ASTM Specification Update

CARB Biodiesel Work Group

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BIODIESEL

TM by the National Biodiesel Board

ASTM Summary for Biodiesel

Biodiesel Process

(Catalyst)

100 pounds	+ 10 pounds	=	10 pounds	+	100 pounds
Triglyceride	Alcohol		Glycerine		Mono-Alkyl Esters
(Fat or Oil)	(Methanol)				(Biodiesel)

- Raw Fats and Oils are NOT Biodiesel!
- Other 'Renewable Products' are NOT Biodiesel!
- Must be long chain mono alkyl esters of fats and oils AND meet ASTM D 6751
- This tight definition needed to secure ASTM specs, OEM approvals, and encourage testing

Spec Background

- ASTM B100 spec based on existing specs for #1 and #2 petrodiesel in ASTM D 975
- If #1 and #2 meet specs, blends are OK
  - No separate set of specs for blends of #1/#2
- If B100 meets D 6751 and diesel meets D 975, up to 20% biodiesel may be used
  - Blends up to B20 are approved
  - No separate set of specs for the blend
- This has worked well in the marketplace

ASTM D 6751-07a

Property	Test Method	Limits	Units
Calcium & Magnesium	EN 14538	5 max	ppm (ug/g)
Alcohol control			
either Flash Point	**D 93**	**130 min.**	**Degrees C**
or GC methanol	**EN 14110**	**0.2**	**% Volume**
Flash Point	D 93	93 min.	Degrees C
Kin. Viscosity, 40C	D 445	1.9 - 6.0	mm²/sec.
Sulfated Ash	D 874	0.02 max.	% mass
Sulfur S500	**D 5453**	**0.05 max (500)**	**% mass (ppm)**
S15	**D 5453**	**0.0015 max (15)**	**% mass (ppm)**
Copper Corrosion	D 130	No. 3 max.	
Cetane number	D 613	47 min.	
Cloud Point	**D 2500**	**Report**	**degrees C**
Carbon Residue	D 4530	0.05 max.	% mass
Acid Number	**D 664**	**0.50 max.**	**mg KOH/g**
Free Glycerin	**D 6854**	**0.020**	**% mass**
Total Glycerin	**D 6854**	**0.240**	**% mass**
Phosphorous content	D 4951	0.001 max	% mass
Distillation, T90 AET	D 1160	360 max	degrees C
Na/K, combined	EN 14538	5 max	ppm (ug/g)
Oxidation Stability	**EN 14112**	**3 min**	**hours**
(Visual Appearance)	**D 4176**	**Free of un-dissolved water, sediment and suspended matter**	

BOLD = BQ-9000 Critical Specification Testing Once Production Process Under Control

Spec Background

- Some users, regulators and OEM's wanted blended fuel specs for biodiesel blends
  - What do you measure if the parent fuel quality is not known? Bid specs, enforcement easier
- Blended fuel specifications are being set so blends will always be in-spec if two good parent fuels are used
- The key is getting B100 that meets D 6751
- Buying from BQ-9000 companies provides added assurance B100 will meet D 6751

ASTM Current Status

- ASTM D 6751 is the approved standard for B100 to be used for blending up to B20 in the US
  - ASTM approval for B100 use only up to B20 in the final blend
  - Higher blends upon consultation with the OEM
- B5 being balloted into the petrodiesel specifications as a fungible component: D 975, D 396 (heating oil)
  - No changes to D975, D 396 parameters
  - B100 must meet D 6751 prior to blending
  - NCWM: No special labeling recommended
- B6 to B20 for on/off road diesel engines will be a stand alone specification
  - Widest of #1/#2 specifications, T-90 5 C increase
  - Addition of stability and acid number specs for final blend
  - NCWM: Label 'B6 to B20' recommended
  - B6 to B20 for heating oil evaluated in future

BIODIESEL ASTM D 6751 Activity

- Changes to D 6751 so that no change is needed for B5 in D 975, D 396
  - Completed: lower acid number; add stability parameter, add Ca/Mg, Na/K
- Precipitate above the cloud point issue identified in the market in 2005:
  - Most due to out of specification biodiesel
  - Small portion could be caused by minor components not controlled in the spec
- ASTM is in process of adding a specification to D 6751 that will address this issue in D 6751
- Once addressed, blended fuel ballots can move forward for approval. Fall/Winter 2007/2008

