

# State of Alaska UST Monitoring

## Contact Information

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Alaska Department of Environmental Conservation (ADEC) has established guidelines defining gasoline range organics (GRO), diesel range organics (DRO), and residual range organics (RRO) from gross organic measurements by gas chromatography. ADEC regulations indicate which aromatic and aliphatic products and indicator compounds are to be tested for each petroleum range. The analyst must use Alaska Series Methods AK 101, AK 102, AK103<sup>1</sup>, AK101AA, AK102AA, and AK103AA<sup>2</sup> and, for the various indicator compounds, methods from US EPA *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*. The Alaska UST procedural manual indicates which products are to be tested for each petroleum range (see [http://www.state.ak.us/dec/dspar/csites/guidance\\_cs.htm](http://www.state.ak.us/dec/dspar/csites/guidance_cs.htm)).

AK101 is used to measure concentrations of gasoline range organics (GRO) in water and soil. GROs correspond to an alkane range from n-hexane (C6) to the beginning of integration of the n-decane (C10) peak, and a boiling point range of 60°C to 170°C. The analytical method is GC/FID/PID, as specified in EPA Method 602 (water) or 8021B (solids). AK101AA is used for extracting, fractionating, and quantifying aromatic and aliphatic compounds in the gasoline range. The method is GC/FID/PID, as specified in EPA SW-846 methods 8015 and 8020B. Compounds are to be quantified as total area, as in Method AK101. BTEX indicator compounds are measured by GC/PID, because aromatic hydrocarbons must be individually identified and quantified. The method quantifies C6, C7, C8, and C9 alkyl benzenes as aromatics.

AK 102 is used to measure concentrations of diesel range organics (DRO) in water and soil. DROs correspond to an alkane range from n-decane (C10) to the beginning of integration of the n-pentacosane (C25) peak, and a boiling point range of 170°C to 400°C. This range includes kerosene, several types of jet fuel, several types of diesel fuel, and several light heating oils. The analytical method is GC/FID, as specified in EPA Method 8000 in SW-8461, American Petroleum Institute (API) consensus method Method for the Determination of Diesel Range Organics revision 2, 2/5/95, and Iowa Method OA-2.4. Quantification is based on direct comparison of resolved and unresolved peaks from C10 to the beginning of C25 against a C10-C25 calibration standard. PAH indicator compounds are assayed and quantified by Method 8100 in SW-846.

AK 103 is used to measure concentrations of residual range organics (RRO) in soil. RROs correspond to an alkane range from n-pentacosane (C25) to the beginning of integration of the n-hexatriacontane (C36) peak, and a boiling point range of 400°C to 500°C. This range includes asphalt, mid-range boiling point products such as diesel fuels, and Bunker C. The analytical method is GC/FID as specified in methods 8000 and 8100 in SW-846, American Petroleum Institute (API) consensus method Method for the Determination of Petroleum Hydrocarbons 2/3/92, Washington Hydrocarbon Identification Method WTPH-HCID, Iowa Method OA-2, and Wisconsin Department of Natural Resources Modified DRO - Method for Determining Diesel Range Organics.

1. AK101, AK102, AK103 revised April 8, 2002.
2. Aromatic/aliphatic methods are under review by the state at the time of publication (July, 2003).

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## 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 continuous 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

## AK101/AK101AA

Method for Determination of Aromatic and Aliphatic Hydrocarbons in Gasoline Range Organics (GRO)

## Calibration Mixes/Composite Standards

### Retention Time Marker Standard

*n*-hexane (C6) *n*-decane (C10) *n*-dodecane (C12) *n*-hexacosane (C25) *n*-hexatriacontane (C36)

new!

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

Each	5-pk.	10-pk.
31819	31819-510	—
<b>w/data pack</b>		
31819-500	31819-520	31919

### Alternate Boiling Point/Carbon Number

#### Distribution Marker Stock Standard (9 components)

*n*-hexane (C6) *n*-octane (C8) *n*-decane (C10) *n*-dodecane (C12) *n*-hexadecane (C16) *n*-heneicosane (C21) *n*-octacosane (C28) *n*-pentatriacontane (C35) *n*-hexatriacontane (C36)

200µg/mL each in pentane, 1mL/ampul

Each	5-pk.	10-pk.
31639	31639-510	—
<b>w/data pack</b>		
31639-500	31639-520	31739

### WA VPH Marker Standard (9 components)

*n*-pentane (C5) *n*-hexane (C6) *n*-octane (C8) *n*-decane (C10) *n*-dodecane (C12) 1-methylnaphthalene naphthalene toluene 1,2,3-trimethylbenzene

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

Each	5-pk.	10-pk.
30450	30450-510	—
<b>w/data pack</b>		
30450-500	30450-520	30550

