

**POLYPHOSPHORIC ACID (PPA)  
MODIFICATION in ASPHALT  
BINDERS  
DOT PERSPECTIVE**

**2008 AGENCY SURVEY (AASHTO)  
USAGE /SPECIFICATION**

# WHY MIGHT THIS BE IMPORTANT?

(AMAP Survey / February 2009)

- **65% must be Modified to Meet Specification**
- **44% specify for Modification**
- **40% Specify Type of Modifier**
- **18% Specify Percent of Modifier**
- **62% of All 50 States have *Plus Specs***
- **25% of Binder reported was Modified**

# **How Have Things Changed?**

**(AMAP Survey / February 2009)**

- **Volatility – both in pricing and supply - is here to stay**
- **Predictability is and will remain poor**
- **Producers are more likely to avoid overdependence in one product**

# **PURPOSE (GOALS)**

- **PROVIDE CURRENT STATUS of USE**
- **IDENTIFY ANY CONCERNS**
- **DETERMINE CRITICAL GAPS in KNOWLEDGE**
- **DEVELOP POTENTIAL DATABASE for PERFORMANCE HISTORY / DOCUMENTATION**
- **DETERMINE WORKSHOP INTEREST**

# **SURVEY FORMAT**

- **AASHTO LIST (All U.S. & M.T.O.)**
- **NINE (9) QUESTIONS**
  - **Short answer**
  - **Progressive**

# “THE QUESTIONS”

1. Do specs actually address PPA?
2. *If allowed*; do you restrict in any way?
3. What binder grades have been used?
4. Documented / tracked performance?
5. If yes; do you have any reports?
6. If not allowed; why?
7. D.Y.K.; FHWA study (Risk/Benefit)?
8. D.Y.K.; FHWA study (PPA/SBS)?
9. Interest in National PPA Workshop?