BIODIESEL ASTM Activity

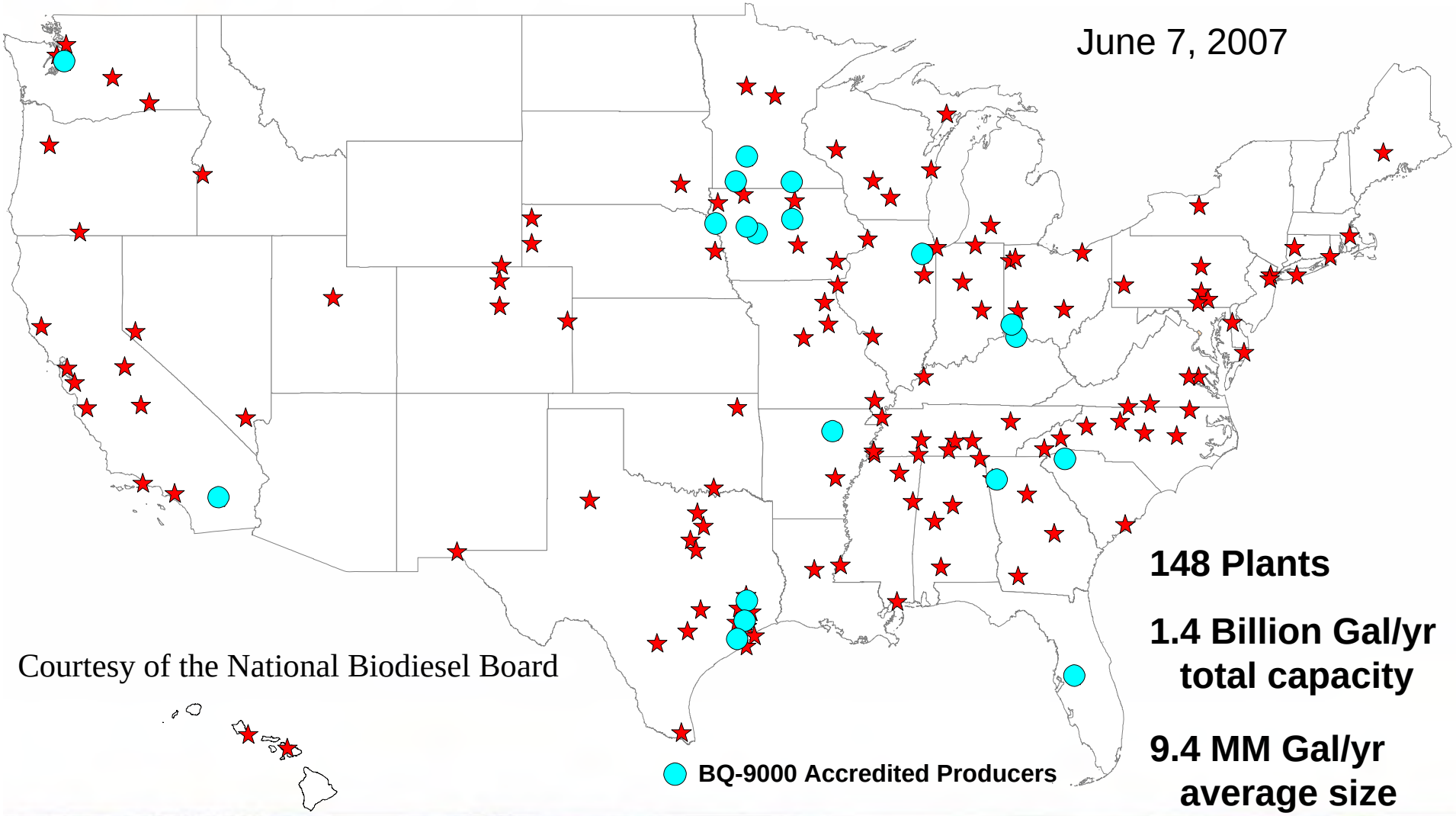
- New ‘Blended and Alternative Fuels’ category for D 975 and D 396
- All non-petroleum fuels would fall into this category, which would identify:
  - ASTM spec for the blend component
  - Maximum allowable concentration
  - Test method for measuring the component
- No parameters added and none changed compared to current D 975 or D 396

