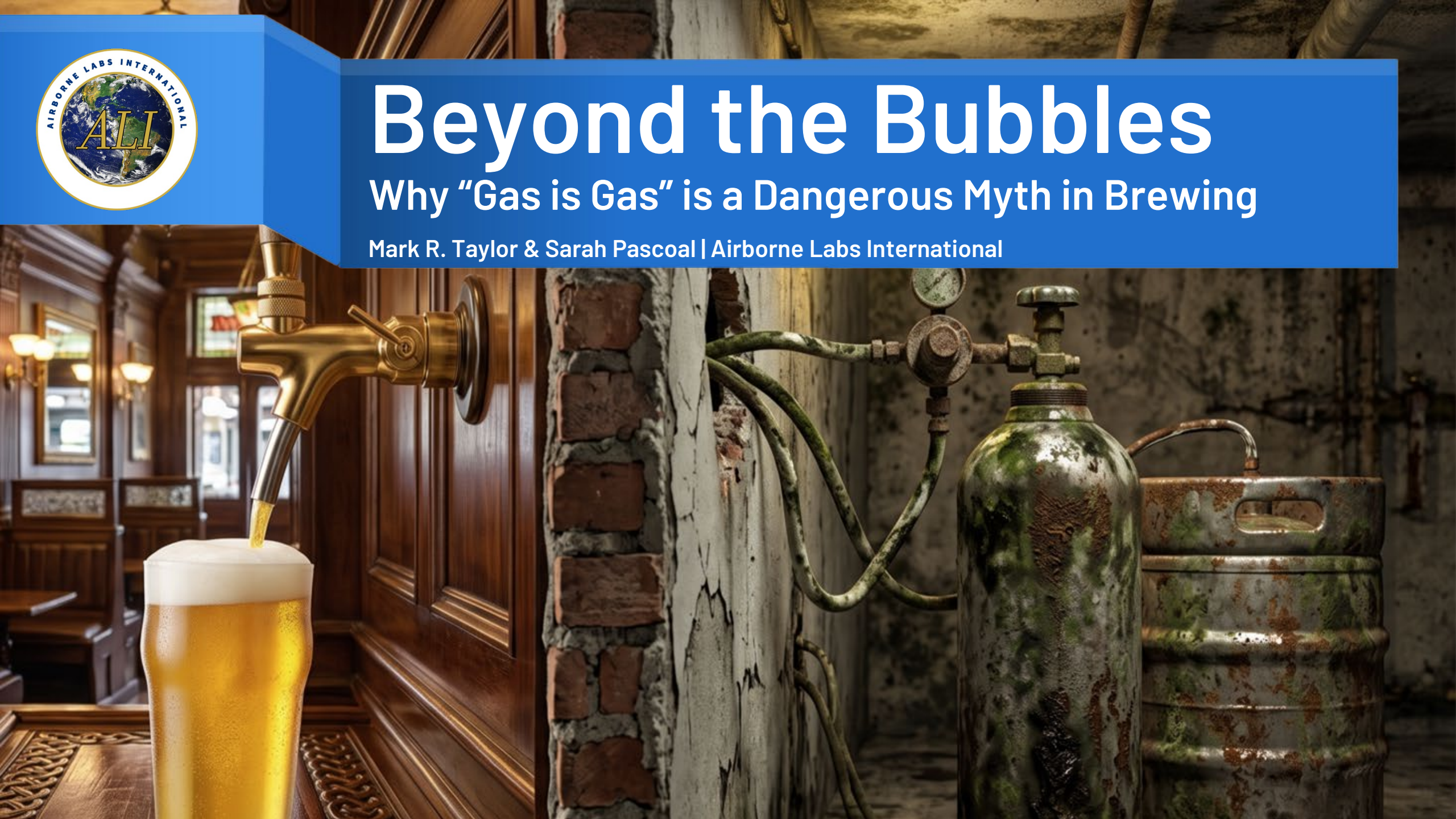
Beyond the Bubbles

Why “Gas is Gas” is a Dangerous Myth in Brewing

Mark R. Taylor & Sarah Pascoal | Airborne Labs International



The Invisible Ingredient

The Disconnect

- Brewers obsess over water chemistry down to the part-per-million.
- You meticulously track hops freshness and yeast vitality.
- What about your CO_2?