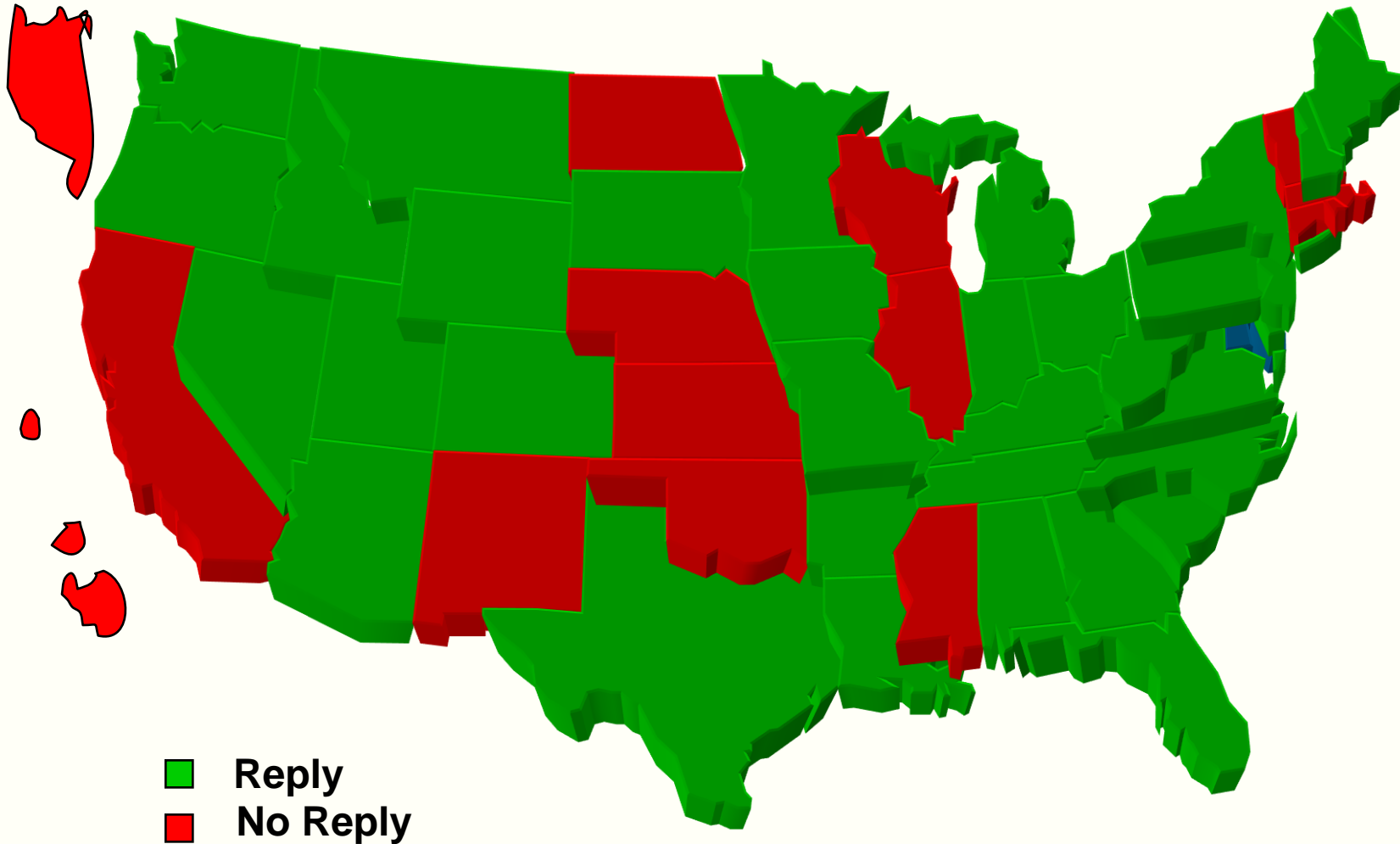
# **SUMMARY of RESPONSES**

## **(The Answers)**



# TOTAL RESPONSE to SURVEY

(37 Responses) 73%

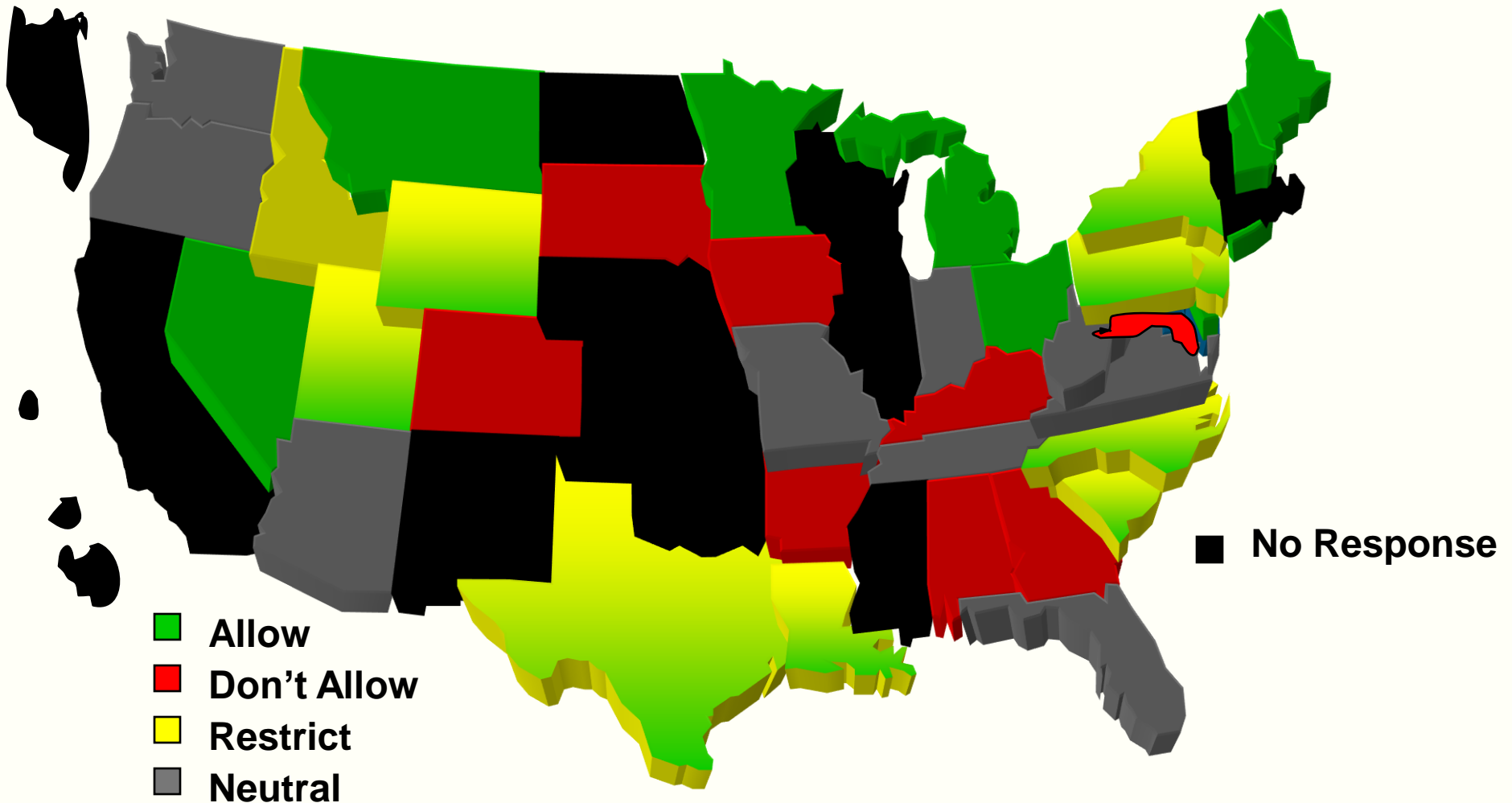




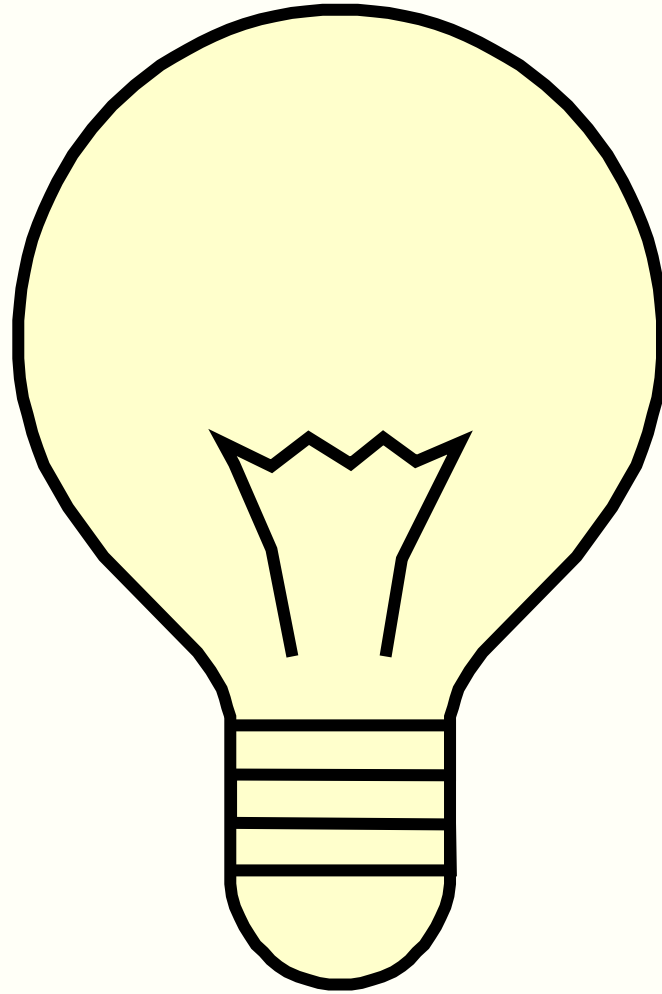
# Do Specs Address PPA / Any Restrictions (Questions #1 & 2)

- Don't Allow (Directly / Indirectly) - **22%**
  - (AL, AR, CO, GA, IA, KY, MD, SD)
- Don't Address (But indirectly restrict / prohibit) – **16%**
  - (ID\*, LA, NC, NJ, TX, UT)
- Allow (Directly / Indirectly - Unrestricted) – **22%**
  - (CT, ME, MI, MN, MT, NH, NV, OH)
- Allow (With restrictions) – **13%**
  - (NY\*, PA\*, SC\*, WY\*, MTO)
- Don't Address (But indirectly allow / neutral) – **27%**
  - (AZ, DE, FL, IN, MO, OR, TN, VA, WA, WV)

