EPA's UPDATE ON CHLORINATED SOLVENT REGULATIONS IN ASPHALT TESTING INDUSTRY

SEAUPG – Binder Task Group
Charleston, WV
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AGENDA

- Solving the Solvent Question
- Safety requirements
- Best practices for solvent handling
- What's in the Future?

Let's Test It!

Why Solvent Extractions Remain Relevant?

01 **RAP and RAS Evaluation:**
Reclaimed Asphalt Pavement (RAP) and **Recycled Asphalt Shingles (RAS)** introduce aged binders that can significantly alter mix properties.
Solvent extraction remains the **most reliable method** to separate and quantify binder from reclaimed materials.
Allows labs to **measure true binder content** and **assess aggregate gradation.**

02 **Polymer-Modified Binders (PMBs)**
Polymer additives improve performance (rutting resistance, elasticity), but also **complicate binder recovery** and testing.
Solvent extraction enables **complete binder recovery** for subsequent characterization (e.g., DSR, G*/sinδ, or MSCR tests).
Critical for verifying **polymer dispersion, degradation, or residual performance** after field aging.

03 **Quality Control and Method Verification**
Solvent extraction serves as the **reference or referee method** when disputes or inconsistencies arise in mix verification.

TCE Current Status

- Proposed TCE Rulemaking
  - Published Oct 31, 2023
  - Prohibited TCE in Asphalt Testing
  - Comments submitted by IAPA, AASHTO, FHWA & ASTM
- Final TCE Rulemaking
  - Published Dec 17, 2024
- Congressional Review Act
  - HJR 27 introduced Jan 22, 2025
  - Needs to Pass House, Senate and Presidential Signature
  - **No further action** (no committee report, no floor vote,
  - no Senate action) has been recorded as of today.
- Final Rule Delaying Section 6(g) parts
  - Delayed until at least Feb 17, 2026
  - Asphalt Testing Not Included in Delay
- PCE Reconsideration July 2025
- **Compliance Timeline:** Starting **March 13, 2026**, employers must ensure no worker's exposure exceeds 0.14 ppm (8-hour TWA) (taking PPE into account) under WCPP

"Simple administrative and engineering controls can go a long way to lowering exposure. You can achieve significant improvements with simple changes."

What Should ALL Labs Using TCE Be Doing NOW?

Compliance With All Conditions Specified by EPA
- ✓ Workplace monitoring
- ✓ Labels and warnings
- ✓ Exposure Monitoring documentation
- ✓ Periodic audits or certifications

Exposure Minimization Plan
- ✓ Closed systems and engineering controls or solvent phase out
- ✓ No consumer exposure
- ✓ Strict worker protections
- ✓ Waste and emissions management

EXPERT ADVICE: TriMedia Environmental & Engineering

- ✓ Regular inspections on equipment - including hoods (leaks can add up)
- ✓ Putting solvent extraction equipment in its own designated room
- ✓ Use of fume hoods or local exhaust ventilation systems or snorkel vents
- ✓ Helps if system is own HVAC and has negative pressure in the room
- ✓ Limiting exposure as much as possible (only be in the designated room when you need to be)
- ✓ Discuss work flow and body positioning when working with the equipment
- ✓ Set up you regulated area or designated areas and follow them
- ✓ Make sure chemicals are stored in leak tight air tight containers and vented areas

EFFECTIVE ENGINEERING CONTROLS

Improve local exhaust ventilation near analyzers and waste drums.
- Enclose waste transfer systems.
- Vent analyzer exhaust and pumps outdoors
- Repair/replace damaged hoses, seals, ventilation parts BE PROACTIVE!
- Add shielding or enclosed ducting for improved capture

Transition away from manual solvent extraction whenever possible – Most difficult to meet new EPA guidelines

Contractor: Engineering/Admin Control Example

- Auto-Extractor Relocated to Cargo Shed
- 2 HVAC Systems (1 continuous/ 1 activated before technician enters)
- When both active air cycled 12X per minute
- Monitoring results
  - Badge Hanging in front of auto-extractor: 0.53 ppm
  - Badge on technician (full shift – 5 samples plus clean out): 0.13 ppm
  - Badge in main lab: <0.1 ppm
- Cost ~$25,000

Improve Solvent Handling

- ✓ **Use vented cabinets for solvent storage**
- ✓ **Post hazard warnings near solvent containment areas**

Enclose waste transfer systems and storage to avoid leaks into the lab space

PPE Fitting and Training

- ✓ Provide NIOSH-approved supplied-air respirators (SARs) or continuous-flow airline respirators until exposures are controlled.
- ✓ Fit check make sure glasses and facial hair are not in the way.
- ✓ Don't use dust masks!

- ✓ Assess gloves, protective clothing, and face protection for chemical permeation resistance.
- ✓ Only "chemical resistant" gloves will provide adequate protection for the hands.
- ✓ Leather or cloth gloves will simply soak up solvents and hold them against the skin.
- ✓ Latex gloves will be softened or dissolved by some solvents

Suggested Workflow for Spot Checks: Identify target solvent exposure checks

Choose monitoring type:
- ✓ If you want a quick "are levels okay?" check → use passive badge or direct read.
- ✓ If you need quantitative verification or regulatory compliance → use active sampling (pump + sorbent tube).

