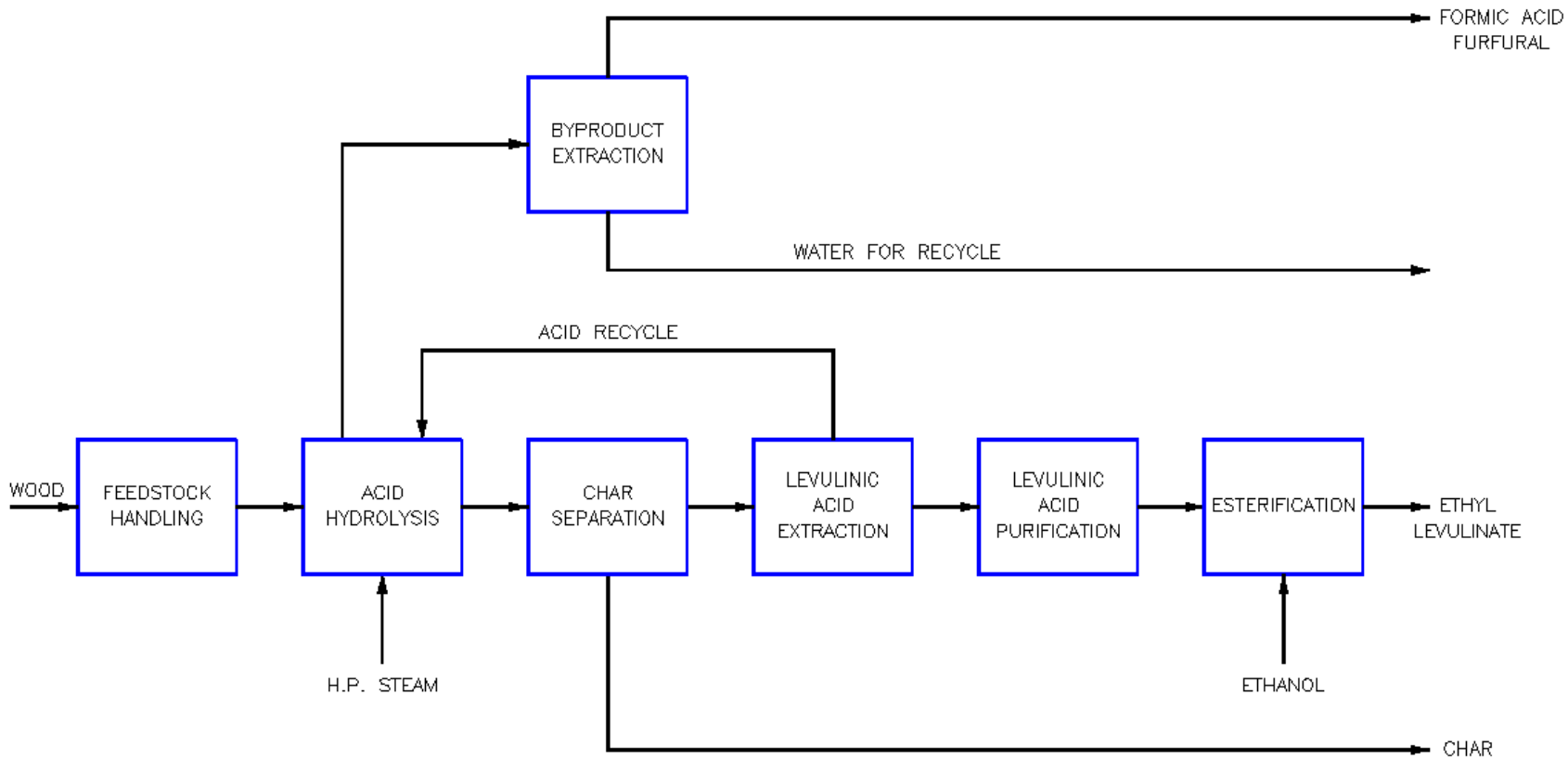
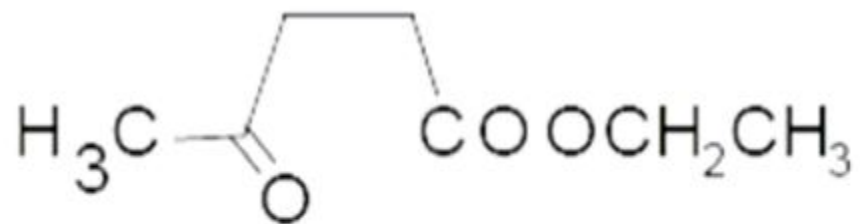
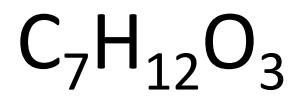


