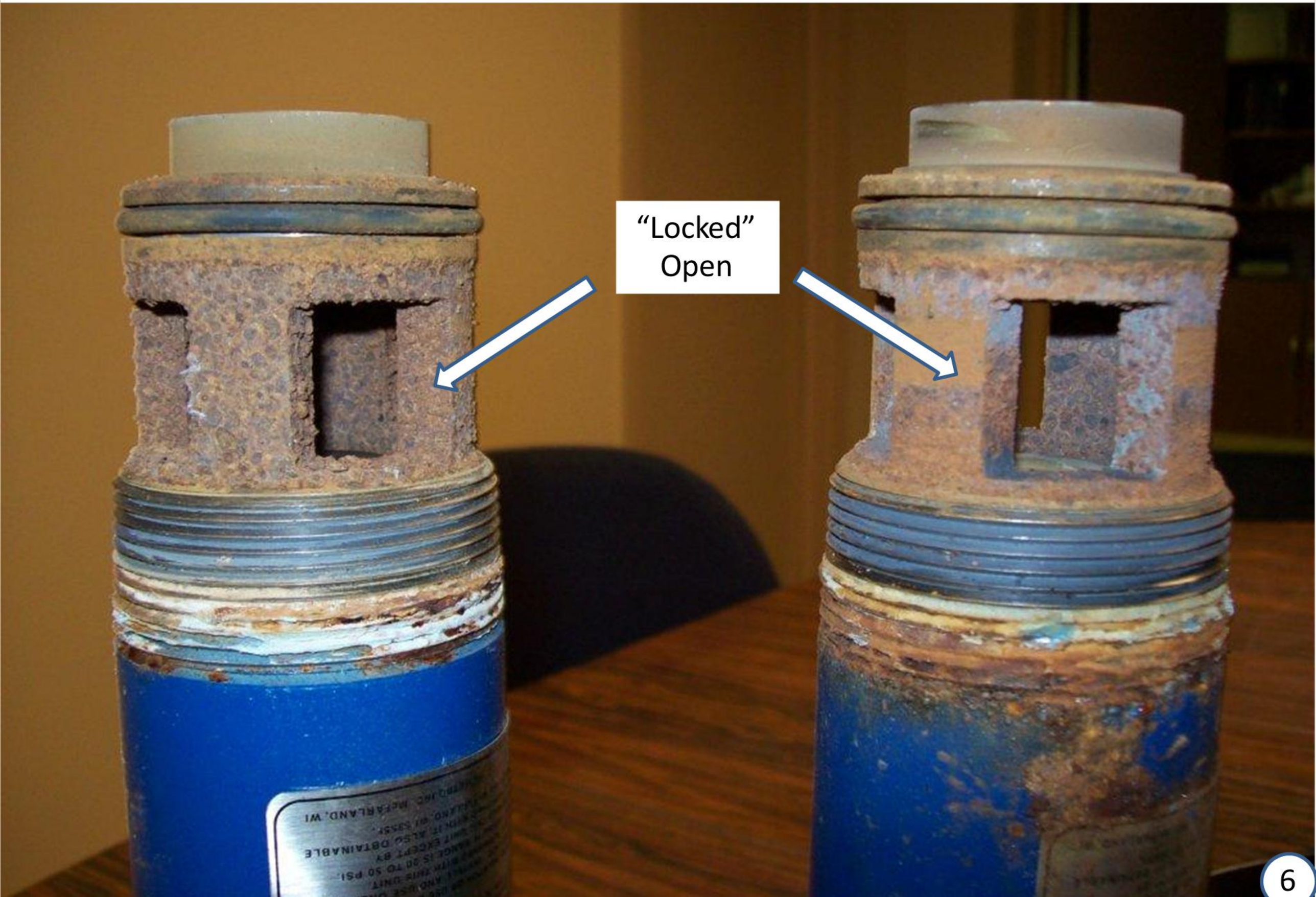

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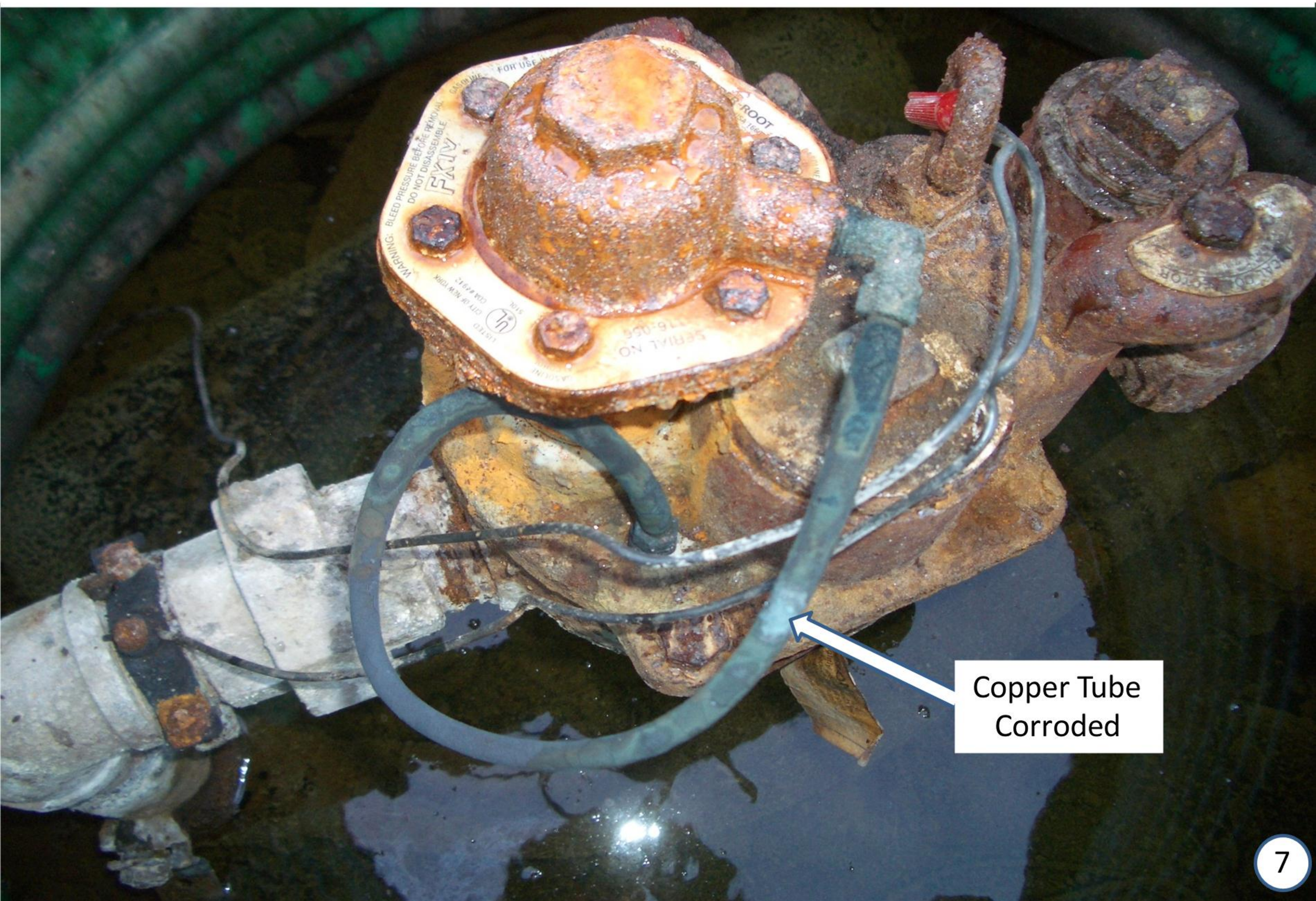