The Blindspot

- CO_2 touches every single drop of beer, delivers the aroma, and creates the mouthfeel.
- Yet, it is almost always purchased based strictly on the lowest price.

The Paradigm Shift

- You must abandon the mindset of reactive CO_2 testing.
- The industry needs to build a proactive safety architecture before problems occur.

The Modern Market

- Instant communication and cancel culture means a single bad batch can permanently destroy a brand.
- You cannot afford to wait for a customer to get sick before finally asking what is in your gas.



The "Gas is Gas" Trap

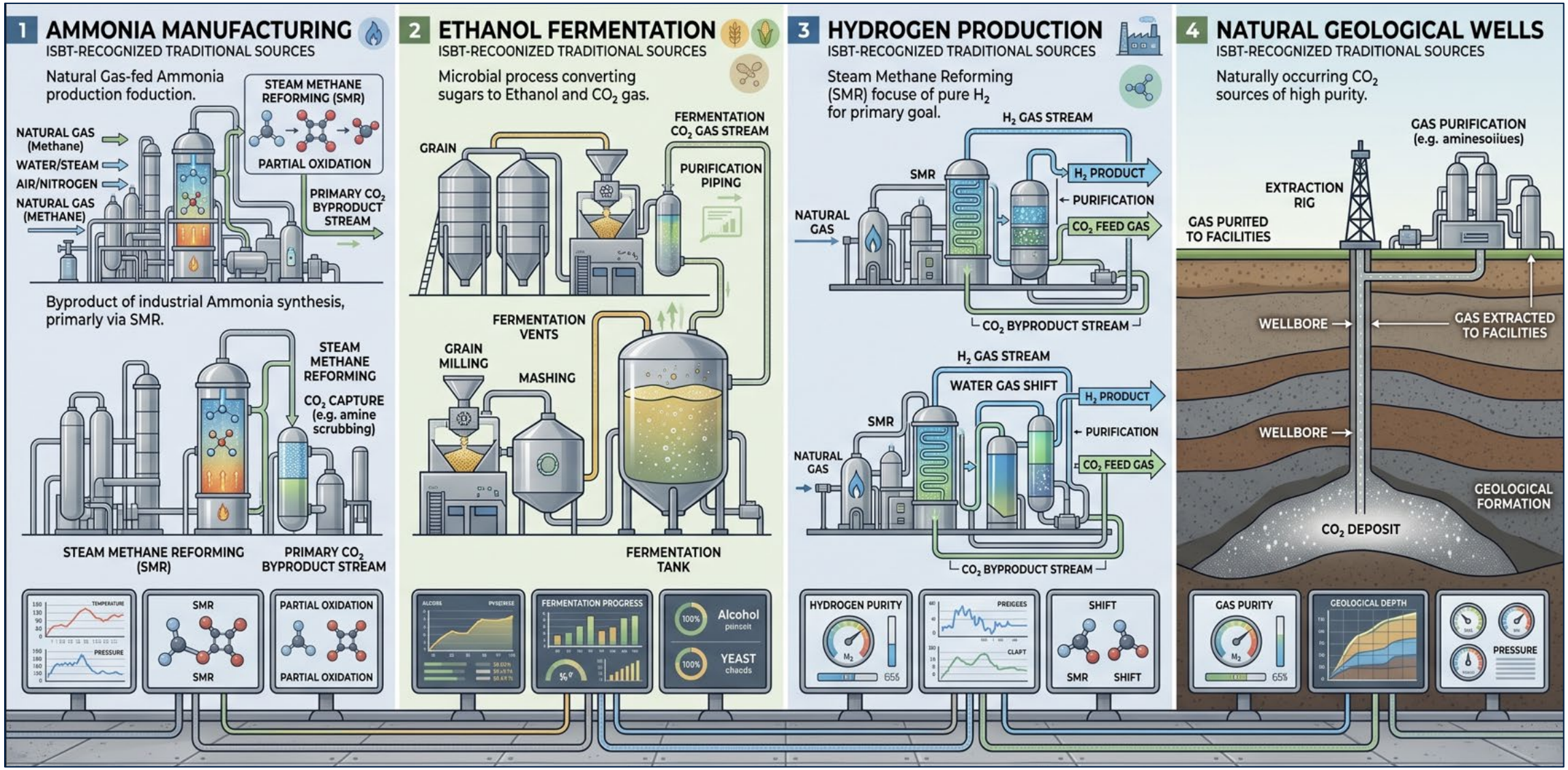
- Budget Realities vs. Quality Control
- CO_2 is a *Byproduct*, Not a Pure Chemical
- Inheriting the "Baggage" of the Source