# Field Evaluation of a 10% Ethyl Levulinate Blend

Technical Workshop  
Sept. 19, 2017





ethyl levulinate

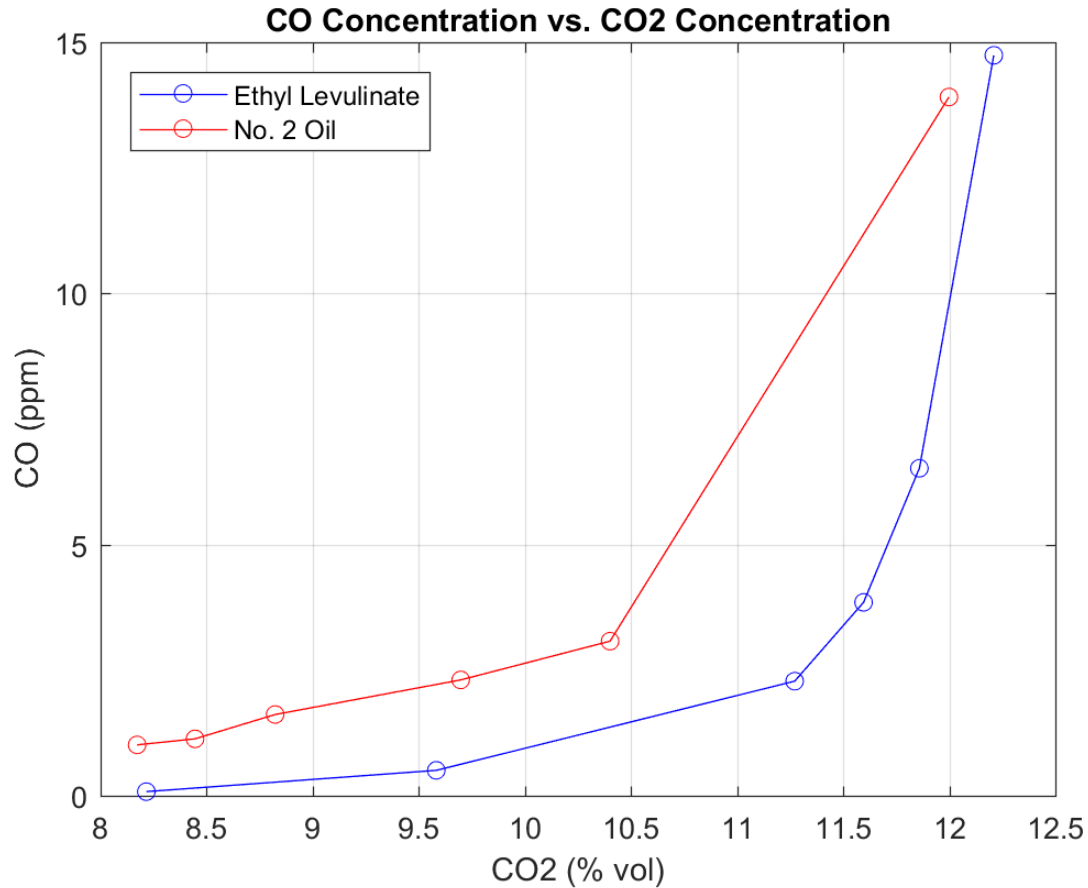
# Planned Field Test Key Elements

1. Identify sites and collect information
2. Pre-Test tank bottom samples
3. Remove/retain pump and filter assembly
4. Periodically the technician records:
  1. Combustion test results
  2. Pump vacuum
  3. Ignition and shutoff observed behavior
5. Periodic tank bottom sampling
6. End of test:
  1. Document burner/appliance condition
  2. Replace pump / retain for testing

