

# **CONCAWE, EI, DGMK**

## **Unexplained Accelerated Corrosion in ULSD Systems**

Brussels, March 16, 2011

Presented by:  
Fuel Quality Services, Inc.

# Discussion

- Problems associated with accelerated corrosion of mild carbon steel in the fuel system several years after introduction ULSD September 2006.
- Issues originally identified by PEI and STI
- This investigation now under the auspices of Clean Diesel Fuel Alliance (CDFA) chaired by API.
- Issue discussed at ASTM workshop July 2010. Next work shop December 2011.

# Discussion

- CDFA has contracted with Battelle National Laboratory to conduct study:
  - Task 1. Evaluate existing survey and historical field inspection data
  - Task 2. Test the Working Hypothesis
  - Task 3- Analyze results and develop conclusions
  - Task 4- Prepare draft and final project reports

# Discussion

- Number of theories
  - Mechanical/Electrical:
    - Electrolysis from lack of proper grounding for submersible turbine pump (STP)
  - Chemical:
    - Presence hydroperoxides
    - Excess corrosion inhibitor
    - Lack of corrosion inhibitor
    - ULSD vs. LSD

# Discussion

- Number of theories
  - Microbial
    - Low levels of sulfur level <15ppm vs. 500ppm
    - Aerobic vs. anaerobic microorganisms
- What we do know:

Fuel Phase		Water Phase			
Formate ppm	Acetate ppm	pH	Conductivity uS/cm	Formate ppm	Acetate ppm
<0.3	30	-	-	-	--
<0.3	35	4.5	22,000	260	19,000

# ULSD STP Manifold & 4" Riser





# ULSD Column Pipe





# ULSD Column Pipe





# ULSD Pump Motor Assembly





# STP Reducer Fitting

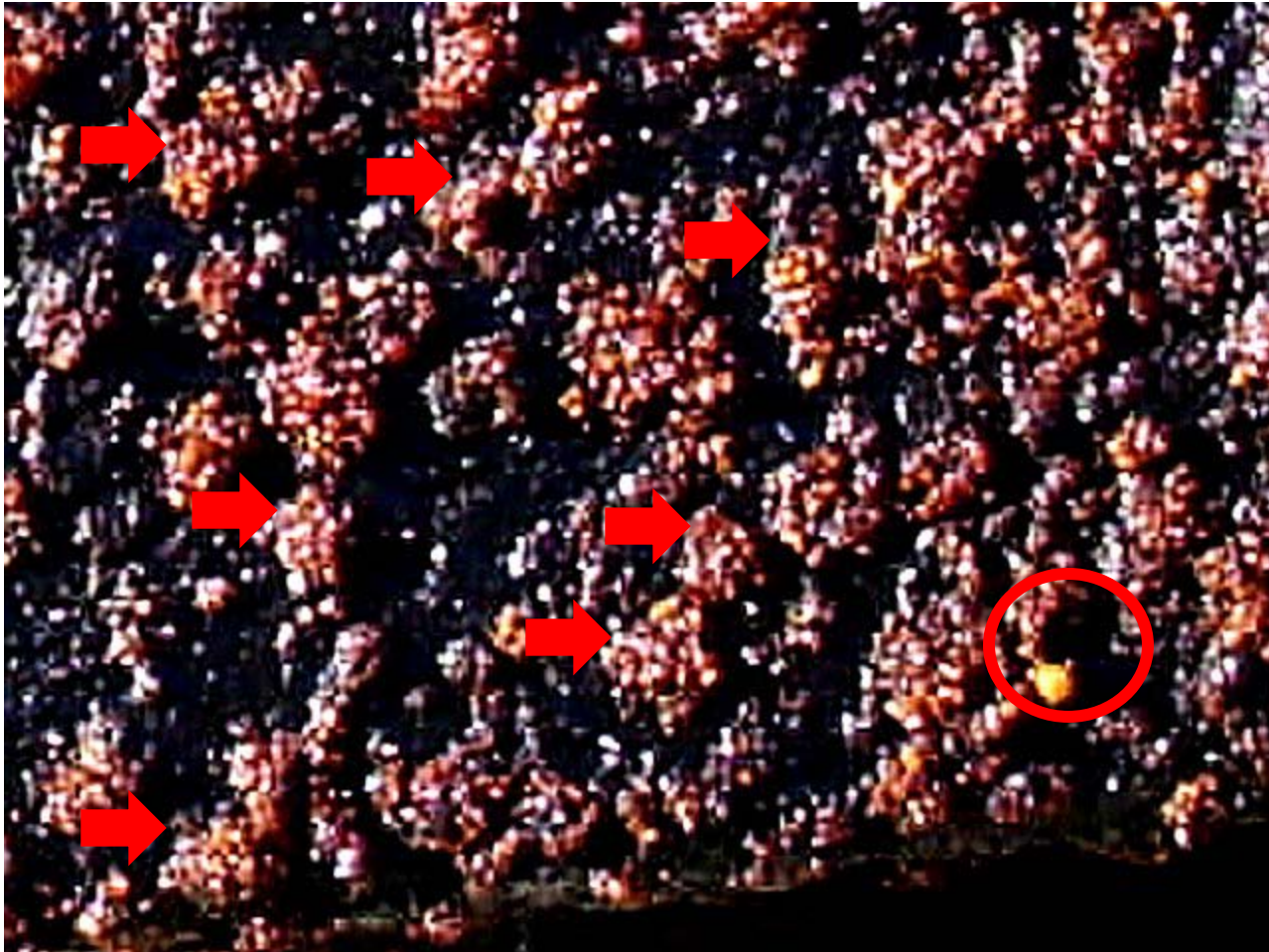


# Close Up of STP Reducer Fitting





# STP Reducer with Carbuncles and Reduced Sulfur Potential for SRB?





# ULSD Corrosion Product



# ULSD Dispenser



# FE Petro Equipment



Old vs New







# Black “gunk” in tank



# Tank Bottom



# ULSD Fuel Tank ATG





# Encrusted ATG