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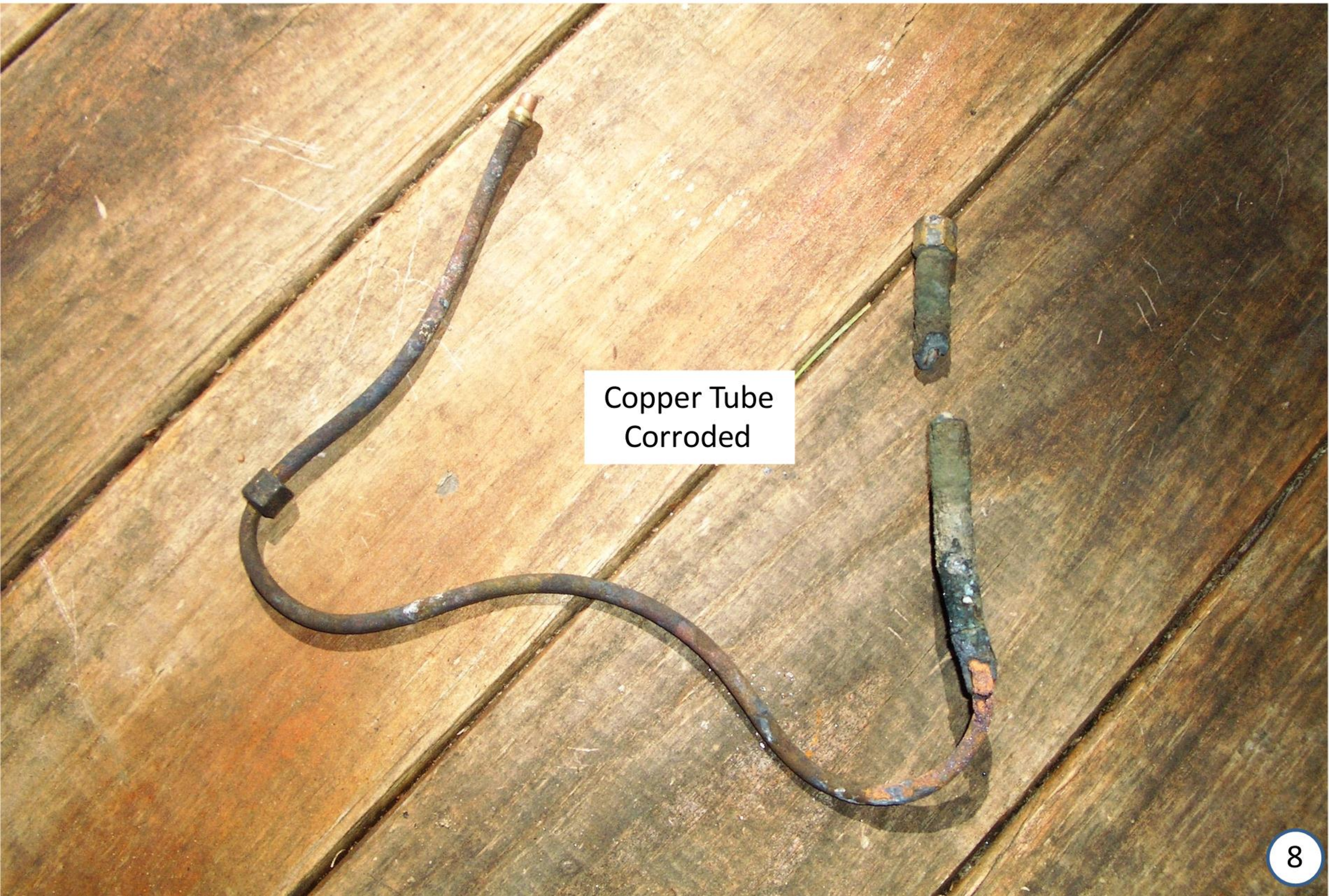

