

# Phenol in Massachusetts

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# Project Summary



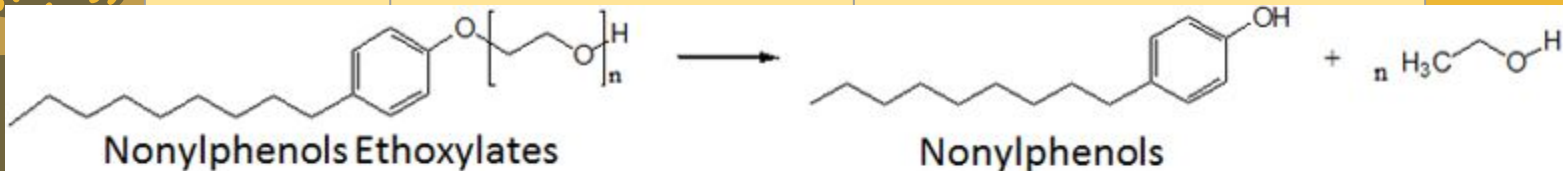
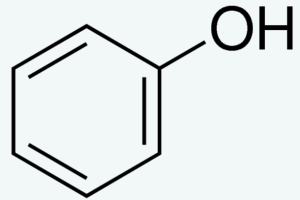
**The Problem:** Phenol and phenol related compounds (NP/NPEs) are widely used chemicals with negative effects on both people and the environment that are not heavily focused on with reporting.

**The Project:** Compile a profile of phenol in its uses, production, and locations across the state of Massachusetts to improve reporting and look into decreasing its usage.



# An Introduction to Phenolic Compounds

	Phenol	Nonylphenols/Ethoxylates
<b>Definition</b>	Carbolic Acid, an organic compound, hydroxyl group substituted into a benzene ring	Derivative of phenol with a 9 carbon tail and hydroxyl group substituted into a benzene ring
<b>Form</b>	White, solid	Pale yellow, liquid
<b>Solubility</b>	More soluble	Less soluble
<b>Production</b>	Extraction from petroleum products (coal, tar, cumene process)	Degradation of alkylphenol ethoxylates
<b>Utilization</b>	Intermediate and solvent in industrial process	Manufacturing of industrial chemicals (cleaning and manufacturing)



