

National Snapshot of State Binder Specifications



AMAP Conference

Phoenix, AZ

February 8, 2018

Mark Buncher, Ph.D., P.E.

Director of Engineering

Always Changing

National Snapshot of State Binder Specifications



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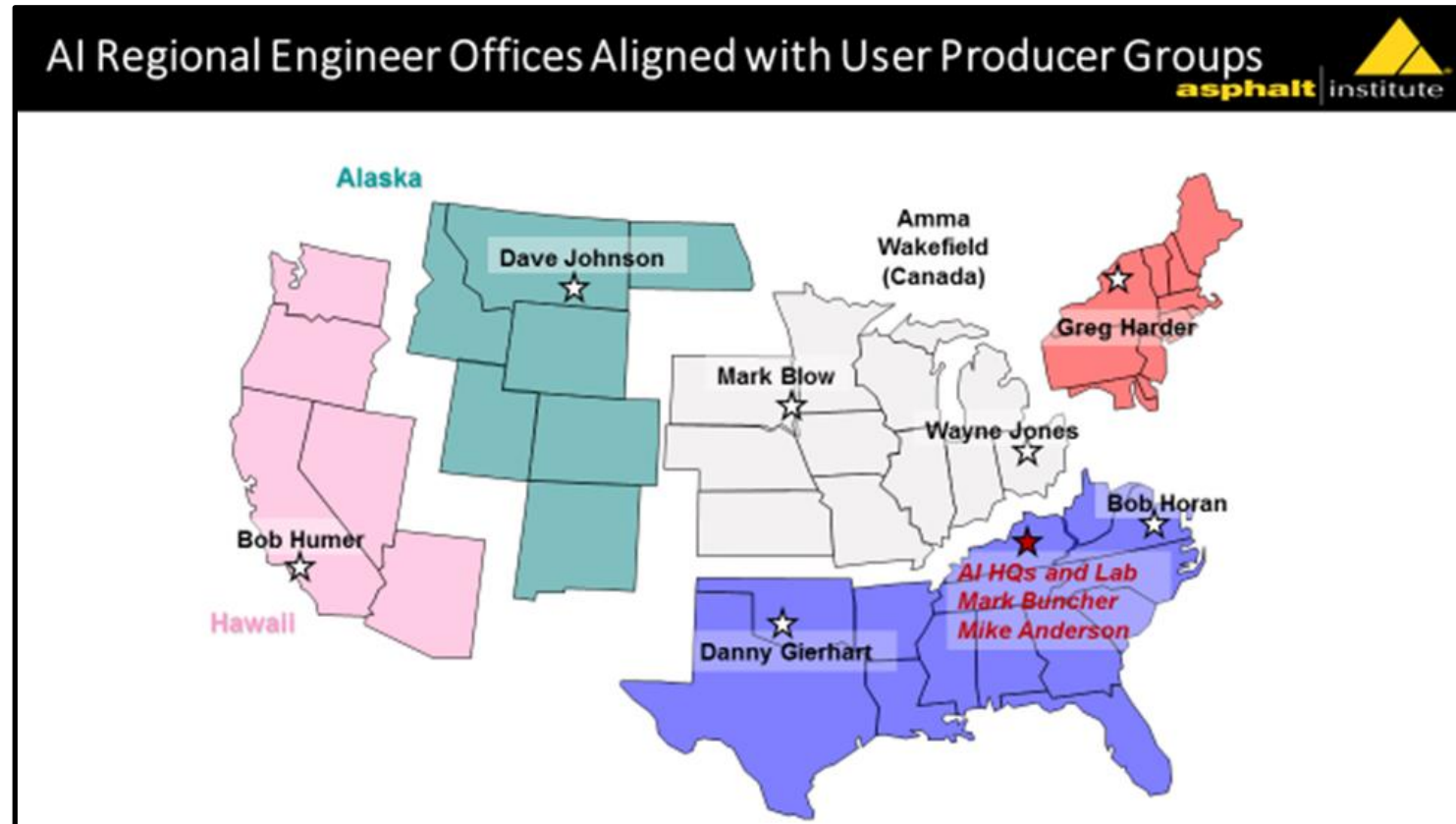
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Director of Engineering

Credits

- AI Regional Engineers
 - Providing information for each state
 - thru AI's Binder Spec and MSCR Implementation Databases
- Greg Harder
 - Leading this effort
 - built many of these slides



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January 16 – 19, 2018: Basic Binder Technician Training
January 22 – 24, 2018: National Binder Technician Training
January 23 – 26, 2018: Basic Mixture Technician Training
January 29 – February 1, 2018: Mix Design Technology Certification
January 30 – February 1, 2018: Basic Roofing Technician Training
February 6 – 9, 2018: Basic Binder Technician Training
February 20 – 23, 2018: Basic Mixture Technician Training
February 26 – 28, 2017: Optimizing Volumetrics and HMA Compactability Utilizing the Bailey Method

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Specification Databases

- 
- [US State Binder Spec Database](#)
 - [US State Emulsion Spec Database](#)
 - [US State MSCR Implementation Database](#)
 - [Canadian Province Binder Spec Database](#)

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Select the State DOT

US State Emulsion Specification Database

Description: This emulsion specification database was developed by the Asphalt Institute. Available below (as downloadable pdf files) are individual documents for each of the 50 state highway agencies which summarize their respective asphalt emulsion specifications. A standardized format is used to list the testing requirements for the emulsion grades listed in that State's specifications. Different Tables are utilized that reflect the different categories of emulsions used in that State. Notes are included for additional details. Other information includes the State website where the specifications can be found and the State Contact.

Updating: AI will periodically contact the Materials Engineer listed on each document to review the agency's information for accuracy. Corrections or comments may be e-mailed to us by using the link below. Changes will only be made after confirmation by the individual listed for that agency.

Disclaimer: While care has been taken to provide the most accurate and current information, users are warned that there may be inaccuracies and recent specification revisions may not be reflected. **To ensure the most accurate information, the particular agency should be contact. In addition, this compilation of information should not infer an Asphalt Institute endorsement for any of the specifications or requirements listed.**

If you have any corrections or comments, please fill out this form.

All specs are in Adobe PDF format.

Alabama
Colorado
Hawaii
Kansas
Massachusetts
Montana
New Mexico
Oklahoma
South Dakota
Virginia
Wyoming

Alaska
Connecticut
Idaho
Kentucky
Michigan
Nebraska
New York
Oregon
Tennessee
Washington

Arizona
Delaware
Illinois
Louisiana
Minnesota
Nevada
North Carolina
Pennsylvania
Texas
Washington DC



Arkansas
Florida
Indiana
Maine
Mississippi
New Hampshire
North Dakota
Rhode Island
Utah
West Virginia

California
Georgia
Iowa
Maryland
Missouri
New Jersey
Ohio
South Carolina
Vermont
Wisconsin

Example FL, Page Header

State: Florida	Materials: Re: Section 916 Bituminous Materials; 916-2 SUPERPAVE™ PG, Asphalt Binder
Date Last Reviewed: 3/29/17	Web Address: www.fdot.gov
State Bituminous Engineer: Howie Moseley	Contact Info: Gregory.Sholar@dot.state.fl.us

Asphalt Binder		
Section 916-1.1	Description	"Superpave PG asphalt binders, identified as PG 52-28, 58-22, 67-22, 76-22 (PMA), 76-22 (ARB), 82-22 (PMA), shall meet the requirements of 916-2. Where PG binder is used in mixes containing reclaimed asphalt pavement (RAP), the requirements of 334-2.3.1 and 334-2.3.5 must also be met. For all PG binder used in all hot mix asphalt, silicone may be added to the PG binder at the rate of 25 cm ³ of silicone mixed to each 5,000 gal. of PG binder. The blending of the silicone with the PG binder shall be done by the supplier prior to the shipment. Unless FM 1-T 283 test results suggest otherwise, all PG binder for Friction Course mixes and for other HMA products containing RAP shall contain 0.5% heat stable liquid anti-strip additive by weight of PG binder, added by the supplier during loading."
	PMA's	All asphalt binders having a high temperature designation of PG 67 or lower shall be prepared without modification. All PG asphalt binders having a high temperature designation higher than PG 67 shall be produced with an SBS or SB polymer (PMA) or ground tire rubber meeting the requirement of Section 919 (ARB). For modified binders, the base grade, the type of modifier and amount added shall be indicated when applying for inclusion on the Approved Products List.
Section 916-1.3	QC Program	Supplier shall have a QC program meeting requirements of 916-2.2.

Grade/Specs in Table Format

Florida		Table 1: PG Requirements for Performance-Graded Asphalt Binders						
Property		Test Method: AASHTO (T), ASTM M 320 Grade Names	Requirements by Performance Grade					
			52-28	58-22	67-22	76-22 (PMA)	76-22 (ARB)	82-22 (PMA)
ORIGINAL								
Flash Point, ° F		T 48	450 min.	450 min.	450 min.	450 min.	450 min.	450 min.
Rotational Viscosity, Pa·s (1)	135° C (275° F)	T 316	3.0 max.	3.0 max.	3.0 max.	3.0 max.	3.0 max.	3.0 max.
Dynamic Shear, kPa ($G^*/\sin \delta$, 10 rad./sec) (2)	At Grade Temperature	T 315	1.00 min.	1.00 min.	1.00 min.	1.00 min.	1.00 min.	1.00 min.
Phase Angle, °			-	-	-	75.0 max.	75.0 max.	65.0 max.
RTFO RESIDUE		T 240						
Mass Change, %		T 240	1.00 max.	1.00 max.	1.00 max.	1.00 max.	1.00 max.	1.00 max.
MSCR, $J_{nr3.2}$ (kPa ⁻¹)	At Grade Temperature	M 332 / T 350	"S" 4.5 max.	"S" 4.5 max	"S" 4.5 max	-	-	-
MSCR, $J_{nr3.2}$ (kPa ⁻¹) (2)	67 °C	M 332 / T 350	-	-	-	"V" 1.0 max.	"V" 1.0 max.	"E" 0.5 max.
MSCR, $J_{nr,diff}$ (%) (2)			75 max.	75 max.	75 max.	75 max.	75 max.	75 max.
MSCR, %R _{3.2} (2)		M 332 / T 350	-	-	-	%R _{3.2} ≥ 29.37 ($J_{nr3.2}$) ^{-0.2633}		
Table 1 Continues on Page 2								