COMPATIBILITY – METALS (E10)

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Piston Leak
Detector
In “dirt” sump

COMPATIBILITY – METALS (E10)

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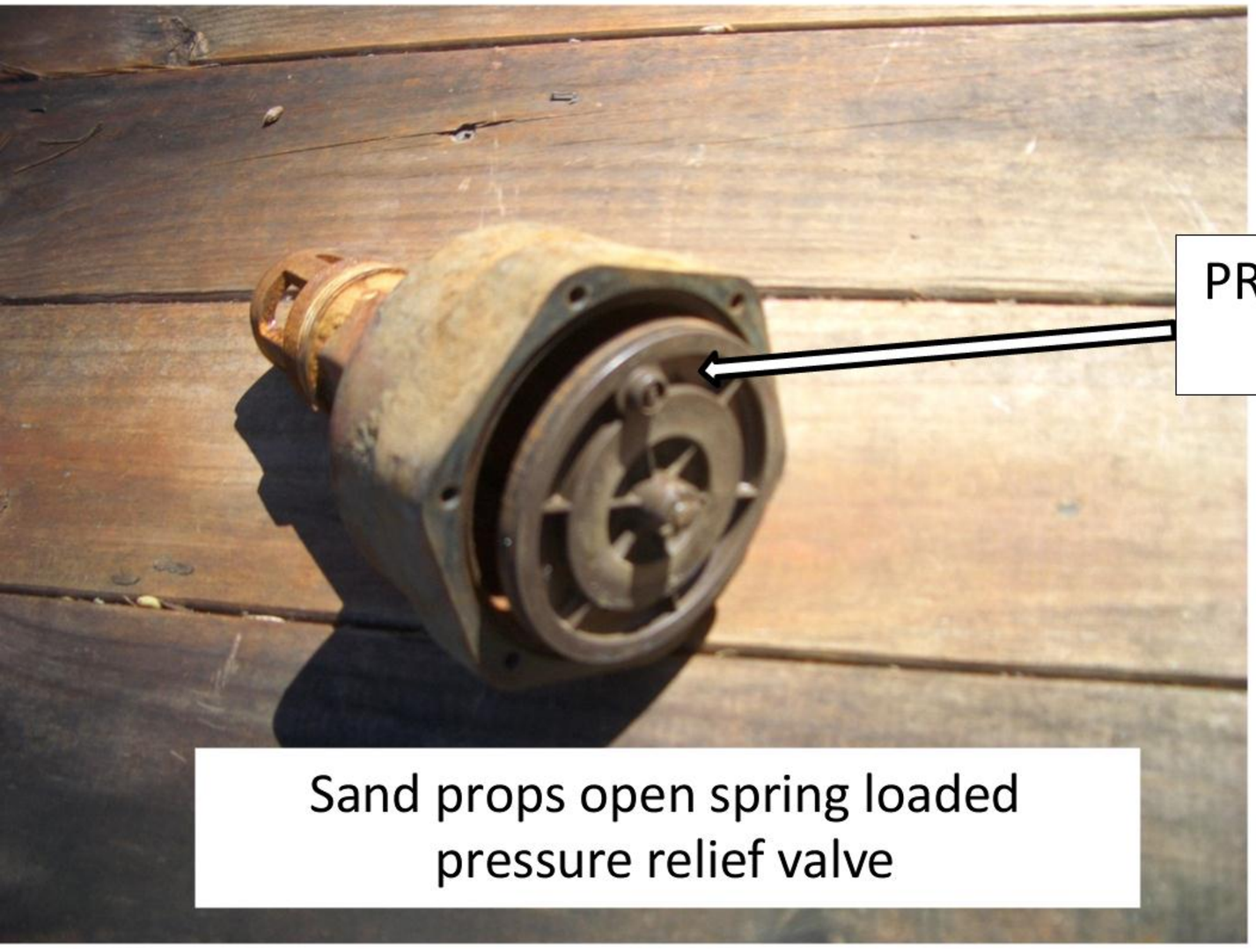


300 gallon release occurs through broken leak detector vent tube before product is seen coming up through expansion joints

