Rx The WellRX Daily

A PHOTO-TRIGGERED DIAGNOSIS FOR **J. MITCHELL** · RIDGELINE PRODUCTION / MERIDIAN OPERATING · SOLUBILIZED IRON IN OIL

SUBJECT	SYMPTOMS OBSERVED	ROOT CAUSE	RECOMMENDED PLAY
Solubilized iron in produced oil NE Texas · Cotton Valley / Travis Peak tank battery	***FeS sludge · black condensate · iron pill*** Three tells in four field photos	***H_2S × Fe^{2+} downhole + O_2 ingress at tank*** Treating tank only = bailing the boat	***TGA batch · chelant continuous · CI upstream*** Payback inside one quarter on a continuous CI well

Dispatch

Four photos came in from the field: a tank manway coated in jet-black FeS-asphaltene sludge, a video frame of the same sludge pouring into vessel, the heater-treater sight glass running jet-black, and a bottle test showing the classic red-brown *iron pill* at the oil-water interface.

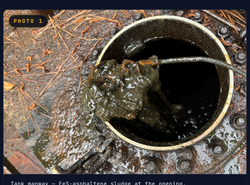
This is textbook sour-gas iron fouling — H_2S is reacting with Fe^{2+} generated by downhole CO_2 / H_2S corrosion, the resulting FeS colloids are partitioning into the oil and stabilizing an emulsion rag, and oxygen ingress at the tank is flipping a fraction to Fe^{3+} (the red-brown band). You don't pull iron out of oil with one silver bullet; you move it to the water phase and drop it there. Chemistry plan below — and critically, this is **upstream of the tank.** Treating only at the tank is bailing the boat while the hole is still open.

PORTFOLIO PULSE

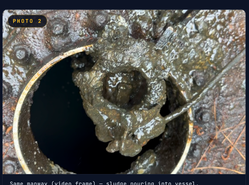
SEVERITY	High
PHOTOS REVIEWED	4
ACTION WINDOW	72h
MONDAY-MORNING BATCH	ready

§ I Subject Photos

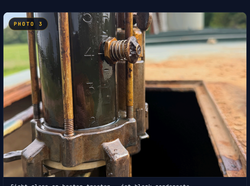
Four field photos as received. Photo 1 and 2 are the tank manway sludge (photo + video frame); 3 is the heater-treater sight glass; 4 is the bottle test after 30 minutes of settling.



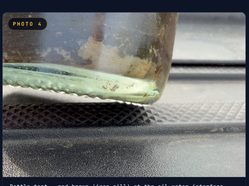
Tank manway — FeS-asphaltene sludge at the opening.



Same manway (video frame) — sludge pouring into vessel.



Sight glass on heater treater — jet-black condensate.



Bottle test — red-brown 'iron pill' at the oil-water interface.

§ II Situation Summary

Classic sour-gas-well iron fouling in a NE Texas Cotton Valley / Travis Peak tank battery. Three diagnostic tells in the provided media:

- **Black, tarry, metallic-sheen sludge at the manway** — iron sulfide (FeS) bound with asphaltene-stabilized rag. Hallmark of H_2S reacting with dissolved Fe^{2+} at an oxygen-exposed interface.
- **Jet-black condensate in the sight glass** — FeS colloids in the hydrocarbon phase pushing the color well past normal Cotton Valley dark-amber.
- **Red-brown band in the bottle test** — classic *iron pill*. Fe^{3+} / $Fe(OH)_3$ / $FeCO_3$ precipitate settling at the oil-water interface. Confirms partial oxidation from O_2 ingress.

Solubilized iron in oil is really two populations: Fe^{2+} complexed or suspended in the hydrocarbon (often as naphthenates or FeS colloids), and Fe^{3+} hydrolyzing at the oil-water interface. You do not pull iron out of oil with one silver bullet — **you move it to the water phase and drop it there**.

§ III Top Likely Causes · Ranked

Cause #1 is upstream; the rest compound what arrives at the tank. Do not invest in tank chemistry before confirming the wellhead program.

1. **Downhole / flowline corrosion by CO_2 + H_2S.** Generates Fe^{2+}, which then reacts with H_2S to form FeS fines that partition into the oil phase and stabilize the emulsion rag. This is the source; the tank photos are the symptom.
2. **Oxygen ingress at the tank** (open thief hatches, vac-truck pulls) flipping Fe^{2+} to Fe^{3+}, producing the red-brown *iron pill* visible in the sample jar.
3. **Asphaltene co-stabilization.** FeS is a natural asphaltene flocculant — once the rag pad forms, it locks iron into the oil phase mechanically. The longer the tank runs without intervention, the harder it is to move iron to the water leg.
4. **No iron-specific chemistry in program.** Foamer and possibly a corrosion inhibitor are present; nothing is chelating or dispersing the iron already in solution.