M 332 Spec

Florida		Table 1: PG Requirements for Performance-Graded Asphalt Binders (cont.)						
Property		Test Method: AASHTO (T), ASTM (D) or other	Requirements by Performance Grade					
			52-28	58-22	67-22	76-22 (PMA)	76-22 (ARB)	82-22 (PMA)
PAV RESIDUE		R 28	90° C	100° C				
Dynamic Shear, kPa ($G^* \cdot \sin \delta$, 10 rad./sec.)	At Test Temperature	T 315	16° C	22° C	26.5° C	26.5° C	26.5° C	26.5° C
			5000 max.	5000 max.	5000 max.	5000 max.	5000 max.	5000 max.
Creep Stiffness, MPa	At Test Temperature	T 313	-18° C	-12° C	-12° C	-12° C	-12° C	-12° C
m-Value			300 max.	300 max.	300 max.	300 max.	300 max.	300 max.
			0.300 min.	0.300 min.	0.300 min.	0.300 min.	0.300 min.	0.300 min.
Direct Tension, % Strain		T314	-	-	-	-	-	-
Notes		1. Binders with values higher than 3 Pa·s should be used with caution and only after consulting with the supplier as to any special handling procedures, including pumping capabilities. 2. AASHTO T 315 and AASHTO T 350 will be performed at a 2 mm gap for PG 76-22 (ARB)						

Another Example, New York: Full M332, Exclusions

State: New York	Materials: Re: Section 401-2.04 - Bituminous Materials
Date Last Reviewed: 12/28/16	Web Address: www.dot.state.ny.us
Materials Engineer: Zueb Zavery	Contact Info: zzavery@dot.state.ny.us

Asphalt Binder		
Section 401-2.04	Description	Use the Performance-Graded Binder (PG) in the production of these mixtures that meet the AASHTO M 320 Standard Specification for Performance-Graded Asphalt Binder. The temperature of PG Binder delivered to the HMA Production Facility will not exceed 175°C, unless the PG Binder supplier recommends it.
	PMA's	58E-34, 64V-22, 64E-22
	Exclusions	PPA, Motor Oil

New York		Table 1: PG Requirements for Performance-Graded Asphalt Binders					
Property		Test Method: AASHTO (T), ASTM	Requirements by Performance Grade				
			58E-34	64S-22	64H-22	64V-22	64E-22
ORIGINAL							
Flash Point, ° C		T48	230				
Rotational Viscosity, Pa·s	135° C	T316	3.0 max.				
Dynamic Shear, kPa (G*/sin δ, 10	At Grade	T315	1.00 min.				

M 332 Grade Names

Also AI's MSCR Implementation Database

State: Virginia	Materials: Re: Section 210 - Asphalt Materials
Date Last Reviewed: 10/05/14	Web Address: www.dot.state.va.us
Materials Engineer: Andy Babish	Contact Info: Andy.Babish@vdot.virginia.gov
Reviewed By: Bob Horan, AI Senior Regional Engineer	AI Contact Info: bhoran@asphaltinstitute.org

Details: VDOT has been evaluating the use of MSCR since January 2011 through participation in a regional effort in the SEAUPG. SEAUPG established regional test temperatures and VA will be 64°C. VDOT has decided to move ahead with full implementation of MSCR for all binder grades effective Jan 1, 2015. See details below.

	MSCR				
Current M320 Grade	M332 Grade <i>or</i> (Test Temp. °C)	Requirement			Implementation
		Jnr _{3.2} (kPa ⁻¹)	Jnr _{diff} (%)	% Rec _{3.2}	
PG 76-22	PG 64E-22	0.5 max.	75 max.	See note below	Jan. 2015
PG 70-22	PG 64H-22	2.0 max.	75 max.	n/a	Jan. 2015
PG 64-22	PG 64S-22	4.5 max.	75 max.	n/a	Jan. 2015

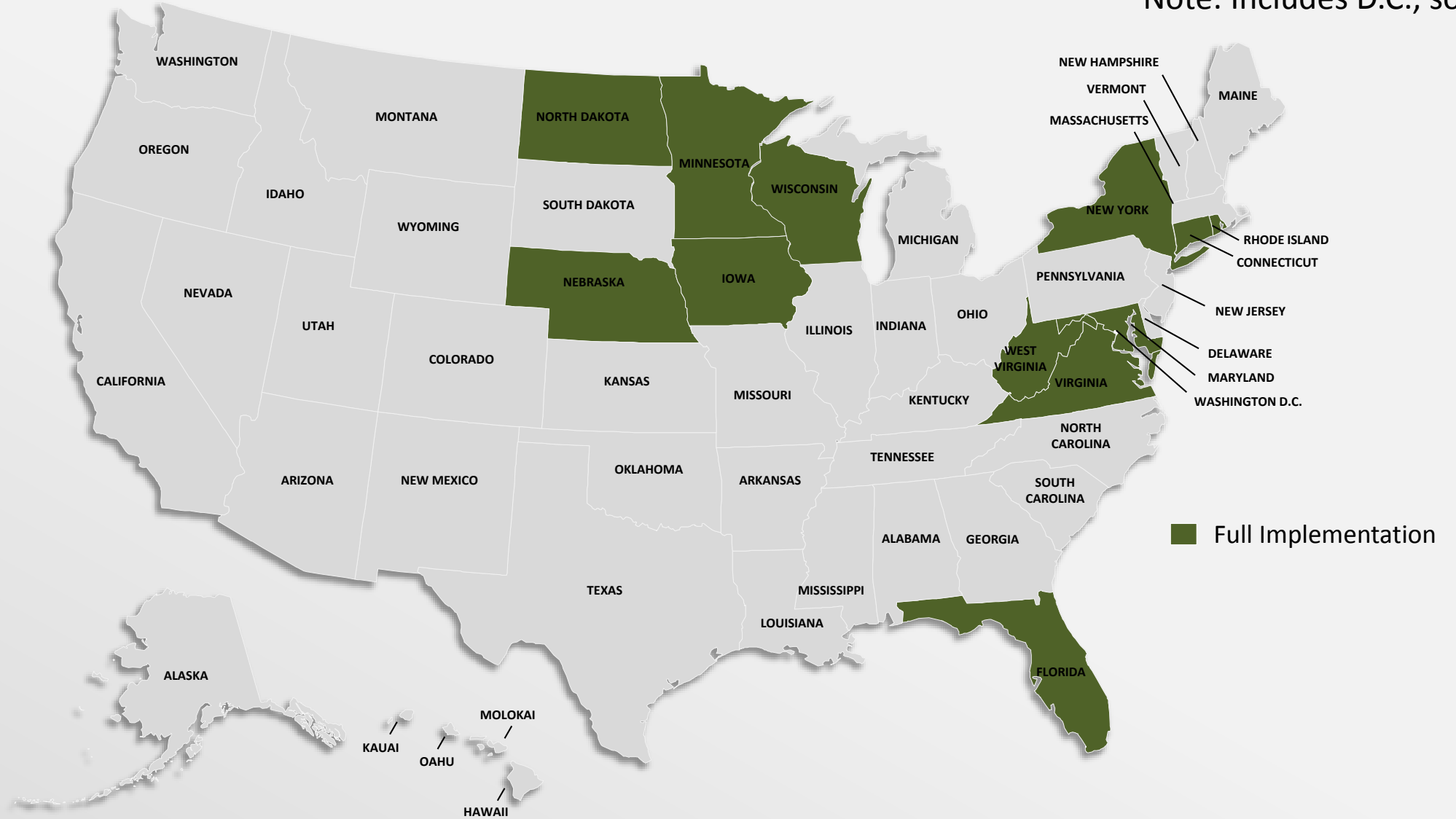
Notes: % Rec_{3.2} > 29.371 Jnr_{3.2} - 0.263

Now the National Snapshot. Intent is to:

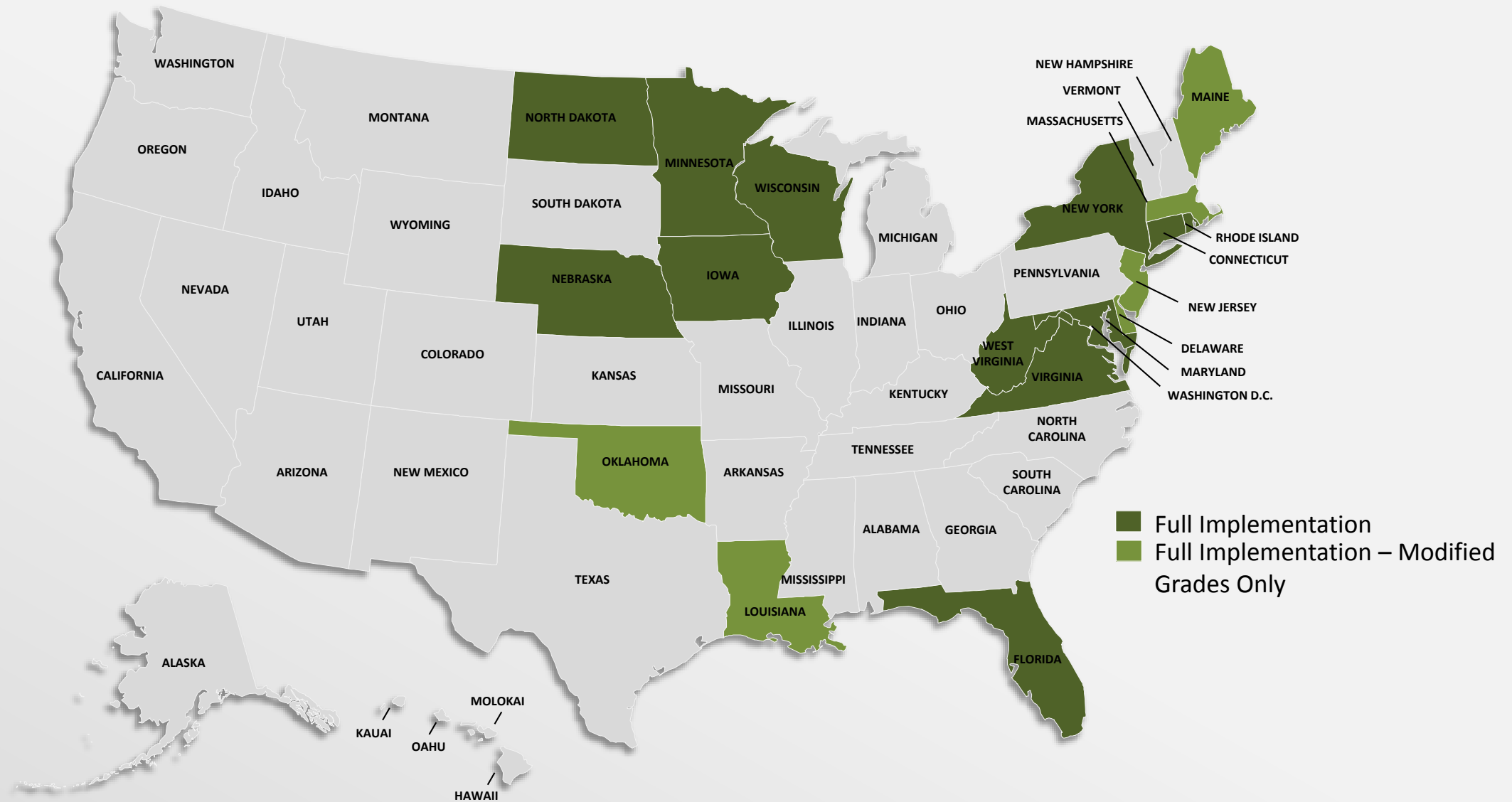
- Provide overall national perspective
 - Around MSCR Implementation
 - Grades
 - Nomenclature
 - % REC
 - Workhorse grades
 - Exclusions
- Not to get into specific state details
 - Those found within:
 - AI's binder spec and MSCR impl. summaries
 - The state DOT's spec book
 - Many grey areas where a state fits
 - Spec doesn't explicitly exclude a modifier, but implicitly does
 - DOT's interpretation different than exact wording in spec

