Asphalt Binder

Sampling and Material Quality Issues

Presentation Overview

- IDOT'S Material Policy
- AASHTO Accreditation
- Sampling
- Failing Tests
- 2005 Material Failures
- Suggestions
- Summary

IDOT Material Policy

Avg 7-day Max, °C	PG 46			PG 52						PG 58					PG 64						PG 70						PG 76						PG 82					
1-day Min, °C	-34	-40	-46	-10	-16	-22	-28	-34	-40	-46	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-40	-10	-16	-22	-28	-34	-10	-16	-22	-28	-34
ORIGINAL																																					
≥ 230 °C	(Flash Point) FP																																				
≤ 3 Pa·s @ 135 °C	(Rotational Viscosity) RV																																				
≥ 1.00 kPa	(Dynamic Shear Rheometer) DSR G*/sin d																																				
	46			52						58					64						70						76						82					
(ROLLING THIN FILM OVEN) RTFO Mass Loss ≤ 1.00 %																																					
≥ 2.20 kPa	(Dynamic Shear Rheometer) DSR G*/sin d																																				
	46			52						58					64						70						76						82					
(PRESSURE AGING VESSEL) PAV																																					
20 Hours, 2.07 MPa	90			90						100					100						100 (110)						100 (110)						110 (110)					
≤ 5000 kPa	(Dynamic Shear Rheometer) DSR G* sin d Intermediate Temp = [(7-day max + 1-day min)/ 2] + 4																																				
	10	7	4	25	22	19	16	13	10	7	25	22	19	16	13	31	28	25	22	19	16	34	31	28	25	22	19	37	34	31	28	25	40	37	34	31	28
S ≤ 300 MPa m ≥ 0.300	(Bending Beam Rheometer) BBR "S" Stiffness & "m"- value																																				
	-24	-30	-36	-0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-0	-6	-12	-18	-24
Report Value	(Bending Beam Rheometer) BBR Physical Hardening																																				
≥ 1.00 %	(Direct Tension) DT																																				
	-24	-30	-36	-0	-6	-12	-18	-24	-30	-36	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-30	-0	-6	-12	-18	-24	-0	-6	-12	-18	-24

Binders Required to Meet AASHTO M 320

- **Polymer modified binders require PG plus tests:**
  - **Separation of Polymer**
  - **Force Ratio**
  - **Elastic Recovery**

Illinois Department of Transportation

www.dot.il.gov

Rod R. Blagojevich, Governor

IDOT Links

- Home
- Traveling Public
- Accountability
- Doing Business
- News
- Press Releases
- Public Partners
- Project Information
- Safety Information
- General Information
- Employment Opportunities
- Site Index
- Help
- FAQ
- Search IDOT

State Links

Search Illinois

Go

[Search Tips]

I-PASS Tollway Information

Secretary of State's Office

Contact Us

e-mail

Or write to:
Illinois Department of

Current Focus

ILLINOIS WORK ZONE SAFETY CALENDAR CONTEST ONLINE VOTING BEGINS -

Beginning *December 12th*, the public will have a chance to view over 200 drawings children from grades K-6 have entered for this first annual Work Zone Safety Calendar Contest. IDOT, along with the Illinois State Board of Education, the American Traffic Safety Services Foundation (ATSSF), and the Illinois Chapter of the American Traffic Safety Services Association (ATSSA), coordinated this statewide contest. Contestants are from across the state.

Latest News

IDOT, ISP urge local law enforcement to intensify enforcement efforts in December

IDOT releases the Illinois State Transportation Plan 2005 for public review.

IDOT Crews Prepare for Winter Season

Fall/Winter 2005 edition of Caution, IDOT Traffic Safety magazine is now available online

IDOT Reduces Peotone Airport Footprint by 2,350 Acres

IDOT to present Prairie Parkway Transportation Alternatives

Did You Know You Can

- Find Information about Public Transportation
- View the latest information on the Chicago Region Environmental and Transportation Efficiency Program (CREATE)
- View IDOT's Supportive Services Program
- Determine the compliance requirements for attaining truck permits
- View the current Road Closure list

Check latest traffic counts

- Displays the current traffic and truck volumes on Illinois roadways.

December 28, 2005

IDOT Features

GCM Gary-Chicago-Milwaukee Travel Maps

Statewide Winter Road Conditions

Road Construction

Context Sensitive CSS Solutions

Mobile Capture & Reporting MCR

www.illinoisroads.info

http://www.dot.il.gov/materials/03-05pgbn.pdf

State of Illinois
Department of Transportation
Bureau of Materials and Physical Research

POLICY MEMORANDUM

April 1, 2003	Springfield	03-05

TO: DISTRICT ENGINEERS AND HIGHWAY BUREAU CHIEFS
ASPHALT MANUFACTURERS & TERMINAL SOURCES

SUBJECT: PERFORMANCE GRADED ASPHALT BINDER ACCEPTANCE PROCEDURE

DEFINITIONS

State - State of Illinois

Department - Illinois Department of Transportation

Bureau - Bureau of Materials and Physical Research at 126 East Ash Street, Springfield, Illinois 62704-4766

