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Katahdin
ANALYTICAL SERVICES


Maine
Augusta
Portland
Katahdin
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Katahdin…a summary

- Founded in 1995
- Data Quality oriented
- Certified 16 states, Accredited nationally
- Full-service Environmental Lab
- Soil, Sediments, Waters, Air, Biota
- Organics, Inorganics, Microbiology
- Small Business
- Specialize in Petroleum Chemistries

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Petroleum Method Summary

TPH (aka TRPH, ETPH, PRO)

GRO, DRO, VPH, EPH, PAHs

Aliphatics, Aromatics, & Petroleum Hydrocarbons

IPEC 2019

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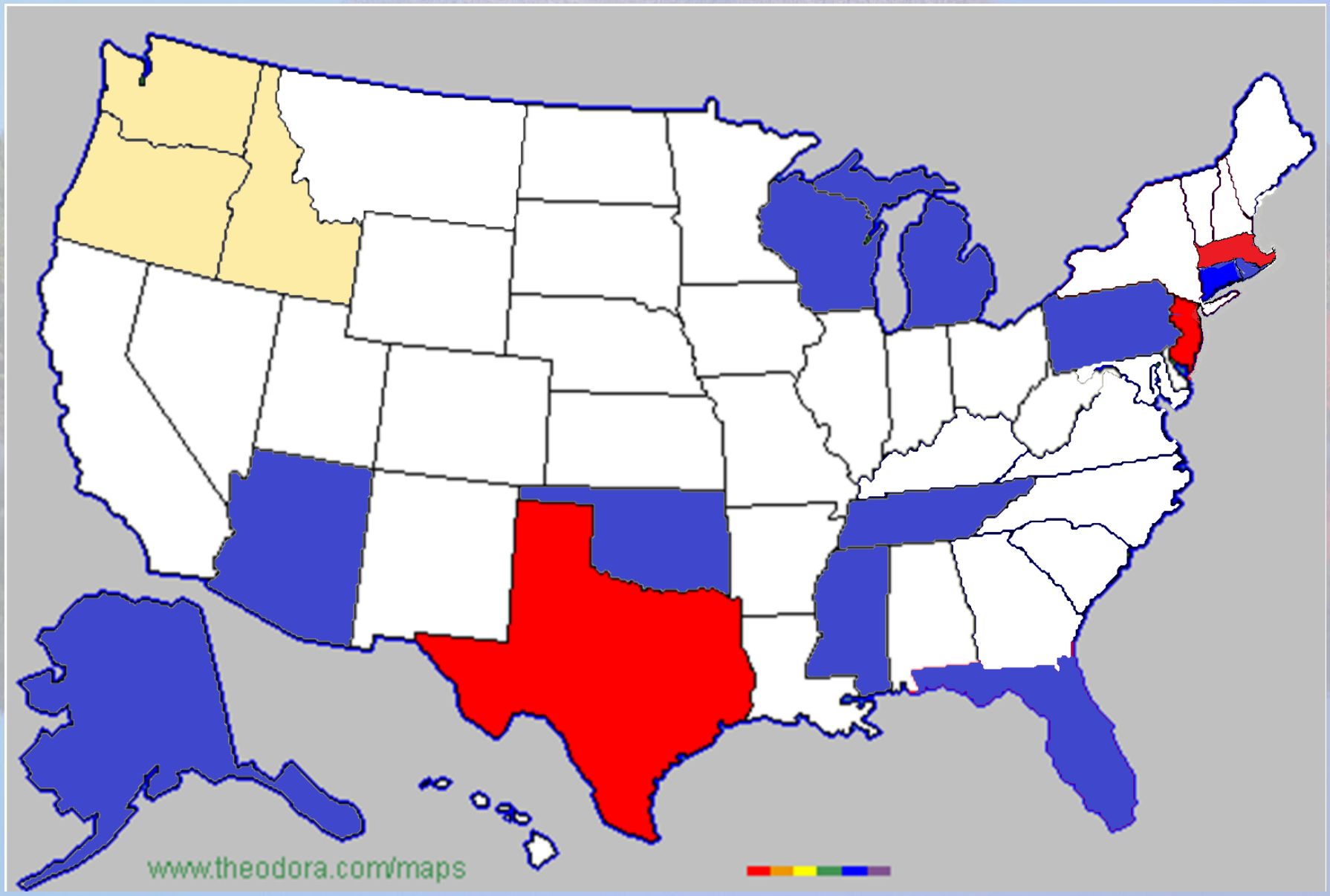
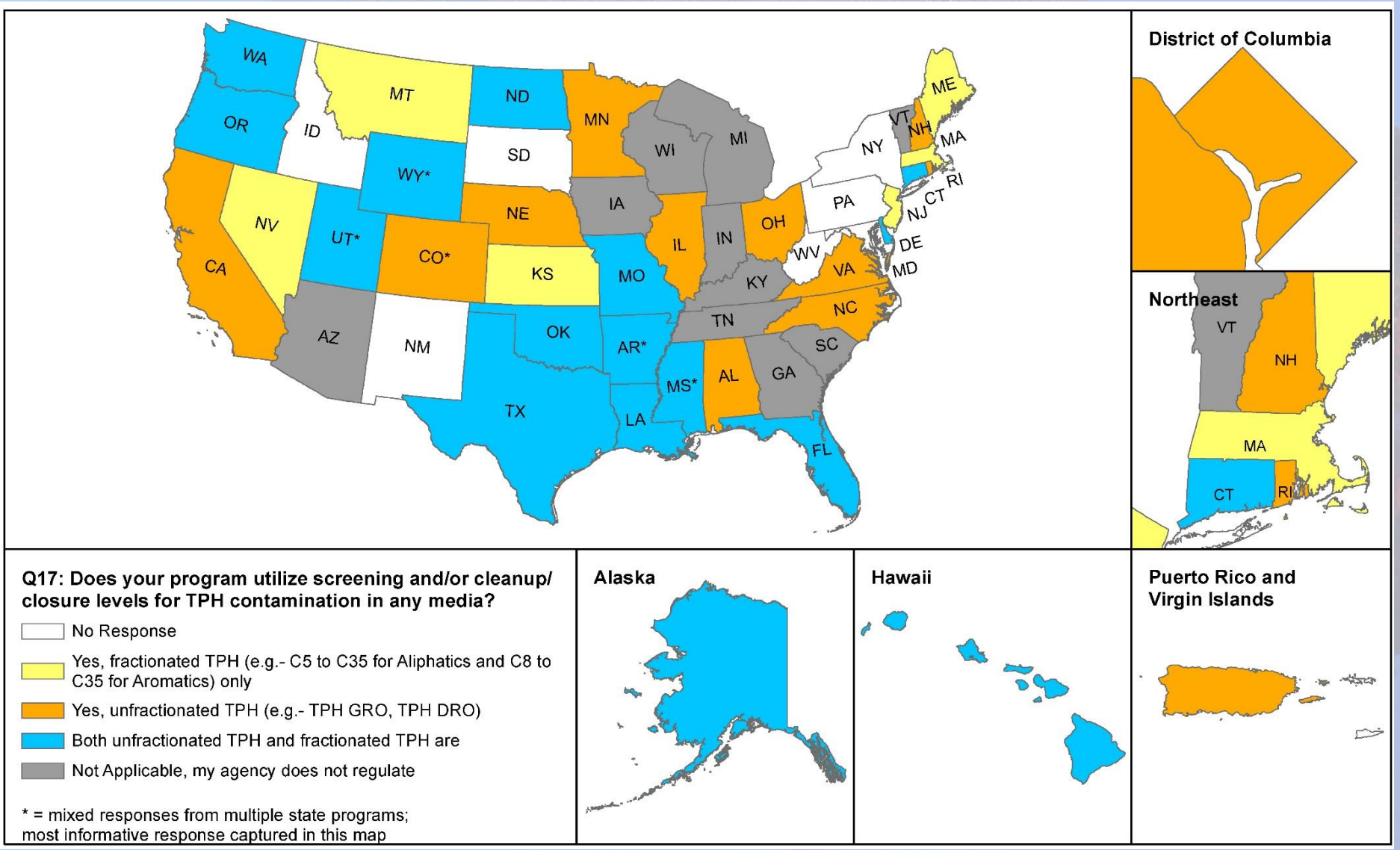
TPH Methods by state



States by TPH Screening



Ranges differ by State

- There are 16 states with specific methods

  Some Examples:

  Florida PRO (C8-C40)

  WA (NWTPH-Gx / NWTPH-Dx) (C5-C30)

  Connecticut ETPH (C9-C36)