Full MSCR (M332) Implementation: All Grades – 13 States

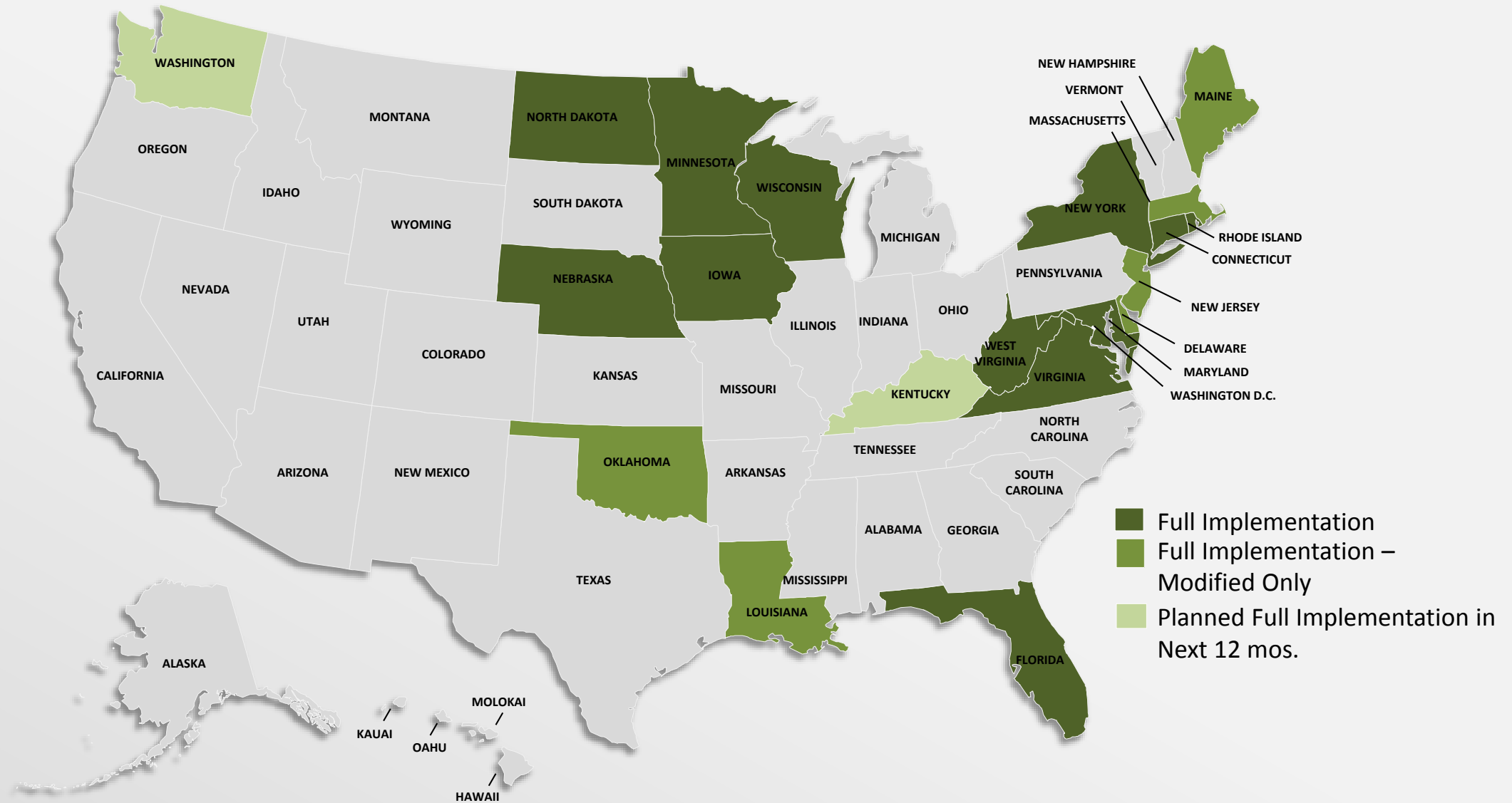
Note: Includes D.C., so 13/51



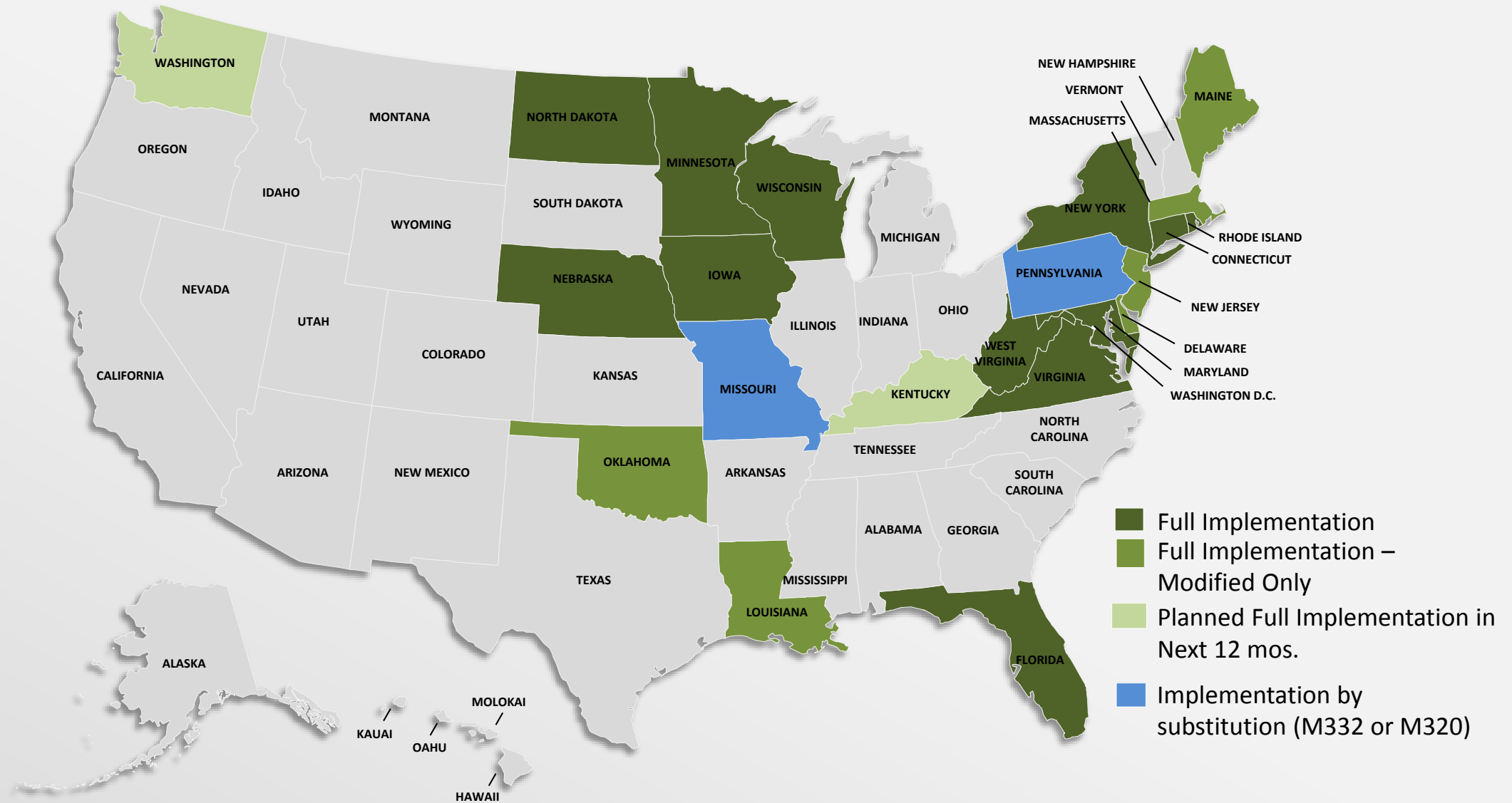
Full MSCR Implementation: All Grades or Modified Grades Only - 19 States