Approved CO_2 Feed Gas Sources

ISBT-Recognized Traditional Sources:

Requirement: Rigorous, multi-stage purification.



Understanding CO_2 Grades

- **Industrial / Welding:** Approved for human waste sources, Unregulated sulfur/VOCs.
- **Food Grade:** Loose guidelines, no strict sensory tests.

- **ISBT Beverage Grade:**
  - Purity: **99.90% - 99.99%**
  - Sensory Testing: **Strictly Required**
  - Total Sulfur: **< 0.1 ppm**
  - Toxic VOCs / Benzene: **< 20 ppb (Parts Per Billion)**

Analytical Parameter	Industrial / Welding Grade	General Food Grade	ISBT BEVERAGE GRADE
Minimum Purity	99.0% – 99.5%	≥ 99.8%	**≥ 99.9%**
Moisture / Water	Varies widely (often high)	≤ 20 ppm	**≤ 20 ppm**
Sensory (Odor & Taste)	Not Tested (May contain oils/solvents)	Expected to be neutral	**Strictly Tested in Water (Odorless/Tasteless)**
Total Sulfur	Not Tested	Rarely Specified	**≤ 0.1 ppm (Prevents off-flavors)**
Aromatic Hydrocarbons	Not Tested	Not Rigorously Tested	**≤ 0.02 ppm (Strict Benzene limits)**
Total Volatile Hydrocarbons	Not Tested	Varies	**≤ 50 ppm (≤ 20 ppm non-methane)**
Oxygen (O_2)	Not Tested	Varies	**≤ 30 ppm (Prevents oxidation/staling)**
Carbon Monoxide (CO)	Not Tested	≤ 10 ppm (Typical)	**≤ 10 ppm**
Source Vetting	Any industrial byproduct	General food-safe sources	**Strictly verified and approved feed gas sources**
Testing Frequency	Minimal to none	Periodic / Batch level	**Rigorous, continuous, and highly specialized batch analysis**

ISBT Template

Non-Approved Sources: The Digester Roulette

- Industrial/Welding Grade Sources:
  - Anaerobic Digesters / Biogas (Municipal solid waste, human waste, manure)
  - Landfill Gas Extraction
- Extreme Volatility and Unpredictability



Non-Approved Sources: The Digester Roulette

- Aromatic Hydrocarbons (Benzene):
  - Known carcinogen.
  - ISBT Limit: 20 ppb (Toxicological regulation).
- Phosphine:
  - Acutely toxic gas.
  - ISBT Limit: 0.3 ppm.
- The Golden Rule:

If it isn't measured, it isn't used.



Sensory and Safety Impacts on Beer



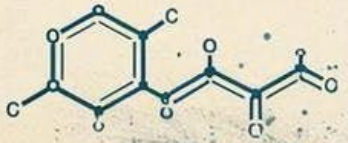
FLAVOR



Oxygen (O_2) — Oxidation; “wet cardboard” staling



Acetaldehyde — Sharp, solvent-like “green apple”