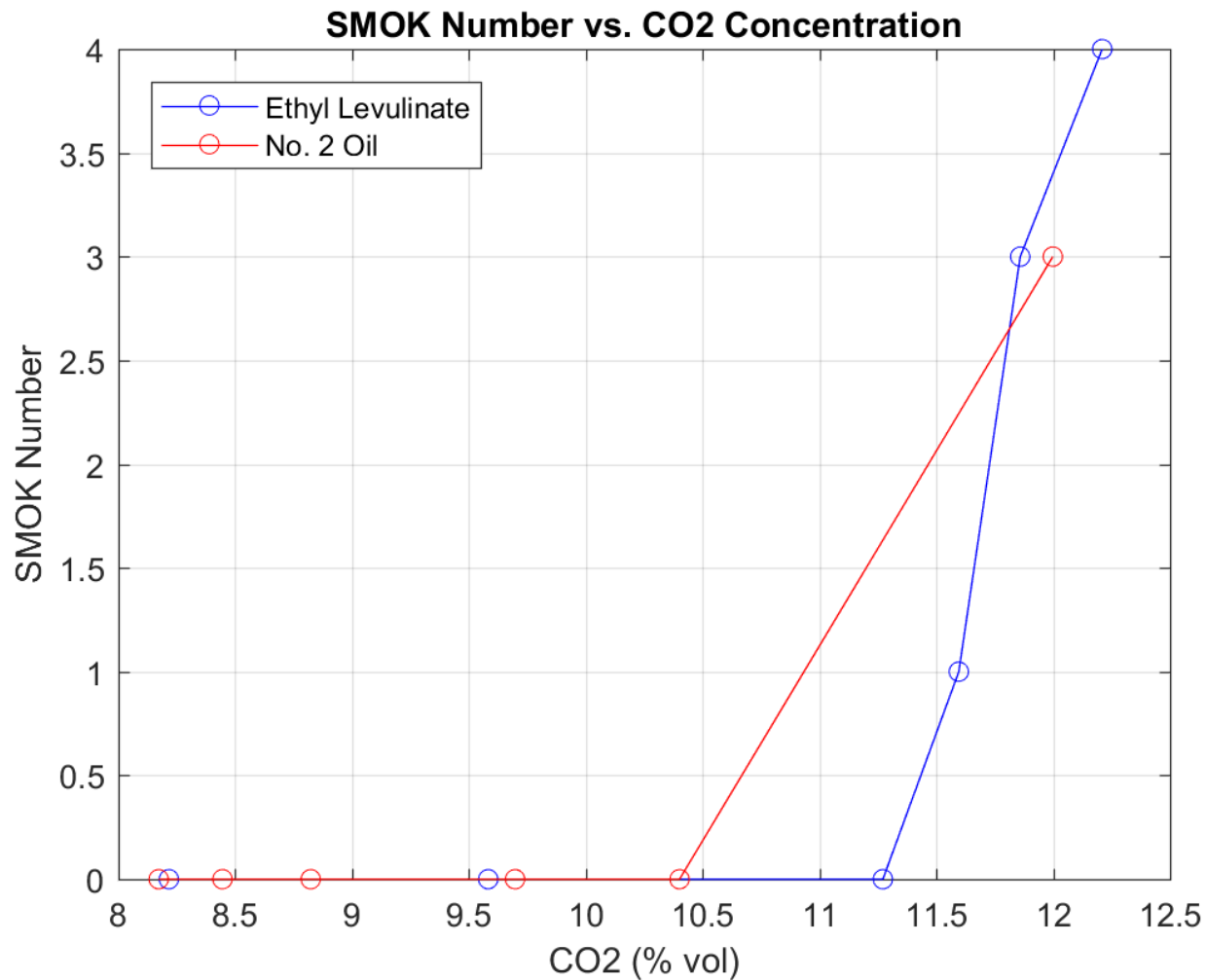
# Lab studies to support field test

- Basic combustion performance
- Seal and nitrile coupon swell tests
- Pump run tests
- Low temperature separation evaluation.