### Alaska UST Method AK101AA, Ver. 3-1-99 (14 components)

benzene ethylbenzene 1-ethyl-2-methylbenzene 1-ethyl-3-methylbenzene 1-ethyl-4-methylbenzene isopropylbenzene *n*-propylbenzene toluene 1,2,3-trimethylbenzene 1,2,4-trimethylbenzene 1,3,5-trimethylbenzene *m*-xylene *o*-xylene *p*-xylene

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

Each	5-pk.	10-pk.
30461	30461-510	—
<b>w/data pack</b>		
30461-500	30461-520	30561

### Certified BTEX in Unleaded Gas Composite Standard

benzene\* ethylbenzene\* isopropyl benzene\* methyl *tert*-butyl ether\* naphthalene\* toluene\* *m*-xylene\* *o*-xylene\* *p*-xylene\*

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

Each	5-pk.	10-pk.
30237	30237-510	—
<b>w/data pack</b>		
30237-500	30237-520	30337

\*Concentration varies lot to lot. See Certificate of Analysis for certified concentrations. See <http://www.restekcorp.com> for current certificate of analysis.

## Certified Aromatics in Gasoline (16 components)

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

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

Each	5-pk.	10-pk.
30485	30485-510	—
<b>w/data pack</b>		
30485-500	30485-520	30585

\*Concentration varies lot to lot. See Certificate of Analysis for certified concentrations. See <http://www.restekcorp.com> for current certificate of analysis.

## Unleaded Gasoline Composite Standard

2,500µg/mL in P&T methanol, 1mL/ampul

Each	5-pk.	10-pk.
30081	30081-510	—
<b>w/data pack</b>		
30081-500	30081-520	30181

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

Each	5-pk.	10-pk.
30205	30205-510	—
<b>w/data pack</b>		
30205-500	30205-520	30305

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

Each	5-pk.	10-pk.
30206	30206-510	—
<b>w/data pack</b>		
30206-500	30206-520	30306

## Surrogates and Internal Standards

### 1-Chloro-4-fluorobenzene Mix

2,500µg/mL in P&T methanol, 1mL/ampul

Each	5-pk.	10-pk.
30066	30066-510	—
<b>w/data pack</b>		
30066-500	30066-520	30166

### 4-Bromofluorobenzene Mix

2,000µg/mL in P&T methanol, 1mL/ampul

Each	5-pk.	10-pk.
30026	30026-510	—
<b>w/data pack</b>		
30026-500	30026-520	30126

### α,α,α-Trifluorotoluene

2,000µg/mL in P&T methanol, 1mL/ampul

Each	5-pk.	10-pk.
30048	30048-510	—
<b>w/data pack</b>		
30048-500	30048-520	30148

2,500µg/mL in P&T methanol, 1mL/ampul

Each	5-pk.	10-pk.
30068	30068-510	—
<b>w/data pack</b>		
30068-500	30068-520	30168

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

Each	5-pk.	10-pk.
30083	30083-510	—
<b>w/data pack</b>		
30083-500	30083-520	30183

## AK102/AK102AA

Method for Determination of Aromatic and Aliphatic Hydrocarbons in Diesel Range Organics (DRO)

## Calibration Mixes/Composite Standards

**Retention Time Marker Standard** (cat.# 31819)

**Alternate Boiling Point/Carbon Number**

**Distribution Marker Stock Standard** (cat.# 31639)

See page 2.

## Certified PAHs in Diesel (7 components)

**Certified PAHs**      **Typical Certified Conc. (ppm)**

acenaphthene	20*	*Concentration varies lot to lot. See Certificate of Analysis for certified concentrations. See <a href="http://www.restekcorp.com">http://www.restekcorp.com</a> for current certificate of analysis.
acenaphthylene	14*	
fluorene	32*	
1-methylnaphthalene	269*	
2-methylnaphthalene	180*	
naphthalene	90*	
phenanthrene	47*	

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

Each	5-pk.	10-pk.
31673	31673-510	—
<b>w/data pack</b>		
31673-500	31673-520	31773

## DRO Mix (Tennessee/Mississippi) (16 components)

<i>n</i> -decane (C10)	<i>n</i> -hexadecane (C16)	<i>n</i> -docosane (C22)
<i>n</i> -undecane (C11)	<i>n</i> -heptadecane (C17)	<i>n</i> -tricosane (C23)
<i>n</i> -dodecane (C12)	<i>n</i> -octadecane (C18)	<i>n</i> -tetracosane (C24)
<i>n</i> -tridecane (C13)	<i>n</i> -nonadecane (C19)	<i>n</i> -pentacosane (C25)
<i>n</i> -tetradecane (C14)	<i>n</i> -eicosane (C20)	
<i>n</i> -pentadecane (C15)	<i>n</i> -heneicosane (C21)	