ASTM Activity

- Category was needed to address deficiencies in blend stocks not covered by D 975 or D 396
  - i.e. 5% raw vegetable oil could be blended into D 975 and meet properties of D 975 but could have severe problems not prevented by existing D 975 parameters
  - Biodiesel is covered through meeting D 6751 prior to blending
- Where do mostly hydrocarbon fuels like FT from biomass, hydrotreated oils/fats, pyrolysis oils, etc. fall?
  - Are they already 'covered' by existing D 975 or D 396?
  - Do they need an ASTM spec prior to blending?
  - Are there minor components in these fuels that can cause major problems which are not covered by D 975 or D 396?
- Task Force set up by ASTM to address these questions
  - Larger issue than just biodiesel, FT, hydrotreated oils/fats
  - Avoid one bad apple spoiling it for all renewables

B100 Plants: Production Locations

June 7, 2007



Courtesy of the National Biodiesel Board

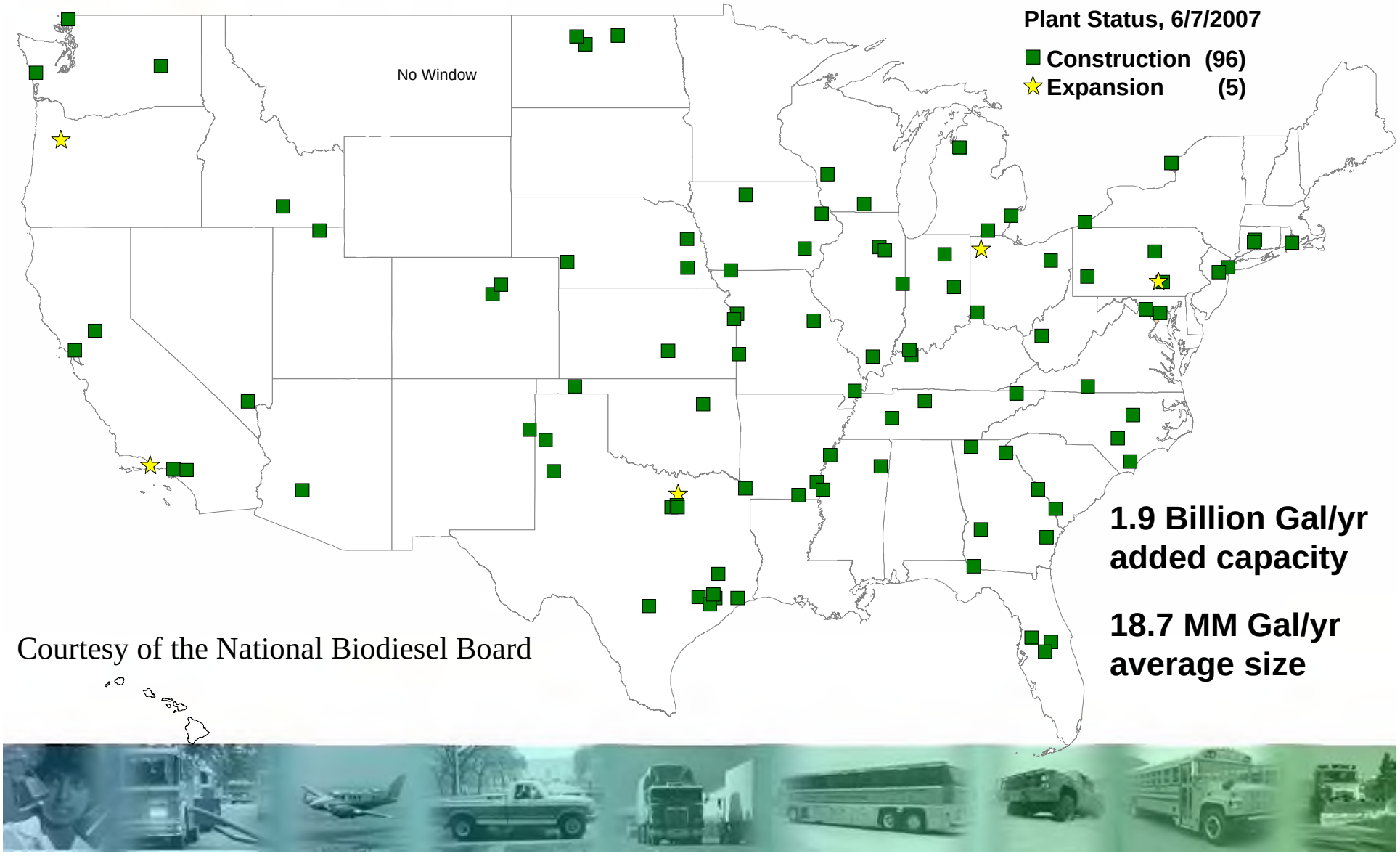
148 Plants

1.4 Billion Gal/yr total capacity

9.4 MM Gal/yr average size

BQ-9000 Accredited Producers

B100 Plants: Construction/Expansion



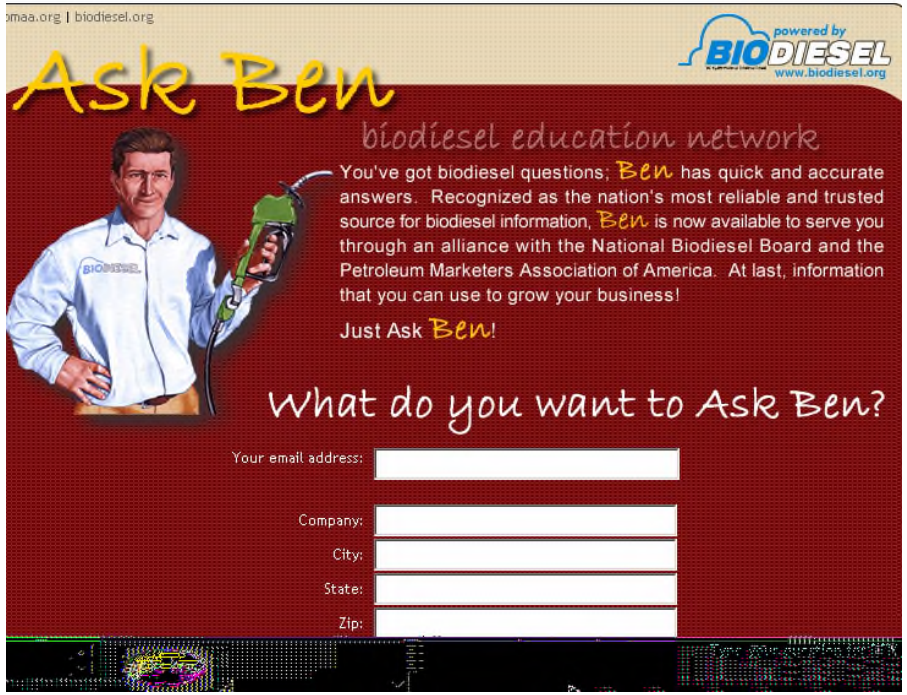
1.9 Billion Gal/yr added capacity

18.7 MM Gal/yr average size

Courtesy of the National Biodiesel Board

Educational Resources

- BEN: Biodiesel Education Network
- Web-based resource specifically for petroleum marketers
- Partnership between NBB/PMAA
- www.pmaa.org
- www.biodiesel.org



Other Biodiesel Resources

- Biodiesel Magazine
  - A **MUST HAVE'** magazine

- Biodiesel Industry Directory On-Line

NBB Resources

- www.biodiesel.org
- Technical Library
- Biodiesel Bulletin
- Educational Videos Available
- Informational Resources
- Technical Resources
- On-line Database & Spec Sheets