# PPA Specification / Use (37 Responses)

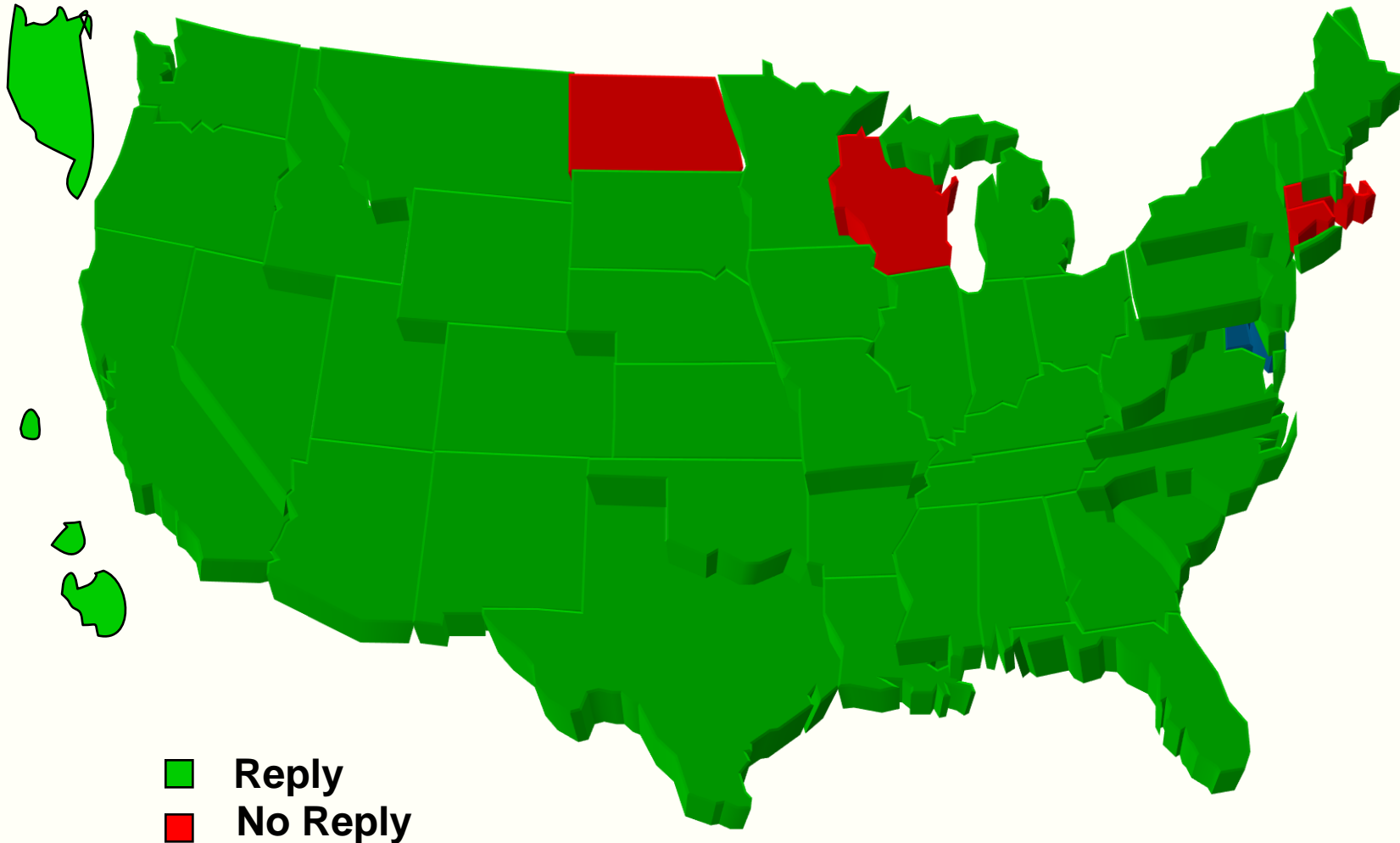


**BUT WAIT A MINUTE !**



# TOTAL RESPONSE BOTH SURVEYS (48 Responses) 94%

Includes 2007 MTO SURVEY

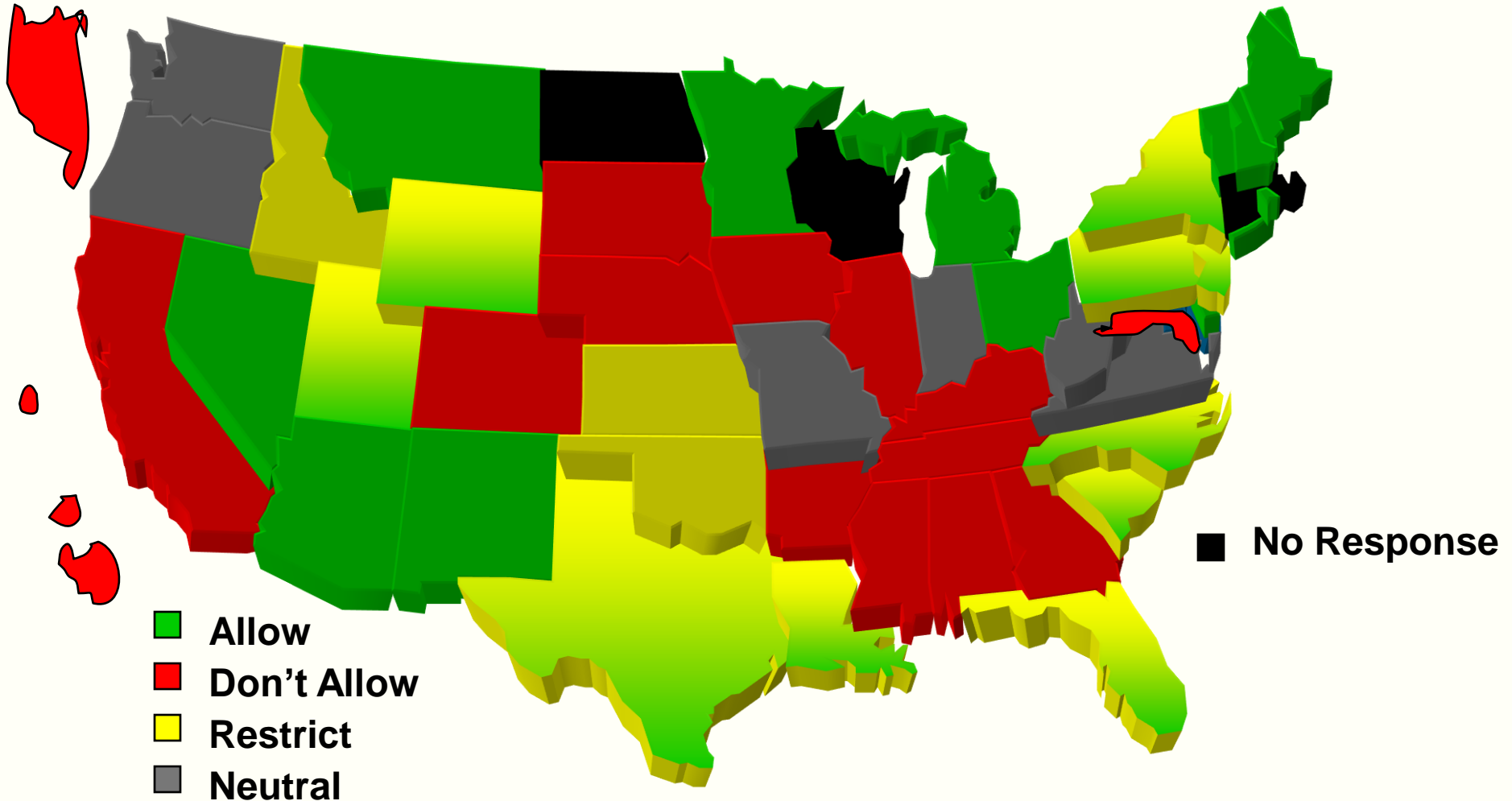


# Do Specs Address PPA / Any Restrictions (Questions #1 & 2)

## \*\*Includes 2007 MTO SURVEY

- Don't Allow (Directly / Indirectly) - **31% (22%)**
  - (AK\*\*, AL, AR, CA\*\*, CO, GA, HI\*\*, IL\*\*, IA, KY, MD, MS\*\*, NE\*\*, SD, TN\*\*)
- Don't Address (But indirectly restrict / prohibit) – **19% (16%)**
  - (FL, ID\*, KS\*\*, LA, NC, NJ, OK\*\*, TX, UT)
- Allow (Directly / Indirectly - Unrestricted) – **25% (22%)**
  - (AZ\*\*, CT, ME, MI, MN, MT, NH, NM\*\*, NV, OH, RI\*\*, VT\*\*)
- Allow (With restrictions) – **10% (13%)**
  - (NY\*, PA\*, SC\*, WY\*, MTO)
- Don't Address (But indirectly allow / neutral) – **15% (27%)**
  - (DE, IN, MO, OR, VA, WA, WV)