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

Each	5-pk.	10-pk.
31214	31214-510	—
<b>w/data pack</b>		
31214-500	31214-520	31314

## WA EPH Aromatic Hydrocarbon Standard (18 components)

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

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

Each	5-pk.	10-pk.
31469	31469-510	—
<b>w/data pack</b>		
31469-500	31469-520	31569

## WA EPH Matrix Spike Mix (10 components)

<i>n</i> -decane (C10)	acenaphthene	naphthalene
<i>n</i> -dodecane (C12)	anthracene	pyrene
<i>n</i> -hexadecane (C16)	benzo(a)pyrene	
<i>n</i> -heneicosane (C21)	benzo(ghi)perylene	

250µg/mL each in acetone, 1mL/ampul

Each	5-pk.	10-pk.
31490	31490-510	—
<b>w/data pack</b>		
31490-500	31490-520	31590

## Diesel Range Calibration Standard (DCS)

diesel #1-diesel #2 (1:1)

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

Each	5-pk.	10-pk.
31820	31820-510	—
<b>w/data pack</b>		
31820-500	31820-520	31920

**new!**

## Diesel Fuel #2 Composite Standard

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

Each	5-pk.	10-pk.
31093	31093-510	—
<b>w/data pack</b>		
31093-500	31093-520	31193

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

Each	5-pk.	10-pk.
31258	31258-510	—
<b>w/data pack</b>		
31258-500	31258-520	31358

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

Each	5-pk.	10-pk.
31259	31259-510	—
<b>w/data pack</b>		
31259-500	31259-520	31359

## Kerosene Fuel Composite Standard

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

Each	5-pk.	10-pk.
31094	31094-510	—
<b>w/data pack</b>		
31094-500	31094-520	31194

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

Each	5-pk.	10-pk.
31256	31256-510	—
<b>w/data pack</b>		
31256-500	31256-520	31356

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

Each	5-pk.	10-pk.
31257	31257-510	—
<b>w/data pack</b>		
31257-500	31257-520	31357

## Aviation Gas Standard

100-octane low-lead fuel currently used in piston-type aircraft.

2,500µg/mL in P&T methanol, 1mL/ampul

Each	5-pk.	10-pk.
30094	30094-510	—
<b>w/data pack</b>		
30094-500	30094-520	30194

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

Each	5-pk.	10-pk.
30207	30207-510	—
<b>w/data pack</b>		
30207-500	30207-520	30307

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

Each	5-pk.	10-pk.
30208	30208-510	—
<b>w/data pack</b>		
30208-500	30208-520	30308

## Jet Fuel A Standard

commercial jet fuel A

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

Each	5-pk.	10-pk.
31215	31215-510	—
<b>w/data pack</b>		
31215-500	31215-520	31315

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

Each	5-pk.	10-pk.
31242	31242-510	—
<b>w/data pack</b>		
31242-500	31242-520	31342

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

Each	5-pk.	10-pk.
31243	31243-510	—
<b>w/data pack</b>		
31243-500	31243-520	31343

## JP-4 Military Fuel Standard

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

Each	5-pk.	10-pk.
31219	31219-510	—
<b>w/data pack</b>		
31219-500	31219-520	31319

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

Each	5-pk.	10-pk.
31250	31250-510	—
<b>w/data pack</b>		
31250-500	31250-520	31350

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

Each	5-pk.	10-pk.
31251	31251-510	—
<b>w/data pack</b>		
31251-500	31251-520	31351

## JP-5 Military Fuel Standard

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

Each	5-pk.	10-pk.
31220	31220-510	—
<b>w/data pack</b>		
31220-500	31220-520	31320

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

Each	5-pk.	10-pk.
31252	31252-510	—
<b>w/data pack</b>		
31252-500	31252-520	31352

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

Each	5-pk.	10-pk.
31253	31253-510	—
<b>w/data pack</b>		
31253-500	31253-520	31353

## JP-8 Military Fuel Standard

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

Each	5-pk.	10-pk.
31262	31262-510	—
<b>w/data pack</b>		
31262-500	31262-520	31362

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

Each	5-pk.	10-pk.
31254	31254-510	—
<b>w/data pack</b>		
31254-500	31254-520	31354

## Surrogates and Internal Standards

### *o*-Terphenyl Standard

10,000µg/mL in methylene chloride, 1mL/ampul

Each	5-pk.	10-pk.
31097	31097-510	—
<b>w/data pack</b>		
31097-500	31097-520	31197

### Surrogate Standard Mixture

squalane *o*-terphenyl tetrahydronaphthol

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

Each	5-pk.	10-pk.
31638	31638-510	—
<b>w/data pack</b>		
31638-500	31638-520	31738

### 5- $\alpha$ -androstane

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

Each	5-pk.	10-pk.
31065	31065-510	—
<b>w/data pack</b>		
31065-500	31065-520	31165

# AK103/AK103AA

Method for Determination of Aromatic and Aliphatic Hydrocarbons in Residual Range Organics (RRO)

## Calibration Mixes/Composite Standards

**Retention Time Marker Standard** (cat.# 31819)

**Alternate Boiling Point/Carbon Number**

**Distribution Marker Stock Standard** (cat.# 31639)

See page 2.

