

The logo for Beckett Corporation, featuring the word "Beckett" in a white, stylized script font on a red square background.

Beckett.

CORPORATION

Testing Summary

1% Vegetable Oil in #2 Fuel Oil

(Projects #4664 & #4667)

Notes to correct

Presented by Ted Olszewski

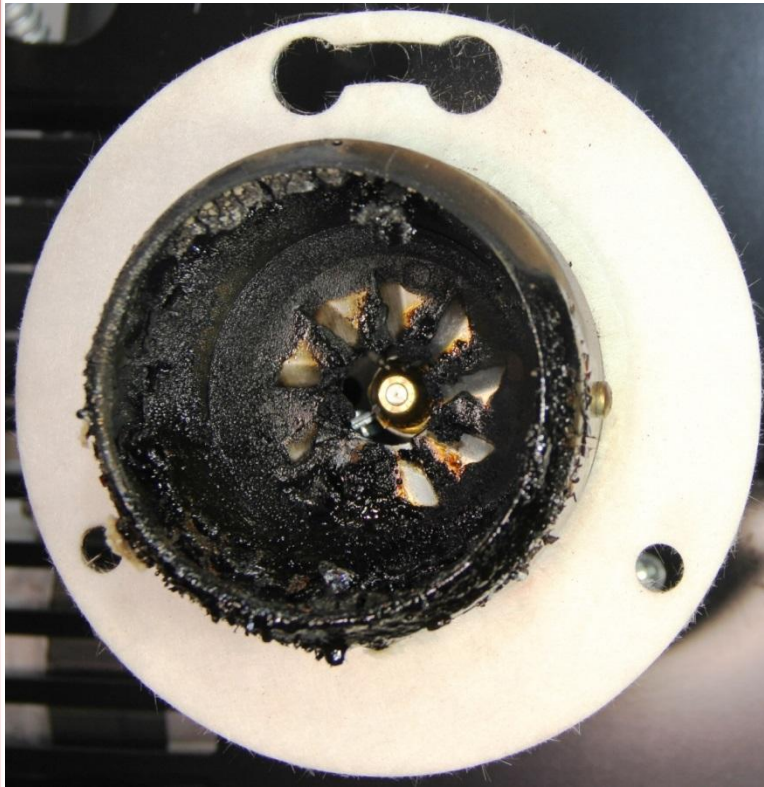
September 14, 2016

NORA Technical Workshop –Newport, RI

The Trigger – Why?



- Testing of B20 Fuels revealed odd results.
 - Suspected (later verified) Vegetable Oil added
 - In Parallel, 1% Additive Ballot D396



Test Conditions for Picture

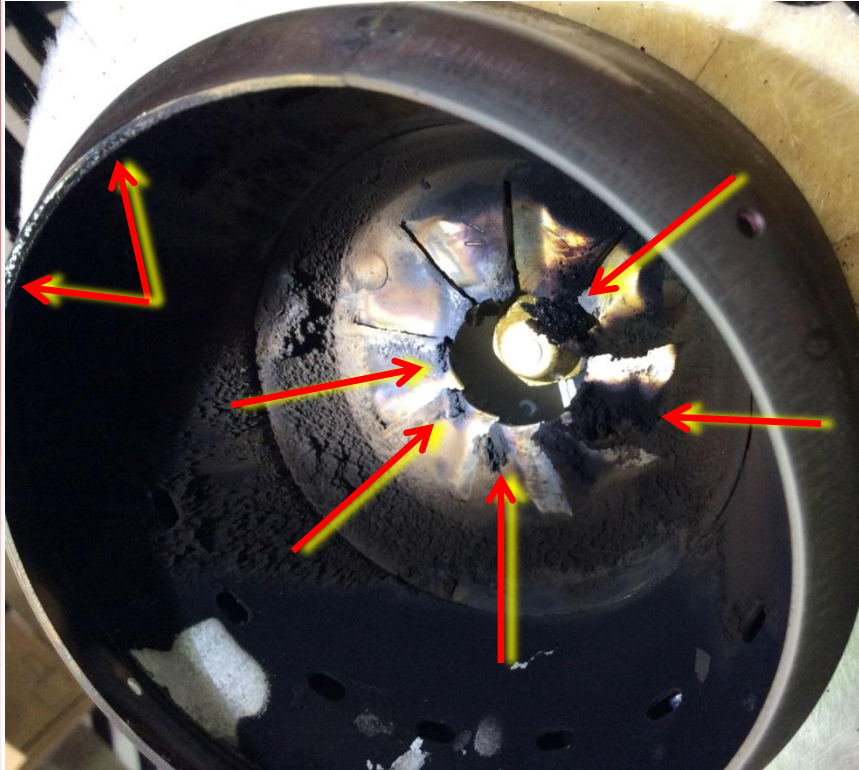
- 3 – Pass Boiler (hi pressure)
- Cast Iron (cold chamber)
- 100 hours operation
- 5 min on / 5 min off cycle
- “B20” (actually a B14)

