

Trichloroethylene Status and Future of Binder Extraction/Recovery

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Illinois Bituminous Paving Conference

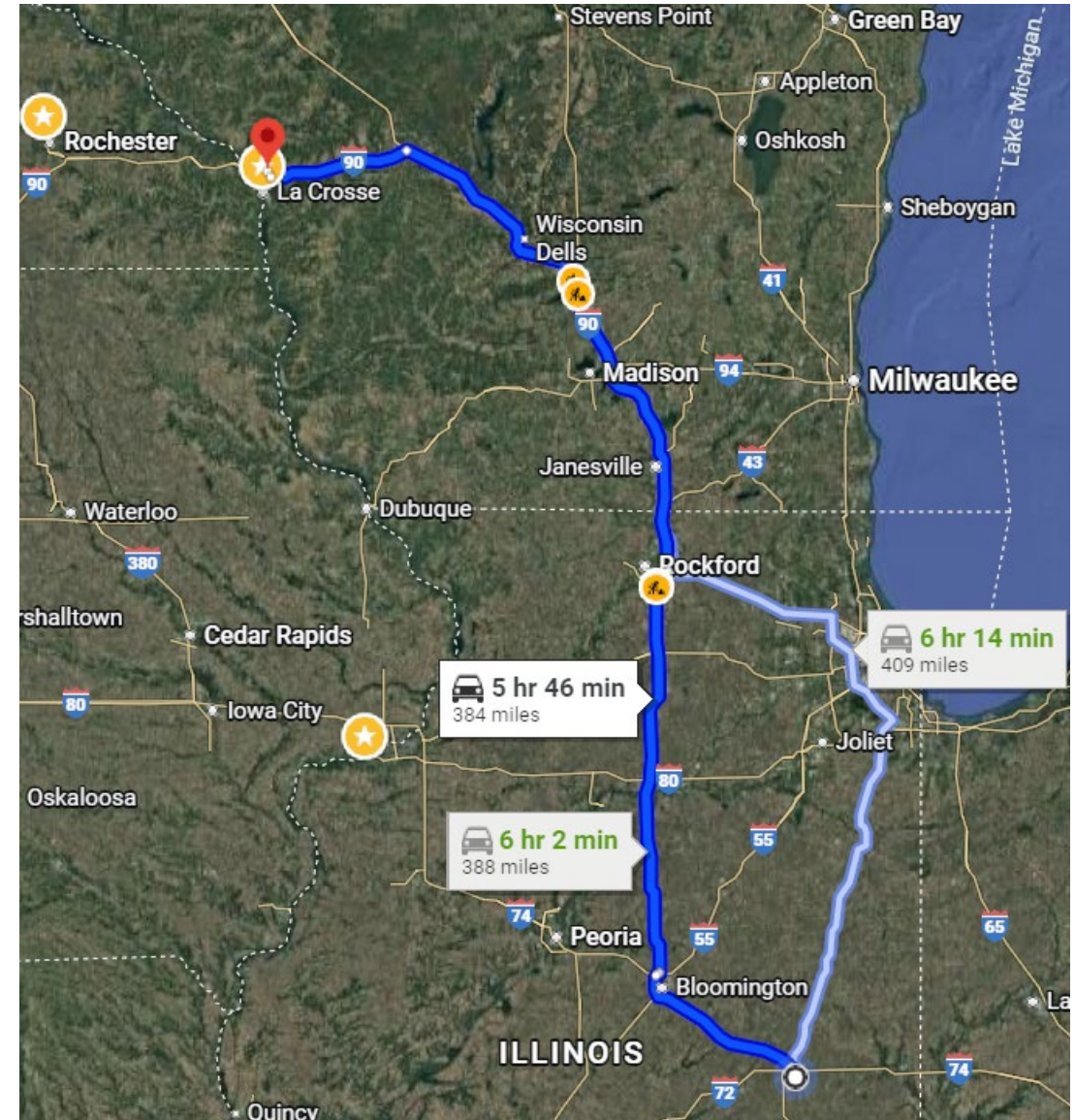
December 10, 2025

Overview

- About Mathy Construction
- Review of Methods used at MTE related to solvents.
- Summary of EPA Rules Related to Solvents
- MTE Monitoring Results and Corrective Action
- Open Discussion

Mathy Construction

- Family-owned company founded in 1944.
- Headquarters in Onalaska, WI.
- Fully integrated construction company.
 - Aggregate Production
 - HMA Production
 - Asphalt Terminals.
- Operates in IA, MN, MI, and WI.