Local Agency - Municipality or City, County or Road District

Source - Refinery or Distribution Terminal

http://www.dot.il.gov/materials/asphaltbinder.pdf

Illinois Department of Transportation
Bureau of Materials and Physical Research

APPROVED LIST OF CERTIFIED SOURCES FOR PERFORMANCE GRADED ASPHALT BINDER

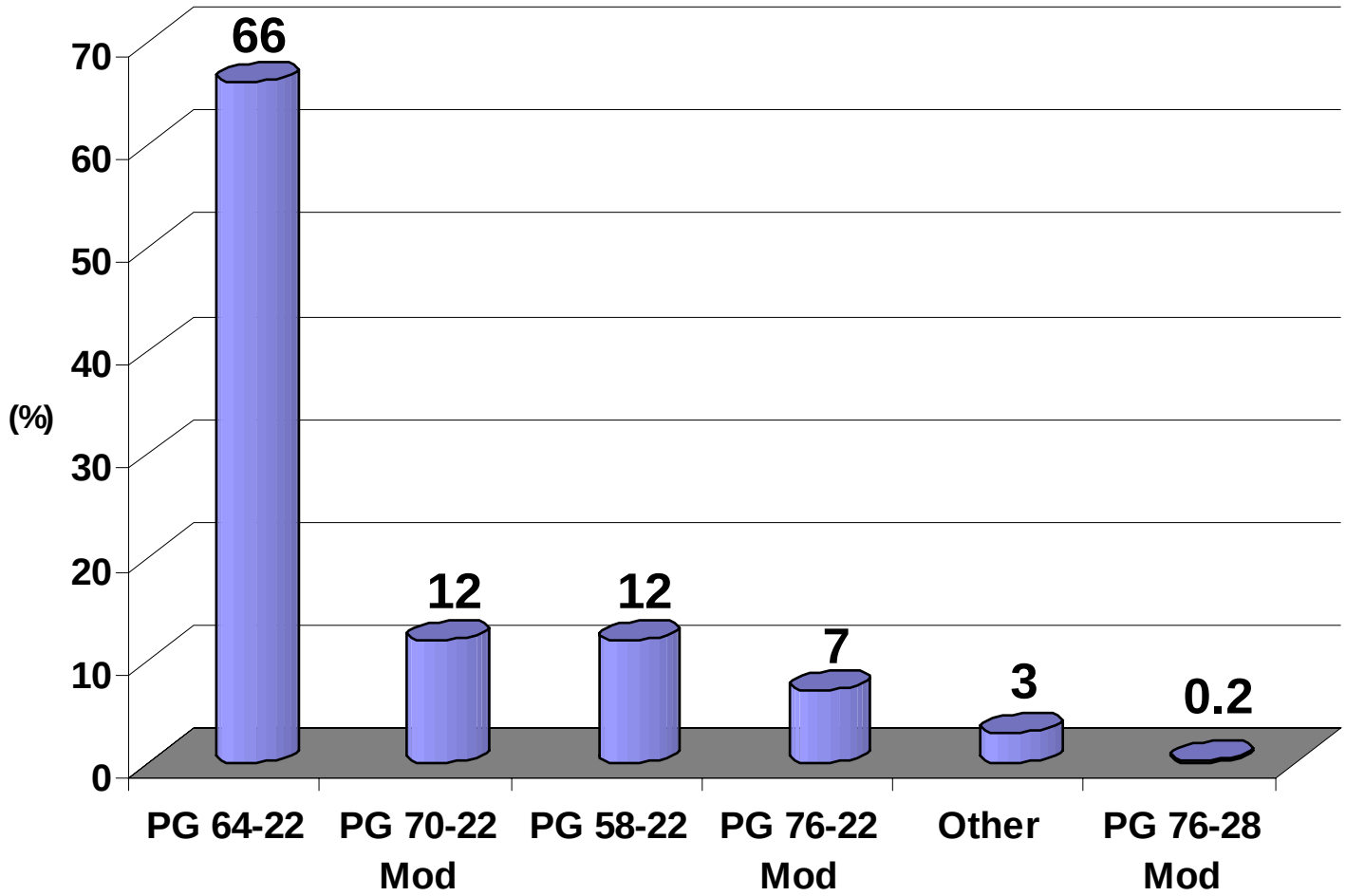
September 16, 2005

This list supersedes the August 26, 2005 list.

Standard Specifications for Road and Bridge Construction, Section 1009 (Adopted January 1, 2002)
Current Policy Memorandum, "Performance Graded Asphalt Binder Acceptance Procedure"

Source	Location	Source No.	Qualified Products
BP	Davenport, IA	5627-01	PG 64-22 PG 58-22 PG 58-28 PG 46-28
BP	Whiting, IN	5627-02	PG 64-22 PG 58-22 PG 52-28 PG 46-28
BP	Milwaukee, WI	5627-04	PG 64-22 PG 58-22
BP	South Bend, IN	5627-11	SBS PG 70-22* SBS PG 64-28*
BP	Bartlett, IL	5627-13	PG 64-22 PG 58-22 PG 52-28