# Application and Implications

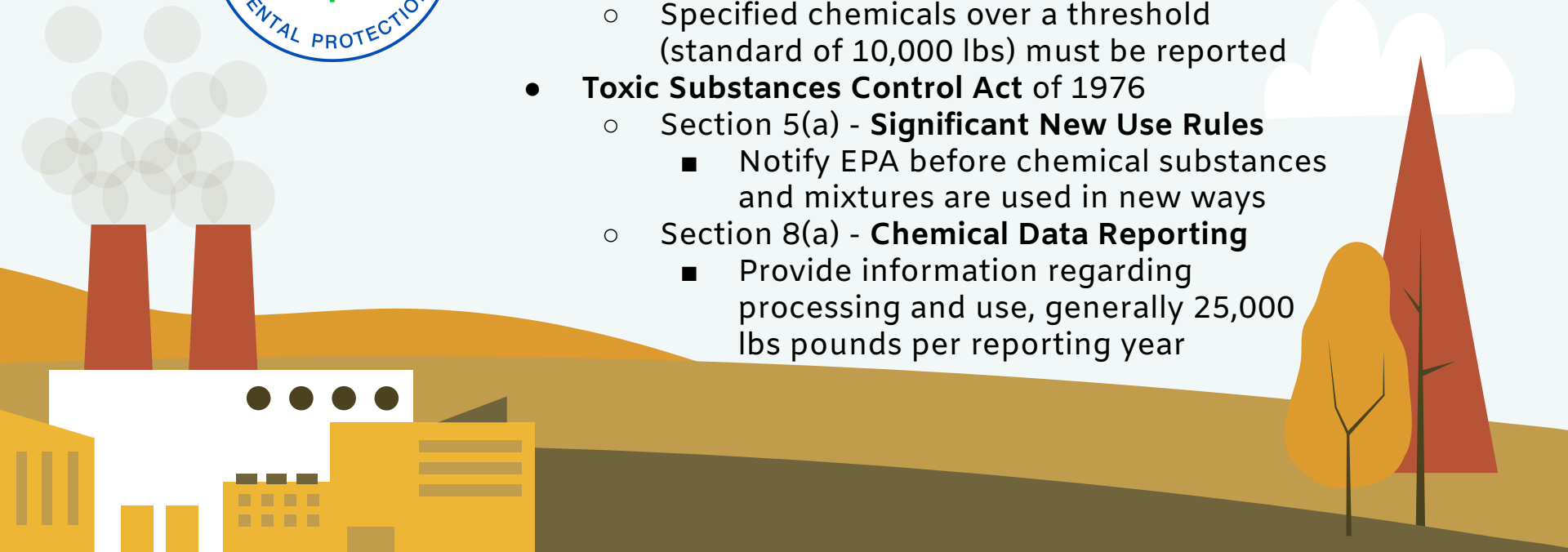


	Phenol	Nonylphenols/ Ethoxylates
<b>Primary Uses and Industries</b>	<ul style="list-style-type: none"><li>• Production of Phenolic Resins primarily for construction</li><li>• Intermediate in Production of Caprolactam and Bisphenol A</li><li>• Medical disinfectant</li></ul>	<ul style="list-style-type: none"><li>• Cleaning detergents</li><li>• Industrial processes as a working fluid and component in coatings</li><li>• Cosmetics and plastic production</li></ul>
<b>Health Impacts</b>	<ul style="list-style-type: none"><li>• Animal tests reflect reproductive issues</li><li>• Toxic, especially via oral exposure</li><li>• Skin and eye irritation</li><li>• Issues with weight maintenance</li><li>• Circulatory system issues with kidneys and blood</li><li>• <u>EPA Group D</u></li></ul>	<ul style="list-style-type: none"><li>• Hormone disruption</li><li>• Aquatic toxicity</li><li>• Skin and eye irritation</li><li>• Reproductive issues</li><li>• Persistent, bioaccumulative and toxic substances (PBTs)</li></ul>