Solvent Use at MTE

Solvent	Standard	Application
N-Propyl Bromide	ASTM D2172 (Quantitative Extraction by Centrifuge)	Mix Design: RAP AC Content, IOCFs. Production: Process monitoring. Comparison with QA.
Trichloroethylene	ASTM D8159 (Automated Extraction)	
Toluene	ASTM D2172 + ASTM D7906 (Recovery by RotoVap)	Recovered binder characterization for High Recycle Mix Design, plant produced PG properties, and forensic analysis.

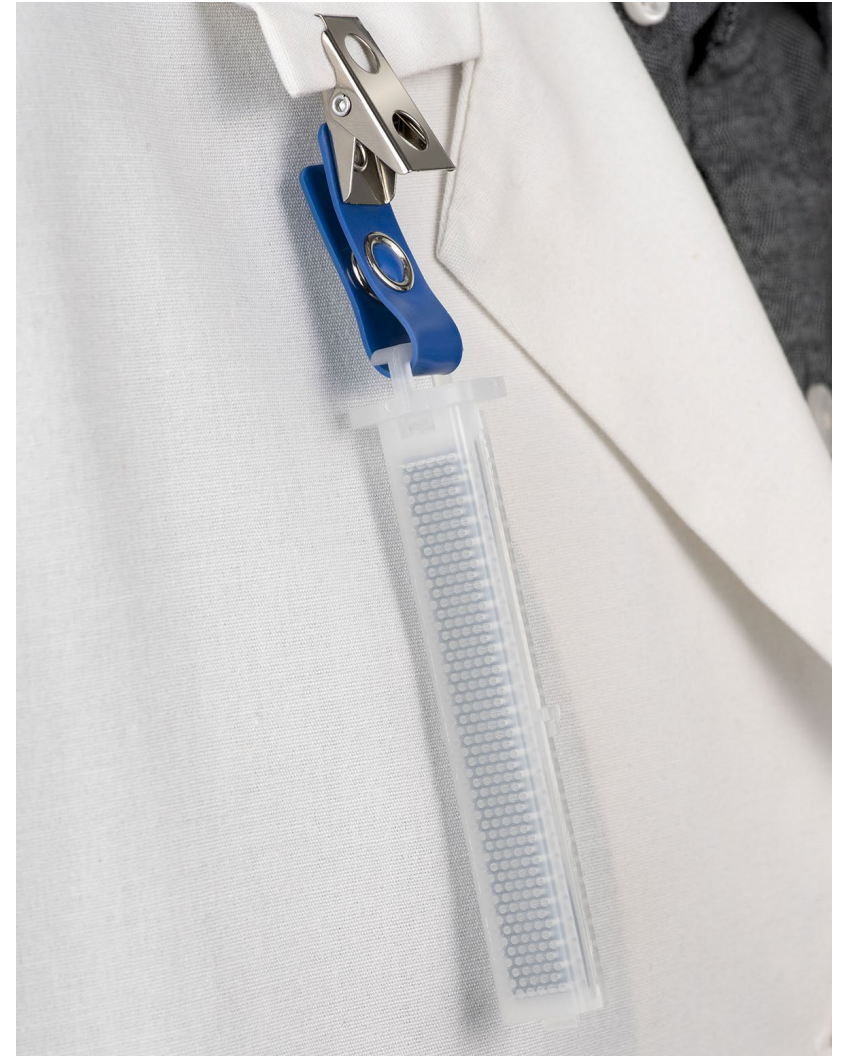
- IOCF = Ignition Oven Correction Factor
- Minnesota banned use of TCE in 2023.

Recent EPA Rules

Solvent	Status of EPA Rule	ECEL – 8 hr TWA (OSHA PEL)	MTE Action
Methylene Chloride	Enacted (7/8/2024)	2 ppm (25 ppm)	Asphalt Analyzer taken out of service due to concerns new limits could not be met.
Trichloroethylene	Enacted (1/16/2025)	0.2 ppm (100 ppm)	Used only in Asphalt Analyzer. Initial monitoring and facilities upgrade to meet exposure limits.
N-Propyl Bromide	Pending	0.05 ppm – Proposed (Not Regulated)	Monitoring of labs during centrifuge extraction.
Perchloroethylene	Enacted (1/17/2025)	0.14 ppm (100 ppm)	Not currently in use.