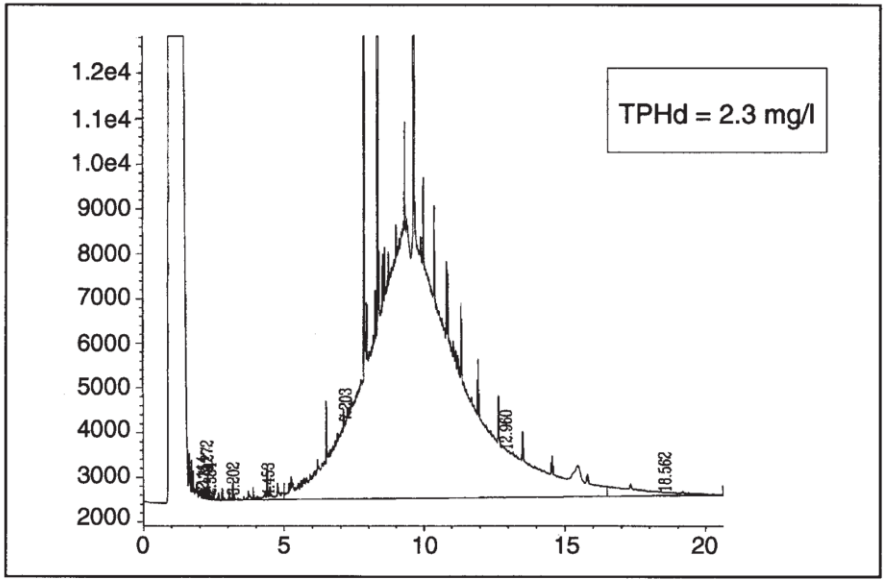
  Massachusetts VPH / EPH

  NJ EPH (C9-C40)

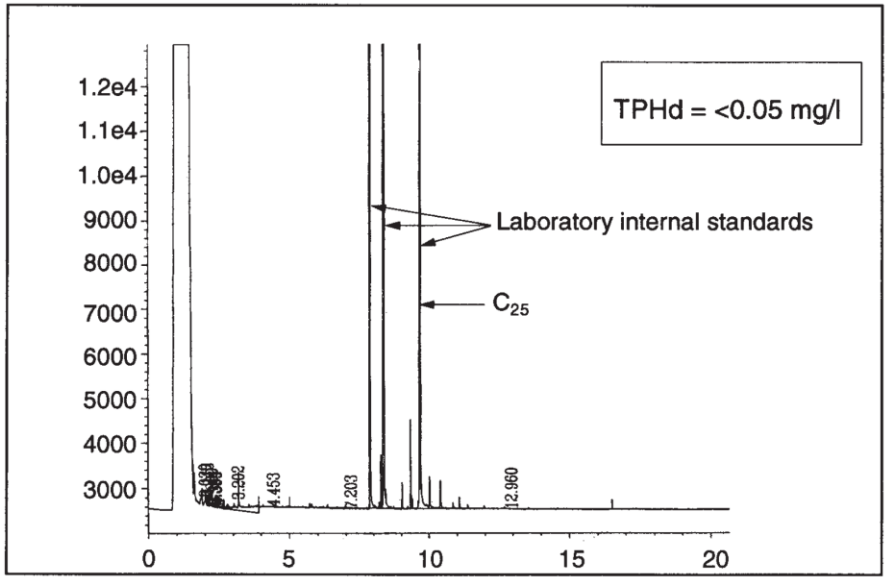
  TX 1005 / 1006 (C6-C35)

TRPH – Total Recoverable Petroleum Hydrocarbon

- Measured gravitmetrically – wt based
- Fats, Oil & Grease (FOG)
- Polar / Non-Polar (HEM – SGT)
- Common NDPES parameter (TPH as oil)