§ IV Immediate Field Actions · Today

Do these four before anyone orders chemistry. Every breath of air into the tank compounds the problem.

- **Close the thief hatches.** Every breath of air makes the problem 10× worse. Free fix.
- **Bottle test.** 50/50 produced fluid + 100 ppm candidate iron control. Shake, settle 30 min, inspect the rag. Compare against the blank jar shown in Photo 4.
- **Hot-oil / circulate the wash tank** if the sludge pad is more than 6 inches. You will not chemically treat through a foot of FeS mousse — thin it physically first.
- **Measure iron.** Hach iron test kit on both oil and water legs. Get total Fe plus Fe^{2+} / Fe^{3+} speciation before sizing chemical.

§ V Next-Step Diagnostics · This Week

Four measurements that determine the right dose and the right injection point. Skip these and you're guessing.

- **Fe^{2+} / Fe^{3+} speciation** on separator water and tank oil. Total iron alone won't tell you whether you need reductive or chelating chemistry.
- **H_2S and CO_2 partial pressures;** bicarbonate alkalinity. Drives the $FeCO_3$ vs FeS formation balance — and therefore which inhibitor family is right.
- **Asphaltene SARA panel**, or at minimum a heptane drop test on the tank oil. Tells you whether dispersant chemistry needs to run alongside iron control.
- **Residual of the existing corrosion inhibitor at the wellhead.** If residual is zero, iron will keep coming no matter what you dose at the tank — that is an upstream problem masquerading as a tank problem.

§ VI Recommended Chemistry

Two product families, two injection points, one job: dissolve FeS + move iron to the water phase. Doses below are target ranges — bottle-test to confirm on actual produced fluid.

PRODUCT CLASS	TARGET	DOSE	APPLICATION
Organic acid + chelant blend citric / erythorbic / thioglycolic acid based — TGA is the FeS workhorse	Dissolve FeS, hold Fe in water phase, prevent Fe^{2+}→Fe^{3+} flip	50–250 ppm continuous 500–1,000 ppm batch	Continuous neat injection at wellhead / flowline manifold; or single-dose batch into standing tank inventory with 4–8 h circulation.
Water-soluble iron-sulfide dispersant / non-emulsifier	Pull FeS colloids out of the oil phase into the water leg	25–100 ppm continuous	Inject with a 1–2 gpm fresh-water carrier ahead of the heater treater.

§ VII Monday-Morning Play

Three-step field program. Execute in order; don't start the continuous program until the batch has dropped out the existing inventory.

1. **Batch the tank** with 500 ppm TGA-based iron dissolver on the standing inventory. Circulate 4–8 hours, then drop the water leg.
2. **Follow with continuous chelant** at 75–150 ppm at the wellhead / flowline manifold via chemical pump, neat (no water wash at those rates).
3. **Re-test iron in 72 hours.** Target Fe total in tank oil under 5 ppm; in water leg under 25 ppm before calling the program clean.

⚠ FSC-600 Compatibility Flags

- **Separate pumps, separate injection points.** FSC-600 is a surfactant foamer (cationic / amphoteric family). TGA and chelant iron controls run anionic to mildly acidic (pH 2–4). Co-mingling in the same tote or injection line will salt out the surfactant and kill foam quality.
- **Low-pH + carbon steel tank = accelerated corrosion.** Add 200–500 ppm fliming-amine corrosion inhibitor to the batch slug, or cap contact time under 12 hours.
- **H_2S release risk.** Acidic chemistry + residual H_2S can flash on sludge break-up. Personal 4-gas monitors on every worker, vac truck staged downwind, no open-hatch sampling during the batch or within 2 h of completion.

§ VIII Economic Lens

Chemistry cost for the continuous program runs **$0.04 – $0.12 per bbl** of produced fluid depending on iron load and chelant choice. Against the downside — FeS-stabilized emulsion pulling oil off-spec on BS&W, accelerated pipeline corrosion downstream, and periodic vac-truck tank cleanouts at $4,000–$8,000 per visit — **the program pays back inside one quarter** for any well on continuous CI.

Bottom line: the iron problem is upstream of the tank. Treating only at the tank is bailing the boat. **Sell the operator a TGA dissolver batch now, a chelant/dispersant continuous program at the wellhead, and keep both physically separate from the FSC-600 line.**

This brief is a field-engineering opinion based on the provided photos and the stated operating context. Final chemical selection and dosing must be verified by a laboratory bottle test on representative produced fluid. WellRX is not liable for application decisions made in the field; always follow SDS, PPE, and operator safety procedures.