Binder Grades used in Illinois

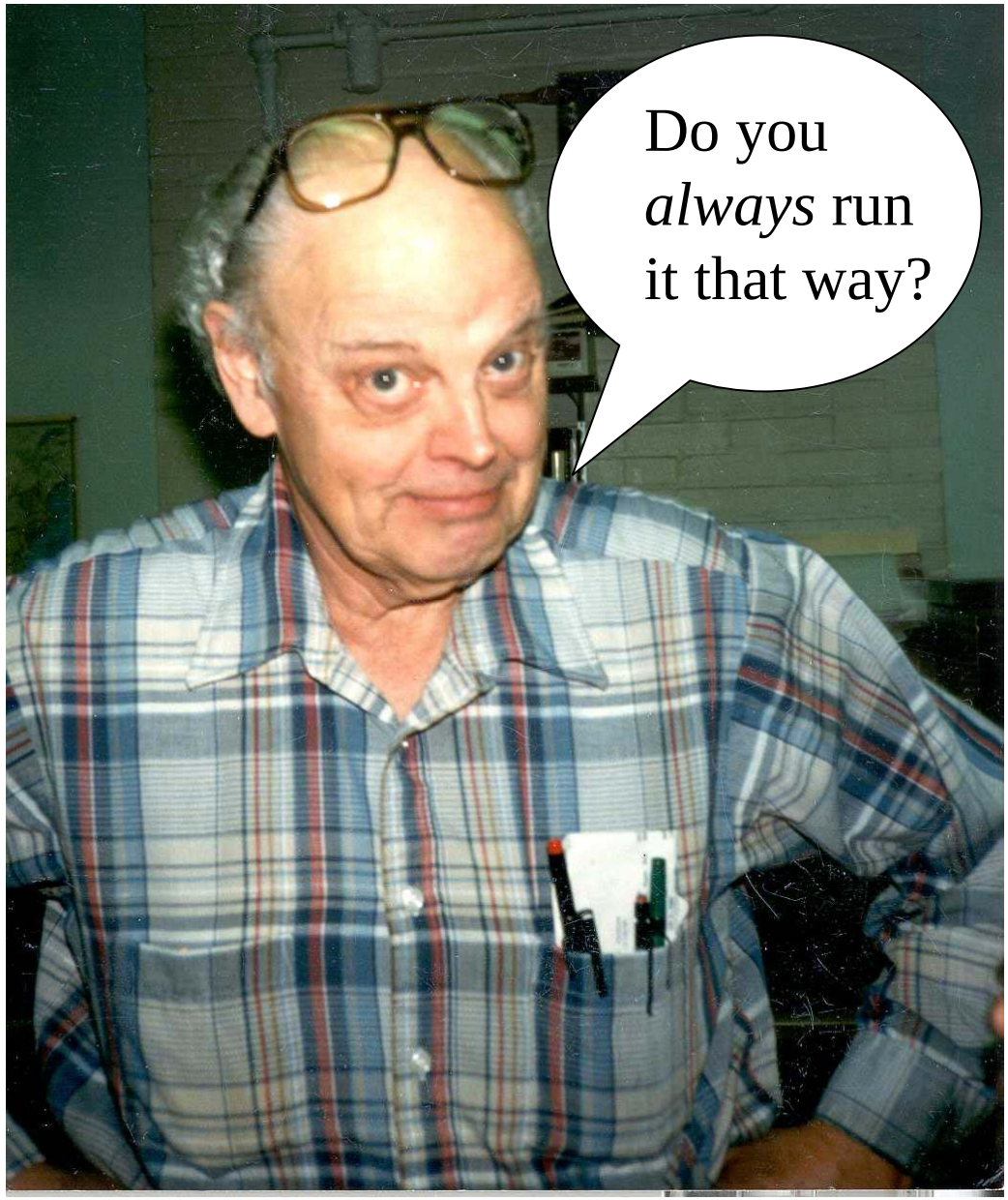



Doug
Brian
Jeff
5890

AASHTO Accreditation

Asphalt Lab
AASHTO Accredited

- Periodic On-site Lab Inspection by AMRL Personnel
- Participate in Round Robin Testing, Sponsored by AMRL
- Periodic Calibration of All Test Equipment


Do you
always run
it that way?

Results for Laboratory Number 45

Performance Graded Asphalt Binder Sample Numbers 201 & 202

December 23, 2005

Test	Test Title	Lab Data 201	Lab Data 202	Averages 201	Averages 202	Ratings 201	Ratings 202
	TESTS ON ORIGINAL BINDER						
	AASHTO T228/ASTM D70, Specific Gravity						
(1)	Specific Gravity	1.0303	1.0314	1.03105	1.03092	-5	5
	AASHTO T48/ASTM D92, Cleveland Open Cup						
(2)	Flash Point (°C)	330	330	326.3	326.8	5	5
	AASHTO T316/ASTM D4402, Rotational Viscosity						
(4)	Viscosity at 135°C (Pa•s)	0.448	0.443	0.4510	0.4521	-5	-5
	AASHTO T315, Dynamic Shear Rheometer (64°C, 25-mm plate, 1-mm gap)						
(5)	Complex Shear Modulus, G^* (kPa)	1.22	1.24	1.292	1.291	-5	-5
(6)	Phase Angle, δ (Degrees)	83.8	83.9	83.69	83.72	5	5
(7)	$G^* / \sin \delta$ (kPa)	1.23	1.25	1.299	1.299	-5	-5

Note: ±5 Best Possible Rating

AASHTO Accreditation Details*

Illinois Dept. of Transportation

David L. Lippert
Bureau of Mtls. and Phys. Res.
126 East Ash Street
Springfield, IL 62704-4766

Phone: (217) 782-2631
Fax: (217) 782-2572
lippertdl@dot.il.gov

Asphalt Cement / Cutback Asphalt - 7/15/1990
R28 T44 T48 T49 T50 T51 T53 T78 T79 T201 T202 T228 T240 T313 T315 T316 - D243

Emulsified Asphalt - 7/15/1990
T59 (Residue by Distillation, Residue by Evaporation, Particle Charge, Saybolt Viscosity, Demulsibility, Cement Mixing, Sieve Test, Storage Stability)

Hot Mix Asphalt - 7/15/1990
T30 T164 T166 T170 T209 T269 T283 T308 T312 - D1188

IDOT Testing Proficiency

Very confident that what we test is representative of the actual properties of the sample provided.

Illinois Asphalt Supplier's Certification Requirements

- Annual Quality Control Plan
- Annual Qualification Samples
  - Product acceptability
  - Test results correlation
- Have source primary lab AMRL inspected

Illinois Asphalt Supplier's Certification Requirements (cont.)

- Test and certify that each tank meets Illinois specifications
- Submit test results
- Maintain records of test results and bills of lading for 3 years

Supplier's annual notarized certification statement

" A routine procedure will be followed that makes a reasonable attempt to prevent the contamination of the material to be loaded into tank trucks or cars by the material previously carried."

Bills of Lading

Required to have specific information including the type of material last transported and ID number referencing supplier's test results.

Sampling

Samples for Evaluation

- Supplier’s process control samples
- Qualification samples
- Random split samples
- Retained samples – kept by supplier a minimum of 60 days
- Investigative samples

Investigative Samples

- At refinery or asphalt terminal – taken by supplier, witnessed by IDOT during unannounced inspections

- At jobsite – as part of QC/QA for Bituminous Concrete Mixtures Program

  2 samples per month per grade

  Witnessed by IDOT

Jobsite Samples

- Can be taken anywhere, anytime.
- Must be witnessed to ensure sample security and integrity.

AASHTO / ASTM

‘**Sampling** is equally as important as the testing, and the sampler shall use every precaution to obtain samples that will show the nature and condition of the materials which they represent’