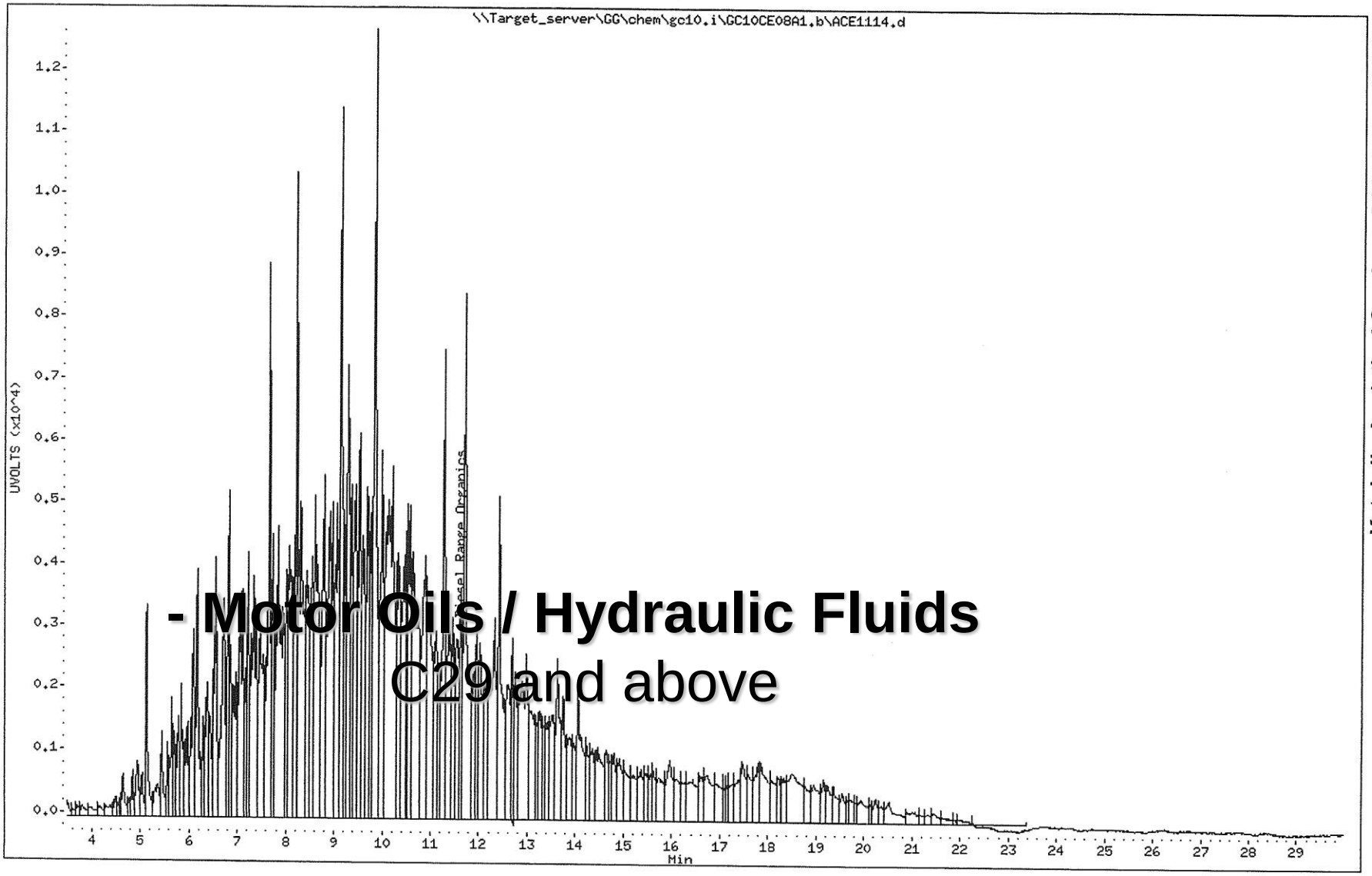
a. Sample before cleanup



b. Sample after silica gel cleanup only

Data File: \\Target_server\GG\chem\gc10.i\GC10CE08A1.b\ACE1114.d
Date : 08-MAY-2009 22:33
Client ID: TR-1
Sample Info: DROA025B,M,GC10CE08A1.B,50,SC2033-1DL
Purge Volume: 0.0
Column phase: ZB-1