## Residual Range Calibration Standard (RCS)

SAE30-SAE40(1:1)

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

new!

Each	5-pk.	10-pk.
31817	31817-510	—
<b>w/data pack</b>		
31817-500	31817-520	31917

## Residual Range Calibration Verification Standard (CVS)

SAE30-SAE40(1:1)

25,000µg/mL in methylene chloride, 1mL/ampul

new!

Each	5-pk.	10-pk.
31818	31818-510	—
<b>w/data pack</b>		
31818-500	31818-520	31918

## Motor Oil Composite Standard

This composite solution is prepared from an equal volume blend of the following types of motor oil: 5W30, 10W30, 10W40, and 20W50. After blending, a precisely weighed amount of the composite is added to a volumetric flask to produce the standard.

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

Each	5-pk.	10-pk.
31464	31464-510	—
<b>w/data pack</b>		
31464-500	31464-520	31564

## Fuel Oil #4 Standard

Fuel Oil #4 is typically used in limited applications in which the fuel cannot be preheated prior to burning. The fuel is a blend of distillate (Fuel Oil #2) and residual (Fuel Oil #6) to meet ASTM viscosity specifications. Fuel Oil #4 used to prepare this mixture has a kinematic viscosity of 21.9 at 38°C (100°F), measured using ASTM D-445.

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

Each	5-pk.	10-pk.
31216	31216-510	—
<b>w/data pack</b>		
31216-500	31216-520	31316

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

Each	5-pk.	10-pk.
31244	31244-510	—
<b>w/data pack</b>		
31244-500	31244-520	31344

## Fuel Oil #5 Standard

Fuel Oil #5 is typically used in applications in which there is little or no preheating of the fuel prior to burning. A blend of distillate (Fuel Oil #2) and residual (Fuel Oil #6), the Fuel Oil #5 used to prepare this mixture has a kinematic viscosity of 106.5 at 38°C (100°F), measured using ASTM D-445.

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

Each	5-pk.	10-pk.
31217	31217-510	—
<b>w/data pack</b>		
31217-500	31217-520	31317

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

Each	5-pk.	10-pk.
31246	31246-510	—
<b>w/data pack</b>		
31246-500	31246-520	31346

## Fuel Oil #6 Standard

This oil, sometimes called Bunker C or residual, is a black viscous fuel. Applications in which it may be used require the ability to preheat the fuel prior to pumping and burning.

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

Each	5-pk.	10-pk.
31218	31218-510	—
<b>w/data pack</b>		
31218-500	31218-520	31318

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

Each	5-pk.	10-pk.
31248	31248-510	—
<b>w/data pack</b>		
31248-500	31248-520	31348

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

Each	5-pk.	10-pk.
31249	31249-510	—
<b>w/data pack</b>		
31249-500	31249-520	31349

## Surrogates and Internal Standards

### n-Triacontane-d62

new!

500µg/mL in methylene chloride, 1mL/ampul

Each	5-pk.	10-pk.
31816	31816-510	—
<b>w/data pack</b>		
31816-500	31816-520	31916

## Surrogate Standard Mixture

squalane                      o-terphenyl                      tetrahydronaphthol  
1,000µg/mL each in methylene chloride, 1mL/ampul

Each	5-pk.	10-pk.
31638	31638-510	—
<b>w/data pack</b>		
31638-500	31638-520	31738

## 5-α-androstane

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

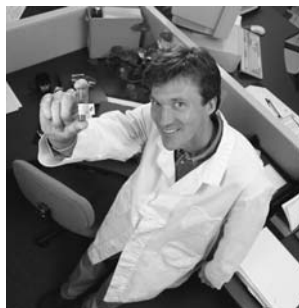
Each	5-pk.	10-pk.
31065	31065-510	—
<b>w/data pack</b>		
31065-500	31065-520	31165

## Request these other UST Fast Facts from Restek:

- California (#59433)
- Florida (#59395)
- Iowa (#59504)
- Massachusetts (#59391)
- Texas (#59394)
- Wisconsin (#59392)
- Northwest (WA / OR) (#59396)
- USEPA (#59397)
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