Monitoring Procedure

- Passive air sampling monitors used
- Placement: clipped to clothing within 12 inches of breathing zone
- Duration: worn the full duration of asphalt analyzer/centrifuge extraction test
- Post-Sampling: monitors analyzed by third party accredited laboratory
 - Results reported in ppm and adjusted to 8-hour TWA



Monitoring Results

Asphalt Analyzer/TCE

Date	Lab	Solvent	Machine	8-hr TWA, ppm	ECEL Action Limit, ppm	EPA ECEL, ppm
10/25/2024	1	TCE	Asphalt Analyzer	1.3	0.1	0.2
7/23/2025	1	TCE	Asphalt Analyzer	<0.06	0.1	0.2
9/20/2024	2	TCE	Asphalt Analyzer	0.1	0.1	0.2
7/31/2025	2	TCE	Asphalt Analyzer	<0.011	0.1	0.2

- Initial Monitoring: Lab 1 exceeded limit, Lab 2 at Action Limit
- After corrective action both labs were below ECEL and Action Limit.
- Additional monitoring needed for multiple runs/day.

Corrective Action - Approach

1. Implement environmental controls

- Goal – below ECEL (0.2 ppm).
- Minimum requirements – below 2 ppm. Did not want require supplied air respirators for technicians.
- Decommission machine if goal could not be met.

2. Isolate equipment

- Before corrective action equipment was part of lab environment, anyone working in the area would require additional PPE.
- Corrective action included assigning dedicated rooms for asphalt analyzers.

Corrective Action

Lab #1



- Self contained solvent transfer system.
- In-line duct fan w/venting behind unit above and below.
- Snorkel for air flow directly over sample entry points.
- Signage to indicate restricted area.
- Converted storage shed to dedicated space.
 - Insulation.
 - Electrical.
 - HVAC system.

Corrective Action

Lab #2



- Self contained solvent handling system. Feeds into floor to ceiling hood.
- Sliding doors to allow minimal exposure for handling samples in hood.
- Internal room dedicated to extractions. External venting with centrifugal fans.
- Signage to indicate restricted area.

Monitoring Results

Centrifuge/nPB

Date	Lab	Solvent	Machine	8-hr TWA, ppm	ECEL Action Limit, ppm	EPA ECEL, ppm
9/20/2024	2	nPB	Centrifuge	1.5	0.03	0.05
7/31/2025	2	nPB	Centrifuge	0.1	0.03	0.05
10/24/2024	3	nPB	Centrifuge	1.1	0.03	0.05
12/11/2024	4	nPB	Centrifuge	0.01	0.03	0.05
7/10/2025	5	nPB	Centrifuge	4.9	0.03	0.05

- Lab 2: Corrective action resulted in 15x reduction in exposure. Remains above current ECEL.
- Lab 3: Above ECEL similar to Lab 2 prior to corrective action.
- Lab 4: Below proposed ECEL
- Lab 5: Corrective action identified during initial monitoring. Retest required.

Example of Centrifuge Set Up

Lab 2



- Hoods face each other – Minimize transport of aggregate + solvent for drying
- Solvent stored under hood, pump to transfer solvent to volumetric cylinder.
- Drying area under hood.

Corrective Action and Exposure Risks

- Corrective Action
 - Modern hood and adequate ventilation required.
- Exposure Risks
 - Manual addition of solvent to centrifuge prior to extraction.
 - Removing aggregate + solvent from centrifuge.
 - Drying of aggregate + solvent on stovetop or oven.
- More exposure risks with manual vs. automated process.
- There will be challenges meeting ECEL if proposed rule is enacted.

Discussion Points

- EPA Rules – Challenges and Successes
- Setting Priorities: Extraction vs. Extraction and Recovery
- Application of Balanced Mix Design
- Future Work Areas

EPA Rules – Challenges

- Challenges
 - Significant reduction in exposure limits. Meeting thresholds requires investment.
 - Manual centrifuge extraction may no longer be viable with regulated solvents.
 - New solvents need to be vetted and incorporated into test procedures.
 - Implementation of Work Place Chemical Protection Program (WCPP).
 - Confusion related to exemptions, timelines, etc.
 - Perception

EPA Rules - WCPP

Exposure (TCE), ppm	Required PPE (Dermal Protection Always Required)	Required Monitoring
≤0.2 ppm	No respirator	Below Action Limit (0.1 ppm) – Every 5 years 0.1 ppm to 0.2 ppm – 180 days
0.2 ppm to 2 ppm	Half mask w/organic vapor cartridges or Air Purifying Respirator (APF 10)	Every 90 days
2 ppm to 5 ppm	Powered Air Purifying Respirator or forced air (APF 25)	Every 90 days
5 ppm to 10 ppm	Powered Air Purifying Respirator or force air (APF 50)	Every 90 days
10 ppm to 200 ppm	Powered Air Purifying Respirator or force air (APF 1000)	Every 90 days

