

To help laboratories comply with and use these analytical procedures, Restek has been active in following the state guidance. Based on our good knowledge of the methods, our experienced chemists have developed a list of the appropriate technical service tools and analytical products to achieve success with these methods. We offer quality chromatographic columns, analytical reference materials, and sample preparation products.

In this comprehensive product listing, you will find everything you need to quickly set up or reorder consumables for these methods. Please refer to our latest product catalog or call 800-356-1688 or 814-353-1300, ext. 3, for more information. Also, we will be happy to provide a quote on any custom consumable you may need!

## Regulatory and Analytical Methodology Contact Information

### UST CONTACT

Massachusetts Dept. of Public Safety  
Department of Fire Safety  
Underground Storage Tank Program  
One Ashburton Place, Room 1310  
Boston, MA 02108  
Phone: 617-727-3200  
Fax: 617-727-4390

### LUST CONTACT

Massachusetts Dept. of  
Environmental Protection  
One Winter Street  
Boston, MA 02108  
Phone: 617-292-5851  
Fax: 617-727-7467

Massachusetts' UST program maintains a web site at  
[http://www.dor.state.ma.us/ust/ust\\_home.htm](http://www.dor.state.ma.us/ust/ust_home.htm)

Massachusetts' LUST program maintains a web site at  
<http://www.magnet.state.ma.us/dep/bwsc/bwschome.htm>

# State of Massachusetts UST Monitoring

- ✓ Comprehensive products listing for the latest UST methods used by the State of Massachusetts.
- ✓ Products conveniently organized by method number.
- ✓ Easy method set-up and reorder of consumables, including:
  - Gas chromatography columns and accessories,
  - Analytical reference materials,
  - Sample preparation supplies,
  - Technical service.

To comply with federal Underground Storage Tank (UST) rules, the Massachusetts Department of Environmental Protection (MADEP) proposed a new toxicological approach to characterize petroleum-contaminated media in August 1994. Under this approach, the toxicity of petroleum-contaminated media is defined by (a) the individual concentrations of targeted petroleum constituents, such as BTEX and PAH compounds, and (b) the collective concentrations of (remaining) aliphatic and aromatic hydrocarbons, within defined carbon ranges.

To provide data to support and complement this new toxicological approach, MADEP issued two draft analytical methods in August 1995. The two methods were needed to cover the range of hydrocarbons of concern; volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH). In January 1998 MADEP published the final VPH and EPH methods for environmental analytical laboratories.

The VPH test method is a purge-and-trap GC procedure that detects hydrocarbons in the C5-C12 range. It can be used to separate the gasoline range organics (GRO) into three sub-fractions, C5-C8 aliphatic hydrocarbons, C9-C12 aliphatic hydrocarbons and C9-C10 aromatic hydrocarbons and 8 target compounds (BTEX, MTBE, and naphthalene).

The EPH method quantitates hydrocarbons heavier than nonane (C9). It separates the total petroleum hydrocarbons (THP) into three sub-fractions: C9-C18 aliphatic hydrocarbons, C19-C36 aliphatic hydrocarbons, and C11-C22 aromatic hydrocarbons and 17 polynuclear aromatic hydrocarbons (PAHs).

In addition, MADEP has been developing a new method for airborne petroleum hydrocarbons (APH) and is in the process of collecting public comments. We will offer appropriate analytical product and service for MADEP APH as soon as it is finalized.



**Ken Herwehe**

Analytical Reference Materials  
Product Marketing Manager  
814-353-1300, ext. 2127



**Joe Moodler**

Analytical Reference Materials  
Custom Standards Group Leader  
814-353-1300, ext. 2148

## Massachusetts

### Gas Chromatography Columns & Accessories

For these items, see Restek's Chromatography Products Catalog:

- Syringes
- Autosampler Vials
- Guard Columns
- Ferrules, Septa



### Recommended Gas Chromatography Columns

Rtx®-5, 30m x 0.25mm

Film Thickness	temp. limits	Cat. #
0.25µm	-60 to 330/350°C	10223
0.50µm	-60 to 330/350°C	10238
1.00µm	-60 to 320/340°C	10253

### Integra-Guard™ Columns

Guard and analytical column in one connectionless length.