# Pertinent Reporting Legislation and Databases

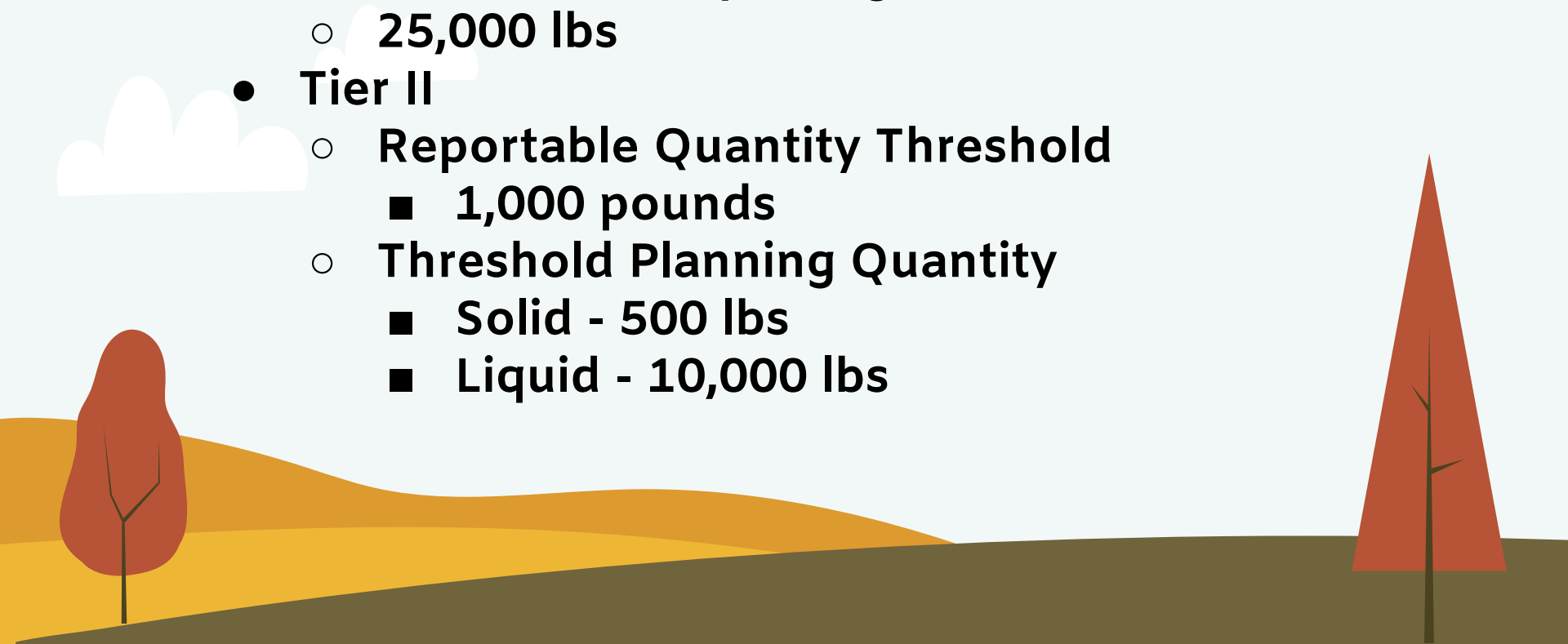


- **Tier II Data** from Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA)
  - Specified chemicals over a threshold (standard of 10,000 lbs) must be reported
- **Toxic Substances Control Act of 1976**
  - Section 5(a) - **Significant New Use Rules**
    - Notify EPA before chemical substances and mixtures are used in new ways
  - Section 8(a) - **Chemical Data Reporting**
    - Provide information regarding processing and use, generally 25,000 lbs pounds per reporting year



# Phenol Thresholds for MA

- **Chemical Data Reporting**
  - 25,000 lbs
- **Tier II**
  - **Reportable Quantity Threshold**
    - 1,000 pounds
  - **Threshold Planning Quantity**
    - Solid - 500 lbs
    - Liquid - 10,000 lbs



# Notes on Phenol Identification

## Appearance:

CDC - Colorless to light-pink

NIH - Colorless to white

## Form:

CDC - Crystalline solid

NIH - Liquid

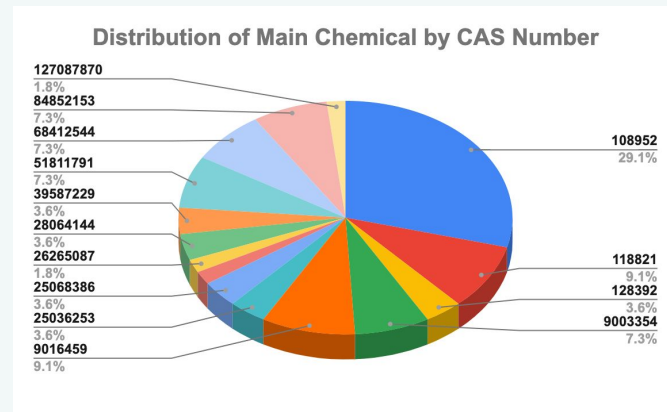
NJ DoH - Combination

## CAS IDs:

Ex. 11-88-21 is listed as both Phenol and an Alkylated Phenol Inhibitor,

It is Phenol,

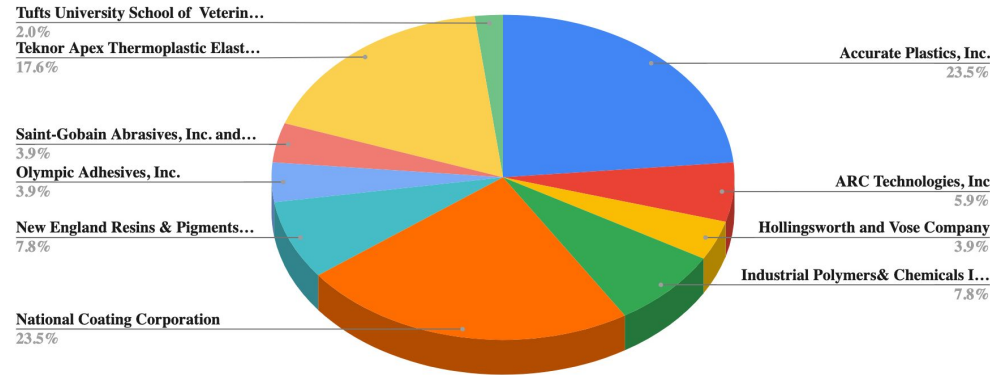
4,4'-methylenebis[2,6-bis(1,1-dimethylethyl)-