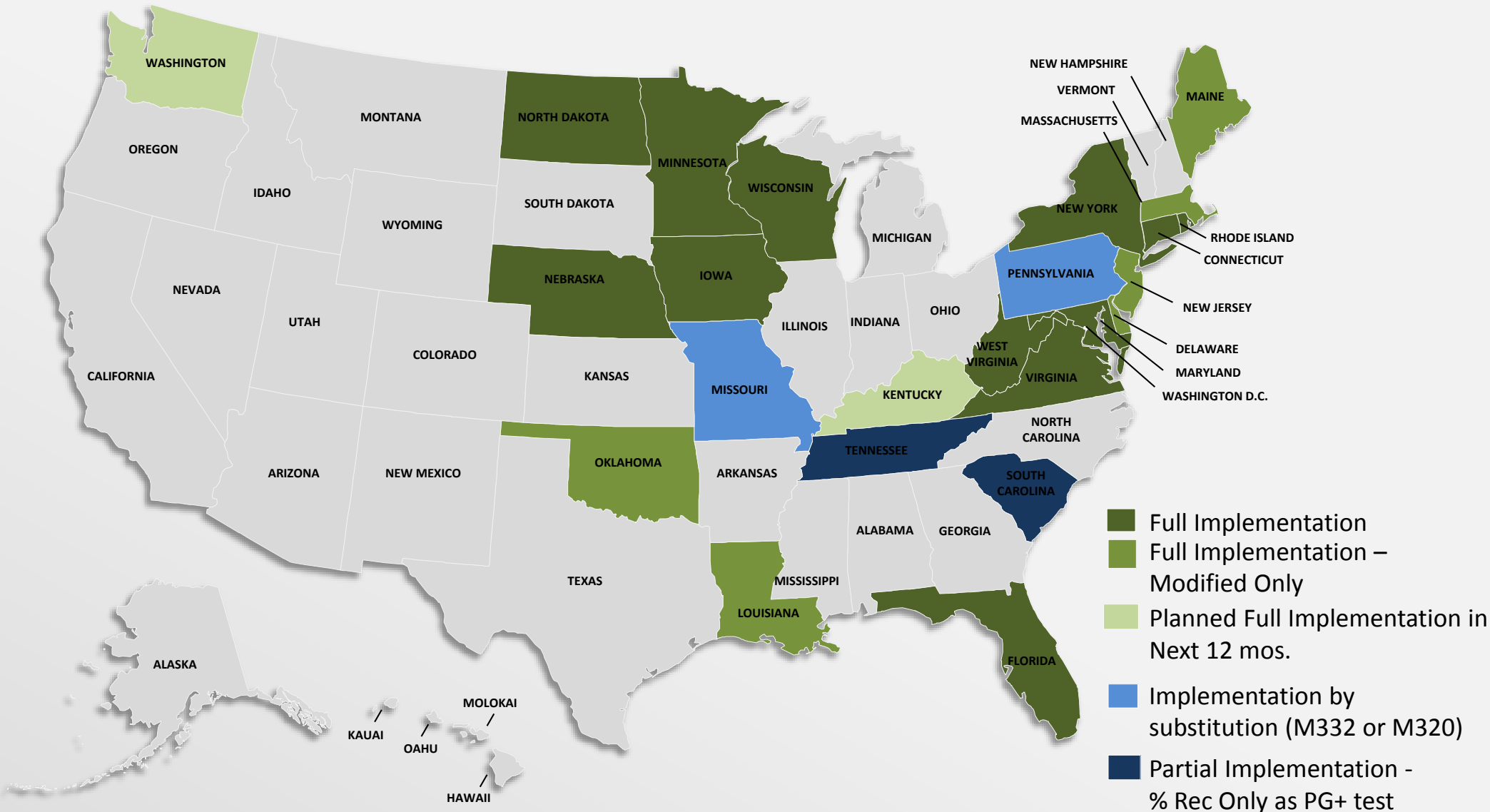
Full MSCR in Next 12 Months: All Grades or Modified Grades Only - 21 States



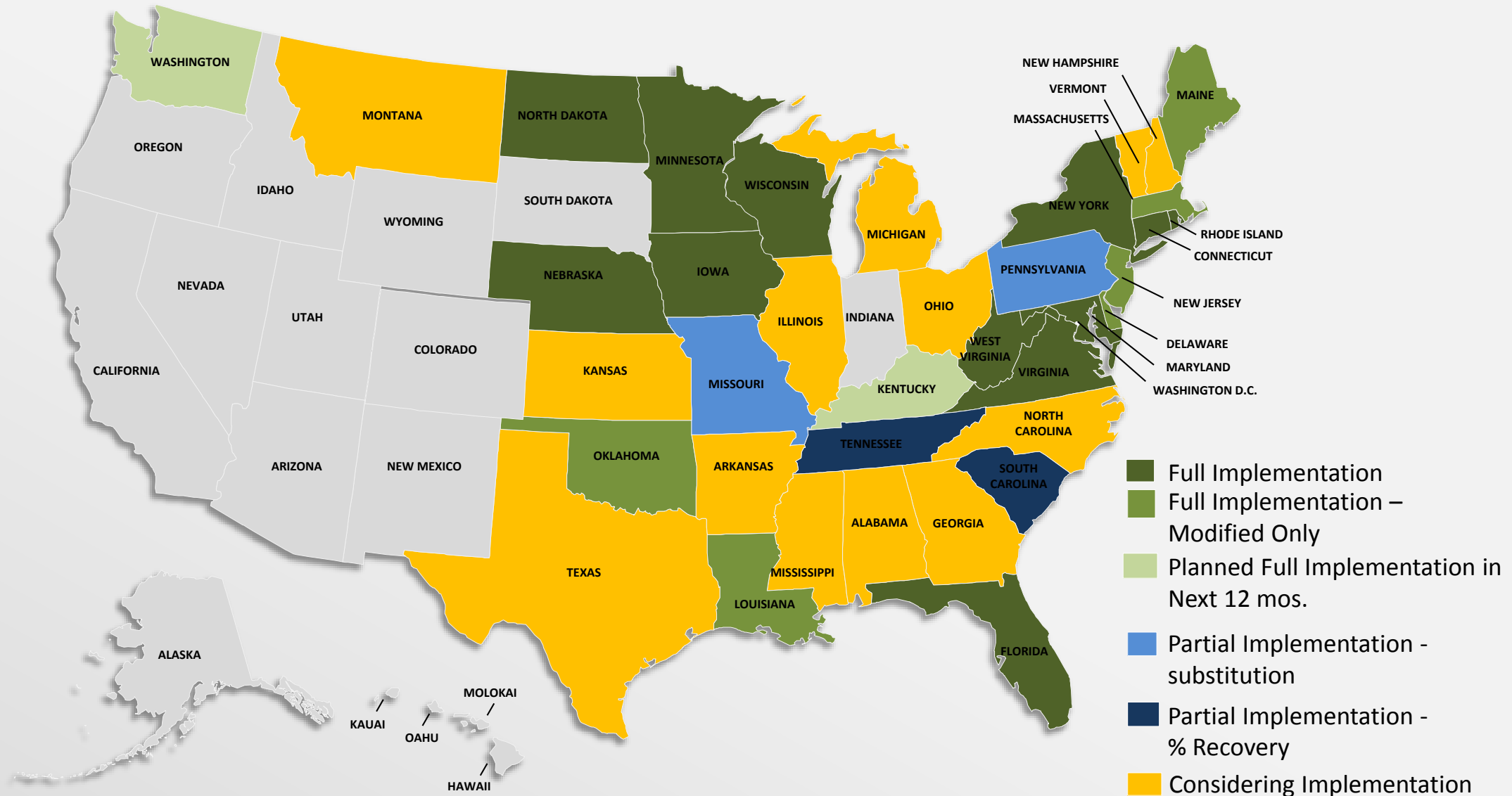
MSCR in Next 12 Months: All Grades, Modified Grades Only, or Substitution - 23 States



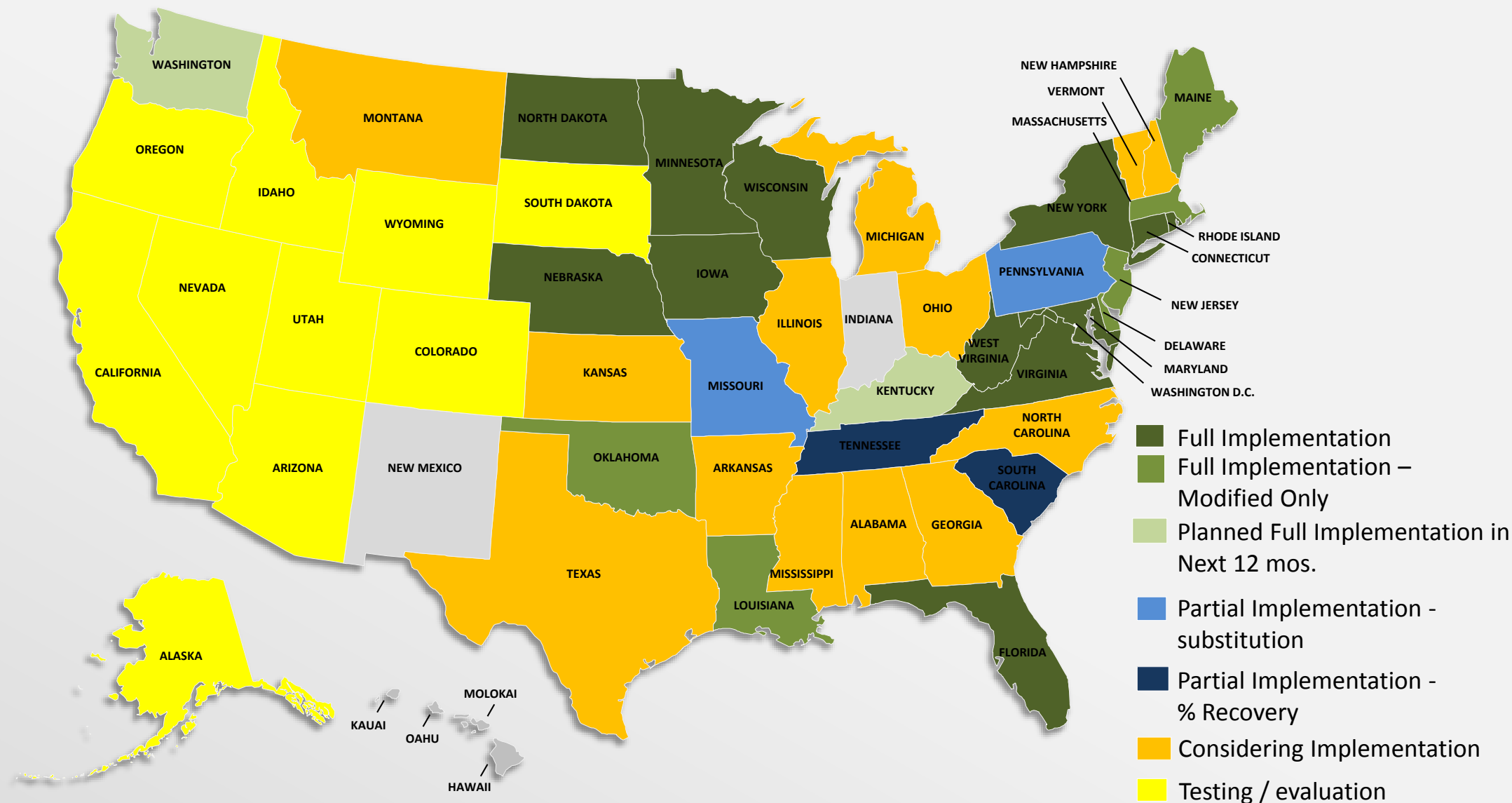
Full or Partial MSCR in Next 12 Months: All Grades, Modified Grades Only, or Substitution - 25 States