\*Add the appropriate suffix number to analytical column catalog number.

ID	Length	Suffix #*
0.25mm	5m	-124
	10m	-127

### Syringes

Standard Micro-Liter Syringes for Agilent 7673 and 7683 Autosamplers

Size	Needle Gauge	6-pk.
10µL	23s	20169
10µL	23s-26s	24600

### Autosampler Vials

Crimp Top Vial Snap Seal™ Style (12 x 32mm, 11mm Crimp)

Description*	1,000-pk.
2.0mL Clear Glass Vial w/White Graduated Marking Spot	24384
2.0mL Amber Glass Vial w/White Graduated Marking Spot	24386

\*Marking spots are available on request in blue, green, rust or yellow.

### Aluminum Crimp Seals w/Septa

Description	1,000-pk.
Silver Seal, PTFE/Natural Rubber Septa	21175
Silver Seal, PTFE/Silicone Septa*	24360

\*PTFE/Silicone/PTFE available on request.

### Thermolite® Septa

Size	temp. limits	25-pk.	50-pk.	100-pk.
11mm (7/16")	to 340°C	20363	20364	20365

### Replacement Inlet Seals

Stainless Steel Inlet Seal for Single-Column Installation\*

Size	2-pk.	10-pk.
0.8mm ID	21315	21316

\*Equivalent to Agilent Part# 18740-20880.

### Inlet Liners

For Agilent GCs

Description	ID/OD & Length (mm)	ea.	5-pk.
Uniliner®*	4.0 ID, 6.3 OD x 78.5	20335	20336
Drilled Uniliner®	4.0 ID, 6.3 OD x 78.5	21054	21055
1mm Split**	1.0 ID, 6.3 OD x 78.5	20972	20973

\*Restek design improves performance over the original Agilent Liner.

\*\*Use this liner for increased sensitivity.

### Low Volume Injector for Agilent GCs

Description	kit.
Low-Volume Injector for Agilent Split/Splitless GC Inlets	21692

## Analytical Reference Materials:

### MA VPH (Jan. 1998)

To measure the collective concentrations of volatile aliphatic and aromatic petroleum hydrocarbons in water and soil. The method is based on a purge and trap, gas chromatography procedure with PID/FID in series for detection.

### Calibration Mixtures

### MA Volatile Petroleum Hydrocarbon (VPH) Standard

<i>n</i> -pentane (C5)	1,000µg/mL	naphthalene	1,000
<i>n</i> -nonane (C9)	1,000	toluene	1,500
benzene	500	1,2,4-trimethylbenzene	1,000
ethylbenzene	500	<i>m</i> -xylene	1,000
isooctane	1,500	<i>o</i> -xylene	1,000
2-methylpentane	1,500	<i>p</i> -xylene	1,000
methyl <i>tert</i> -butyl ether	1,500		

In P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30434	30434-510	
w/data pack	30434-500	30434-520	30534

### MA VPH Standard with Surrogate

<i>n</i> -pentane (C5)	1,000µg/mL	methyl <i>tert</i> -butyl ether	1,500
<i>n</i> -nonane (C9)	1,000	naphthalene	1,000
benzene	500	toluene	1,500
2,5-dibromotoluene (surrogate)	1,000	1,2,4-trimethylbenzene	1,000
ethylbenzene	500	<i>m</i> -xylene	1,000
isooctane	1,500	<i>o</i> -xylene	1,000
2-methylpentane	1,500	<i>p</i> -xylene	1,000

In P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30452	30452-510	
w/data pack	30452-500	30452-520	30552

### Surrogate Mixtures

### MA VPH Surrogate Standard

2,5-dibromotoluene

1,000µg/mL in P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30435	30435-510	
w/data pack	30435-500	30435-520	30535

10,000µg/mL in P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30453	30453-510	
w/data pack	30453-500	30453-520	30553