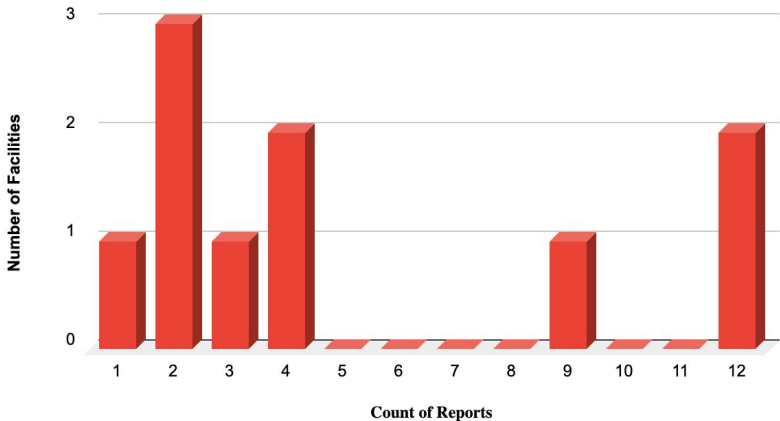
The proportional distribution of all 2017 Tier II reports by main chemical, with the omission of 8 values that did not input a CAS number

# Tier II - Phenol Main Substance Distribution

Phenolic Main Chemical Reports by Facility



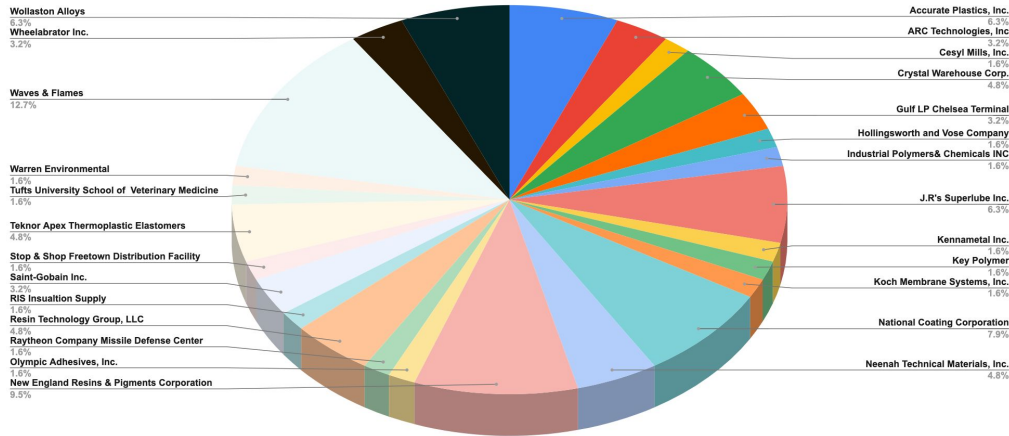
Number of Phenolic Main Substance Reports per Facility



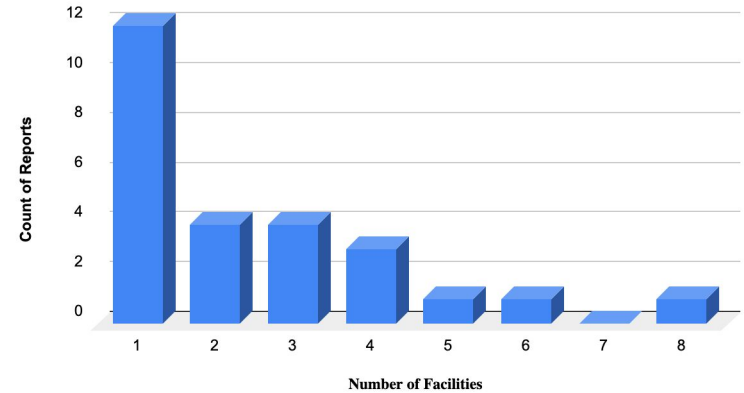


# Tier II - Phenol Main or Mixture (MoM) Distribution

Phenolic Main or Mixture Chemical Reports by Facility



Number of Phenolic MoM Substance Reports per Facility



Count: 26 firms with 63 entries

# Tier II - Statistical Significance

## Sample: Facilities with Phenol as a Main Substance

Unique IDs: 11

Reports: 225

Mean: 20.455

St. Dev: 3.880

## Population: All Facilities with a Main Substance

Unique IDs: 6,320

Reports: 13,689

Mean: 2.166

## Conclusion

The difference between the mean reports from facilities with phenol as a main substance and mean reports from all facilities with a main substance is statistically significant.