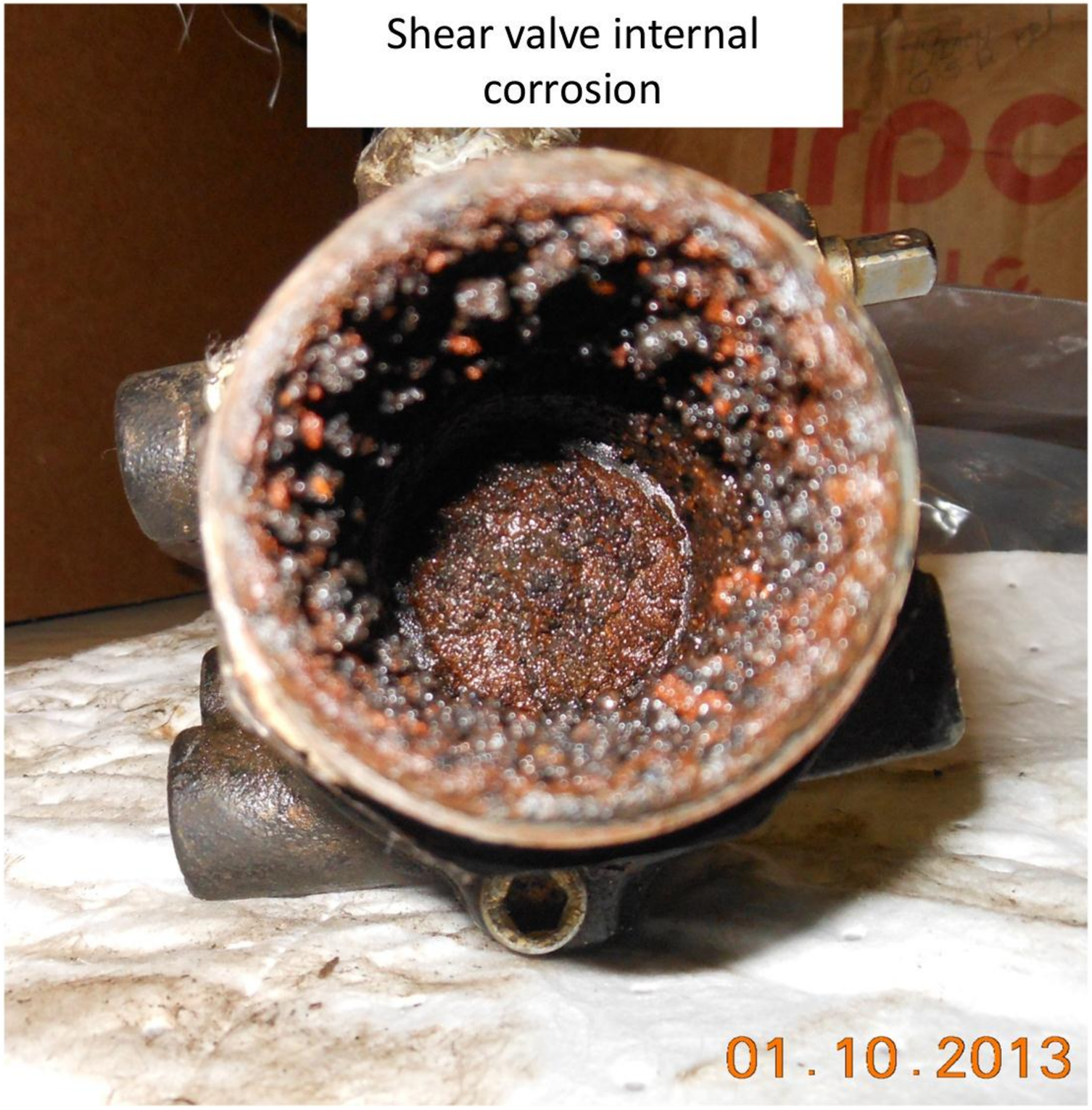
COMPATIBILITY – METALS (ULSD)

ELECTRONIC LINE LEAK DETECTORS “PLUGGED” BY CORROSION CRUD

COMPATIBILITY – METALS (E10)

Aluminum ATG probe corroded – Ethanol?

COMPATIBILITY – METALS



COMPATIBILITY – ELASTOMERS (E10/ULSD)?