The Test



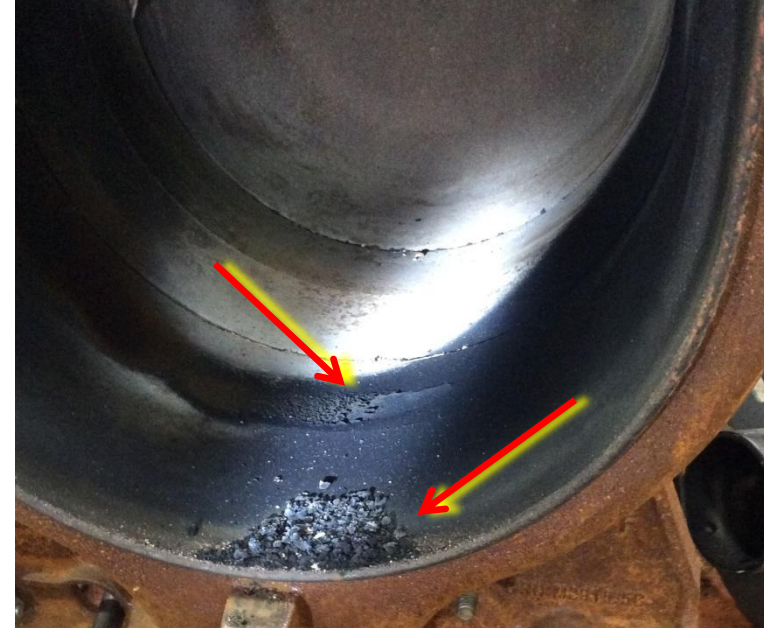
- Fuel – Mix 55 Gallons (7040 oz) #2 with 70 oz Vegetable Oil = 1%
- Splash blended @70°F, hi-speed agitation 10 min
- Constant recirculation with pump during test
- Same Boiler (Cold, Hi Pressure, 108 hours)
- Care to prevent air infiltration during test
- 5 min on / 5 min off, 108 hours, 1331 cycles

Results – Head/Chamber



- Build up restricts air flow; creates soot, CO/CO₂
- “Glazing” on head(drips in)
- “Wetting” inside chamber

Test Run #2 – Confirmation Plus: 112 Hrs (1,394 cycles)



Confirmation:

- Hard Carbon
- Debris

Plus (readings):