## One-Sample Two-Tailed T-Test

t value: 70.705

Alpha level: .05

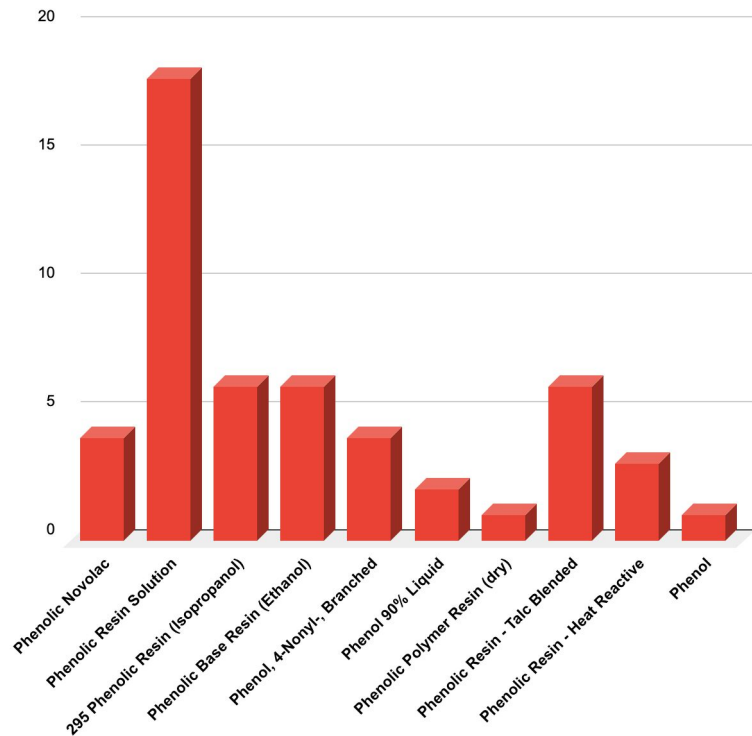
DoF = 224

P-value: < 0.001



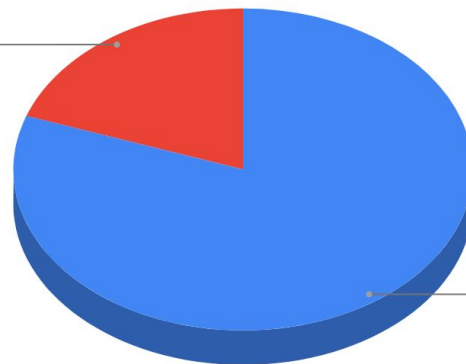
# Tier II - Main Phenolic Substances

Main Chemical Substance



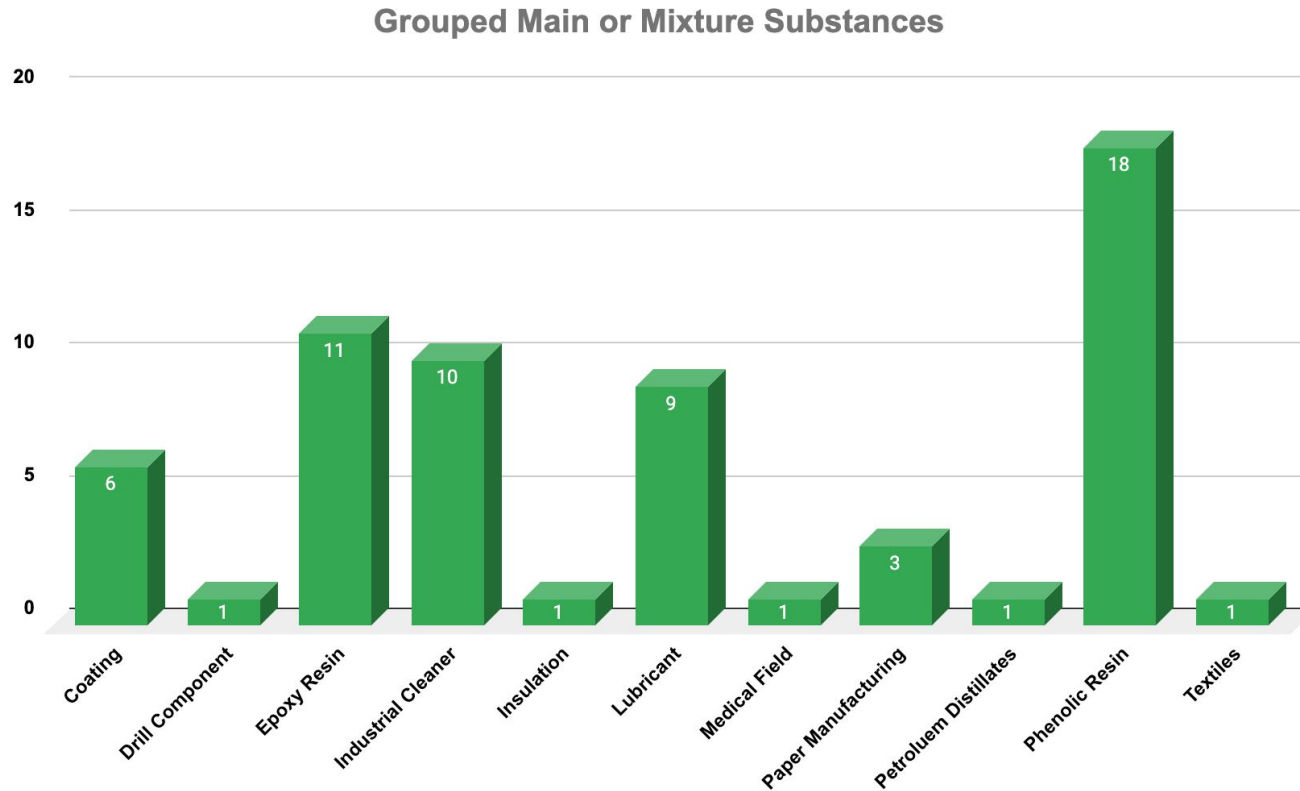
Physical State of Main Substance Phenolic Compounds

Solid  
19.6%



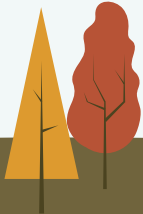
Liquid  
80.4%

# Tier II - How are Phenol MoM Substances Used?



# Tier II - Firms that Meet CDR Thresholds

- Firms with a Main Chem Ave Amt Greater than CDR Threshold
  - Hollingsworth & Vose Company
    - Resin - 25,457 lbs (x2)\*
  - National Coating Corporation
    - Resin - 25,000 lbs (x6)\*
    - Resin - 44,300 lbs (x6)\*
  - Saint-Gobain Abrasives Inc. and Saint-Gobain Ceramics and Plastics, Inc.
    - Resin - 137,644 lbs\*