# PPA Specification / Use (48 Responses)



# **Summary of Direct / Indirect Restrictions (Question #2 )**

- **Mostly “Plus” Specifications (Polymers)**
  - LA – (FD & ER Requirements)
  - NJ & TX – (ER Requirements)
  - NC – (With Polymers Only)
  - UT – (PA, ER, DT & HWT)
- **Others**
  - NY – Not with Limestone (Northern Region)
  - PA – Experimentally only (PG 64-28)
  - SC – Recently Due to SBS Shortage
  - WY – Max. 0.5% PPA (1900 ppm)
  - MTO – Max. 0.5% w/polymer & 1% all others

# Distribution of Binder Grades Modified w/ PPA (Question #3)

- 4.5 % PG 64-22 - LA(?)
- 9 % PG 76-22 - NJ(?), NC(?)
- 41 % PG 64-28 - CT, ME, MT, NH, **NY**,  
OH, **PA**, WY, MT
- 14 % PG 70-22 - NY, NC, SC
- 18 % PG 70-28 - MT, UT, WY, MTO
- 4.5 % PG 58-34 - MN
- 9 % PG 64-34 - MN, UT



# Most Common Binders Reported (AMAP Survey / February 2009)

## 2008

- 75% PG 64-22      35% are Modified
- 57% PG 76-22      100% are Modified
- 57% PG 64-28      91% are Modified
- 39% PG 58-28      65% are Modified
- 39% PG 70-22      96% are Modified
- 30% PG 70-28      100% are Modified
- 18% PG 58-22      87% are Modified
- 13% PG 76-28      100% are Modified
- 13% PG 67-22      87% are Modified
- 9% PG 58-34      100% are Modified

# **Documentation / Tracking (Question #4)**

- **CT – Gen. observe (Vol., Place & Compact)**
- **ME – Monitoring T.S. (58-28 w/o & 64-28 w)**
- **MN – MnROAD T.S. 2007 (Workshop)**
- **MT – New Lab study (PPA?, HWT vs. PPA(x))**
- **NV – Current project (Modified vs. Unmodified)**
- **PA – Monitoring 2 Projects (2007 – 64-28)  
More planned '09 – Lab tests / Performance)**
- **UT – Recent Binder Studies – MSCR (w/SBS  
“reasonable qty” enhance some mixes)**
- **MTO – Attempting now (Required Rpt. '07)**

# Available Reports (Question #5)

- **NONE CURRENTLY**      *However*
- **WORKSHOP PRESENTATIONS**
  - AR – “Arkansas Rubbleization Program”
  - MN – “MnRoad Test Sections”
  - UT – “Utah Trials”
  - MTO – “Ontario Strategy for Evaluating PPA”
- **PREVIOUS PRESENTATIONS**
  - UT – HWT Papers (2008 Peterson / 2007 MAIREPAVE 5)
- **“WISH LIST” (Documentation)**
  - ME, MT, NE\*, NY\*, NV, PA, WY

# **REASONS for NOT USING or RESTRICTING PPA**

**(Question #6)**

- **Like / Prefer Polymers – AL, KY, MD, PA, SD**
- **Possible Adverse Reaction w/ HL,LS,LA  
(Moisture Damage) – GA, IA, KY, NY, PA, SC**
- **Unknown Long-Term Performance – AR, KY,PA**
- **Negative Reports By Others – CO, ID, (WY'04-'06)**
- **Binder Recovery Concerns - SC**

# **AWARE of FHWA STUDIES**

## **(Questions #7&8)**

- **T/F (PPA Risk/Benefits)**
  - 25 States thought they heard about study
  - 11 States did not know
- **FHWA (Co-modifier)**
  - 20 States thought they heard about study
  - 16 States did not know

# **Interest in Attending Workshop (Question # 9)**

- **Strong Support**
  - 31 “Yes”
  - 2 “Not sure”
  - 3 “No”
- **Travel Restrictions Significant Concern**
  - 55%(17/31)