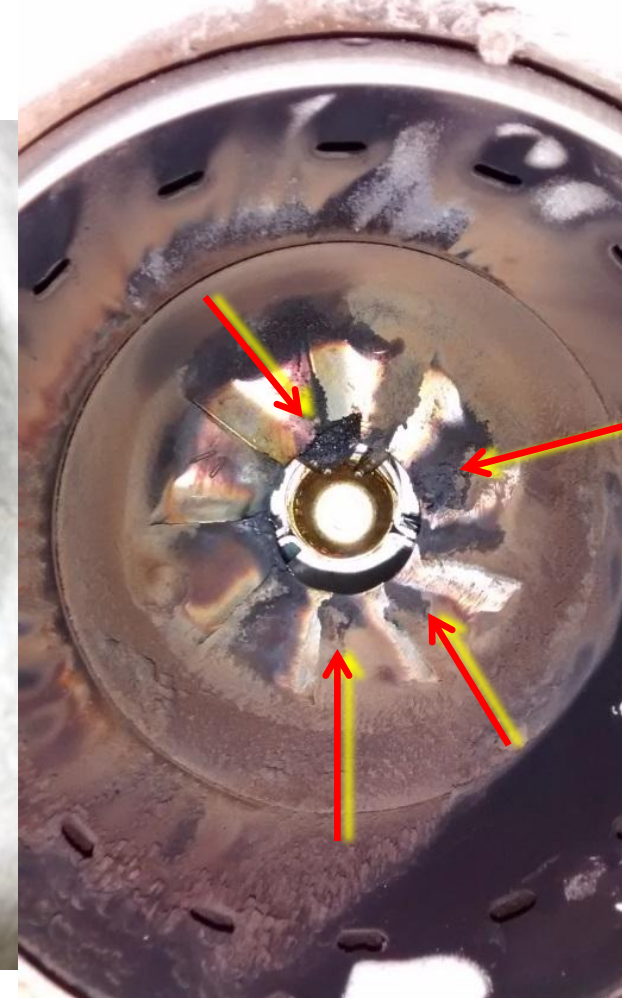
- CO₂ (~1%) and CO up
- CAD readings up (from 860 to 1056 Ohms)

Comparison to Original Application

#2 Fuel Oil
(Original Application)
No Black deposits



#2 Fuel Oil w/1%
Vegetable Oil



Reports Available

R.W. Beckett Corporation

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SUMMARY REPORT

PROJECT NUMBER: 4664
PROJECT DESCRIPTION: #2 FUEL WITH 1% VEGETABLE OIL
CUSTOMER: INTERNAL RW BECKETT PROJECT
REPORT DATE: JUNE 15, 2016
TESTED BY: JAY MILES
REQUESTED BURNER: AFG
APPLIANCE TYPE: MP0147 – 3 PASS BOILER
OBJECTIVE:
Blend 1% vegetable oil with petroleum #2 fuel and perform a combustion test and then cycle test the AFG Burner Spec-BCB-9504.

TEST SET UP:

The MPO147 was set up in a typical laboratory arrangement. See Figure-1. This is an existing application that has been previously tested and approved using #2 fuel oil and reported in Project #4447.



Figure-1
Boiler Test Set-up

Conclusion:



Follow-up:

- Ballot (ASTM) to ban use of Vegetable Oil as Additive
- In process of testing 0.1% Vegetable Oil. Max limit?

Renewable Fuels are the Future of the Oil Heat Industry



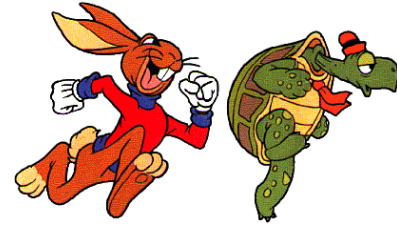
- Beckett committed to the use of Renewable Fuels
- Beckett was part of original B5 testing resulting in #2 Fuel Oil Grade allowing up to B5 (ASTM D396)
- Success using Renewables is critical, so critical we need to make sure the renewable we use is safe and reliable.
- Options include: Biodiesel, Renewable Diesel, 2nd Generation fuels



Largest Biodiesel Concern

(first out of the gate):

- 6-month published shelf life (NREL, US Navy, US Army, EPA, State of California, others).
 - Degrading creates acids (material compatibility) volatiles, and non-volatiles
 - Materials commonly used in Oil Heat Equipment accelerate biodiesel degradation
- Movement towards Renewable Diesel by many who started with Biodiesel
- Beckett to test Renewable Diesel



Renewable Diesel – Who's In?



Mercedes-Benz



NYC



- Meets ASTM D396 for #2 Fuel Oil
- It's a hydro-carbon
- No blend wall (can use @ 100%)
- Compatible with existing equipment
- Highly stable

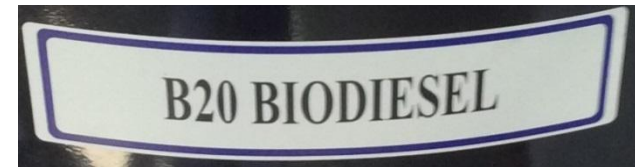


Questions?

Extra Slide – Vegetable Oil Used



Labels (top and side)



Actual Analysis: 14%
(Santmyer-Perkins)