  - Teknor Apex Thermoplastic Elastomers
    - Heat Reactive Solid - 30,000 lbs (x6)\*



# Tier II - Firms that Meet CDR Thresholds

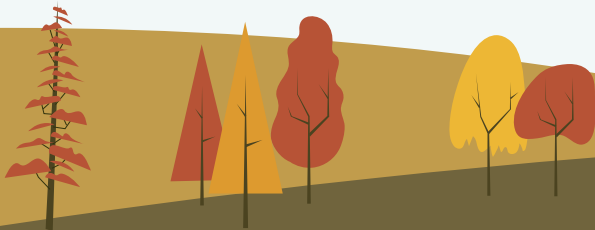
- Firms with a Main Chem Max Amt Greater than CDR Threshold
  - Accurate Plastics, Inc.
    - Resin - 45,000 lbs (x4)\*
  - Hollingsworth & Vose Company
    - Resin - 51,300 lbs (x2)\*
  - Industrial Polymers & Chemicals
    - Resin - 30,000 lbs (x4)\*
  - National Coating Corporation
    - Resin - 86,000 lbs (x6)\*
    - Resin - 88,600 lbs (x6)\*
  - Olympic Adhesives, Inc.
    - Liquid Phenol - 38,375 lbs (x2)\*
  - Saint-Gobain Abrasives Inc. and Saint-Gobain Ceramics and Plastics, Inc.
    - Resin - 186,666 lbs\*
  - Teknor Apex Thermoplastic Elastomers
    - Solid Talc Blend - 65,000 lbs (x3)\*
    - Solid Heat Reactive - 45,000 lbs (x6)\*