Hydrocarbons (Volatile) — Plastic, chemical aftertastes

AROMA

Hydrogen Sulfide (H_2S) — “Rotten egg” or sewage



Carbonyl Sulfide (COS) — Burnt, struck-match smell



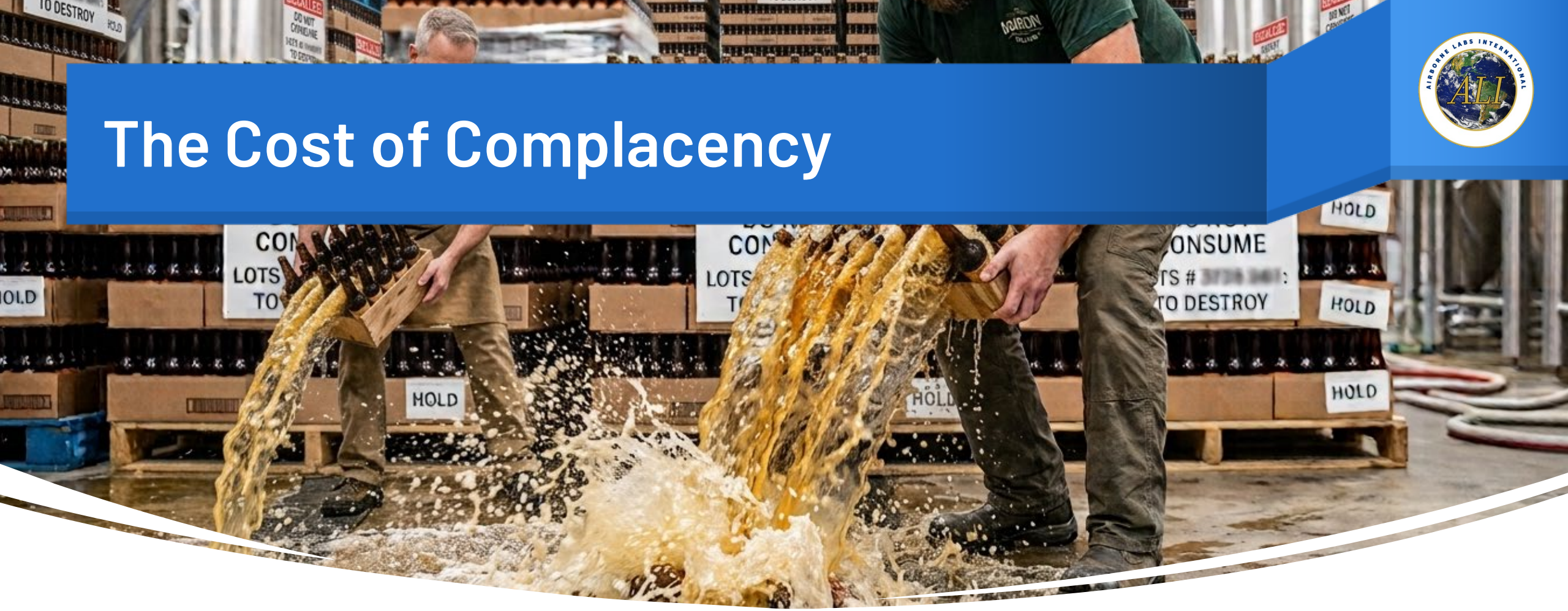
Nitrogen Oxides / Ammonia — Sharp, metallic notes



APPEARANCE (FOAM)

Non-Volatile Organic Residue (NVOR) — Destroys head retention

The Cost of Complacency



- Saving $50 on gas can cost $50,000 in dumped product.
- Historical Multi-Million Dollar Recalls.
- Permanent Brand Damage.

Trust But Verify: The Delivery & Storage Trap

The COA Assumption

- Never rely solely on transit paperwork.