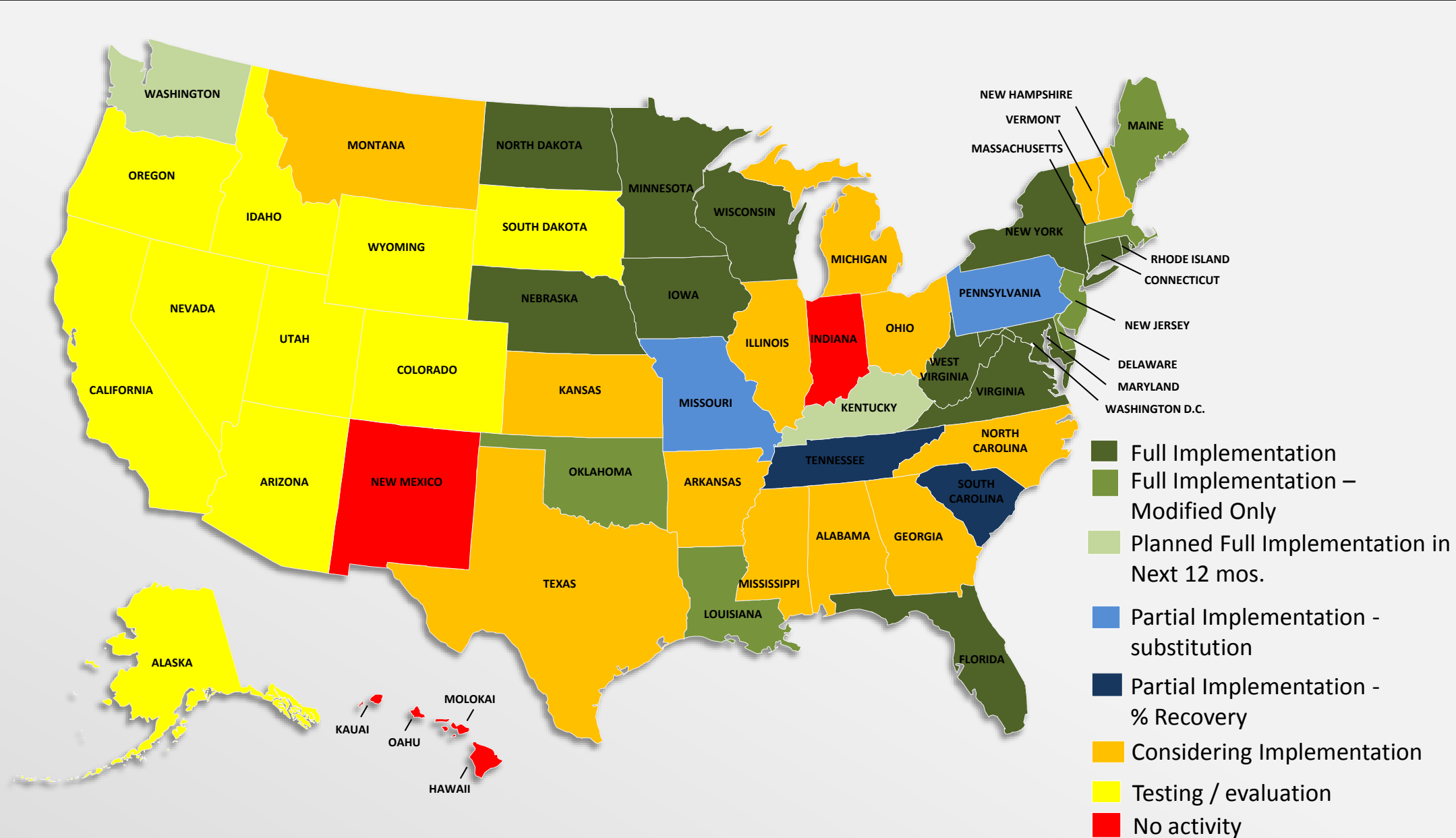
13 Additional States Are “Considering Implementation”



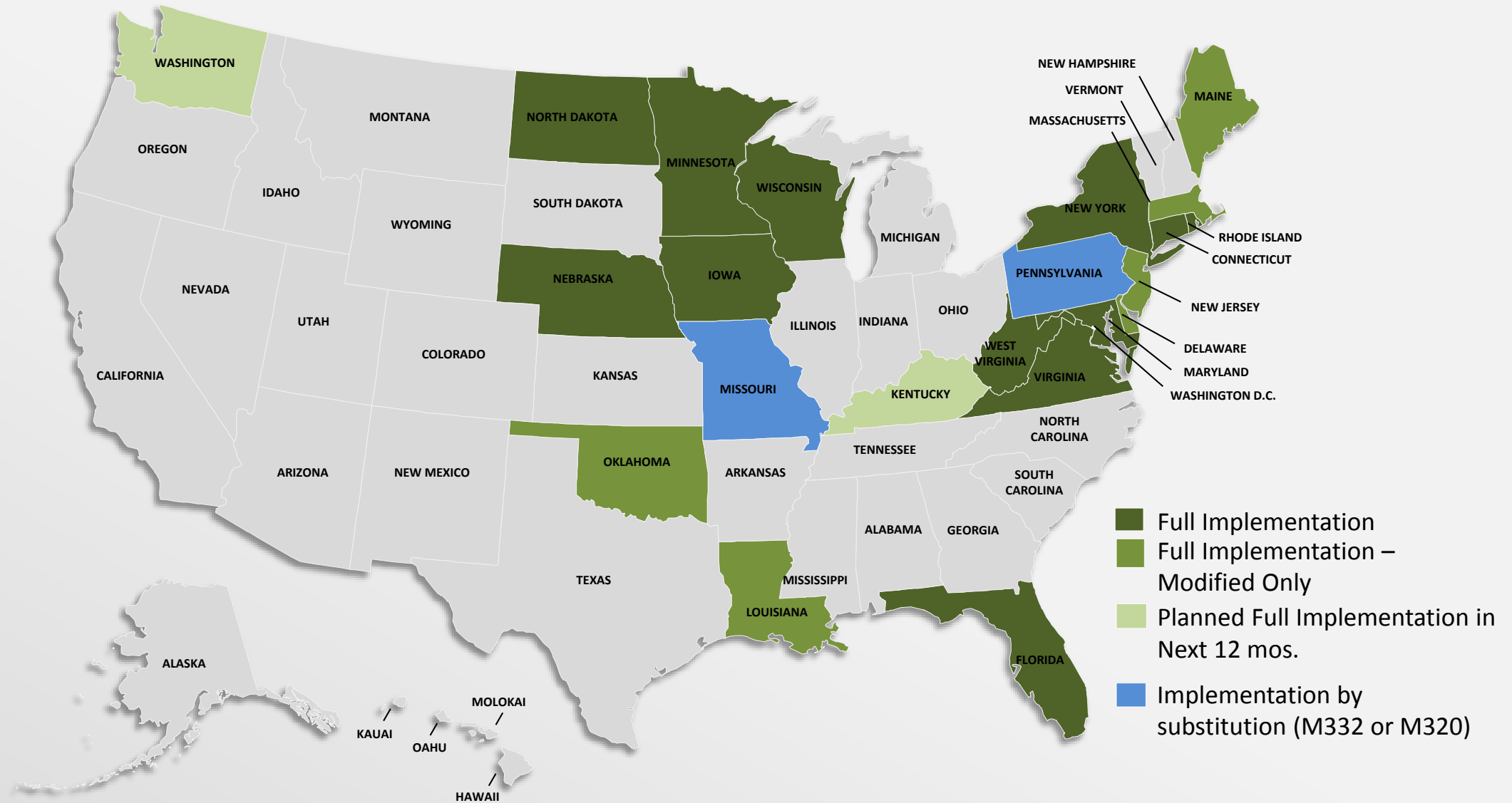
10 Other States Have Conducted “Testing and Evaluation”



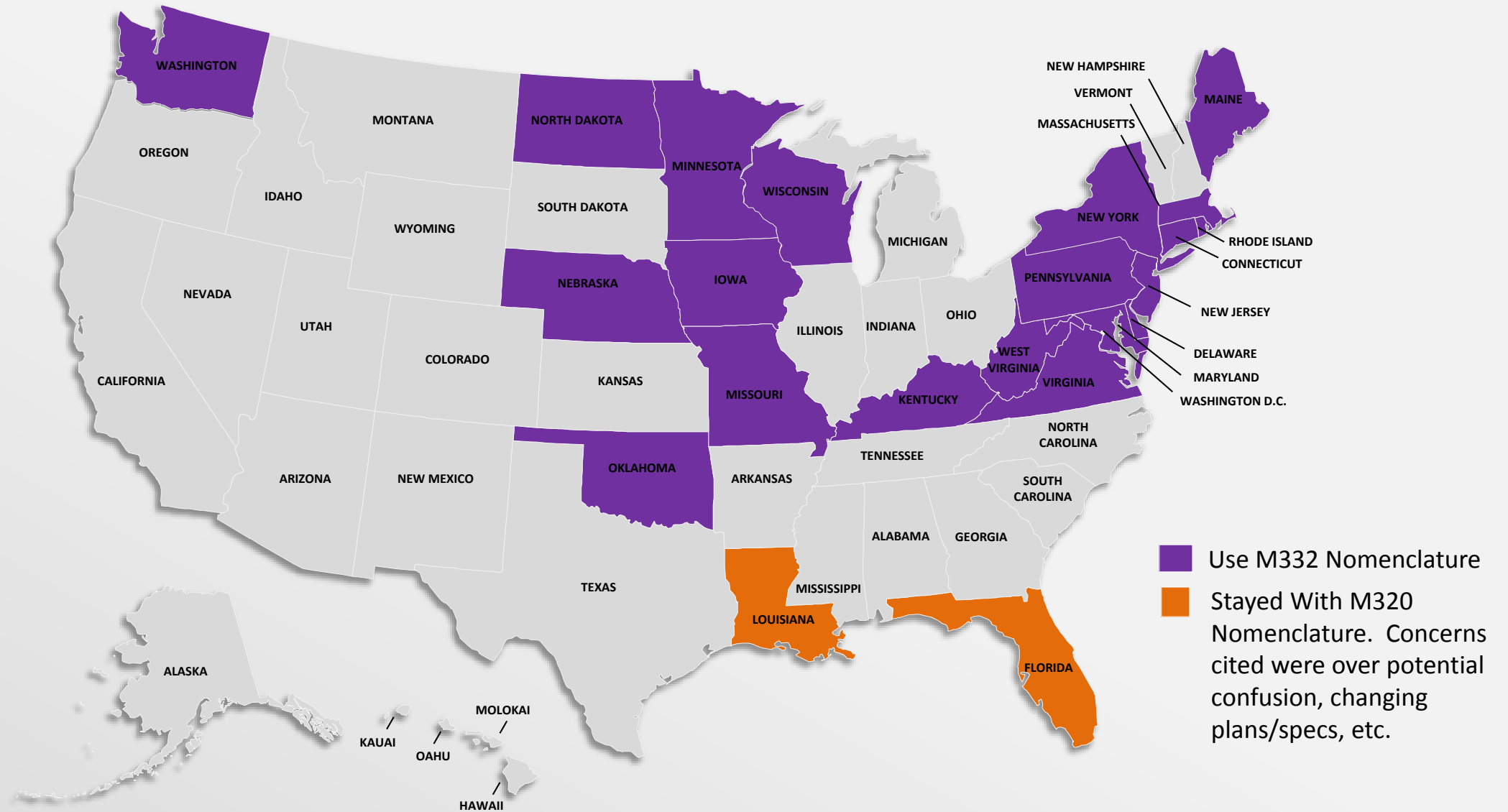
Final 3 States Report “No Activity”