# EPA's 2016 CDR Data

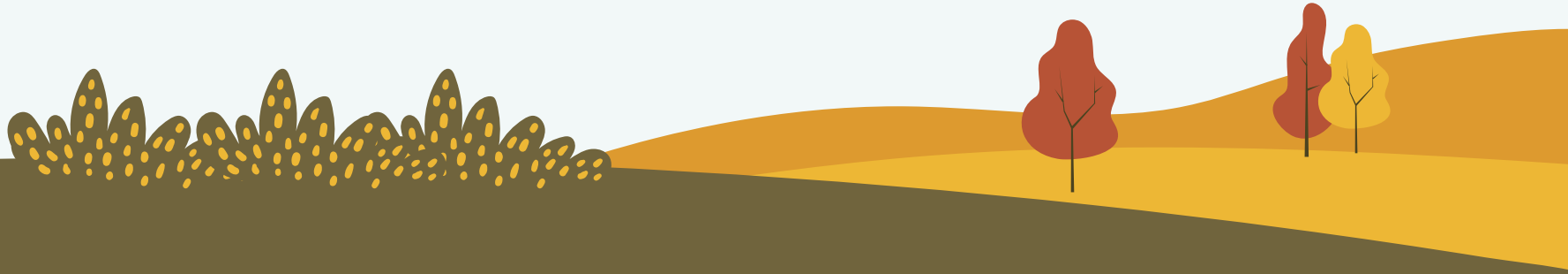
- 12 Chemical Data Reporting entries at Massachusetts Sites for the categories of:
  - Manufacturing
  - Industrial Processing and Use
  - Consumer and Commercial Use

	Phenolic Compound Entries	Listings on Tier II Data
<b>Sabic Innovative Plastics</b>	7	<u>0</u>
<b>Monson Companies for E.W. Kaufmann</b>	4	<u>0</u>
<b>Polnox Corporation</b>	1	<u>0</u>



# CDR - Sabic Innovative

- 'Confidential Business Information' for all CDR values
- Subsidiary of Saudi Aramco, state owned oil and natural-gas of Saudi Arabia
- 5 other Tier II facility reports





# CDR - Monson Companies

- Reports that all 171,107 lbs of phenolic compounds were used
- 42 other Tier II reports between their two facilities locations
- Now 'Azelis L&MF US and Azelis Essential Chemicals US'
- 2 facility addresses in the same town



Innovation  
through  
formulation



# CDR - Polnox Corporation

- 'Confidential Business Information' for all CDR values
- 0 other Tier II reports
- 2 employees and receiving funding from Department of Energy and National Science Foundation for lubrication development initiatives



# New Legislation

Proposal	Status	Future
<p>A new SNUR regarding NPs/NPEs</p> <p>September of 2014</p> <p>Manufacturers provide 90 days notice to EPA</p> <p>Split as 4 NPs and 11 NPEs</p>	<p>November 2019, EPA does NOT have plans to finalize NP/NPEs SNUR</p> <p>Manufacturers from the automotive, aerospace and chemical industries requested an exclusion</p> <p>“Currently determining the best path forward to manage NPs/NPEs”</p> <p>Chemical Nomenclature Issues</p> <p>Altered website information</p>	<p>Three year cycle of evaluation for future prioritized substances</p> <p>NP/NPEs not selected in in high-priority candidates which are targeted for December 2022</p> <p>Earliest probable date to conclude review of NP/NPE would be late 2025</p> <p>If unreasonable risk identified, EPA has two more years to finalize risk management rules putting regulatory action only as early as 2027</p>

# Conclusion

In the current state in which there is a noted absence of accountability in monitoring and progress in legislation, phenolic compounds, with their documented costs to health and the environment, will remain a problem at large for the immediate future.