Proper Sampling

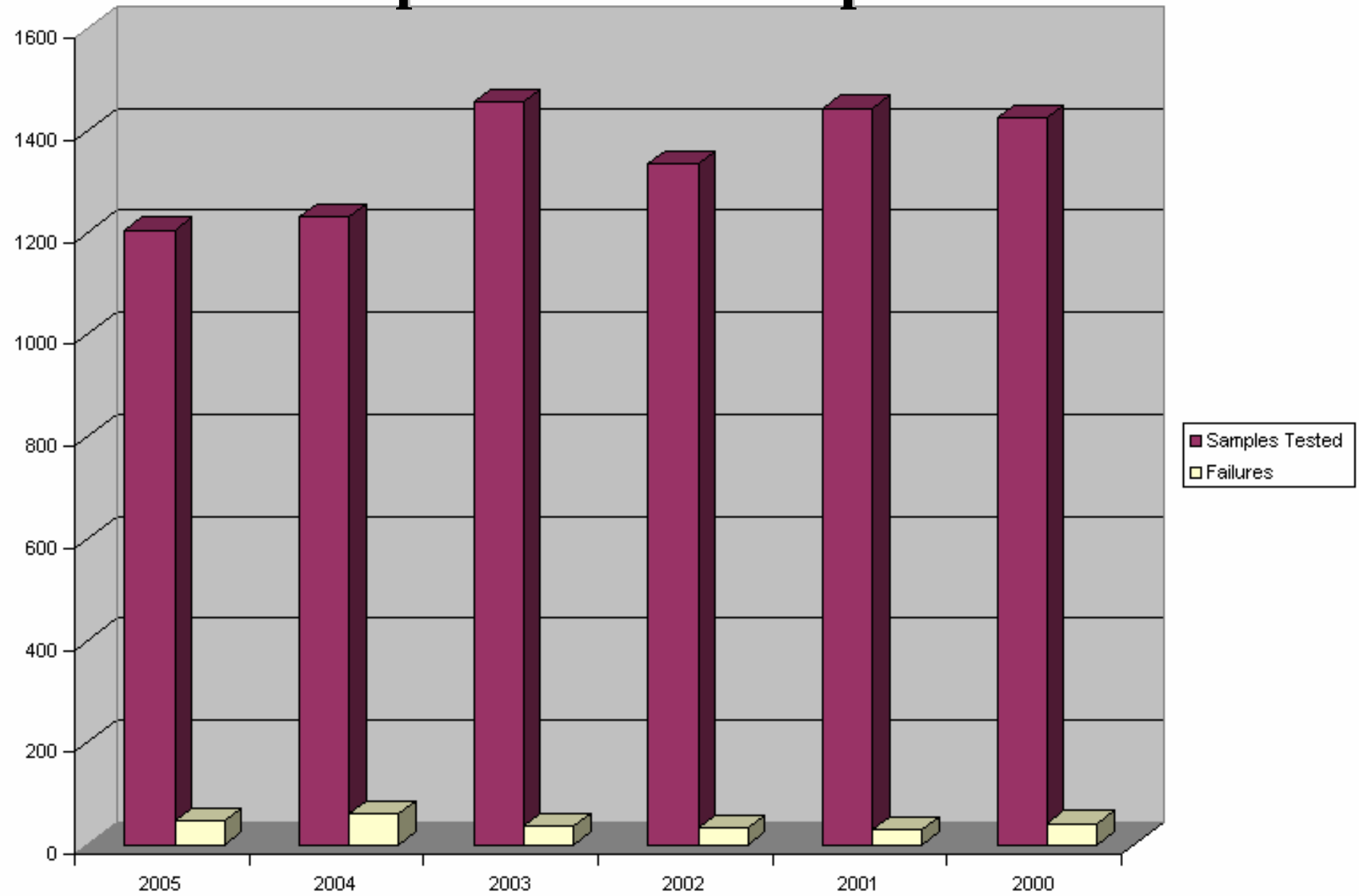
- Container
  - 1 quart friction-top can
  - new, clean and dry
- Representative Sample - Prior to Sampling draw and discard a **minimum 1 gallon** of material
- Seal sample container **immediately**

Proper Sampling (cont.)

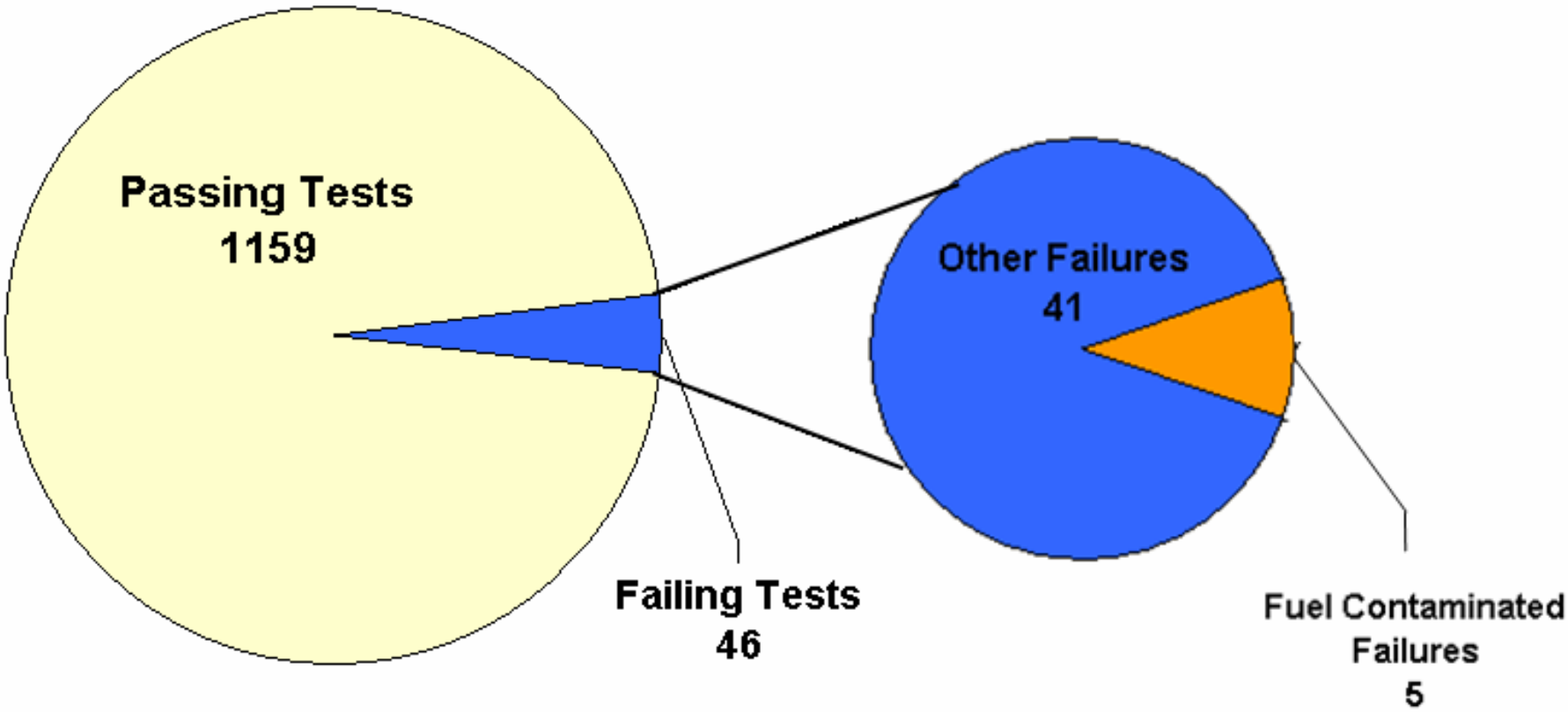
- Label Container Properly (not lid)
- Label Paperwork Thoroughly and Accurately
  - Sampled From
  - Bill of Lading Number
  - Date
- Submit samples in a reasonable time frame
- For more Information on Proper Sampling
  - AASHTO T 40 *Sampling Bituminous Materials*