Examples of Power Air Purifying Respirators

POWERED AIR-PURIFYING RESPIRATORS (APR)



**Tight-Fitting Half Facepiece
Powered Air-Purifying Respirator
(PAPR)**
APF=50
Needs to be fit tested



**Tight-Fitting Full Facepiece
Powered Air-Purifying Respirator
(PAPR)**
APF=1,000
Needs to be fit tested



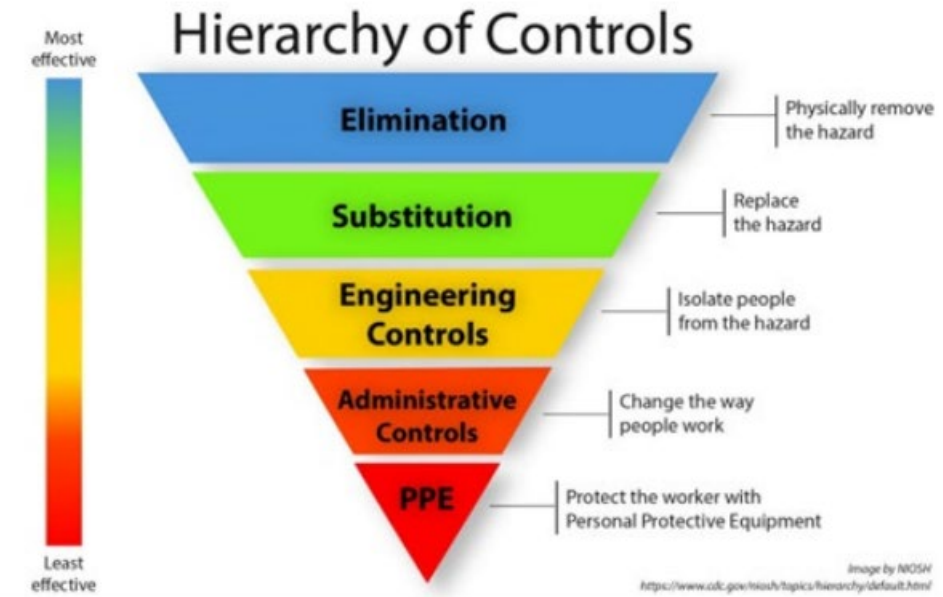
**Loose-Fitting Powered
Air-Purifying Respirator
(PAPR)**
APF=25



**Hood Powered
Air-Purifying Respirator
(PAPR)**
APF=25



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[A Guide to Complying with the 2024 Trichloroethylene \(TCE\) Regulation under the Toxic Substances Control Act \(TSCA\) \(RIN 2070-AK83\)](#)

EPA Rules - Successes

- Focus on safety of work force.
- Involvement by all stakeholders to address the issue.
 - Illinois Asphalt Pavement Association held comprehensive training.
 - UIUC is researching a project funded by IDOT to evaluate alternative solvents.
 - Infratest introduced a new solvent.
 - NAPA Committee on Asphalt Research and Technology formed a subcommittee.
 - CAPRI – Recent Webinar Series ([CAPRI](#))

Setting Priorities

1. Asphalt Content Determination (Tactical)

- Industry: Mix Design (RAP AC content), IOCF correction factors and process control.
- Agency: AC Content is a pay item in many states and a high priority quality indicator.

2. Recovered Asphalt Binder Characterization (Strategic)

- Generally not a pay item. Limited to specialty designs and forensic research.
- Alternative methods exist that use non-regulated solvents.
- Reduced need as BMD evolves.

Application of BMD Cracking Tests

Test	Limit	1s%	1s% Range	d2s%	d2s Acceptance Range
IFIT AASHTO T393	8	25.3	6.0 to 10.0	95.5	4.2 – 11.8
IDEAL CT ASTM D8225	30	17.4	24.8 – 35.2	68.3	19.8 – 40.2

- Asphalt binder content tolerance of 0.3% acceptable in both Illinois and WisDOT.
- Further work needed understand range of AC content for 1s% range of performance tests.
- Additional work needed to manage risk due to longer testing times.

Final Thoughts

- EPA identified a potential hazard. The asphalt community responded well.
- Future of regulation is uncertain.
 - Existing rules being litigated, potential for new rules.
- Leverage lessons learned to be prepared for the future.
 - Practical approaches to reducing dependence on solvents.
 - Development of training programs on EPA regulation/industrial hygiene.
 - Continue research on alternative solvents and performance testing.
 - Maintain partnerships.

Thank You!

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