The Stratification Effect

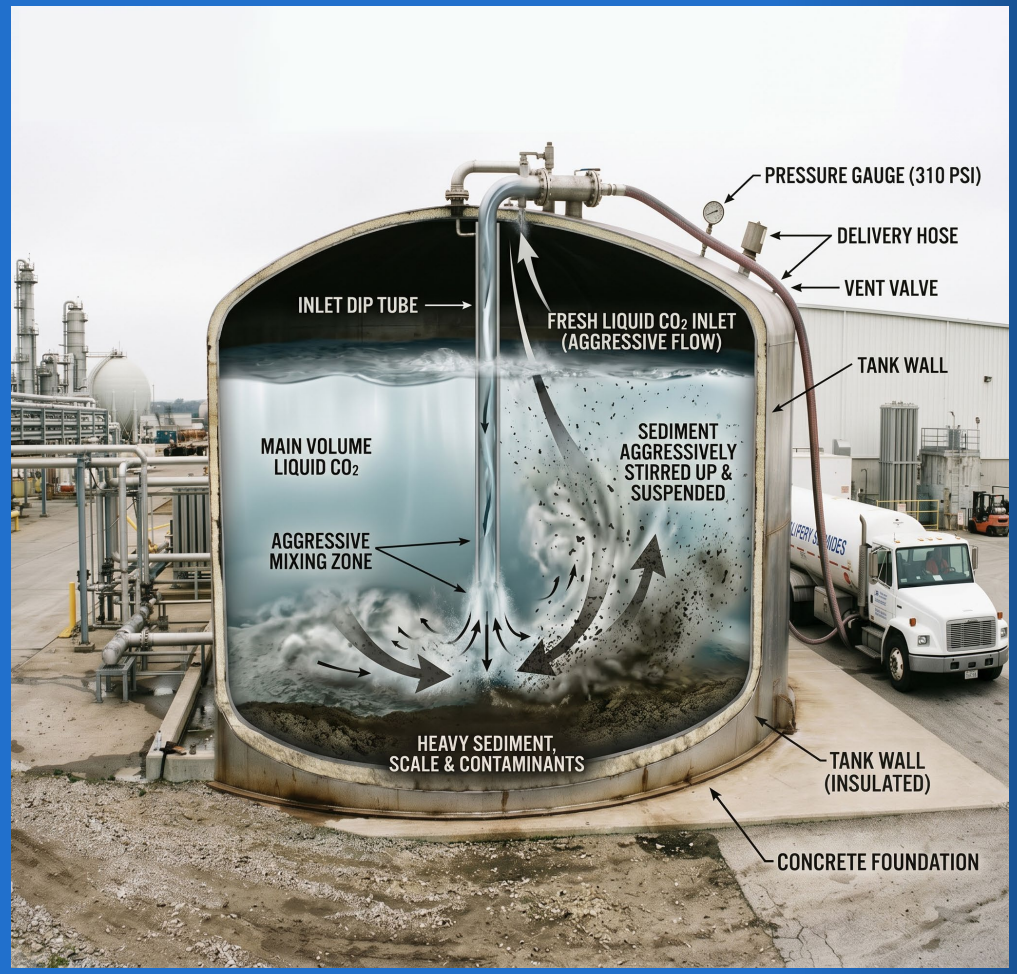
- Trace impurities settle over time.

The Stir-Up

- High-pressure deliveries agitate settled contaminants.

The Solution

- 5-Year Comprehensive Diagnostic Testing.



Defending Your Brewery: In-House Testing Solutions

Entry Level:

- Fast spot-checking



Gas-1P



SulfAlert-1

Comprehensive:

- Multiple ISBT parameters



Gas-5XLT

Automated:

- Continuous monitoring



Xcela



Max-Bev



Definitive Verification: 3rd-Party Laboratory Testing

- 3rd-Party Lab Analysis (Feed Gas & Polished Gas).
- The No-Haz Sample Kit:
  - CO_2 is a Division 2.2 non-flammable gas.
  - Sample held under 29 psig = Non-Hazmat.
  - No specialized carriers, no massive surcharges, no delays.

Summary & Conclusion

- **Source Matters:**

Gas is not just gas.

- Industrial Grade is a Liability.

- ISBT Beverage Grade is the *Only* Standard.

- **Trust But Verify:**

Test deliveries and tanks proactively.



Thank you!

Mark R. Taylor | President

sales@airbornelabs.com | www.airbornelabs.com

Contact Us

CO_2 Analysis