Failing Tests

Samples Tested in Asphalt Lab



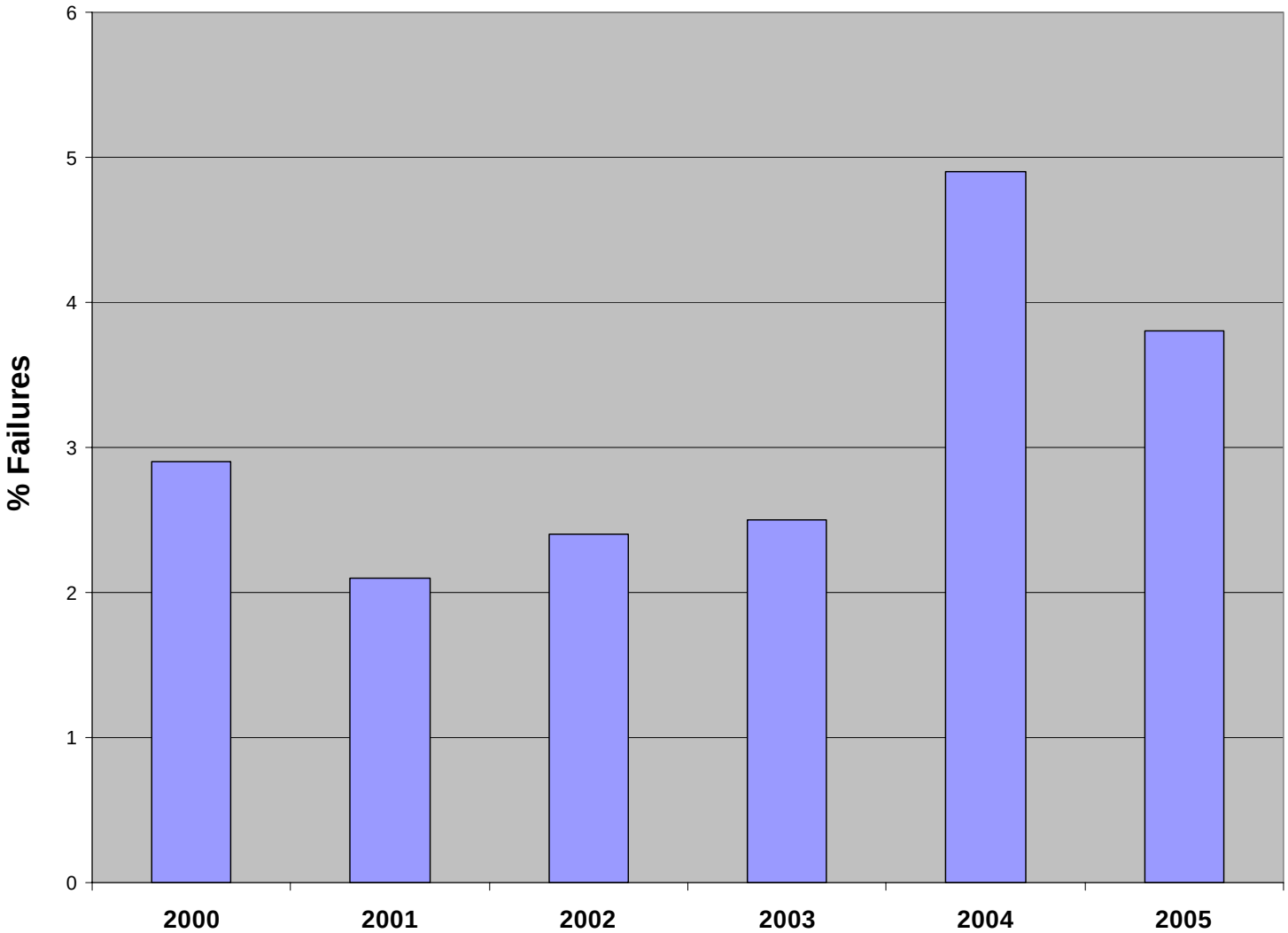
Binder Samples Tested in 2005



Failures

- Look at trends
- Resample if possible
- Check for contamination
- We don’t mill up pavement based on one low DSR test result
- Sample at asphalt terminal - More emphasis on samples from the binder supplier’s tanks