### Matrix Spike Mixtures

### MA VPH Matrix Spike Mix with Surrogate

<i>n</i> -pentane (C5)	ethylbenzene	toluene
<i>n</i> -nonane (C9)	isooctane	1,2,4-trimethylbenzene
benzene	2-methylpentane	<i>m</i> -xylene
2,5-dibromotoluene (surrogate)	methyl <i>tert</i> -butyl ether	<i>o</i> -xylene
	naphthalene	<i>p</i> -xylene

2,500µg/mL each in P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30454	30454-510	
w/data pack	30454-500	30454-520	30554

## Petroleum Reference Mixtures Pattern Recognition Mixtures

### Unleaded Gasoline Composite Standard

2,500µg/mL in P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30081	30081-510	
w/data pack	30081-500	30081-520	30181

50,000µg/mL in P&T methanol, 1mL/ampul

	Each	5-pk.	10-pk.
	30205	30205-510	
w/data pack	30205-500	30205-520	30305

50,000µg/mL in P&T methanol, 5mL/ampul

	Each	5-pk.	10-pk.
	30206	30206-510	
w/data pack	30206-500	30206-520	30306

## Analytical Reference Materials:

### MA EPH (Jan. 1998)

To measure the collective concentrations of volatile aliphatic and aromatic petroleum hydrocarbons in water and soil. The method is based on a solvent extraction, silica gel solid-phase extraction/fractionation (SPE), gas chromatography procedure with FID detection.

### Calibration Mixtures

#### MA EPH Aromatic Hydrocarbon Standard

acenaphthene	dibenzo(a,h)anthracene
acenaphthylene	fluoranthene
anthracene	fluorene
benzo(a)anthracene	indeno(1,2,3-cd)pyrene
benzo(a)pyrene	2-methylnaphthalene
benzo(b)fluoranthene	naphthalene
benzo(k)fluoranthene	phenanthrene
benzo(ghi)perylene	pyrene
chrysene	

1,000µg/mL each in methylene chloride, 1mL/ampul

	Each	5-pk.	10-pk.
	31458	31458-510	
w/data pack	31458-500	31458-520	31558

#### MA EPH Aliphatic Hydrocarbon Standard

<i>n</i> -nonane (C9)	<i>n</i> -eicosane (C20)
<i>n</i> -decane (C10)	<i>n</i> -docosane (C22)
<i>n</i> -dodecane (C12)	<i>n</i> -tetracosane (C24)
<i>n</i> -tetradecane (C14)	<i>n</i> -hexacosane (C26)
<i>n</i> -hexadecane (C16)	<i>n</i> -octacosane (C28)
<i>n</i> -octadecane (C18)	<i>n</i> -triacontane (C30)
<i>n</i> -nonadecane (C19)	<i>n</i> -hexatriacontane (C36)

1,000µg/mL each in hexane, 1mL/ampul

	Each	5-pk.	10-pk.
	31459	31459-510	
w/data pack	31459-500	31459-520	31559

## Analytical Reference Materials:

### MA EPH (cont.)

### Surrogate Spike Mixtures

#### MA EPH Surrogate Spike Mix

1-chlorooctadecane *o*-terphenyl  
4,000µg/mL each in acetone, 1mL/ampul

	Each	5-pk.	10-pk.
	31479	31479-510	
w/data pack	31479-500	31479-520	31579

#### MA Fractionation Surrogate Spike Mix

2-bromonaphthalene 2-fluorobiphenyl  
4,000µg/mL each in hexane, 1mL/ampul

	Each	5-pk.	10-pk.
	31480	31480-510	
w/data pack	31480-500	31480-520	31580

## Internal Standards

### 5- $\alpha$ -androstane

2,000µg/mL in methylene chloride, 1mL/ampul

	Each	5-pk.	10-pk.
	31065	31065-510	
w/data pack	31065-500	31065-520	31165

## Matrix Spike Mixtures

### MA EPH Matrix Spike Mix

<i>n</i> -nonane (C9)	acenaphthene
<i>n</i> -tetradecane (C14)	anthracene
<i>n</i> -nonadecane (C19)	chrysene
<i>n</i> -eicosane (C20)	naphthalene
<i>n</i> -octacosane (C28)	pyrene