Set up the sampling train:
- ✓ For active: calibrate pump, attach sorbent tube, sample for known volume/time.
- ✓ For passive: place badge on worker/lapel or area, allow exposure period.
- ✓ Document worker activity, location, ventilation state, solvent use during the sampling period (context matters).
- ✓ Send samples to a capable analytical lab (for sorbent tubes) or read direct monitor.
- ✓ Compare results to limits; if exposures are elevated, investigate controls (ventilation, substitution, PPE).
- ✓ Maintain records (sampling data, calibration logs, corrective actions) as part of your program.

Passive OSHA Exposure Compliance Tools

- ✓ SKC 575-002 passive sampler is a widely used, validated device for personal air sampling of organic vapors like trichloroethylene (TCE) in workplace settings.
- ✓ Suitable for short-term (15 min) and full-shift (8 hour) occupational exposure sampling
- ✓ OSHA recognizes this sampler as a valid sampling method for TCE exposure

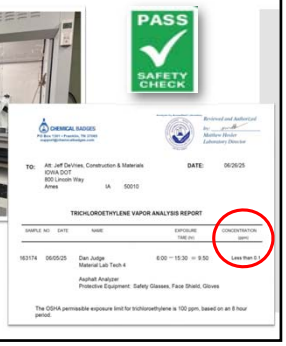
WHAT'S YOUR SIGN???

Know your chemical hazard symbols!

Training, Signage & Communication

- ✓ **Conduct employee training on chemical hazards, safe handling, and emergency procedures.**
- ✓ **Identify all employees who handle or may be exposed to hazardous chemicals**
- ✓ **Schedule training upon hire and refresher training annually (or after new chemicals/processes are introduced.**
- ✓ **Document attendance, training date, and trainer credentials.**
- ✓ **Post hazard warnings near all solvent handling areas.**
- ✓ **Maintain inspection logs for hoses, fittings, exhaust systems – be proactive!**

CASE STUDY: IOWA DOT

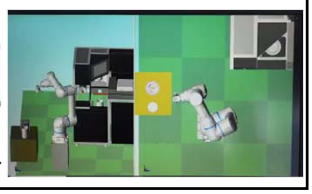


FUTURE OF SOLVENT HANDLING: Closed System for Extraction and Recovery

CLOSED SYSTEMS
- **Fully automated extraction and recovery systems**
- **Add on- vapor sensors and solvent exposure detection.**
- **Regulatory: - EPA evaluations phase out TCE**

Push toward sustainability and zero-exposure labs

Is Full Lab Automation The Future?



SEARCH FOR TCE REPLACEMENT SOLVENT:

1. What is the possible impact on human health ?
2. What is the possible environmental impact ?
3. What is the influence on binder property ?
4. How is the dissolving power (extraction time)
5. How do we get it out completely of the binder ?
6. Can we recycle it?
7. Is it flammable ?
8. Is it explosive ?
9. Is it available ?
10. Is it affordable ?

Alternative Solvent Solution: AeroTron-Infra

Category	AeroTron Infra
Extraction performance	Equal or better recovery than TCE; fast drying, no residue Recyclable (efficient recovery performance)
Safety	Low overall toxicity – Non regulated for transportation
Regulatory status	Non-HAP, non-ozone-depleting; easier disposal and recordkeeping
Equipment compatibility	Stable, non-corrosive, suitable for solvent recovery in existing equipment Rotovap/Abston/Centrifuge and Automated Extraction Systems.
Exposure control	**OSHA 200 ppm exposure limit** – easy to manage with standard ventilation
Availability/Price	Available – manufactured in Chicago IL and priced comparable to TCE and DCM

HAZARD LEVEL COMPARISONS

TCE, DCM, PCE | Toluene | AeroTron Infra

AeroTron-Infra Internal Research Extraction Results – Asphalt Analyzer Compatibility

Parameter	Average Value	Standard Deviation (±)
Extracted Components (binder %)	14.68	0.21
Binder Content (%)	5.98	0.11
Filler Content (%)	8.70	0.12
Mass Constancy	> 99.9995 (up to 7 digits)	N/A
Run Time (per extraction)	~46 - 52	N/A

- ❑ Needs more testing in manual extraction
- ❑ Needs collaboration with other equipment models
- ❑ Need help from industry to test effectiveness against currently accepted solvents
- ❑ More research needed for Binder Property impact determination

Key Takeaways For ALL Labs

- Implement robust engineering controls and PPE
- Conduct regular exposure monitoring and maintain detailed records.
- Train all staff on solvent hazards and emergency procedures.
- Stay informed of evolving EPA regulations and industry guidance.
- **Consider Alternatives:**
  - Toluene (with safety caveats), Ash Test (AASHTO T111, ASTM D8078)
  - New Non-Hazmat solvent for automated extraction Under consideration for CAPRI Study

infraTest TESTING SYSTEMS

Thank You!

Questions?