American Institute of Marine Underwriters

Ethanol’s Affect on Recreational Boats

John McKnight
National Marine Manufacturers Association
Recreational Marine Engine Categories

SI Marine
- Outboards
- Personal Watercraft
- Stern drive/Inboard
- Marine generators
Recreational Boats in Use by Engine Type

Outboard
Inboard
Sterndrive
PWC's
Sailboats
Other
Boat Fuel System Components
Typical Boat Fuel System

- Carburetor 183.526
- Fuel Filter Independently Supported 183.534
- Fuel Line Supports 183.532
- Fuel Strainer Independently Supported
- Distribution Line 183.538 183.536
- Fuel Pump 183.566 183.524
- Flexible Fuel Line Connection to Engine 183.562
- Anti-Siphon Device 183.568
- Stop Valve 183.528
- Vent Line 183.540
- Fuel Tank Fill 183.564
- Overboard Vent Fitting 183.520 183.505
- Fuel Tank 183.510 183.512 183.550
- Label 183.514
- 183.572
- 183.540
- 183.518
- 183.554
- 183.556
- 183.562
Ethanol

Why is This a Problem?

— Marine and many other engines are not designed, calibrated, certified, or warranted to run on E15

— The EPA has done minimal testing as to the effects of E15 on engines

— E15 fuel can affect engine performance, air emissions, warranty, and consumer safety concerns for marine and other equipment
Why Are We Putting Ethanol in Gasoline?

• Get our fuel from the Midwest / not Middle East
• Supports farmers and jobs in agricultural areas.
• Energy Independence and Security Act of 2007
  – 36 billion gallons of biofuel by 2022.
Ethanol Producers Waiver Petition for E15

- Growth Energy, a group representing ethanol producers, filed a waiver petition with the EPA in March 2009.

- The waiver asked that E15 fuel be allowed for use in on-road vehicles made in 2001 and after.

- In December 2010 NMMA and others filed suit to block the EPA’s partial waiver.
Fuel Tank Failure Risks

• Fuel tank materials degradation
  – Leaks develop in fiberglass
  – Corrosion to steel tanks
  – Corrosion to zinc parts
Ethanol Fuel Harms Boat Engines, Lawsuit Claims

*Portfolio Media, New York (April 7, 2008)*--A boat owner has filed a proposed class action against several major oil companies including Exxon Mobil Corp., ConocoPhillips Co. and Chevron USA Inc., claiming that their ethanol-blended gasoline damages marine fuel tanks and engines.
Post-mortem analysis of fiberglass fuel tank after exposure to ethanol fuel. Result of ethanol scouring inside of fuel tank.
Fuel/Resin mixture caused by scouring of resins inside fuel tank, which are then passed through filter into the fuel.
Valve with carbon build-up from breakdown of the resin in fiberglass fuel tanks.
NMMA Concerns with Increased Ethanol in Fuel

• **What Makes the Marine Industry Unique?**
  – Long Periods of storage
  – Spans from single small engines to 1325 HP multi-engine applications
  – Operate at high power settings - High fuel consumption
  – No gravity or pressure feed fuel systems
  – Open vented fuel systems
  – Just starting feedback loop engine controls
NMMA Concerns With Increased Ethanol in Fuel

• Long periods of storage
  – Increased water in boat tanks
  – Possible phase separation if fuel is stored over a wide temperature range.
NMMA Concerns with increased Ethanol in Fuel

Ethanol Fuel retrieved from a boat in 2006
Ethanol Holds Water

How much -- Depends on:
• Temperature
• Hydrocarbons in the gasoline blend (aromatics and others)
• Alcohol blend
• Co-solvents in the gasoline. Often blended with TBA

More alcohol in blend holds more water
Specific Conditions

- Dissolves seawater
- Promotes general corrosion

Observed in laboratory
Corrosion Sites

- Where water phase pools under gasoline
- At the water-gasoline interface
- Near dissimilar metal or contamination site

Accelerated with Cu for these tests of Al 5052
A DOE Funded Mercury Marine and Volvo Penta study of the effects of running 15% ethanol concentration in current production 4-stroke engines and “legacy” 2-stroke engines

- Verado 300 hp Outboard – Mercury Marine
- 9.9 hp four stroke outboard- Mercury Marine
- 200HP EFI 2.5L 2 Stroke- Mercury Marine
- 4.3 Liter Volvo Penta Inboard Engine
What Are We To Do?

• Marine engines and other small engines can run of E15, E20, E25.
• Isobutynol advantages and NMMA test program
• US Government needs to come up with a good biofuel plan that works
Insurance Implications – Boat and Yacht Policies

Direct Damage issues
• Gradual Deterioration
• Wear & Tear
• Intentional Misuse or Misconduct
• Lack of reasonable care or due diligence
• Mechanical Breakdown exclusions

Consequential Damages – Will the above exclusions hold up for subsequent damage?

Coming soon to a policy near you..

“BI or PD caused by or resulting from fuel, fueling or politically motivated legislation shall be excluded”....
Insurance Implications - Commercial Marina’s/Dealers

Marinas/Dealers

• Accidentally fill a customers boat with E15 (MOLL or GL)

• Product Liability if selling E15 fuel