250µg/mL each in acetone, 1mL/ampul

	Each	5-pk.	10-pk.
	31460	31460-510	
w/data pack	31460-500	31460-520	31560

## Fractionation Check Mixtures

### MA Fractionation Check Mix

PAHs:	naphthalene	Hydrocarbons:
acenaphthene	phenanthrene	<i>n</i> -nonane (C9)
acenaphthylene	pyrene	<i>n</i> -decane (C10)
anthracene		<i>n</i> -dodecane (C12)
benzo(a)anthracene		<i>n</i> -tetradecane (C14)
benzo(a)pyrene		<i>n</i> -hexadecane (C16)
benzo(b)fluoranthene		<i>n</i> -octadecane (C18)
benzo(k)fluoranthene		<i>n</i> -nonadecane (C19)
benzo(ghi)perylene		<i>n</i> -eicosane (C20)
chrysene		<i>n</i> -docosane (C22)
dibenzo(a,h)anthracene		<i>n</i> -tetracosane (C24)
fluoranthene		<i>n</i> -hexacosane (C26)
fluorene		<i>n</i> -octacosane (C28)
indeno(1,2,3-cd)pyrene		<i>n</i> -triacontane (C30)
2-methylnaphthalene		<i>n</i> -hexatriacontane (C36)

25µg/mL each in hexane, 1mL/ampul

	Each	5-pk.	10-pk.
	31481	31481-510	
w/data pack	31481-500	31481-520	31581

## Petroleum Reference Mixtures Pattern Recognition Mixtures

### Diesel Fuel #2 Composite Standard

5,000µg/mL in methylene chloride, 1mL/ampul

	Each	5-pk.	10-pk.
	31093	31093-510	
w/data pack	31093-500	31093-520	31193

50,000µg/mL in methylene chloride, 1mL/ampul

	Each	5-pk.	10-pk.
	31258	31258-510	
w/data pack	31258-500	31258-520	31358

50,000µg/mL in methylene chloride, 5mL/ampul

	Each	5-pk.	10-pk.
	31259	31259-510	
w/data pack	31259-500	31259-520	31359

### Other Certified Fuel Standards

Save time—use these standards to perform calibration checks for TPH and aromatics in a single analysis.

### Certified BTEX in Unleaded Gas Composite Standard

<b>Certified for:</b>	toluene
benzene	<i>m</i> -xylene
ethylbenzene	<i>o</i> -xylene
isopropyl benzene	<i>p</i> -xylene
methyl <i>tert</i> -butyl ether	
naphthalene	

5,500ppm gasoline in P&T methanol, certified components listed, 1mL/ampul

	Each	5-pk.	10-pk.
	30237	30237-510	
w/data pack	30237-500	30237-520	30337

### Certified Aromatics in Gasoline

<b>Certified for:</b>	<i>n</i> -propylbenzene
benzene	toluene
ethylbenzene	1,2,3-trimethylbenzene
<i>m</i> -ethyltoluene	1,2,4-trimethylbenzene
<i>o</i> -ethyltoluene	1,3,5-trimethylbenzene
<i>p</i> -ethyltoluene	<i>m</i> -xylene
isopropylbenzene	<i>o</i> -xylene
methyl <i>tert</i> -butyl ether	<i>p</i> -xylene
naphthalene	

5,500ppm gasoline in P&T methanol, certified components listed, 1mL/ampul

	Each	5-pk.	10-pk.
	30485	30485-510	
w/data pack	30485-500	30485-520	30585

### Certified PAHs in Diesel #2

#### Certified PAHs and Typical Certified Conc. (ppm)

acenaphthene	7	1-methylnaphthalene	110
acenaphthylene	1	2-methylnaphthalene	60
anthracene	13	naphthalene	30
fluorene	6	phenanthrene	13

50,000ppm diesel #2 in methylene chloride,  
PAH concentrations listed above, 1mL/ampul

	Each	5-pk.	10-pk.
	31673	31673-510	
w/data pack	31673-500	31673-520	31773

## EPA Methods

### for Massachusetts UST Applications

To complement the MA-EPH and MA-VPH methods, analyses for individual target compounds, such as benzene, toluene, naphthalene, and other aromatics, are included in EPA Methods 8021, 8260 or 8270. Please request our EPA UST *Fast Facts* (Lit. Cat. #59397) for complete product listings.