BIO-FOULING - ULSD

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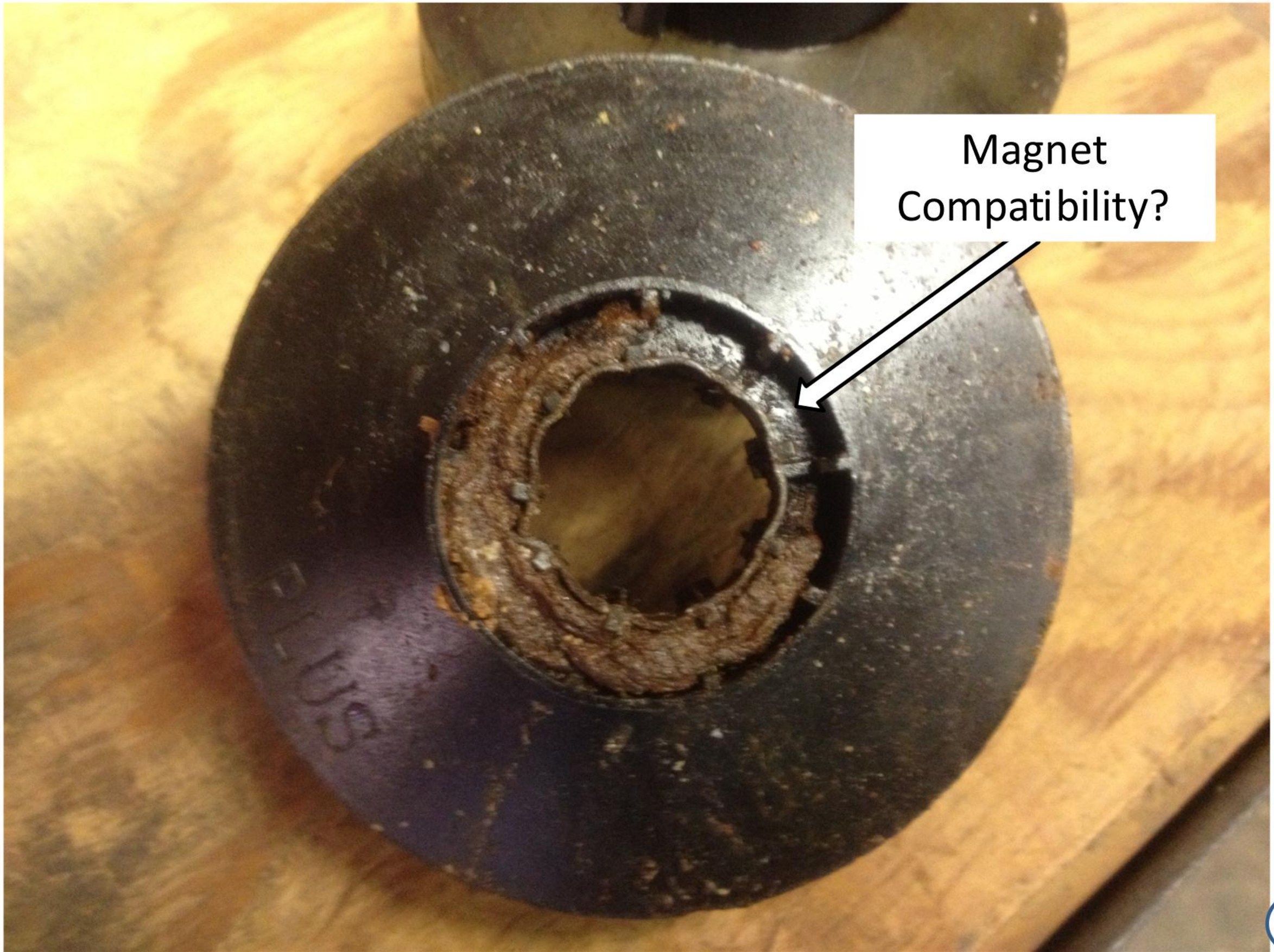

DETECTING WATER INGRESS - ATGs

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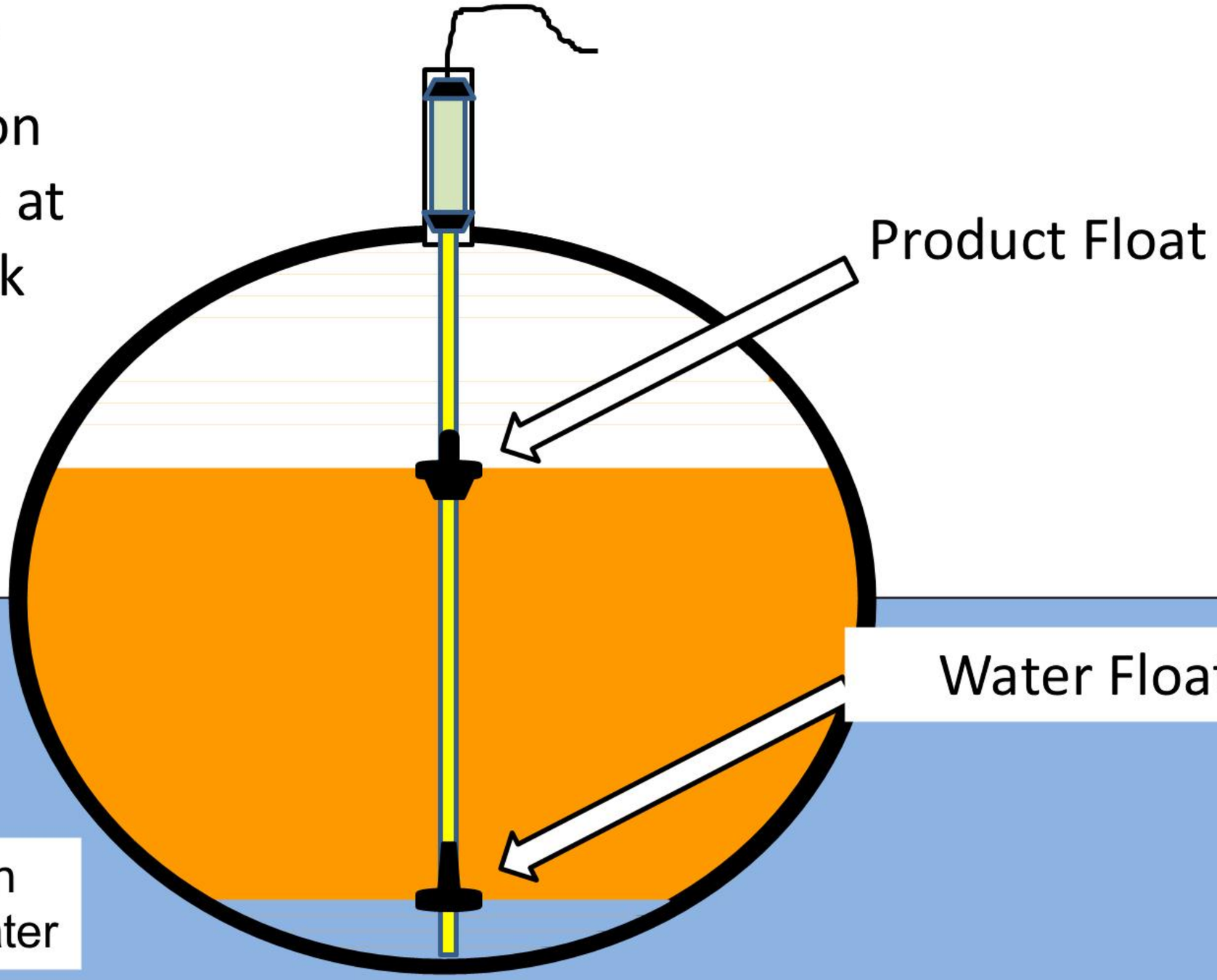
Water detection relies on density difference of fuel vs. water