Closer Look at the 23 MSCR (M332) States ...



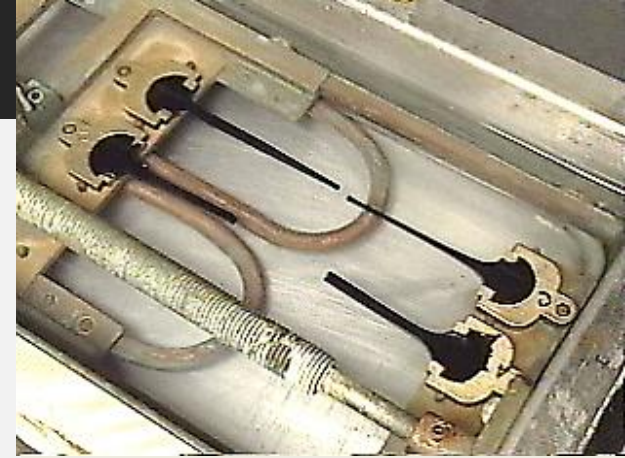
21 of 23 MSCR States Use MSCR Grading Nomenclature



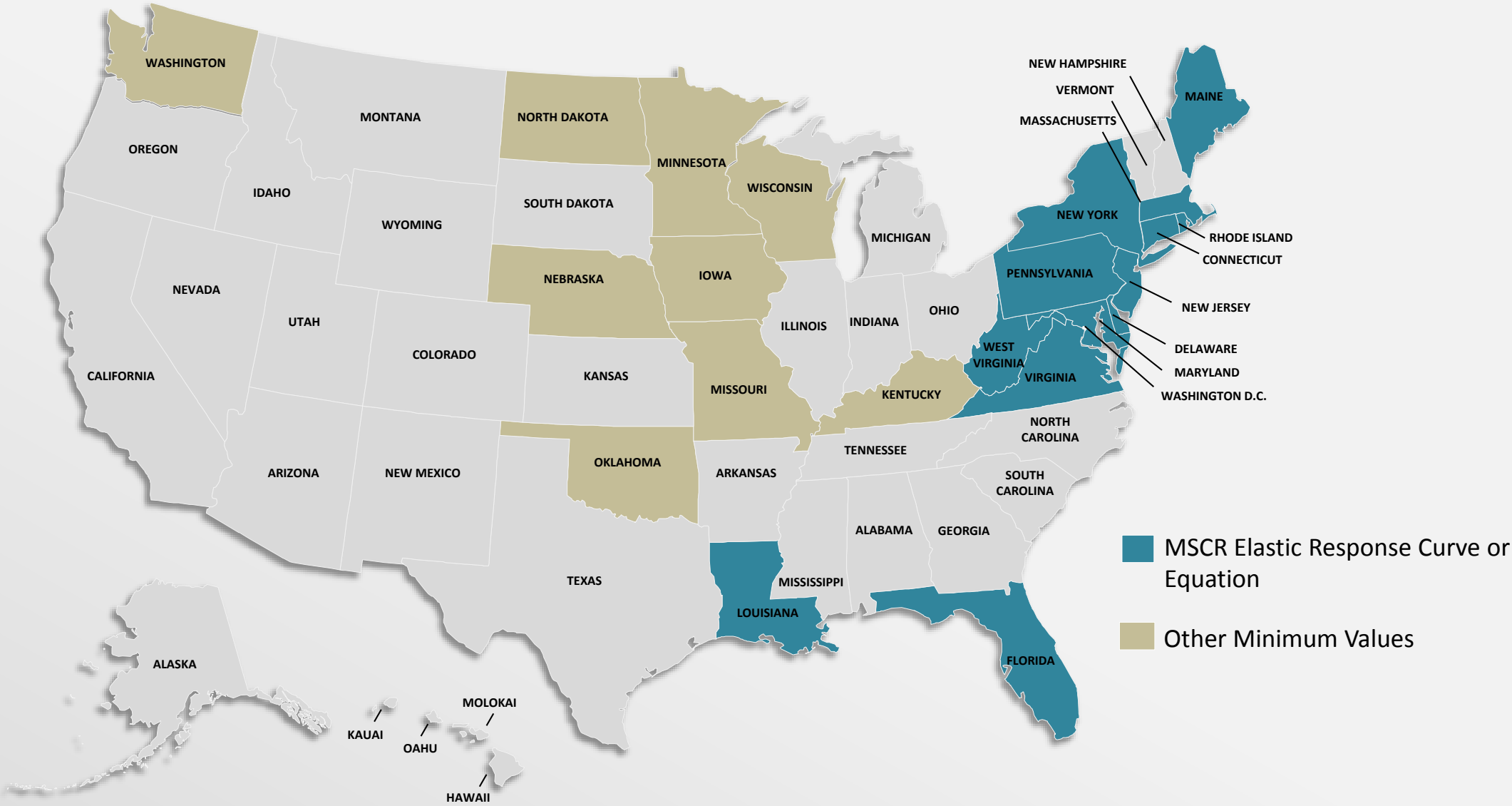
MSCR % RECOVERY

- The Elastic Recovery (ER) test is an excellent tool to establish the *presence* of polymer modification.
 - It takes about 4 hours to prepare and test samples for this information.
- However, it is a poor tool to evaluate the rutting *performance* of polymer-modified binders.
- The MSCR % Rec uses the same DSR sample to give more information in a few extra minutes. Captures *networking* of polymer and *overall elastic behavior*.