Failures

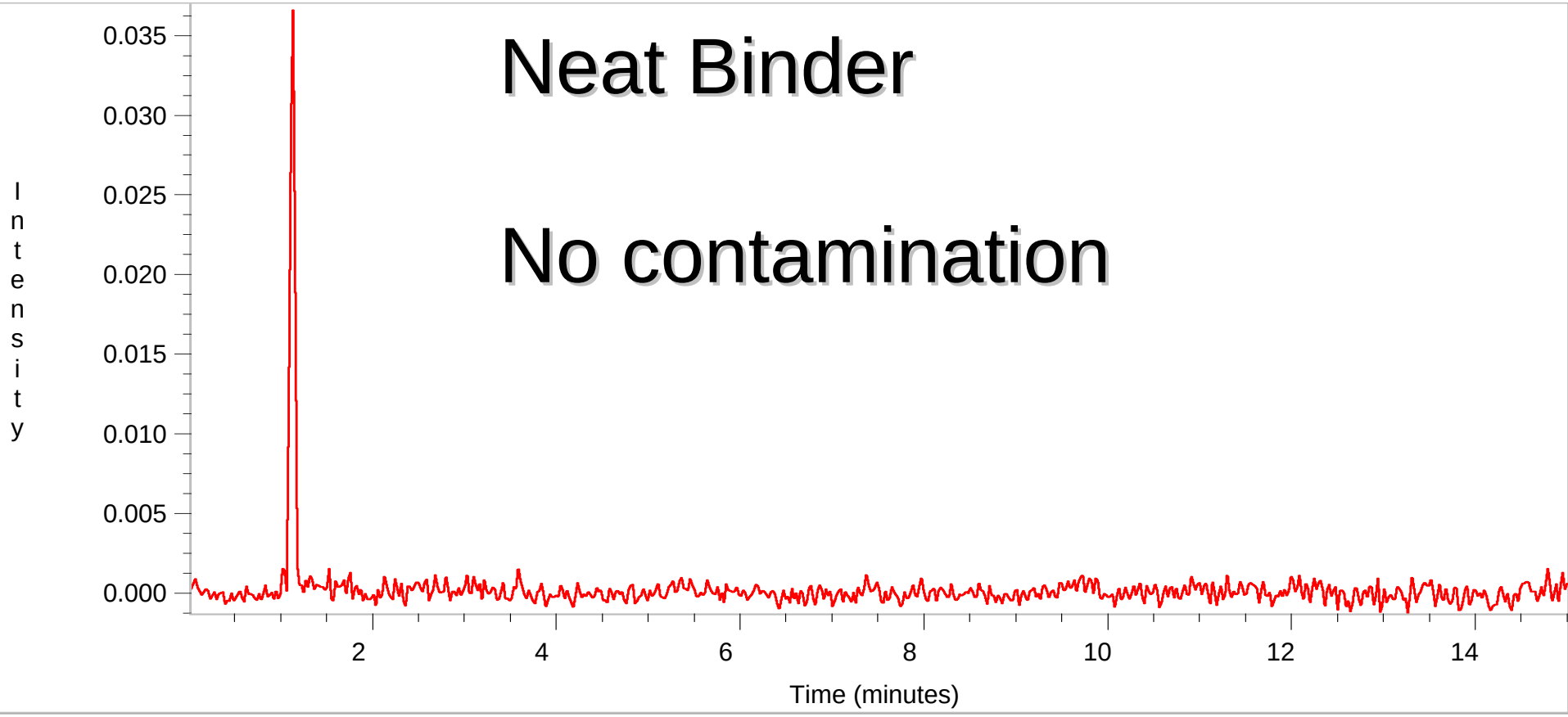



HMA Plant Sample
Binder Producer Sample

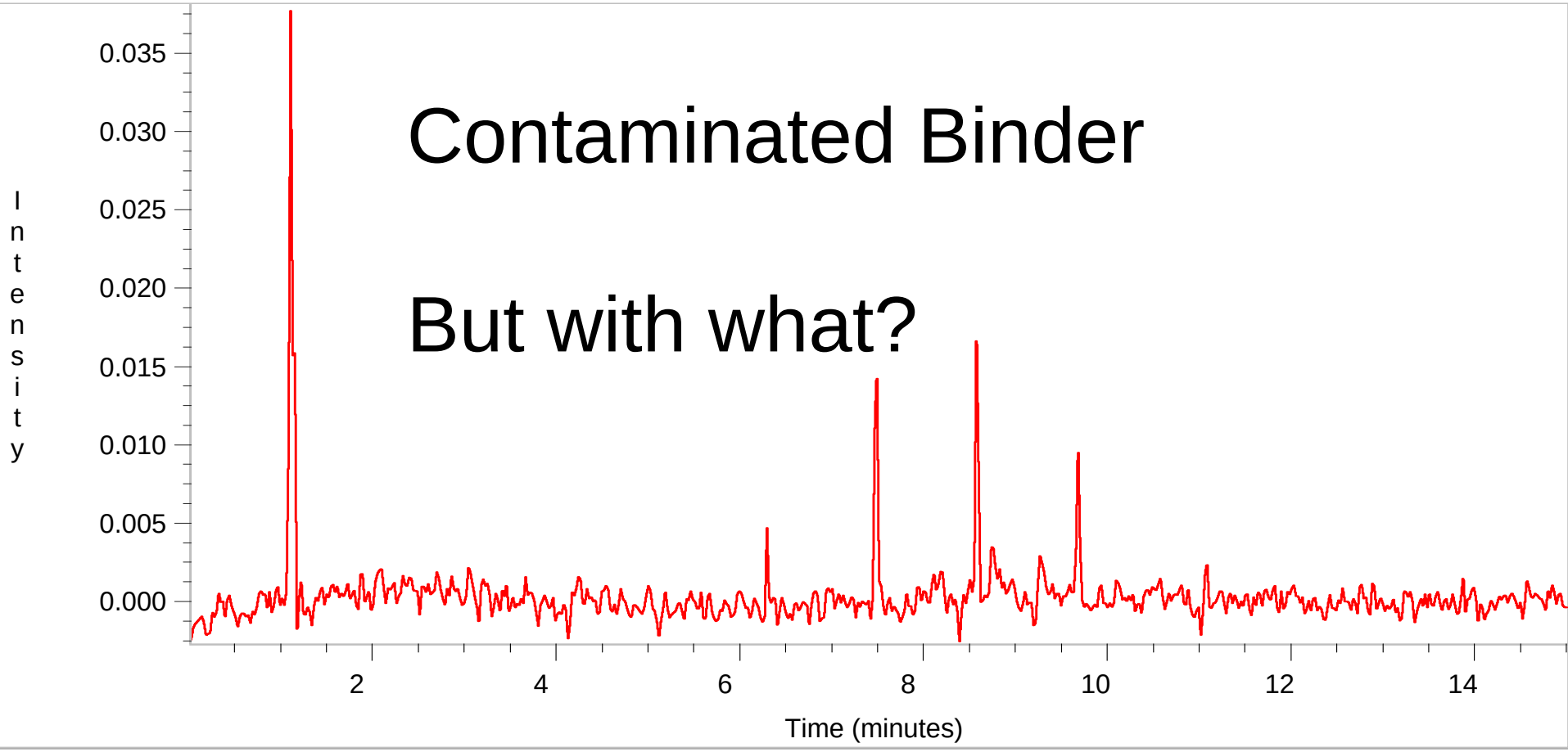
Gas Chromatograph

- Used to detect contamination with solvents, diesel or fuel oil

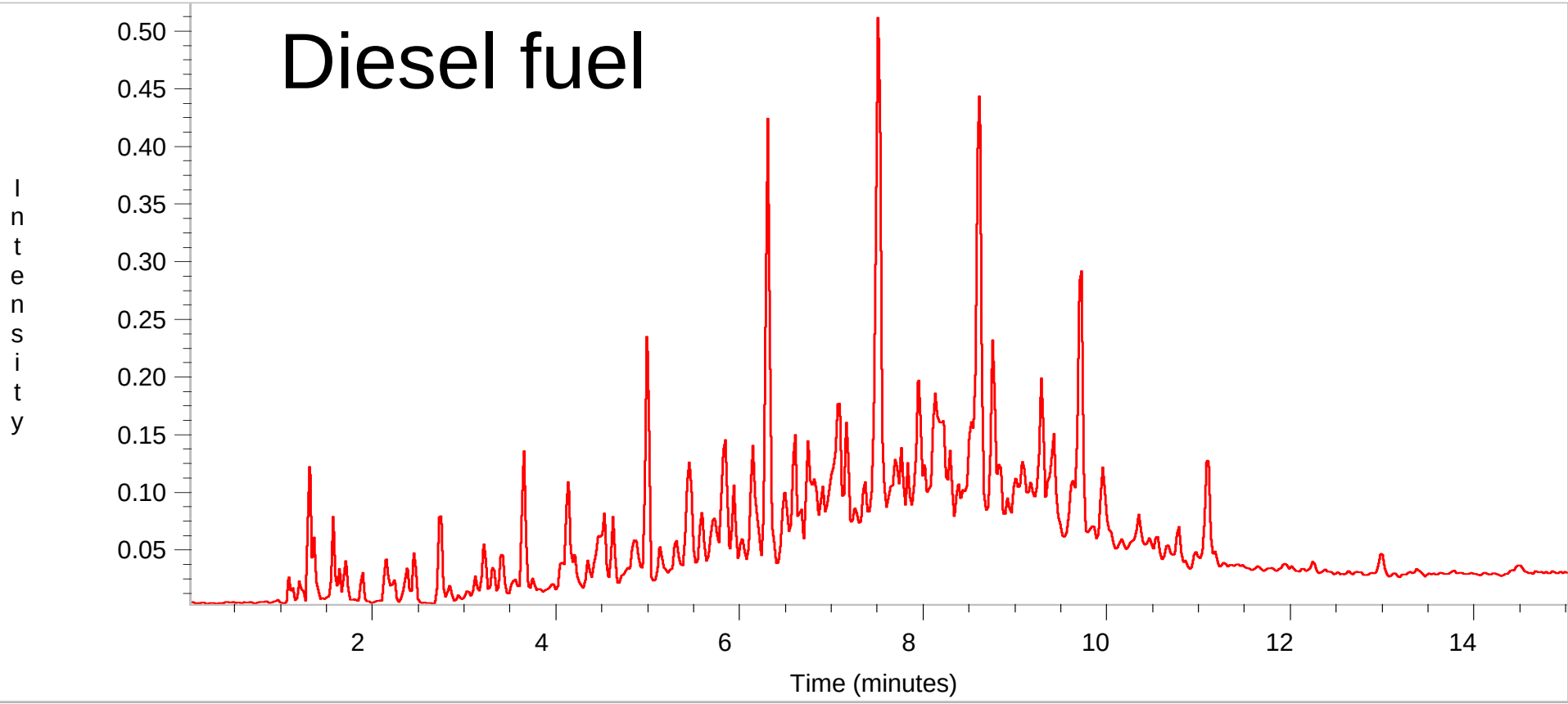

5890



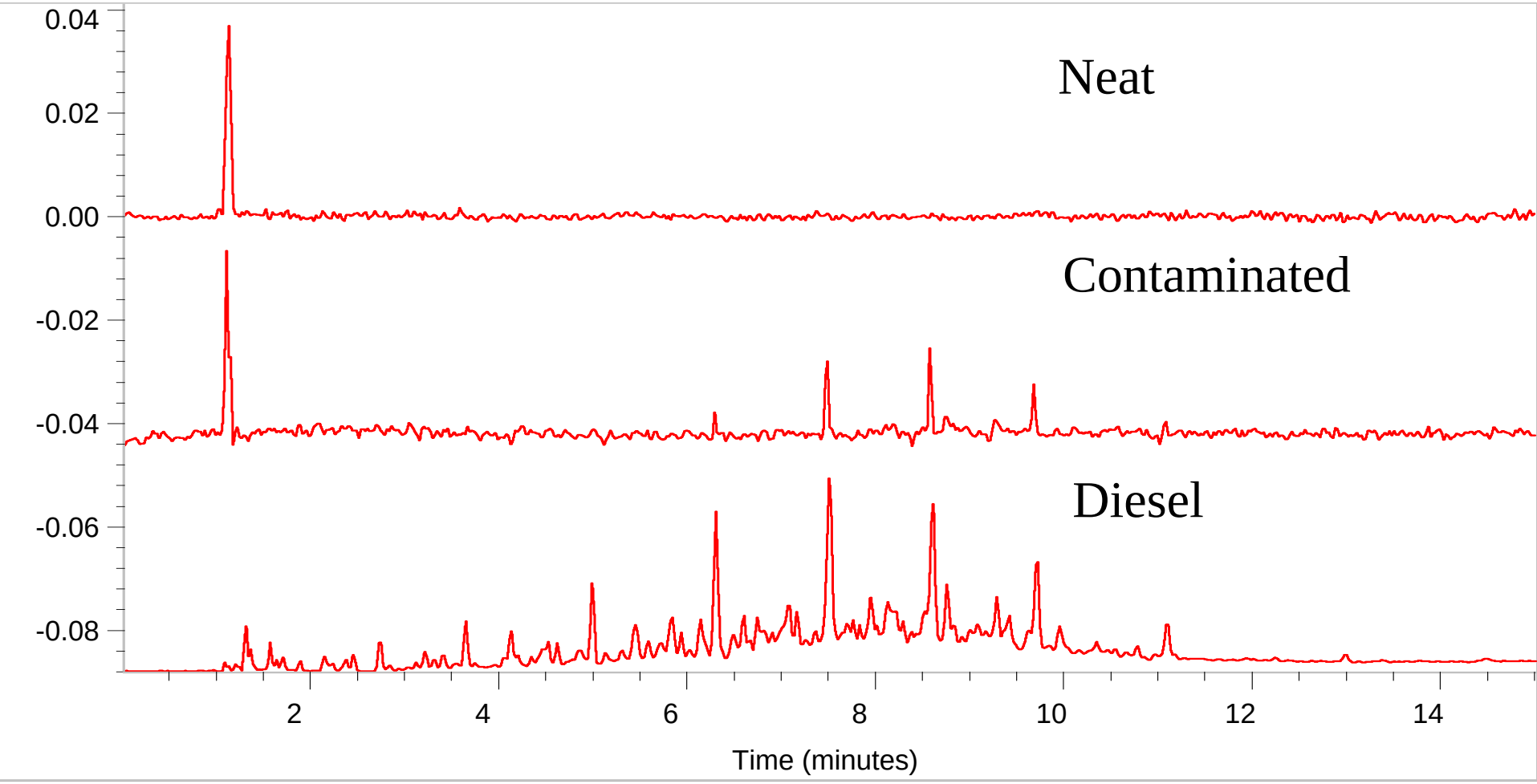
Gas Chromatograph



Gas Chromatograph



Gas Chromatograph



Gas Chromatograph

Factors Affecting Field Samples

- Borderline original results
- Contamination with binder in haul tank from last cartage
- Contamination with binder in HMA mix plant storage tank
- Contaminated in asphalt lines
- Fuel oil for flushing (be aware of line sags)

IDOT Special Provision for SUPERPAVE Mixes