"Traditional" system relied on water to collect at bottom of tank

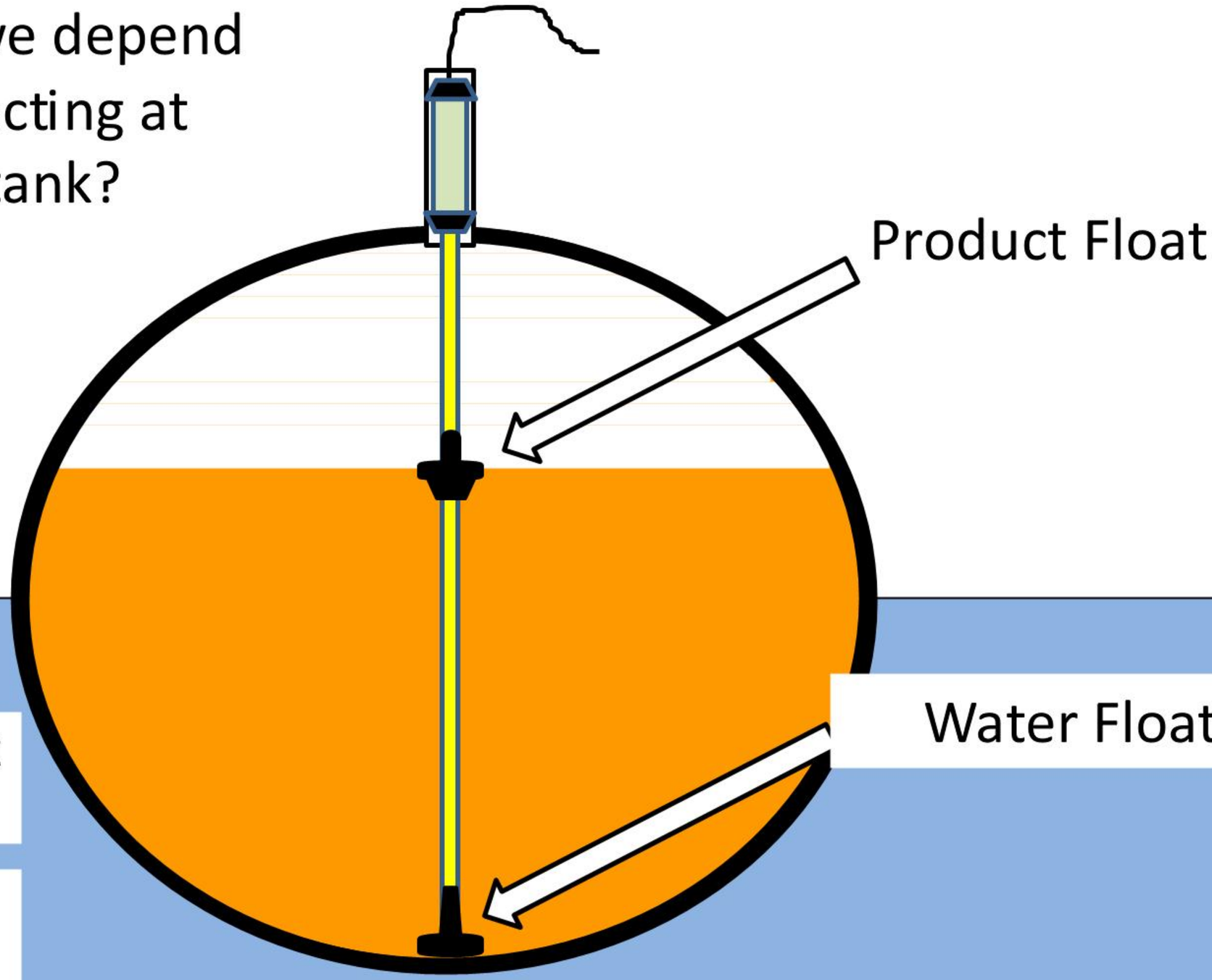


Water float sinks in fuel but floats on water

DETECTING WATER INGRESS – ATG

Water detection relies on density difference of fuel vs. water

With ethanol blended fuel systems – Can we depend on water collecting at bottom of tank?



Does the water float ever float?

What about “phase separation”?

DETECTING WATER INGRESS

SAMPLE

MONTHLY INVENTORY RECORD

(N) TANK IDENTIFICATION & TYPE OF FUEL: 4 MIDGRADE UNL

MONTH/YEAR: 9,93

FACILITY NAME: LAST CHANCE #2

DATE OF WATER CHECK: 9/1 LEVEL OF WATER (INCHES): 0 (V)