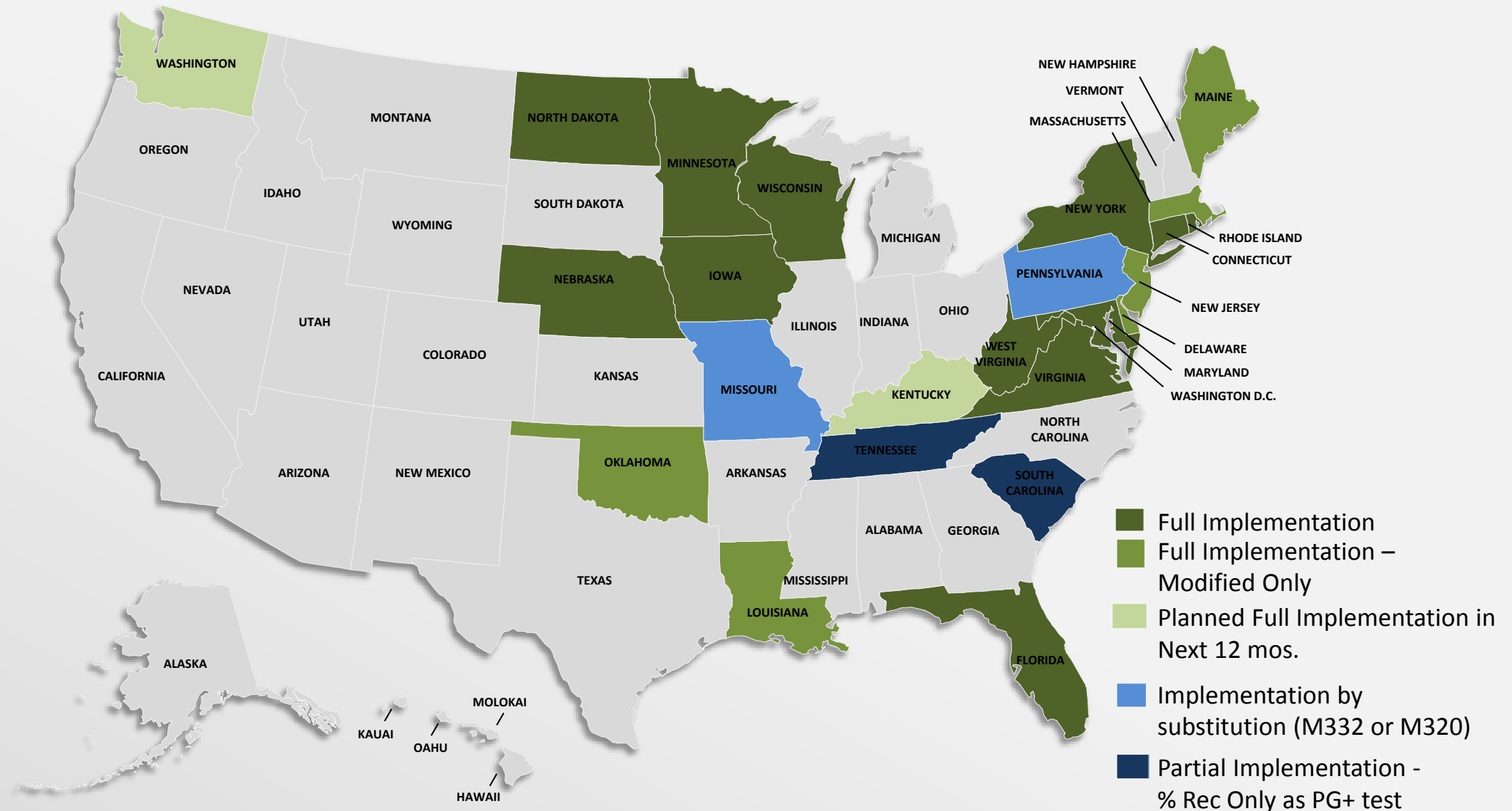
AASHTO M 332



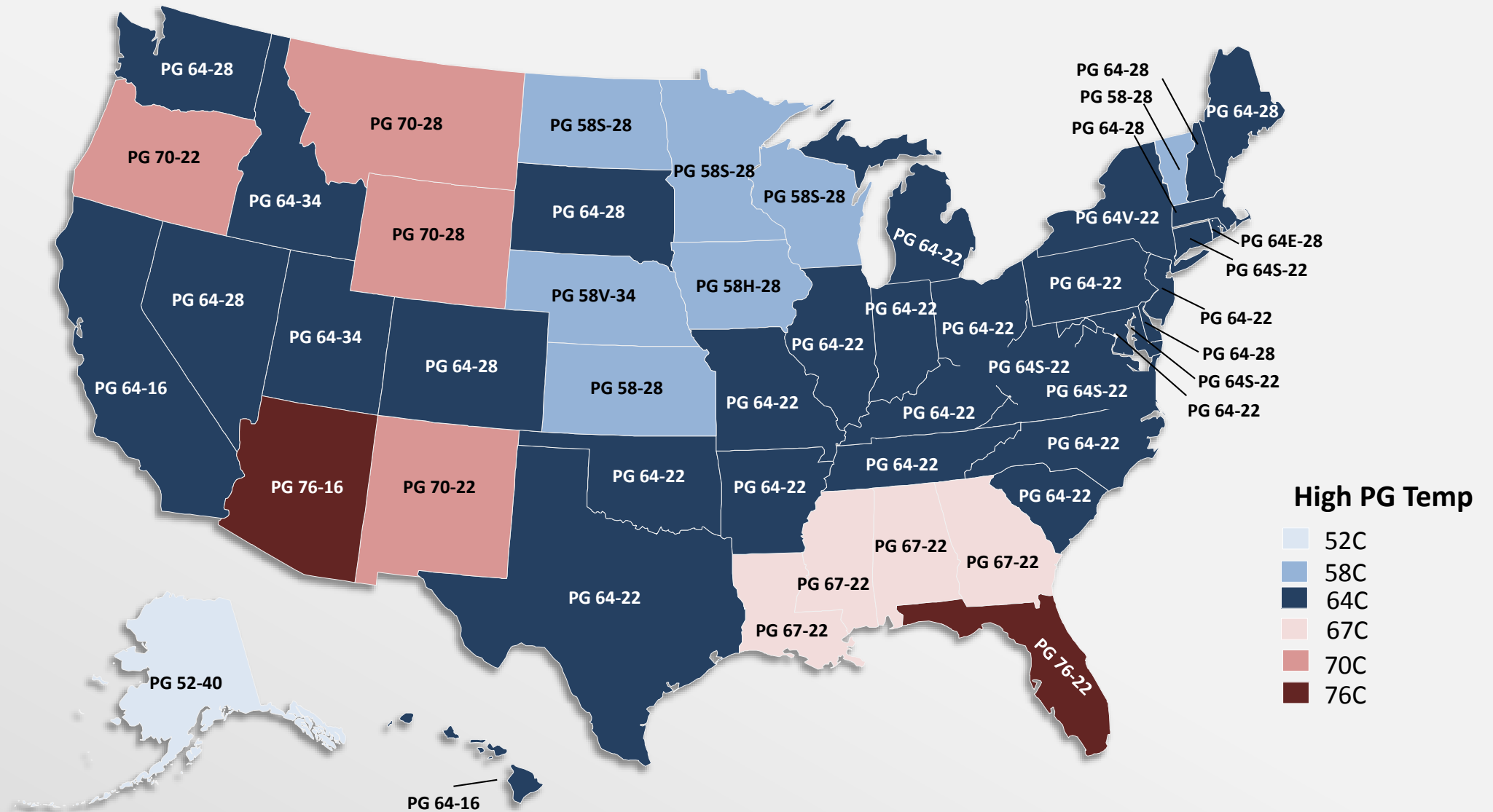
23/23 MSCR States Use MSCR % Recovery. 14 Use the Actual Curve, 9 Use Other Min Values.