# Survey Conclusions / Observations

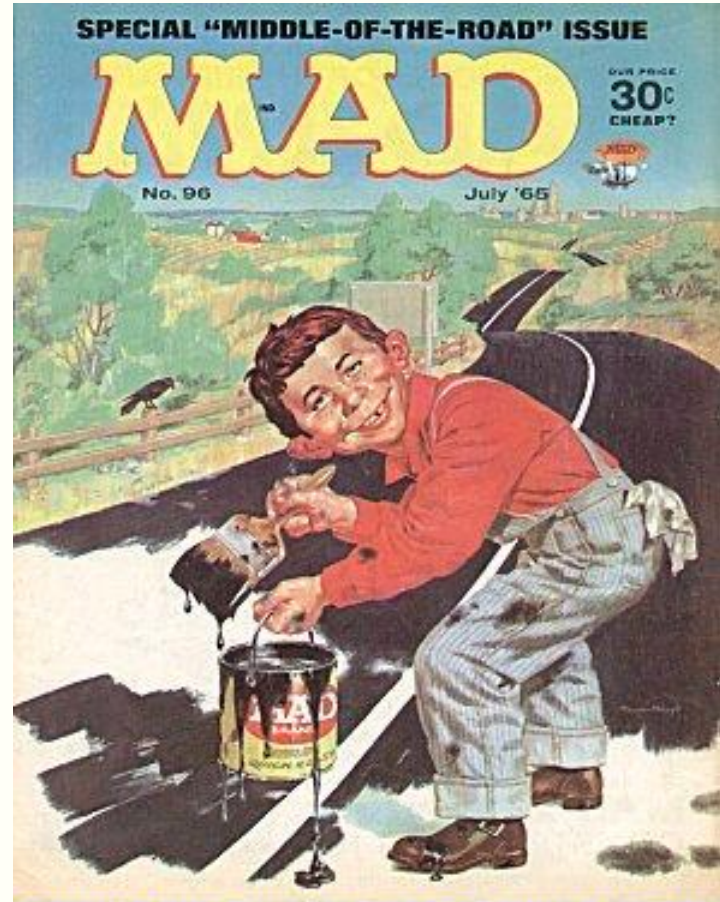
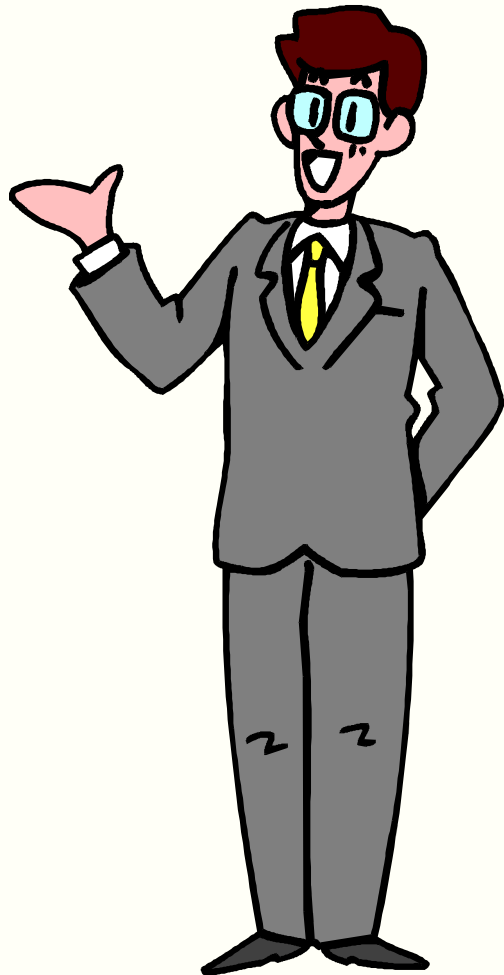
- No clear consensus or majority on the reported use or restriction of use of PPA However  
(May be some regional bias (SE → MW))
- Among concerns identified are:
  1. Inferior quality of modification compared to polymers (elastomerics).
  2. Potential for improper dosing or unexpected reactions.
  3. Potential for adverse reactions, including; modification reversal w/ HL,LS,LA → PD / MD.
  4. Binder recovery issues leading to improper grade determination.

# **Survey Conclusions / Observations (cont.)**

- A potential exists to significantly expand the currently limited performance database & available documentation on PPA as a binder modifier.**
- Due to fluctuating Binder / Modifier supply, agencies will need to be more flexible & knowledgeable concerning modifiers.**
- Workshop agenda should go a long way toward filling critical gaps in knowledge on PPA modification.**



# THANK YOU ! QUESTIONS ?



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