DATE	(O) START STICK INVENTORY (GALLONS)	(P) GALLONS DELIVERED	(Q) GALLONS PUMPED	(R) BOOK INVENTORY (GALLONS)	(S) END STICK INVENTORY (INCHES)	(S) END STICK INVENTORY (GALLONS)	(T) DAILY OVER (+) OR SHORT (−) ["End" − "Book"]	(U) INITIALS
1	4047 (+)	—	(−) 333	(=) 3714	38 1/4	3690	−24	JD
2	3690 (+)	—	(−) 44	(=) 3646	38	3658	+12	JD
3	3658 (+)	—	(−) 329	(=) 3329	35 3/8	3323	−6	JD
4	3323 (+)	—	(−) 60	(=) 3263	35	3275	+12	JD
5	3275 (+)	—	(−) 145	(=) 3130	33 3/4	3117	−13	JD
6	3117 (+)	—	(−) 238	(=) 2879	31 1/8	2790	−89	JD
7	2790 (+)	6134	(−) 117	(=) 8807	80	8844	+37	JD
8	8844 (+)	—	(−) 127	(=) 8717	78 7/8	8732	+15	JD
9	8732 (+)	—	(−) 182	(=) 8550	77 1/2	8591	+41	JD
10	8591 (+)	—	(−) 205	(=) 8386	75 1/2	8379	−7	JD
11	8379 (+)	—	(−) 204	(=) 8175	73 5/8	8173	−2	JD
12	8173 (+)	—	(−) 166	(=) 8007	72	7991	−16	JD
13	7991 (+)	—	(−) 320	(=) 7671	69 3/4	7730	+59	JD
14	7730 (+)	—	(−) 307	(=) 7423	67	7402	−21	JD
15	7402 (+)	—	(−) 76	(=) 7326	66 1/2	7342	+16	JD
16	7342 (+)	—	(−) 224	(=) 7118	64 1/8	7050	−68	JD
17	7050 (+)	—	(−) 390	(=) 6660	61	6657	−3	JD
18	6657 (+)	—	(−) 296	(=) 6361	58 5/8	6354	−7	JD
19	6354 (+)	—	(−) 78	(=) 6276	58 1/8	6290	+14	JD
20	6290 (+)	—	(−) 424	(=) 5866	54 3/8	5869	+3	JD
21	5869 (+)	—	(−) 205	(=) 5664	53 1/8	5639	−25	JD
22	5639 (+)	4177	(−) 403	(=) 9413	86 1/2	9423	+10	JD
23	9423 (+)	—	(−) 87	(=) 9336	85 1/2	9343	+7	JD
24	9343 (+)	—	(−) 311	(=) 9032	82	9036	+4	JD
25	9036 (+)	—	(−) 239	(=) 8797	79 1/8	8757	−40	JD
26	8757 (+)	—	(−) 256	(=) 8501	76 7/8	8526	+25	JD
27	8526 (+)	—	(−) 264	(=) 8262	74 1/2	8270	+8	JD
28	8270 (+)	—	(−) 263	(=) 8007	72	7991	−16	JD
29	7991 (+)	—	(−) 185	(=) 7806	69	7811	+5	JD
30	7811 (+)	—	(−) 116	(=) 7695	68	7690	−5	JD
31	(+)		(−)	(=)				

(W) TOTAL GALLONS PUMPED > 6594 TOTAL GALLONS OVER OR SHORT > −74 (X)

DROP THE LAST 2 DIGITS from the PUMPED number and enter on the TOTAL GALLONS line below

Compare these numbers

(Y) LEAK CHECK: 65 + 130 = 195 gallons

Is "TOTAL GALLONS OVER OR SHORT" LARGER than "LEAK CHECK" result? YES (NO) (circle one) (Z)

If answer is "YES" for 2 MONTHS IN A ROW, notify regulatory agency as soon as possible.

KEEP THIS PIECE OF PAPER ON FILE FOR AT LEAST 1 YEAR

<u>All of these leak detection methods must be able to detect water ingress also</u>

- SIR
- Inventory Control
- Manual Tank Gauging

DETECTING WATER INGRESS – PRECISION TANK TIGHTNESS TESTING

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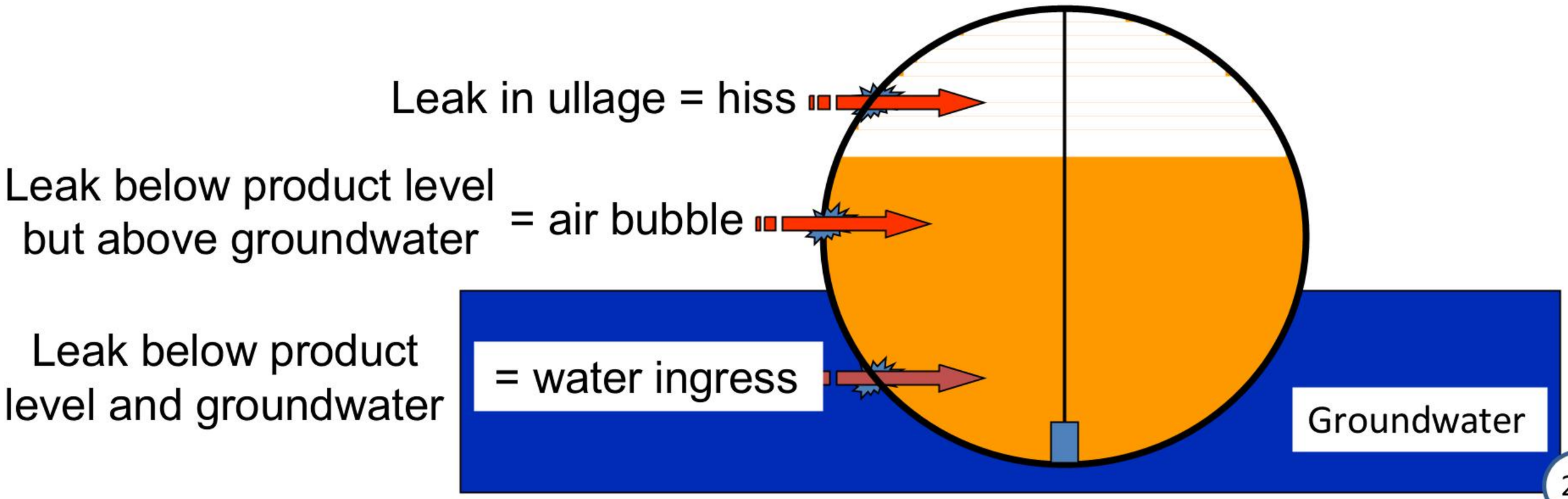
"Vacuum" Precision Tank Tightness Testing