25 States Using MSCR % Recovery to Ensure Minimum Elastic Behavior

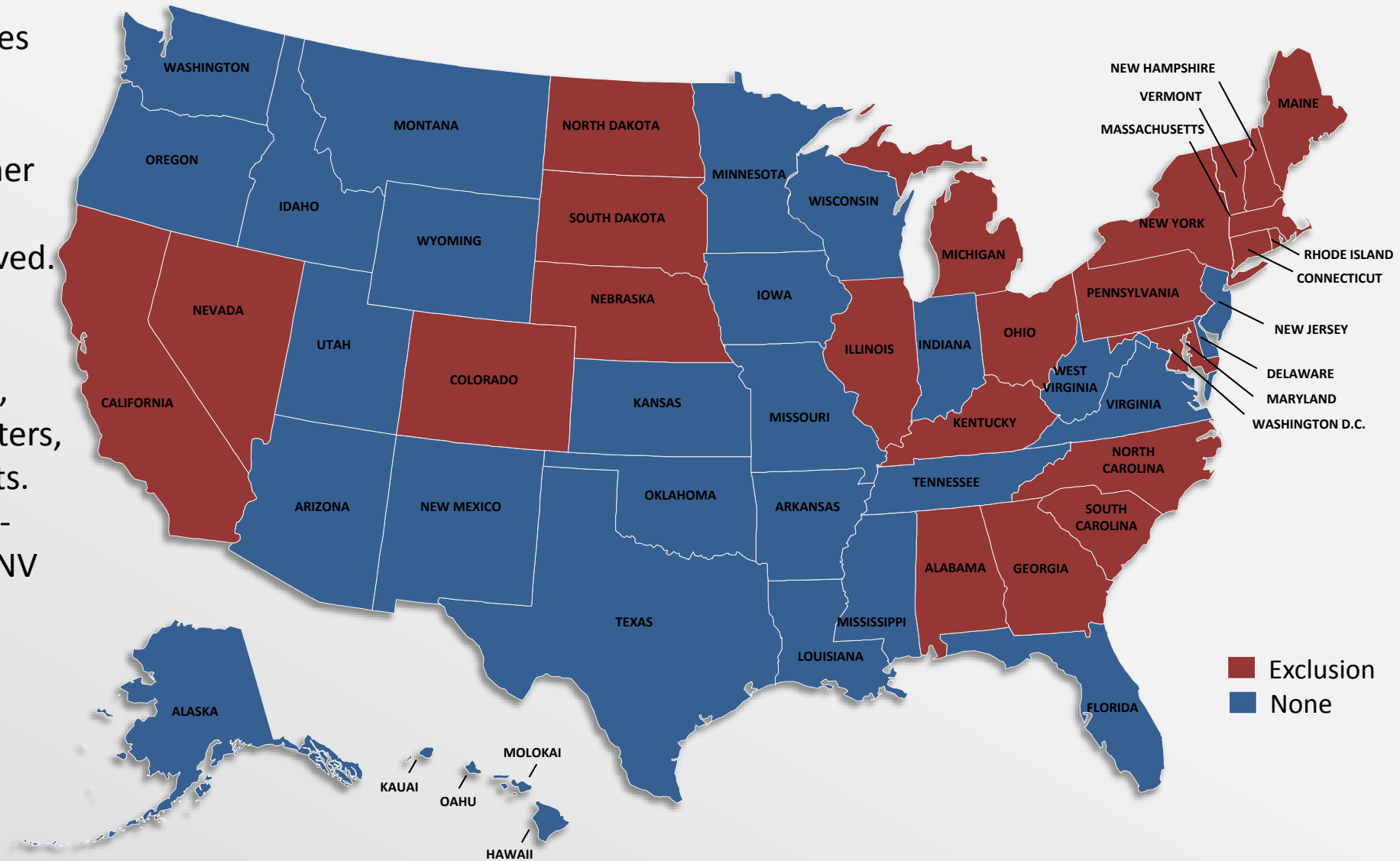


“Workhorse” Binder Grades per AI RE or DOT

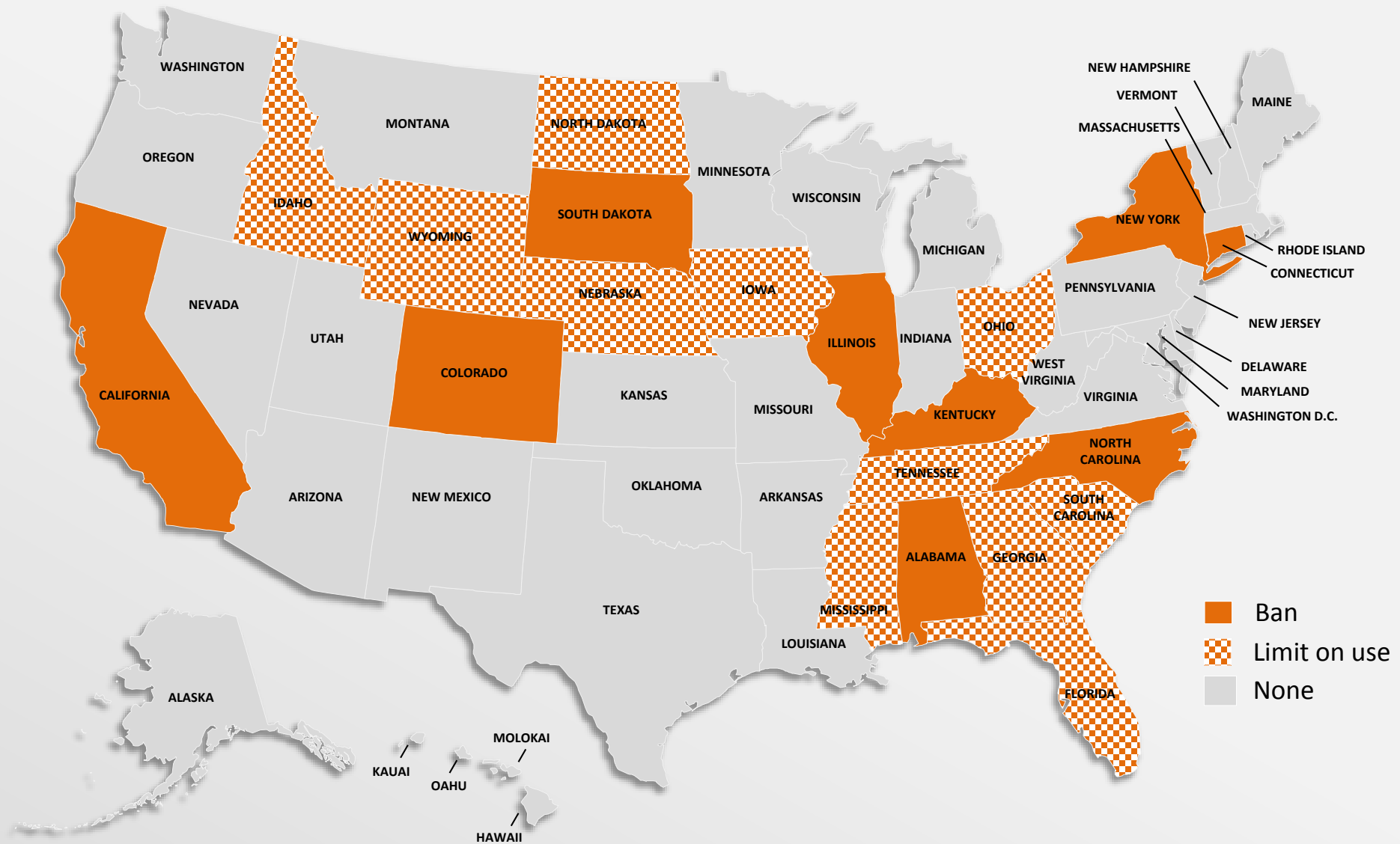


Binder Exclusions (PPA, REOB, Air Blown Asphalt, Motor Oil, Other)

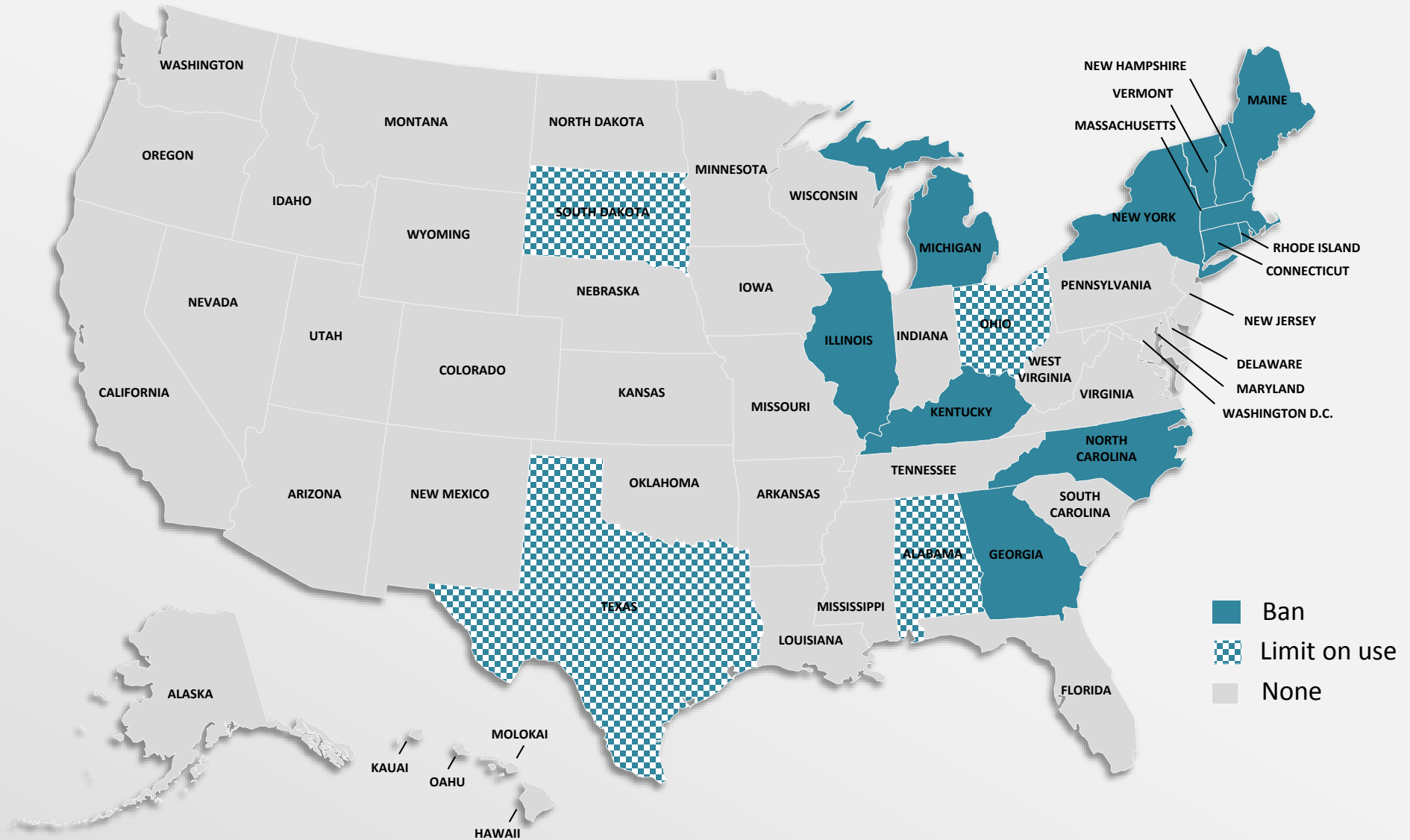
- Motor Oil: 5 states
- Other exclusions found:
 - Any modifier other than SBR or SBS unless preapproved.
 - Fuel oils, other solvents.
 - Extenders, fillers, adhesion promoters, reinforcing agents.
 - Railcar for PG 64-28NV and 76-22NV



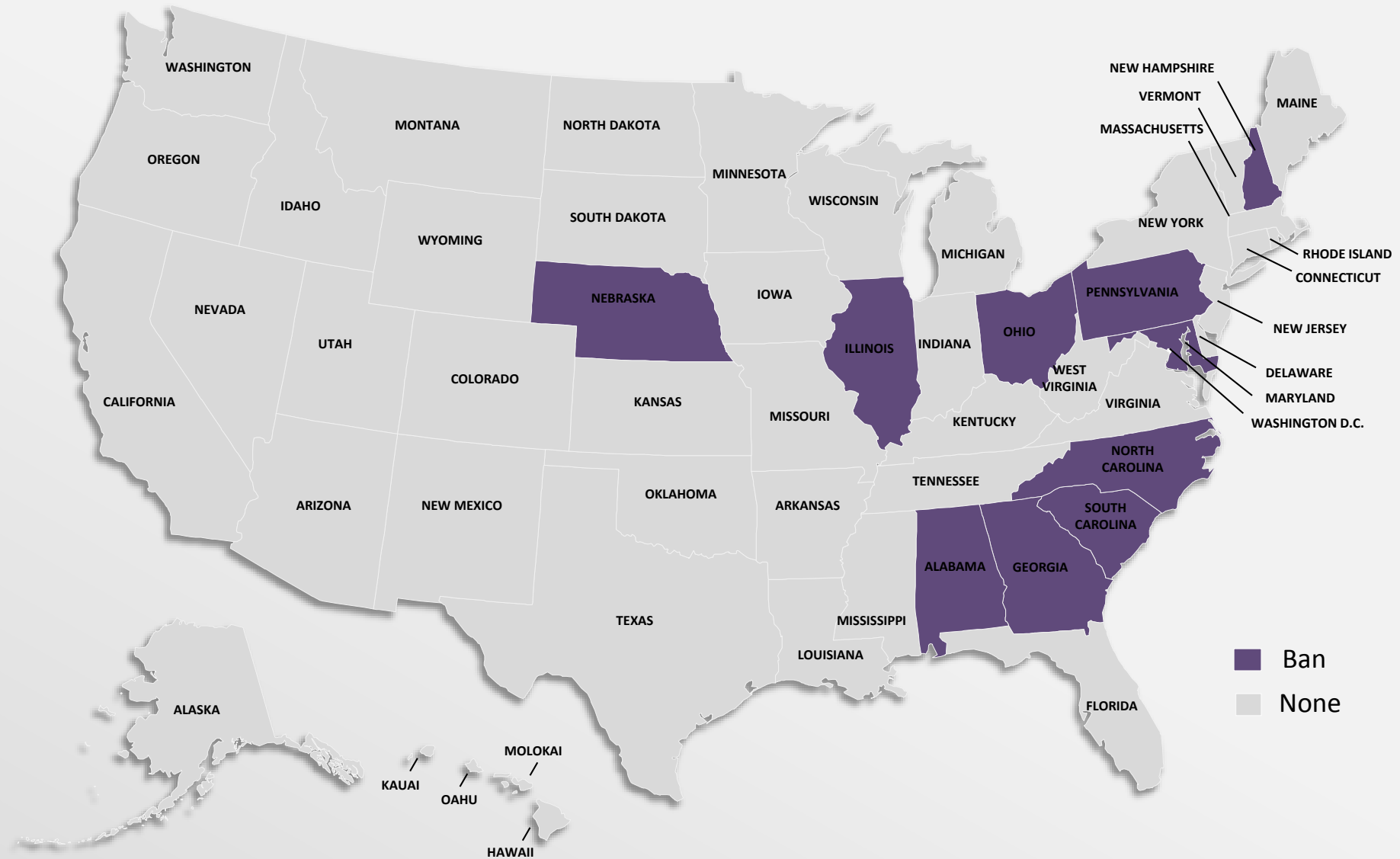
PPA Exclusion



REOB Exclusion



Air Blown Binder Exclusion



Adding Cigarette Butts to Asphalt Can Improve Roads

It also prevents their noxious chemicals from leaching into waterways.

BY KELSEY KENNEDY AUGUST 07, 2017



Finally, a solution for cigarette butt litter. [MAX PIXEL/PUBLIC DOMAIN](#)

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Thanks. Questions?



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