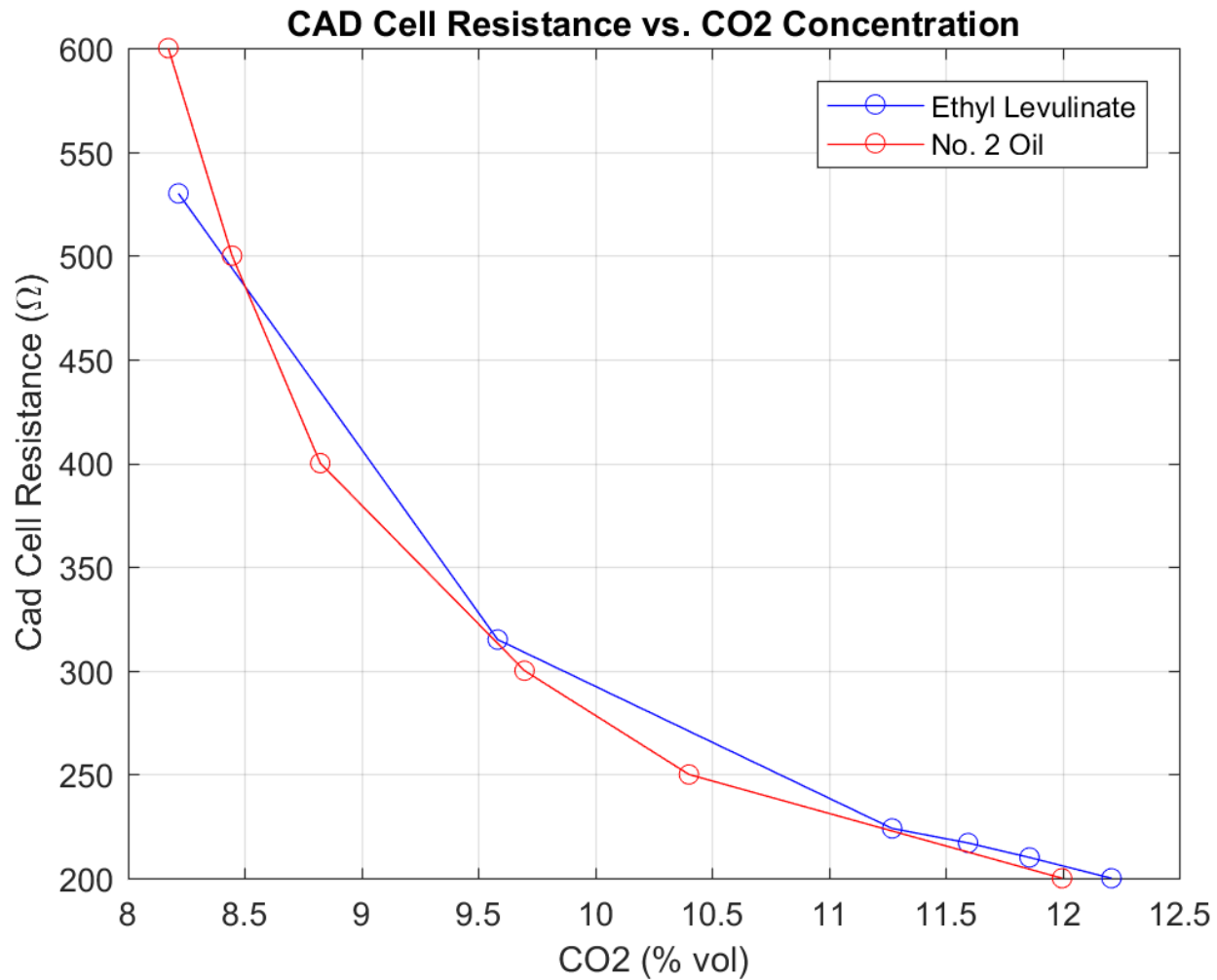
# Basic combustion testing – EL10 Blend



# Basic combustion testing – EL10 Blend

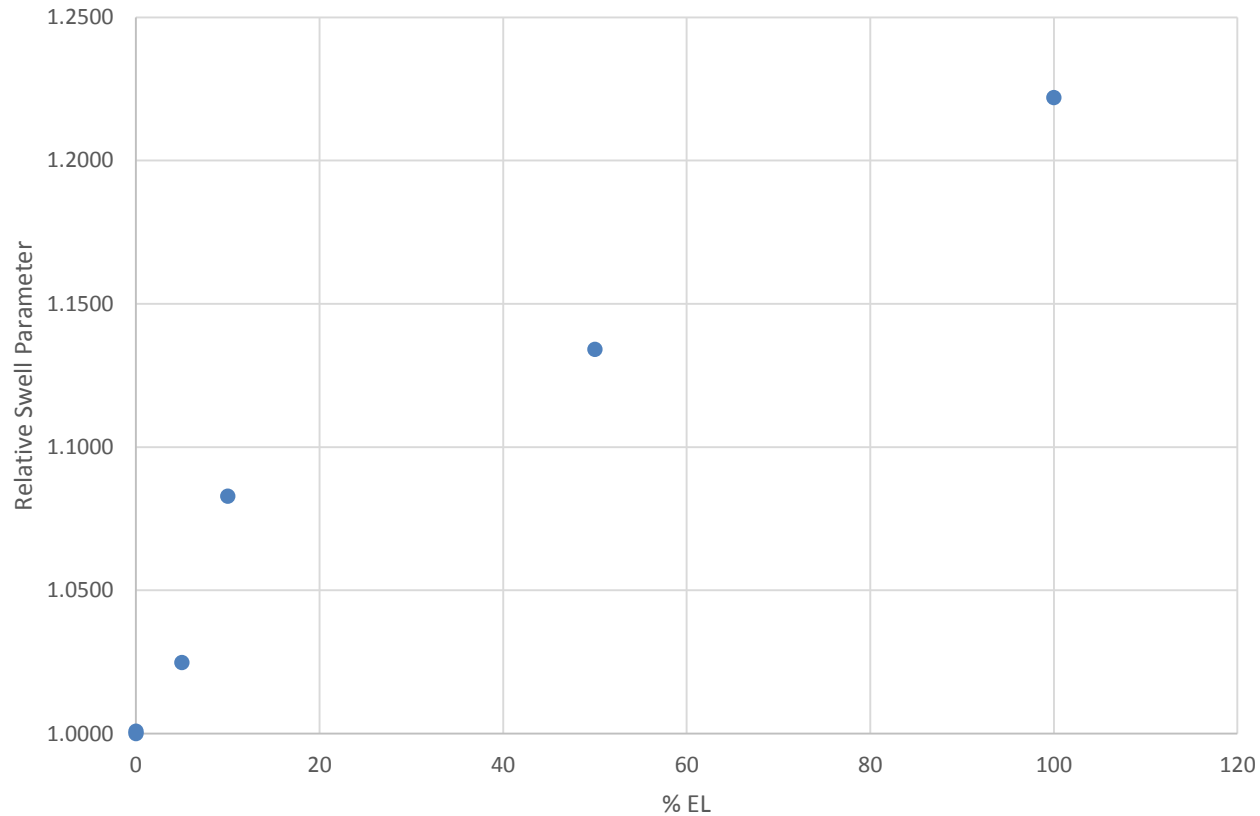


# Basic combustion testing – EL10 Blend





# Pump seal swell test



# 6 month pump test – 2.5% blend



# Pump tests with 10% blends

Currently in progress

47 days – conventional pump

Plan to add other pumps

15 minutes on / 15 minutes off cycling pattern.



# Water tolerance testing in progress



# Low Temperature Separation Tests

10% and 20% blends

Typical exposure at 15 F (at lower temperature oil clouds)

With and without water exposure

With and without cosolvent (higher alcohols)