### Fuel and Certified Fuel Standards

We offer a wide variety of composite and single-source fuel standards to meet your needs. Please see our general chromatography product catalog for detailed listings of the following:

Aviation Gasoline	JP-4 Military Fuel
Jet Fuel A	JP-5 Military Fuel
Fuel Oil #4	JP-8 Military Fuel
Fuel Oil #5	Mineral Spirits
Fuel Oil #6	

### Certified PAHs in Motor Oil

*coming soon!*

## 50 State UST Methods

## Latest Revisions for All 50 States Available Soon!

- ✓ Detailed product listings for each state in convenient *Fast Facts* format:
  - analytical columns
  - reference materials
  - sample preparation materials
  - other consumables
- ✓ Completely updated with the latest method revisions.
- ✓ Allows easy ordering and method setup.

Call Technical Service at 800-356-1688 or 814-353-1300, ext. 4, for more information, or contact your local Restek representative.





## Custom Reference Material Request Form

**Domestic Customers**  
**FAX#:** (814) 355-2895  
**email:** standards@restekcorp.com

**International Customers**  
**Contact Your Local**  
**Restek Representative.**

**Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Company/Location:** \_\_\_\_\_

**Phone #:** \_\_\_\_\_ **FAX #:** \_\_\_\_\_

**E-mail:** \_\_\_\_\_

**Take these eight steps to create the right solution:**

- 1. Mixture Description: \_\_\_\_\_
- 2. Solvent: \_\_\_\_\_ **3. No. of components:** \_\_\_\_\_
- 4. Volume (select): 1mL, 2mL, 5mL, 10mL, or other mL \_\_\_\_\_
- 5. Quantity: No. of units \_\_\_\_\_

**6. Select testing and documentation that best meets your requirements:**

- Gravimetric Documentation: Lot Sheet with balance printout attached.
- Qualitative Documentation: Certificate of Composition, Chromatogram, and Gravimetric Documentation.
- Quantitative Documentation: Certificate of Analysis and Data Pack.

7. Compound(s): (list or attach sheet)		Concentration:	8. Concentration Units
1.			<input type="radio"/> mg/mL <input type="radio"/> µg/mL <input type="radio"/> ng/mL <input type="radio"/> vol./vol.% <input type="radio"/> wt./wt.% <input type="radio"/> other _____
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

ALL mixtures are produced in accordance with our ISO 9001 registration. Analytical balances are calibrated daily at seven mass levels using NIST-traceable weights. ALL raw materials used are a minimum of 97% pure unless otherwise specified.

**on-line:** <http://www.restekcorp.com/stdreq.htm>

# Can't locate the exact mixture you need?

With **thousands** of compounds in our inventory,  
we can make any mixture  
to your specifications.

*To order, use the convenient custom  
reference material request form inside.*

visit us online at  
[www.restekcorp.com](http://www.restekcorp.com)

For more information,  
Call 800-356-1688 or 814-353-1300 or  
Contact Your Local Restek Representative

**USA:** 110 Benner Circle, Bellefonte, PA 16823 • phone: (800) 356-1688 • fax: (814) 353-1309

**Germany:** Schaberweg 23, 61348 Bad Homburg • phone: (49) 06172 2797 0 • fax: (49) 06172 2797 77

**France:** 1, rue Montespan, 91024 Evry • phone: 01 60 78 32 10 • fax: 01 60 78 70 90

**Ireland:** 8 Baronscourt Lane, Belfast, BT8 8RR, Northern Ireland • phone: (44) 28 9081 4576 • fax: (44) 28 9081 4576

**Thames Restek UK Ltd.:** Fairacres Industrial Centre, Dedworth Road, Windsor, Berkshire • SL4 4LE  
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