Several different scenarios possible depending on relationship between product level in tank and the groundwater conditions

Tank is Partially Submerged by Groundwater



DETECTING WATER INGRESS – PRECISION TANK TIGHTNESS TESTING

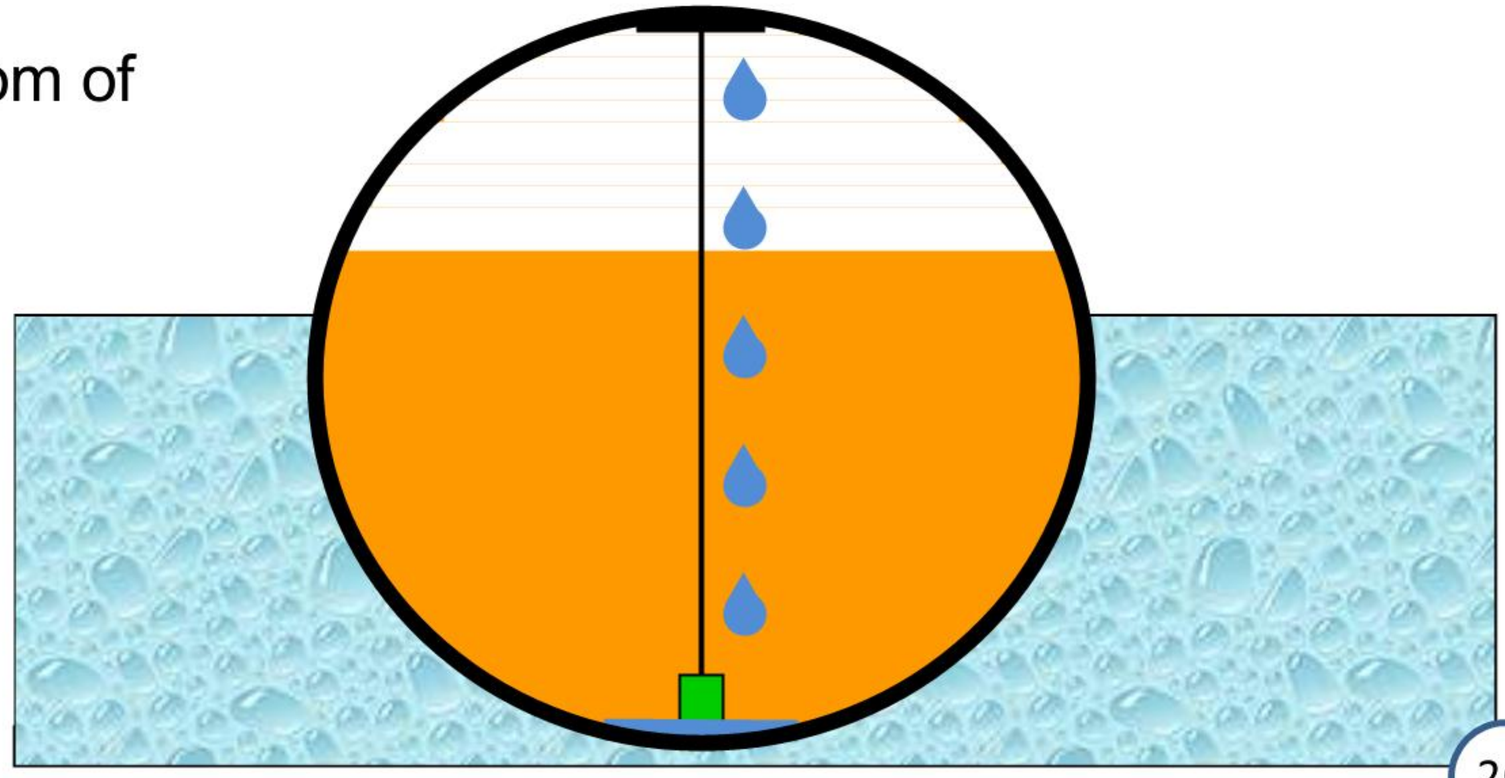
"Vacuum" Precision Tank Tightness Testing

With Single-Walled Tanks

- When groundwater is above the bottom of the tank, must use water sensor
- Water sensor works by detecting change in conductivity

- How does water behave in a tank with ethanol blended fuel?
- Does the water go to the bottom of the tank?
- Is the water sensor able to detect water ingress?
- Should the PTT be able to detect an ingress of 0.1 gph?
- Is it a valid test if it does not?

Tank is Partially Submerged



KEVIN HENDERSON CONSULTING, LLC

Petroleum Storage Tank
Environmental Management Solutions

59 Summit Place
Brandon, MS 39042

Phone: 601-706-4463
Mobile: 601-825-1985
E-mail: Kevin4824@comcast.net