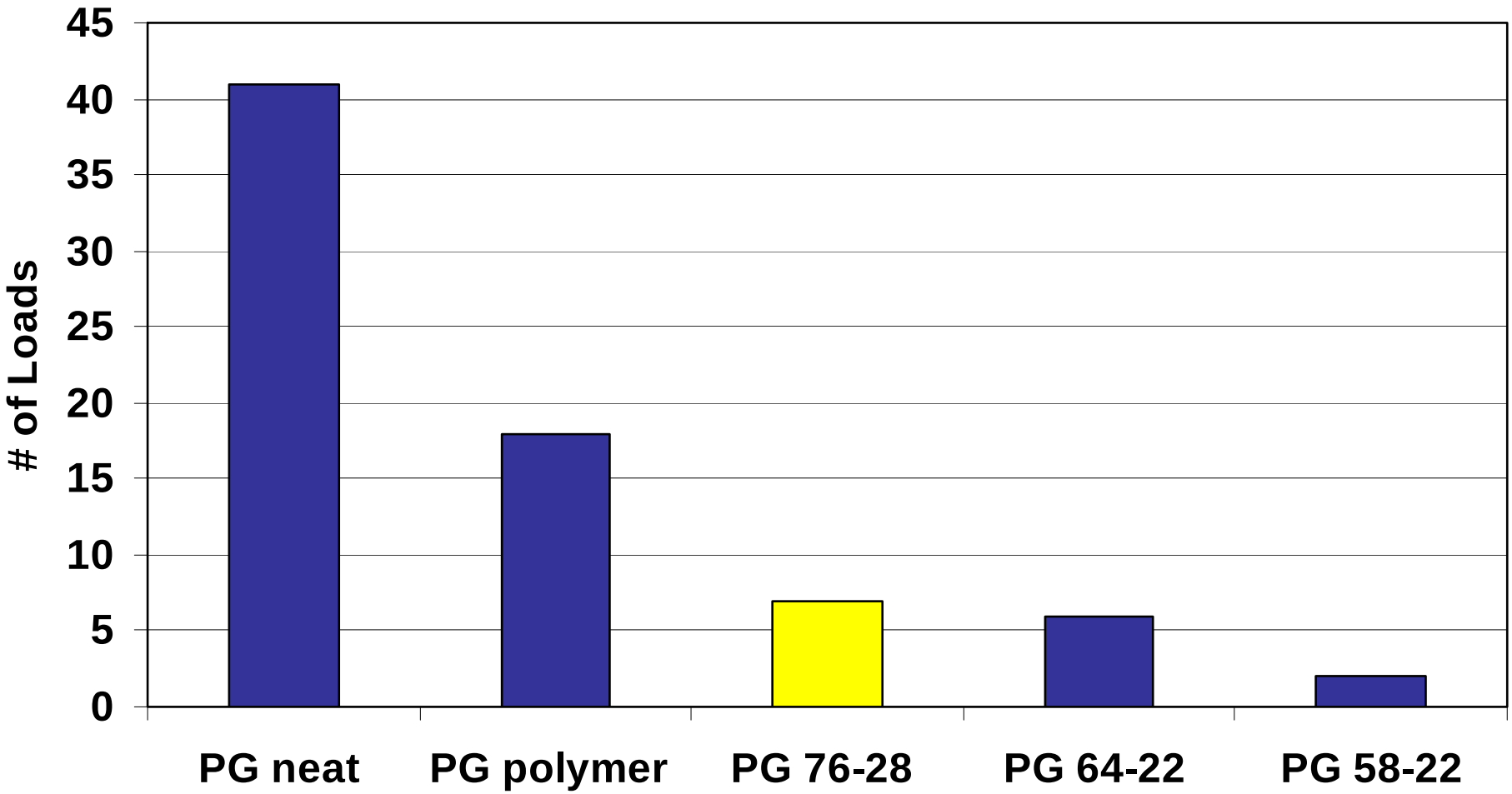
Requires:

> “Polymer modified asphalt binder shall be placed in an empty tank and shall not be blended with other asphalt binders.”

2005 Material Failures

- Sand Mix jobs requiring small quantities of Polymer Modified PG 76-28 transported in small loads
- 4 samples taken over a period of 10 days failed Original DSR
- Suspect contamination with previous load carried in transport truck or residual in plant tank

Last Load Carried



Actions

Suggested that to minimize possible contamination during small jobs, it may be a good idea to keep the materials in the tanker and directly feed the HMA plant.

Sampling Issues

- Sample Properly
- Make sure representative
- Label, store properly
- Send to lab in a timely manner

Material Handling Issues

- Borderline original results
- “clean” transport truck
- “clean” receiving tank
- Be aware of possible contamination

Summary

- Want to make sure taxpayer is getting what is specified “on the road”
- Binder sampling is throughout pipeline
- Testing properly and accurately on sample

Summary (cont.)

- What does sample represent?
- In Illinois, binder producer has responsibility of material until pumped off truck
- Marginally produced material is at risk of failure
- Possible HMA plant shut down

Abraham Lincoln Museum and Library

Springfield, Illinois