Instrument: gc10.i
Operator: CAM
Column diameter: 0.53



- Motor Oils / Hydraulic Fluids

C29 and above

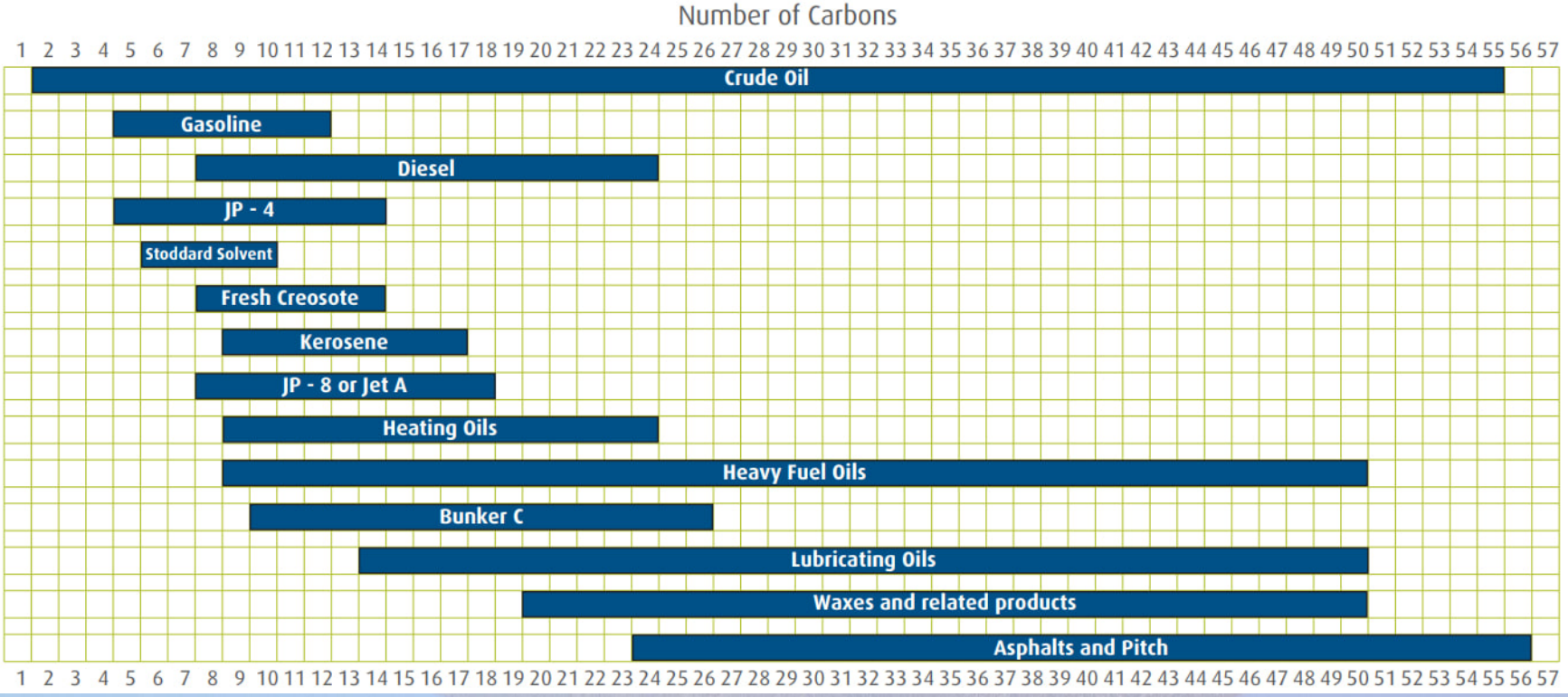
Volatiles vs. Extractables

- Volatiles volatize
- Purged out of sample with air
- C5 Pentane – C12 Dodecane
- Components of gasoline
- Aliphatics / Aromatics

- Extractables… extracted
- C8 – C44 or higher
- DRO C10-C28
- ORO C28 and up
- Components of diesel, motor oil, crude, etc.
- Aliphatics / Aromatics

Petroleum Hydrocarbon Ranges

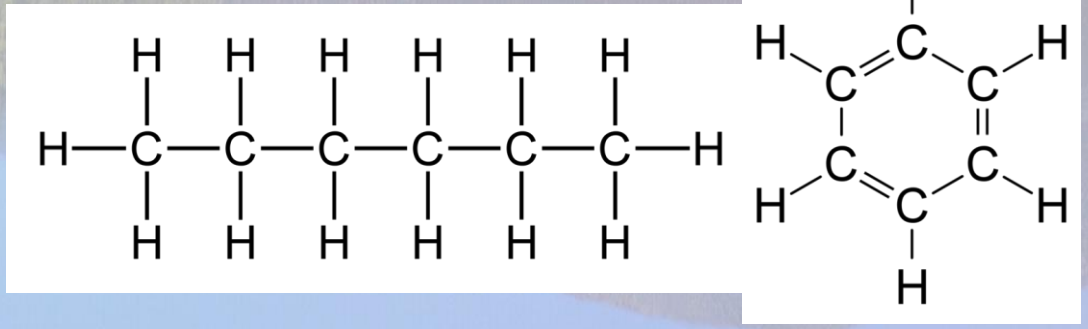
Petroleum Fractions by Carbon Range



VPH / EPH

- The MADEP methods estimate the concentrations of classes of chemical groups and utilize toxicity measures which are specific to the groups to assign risk.

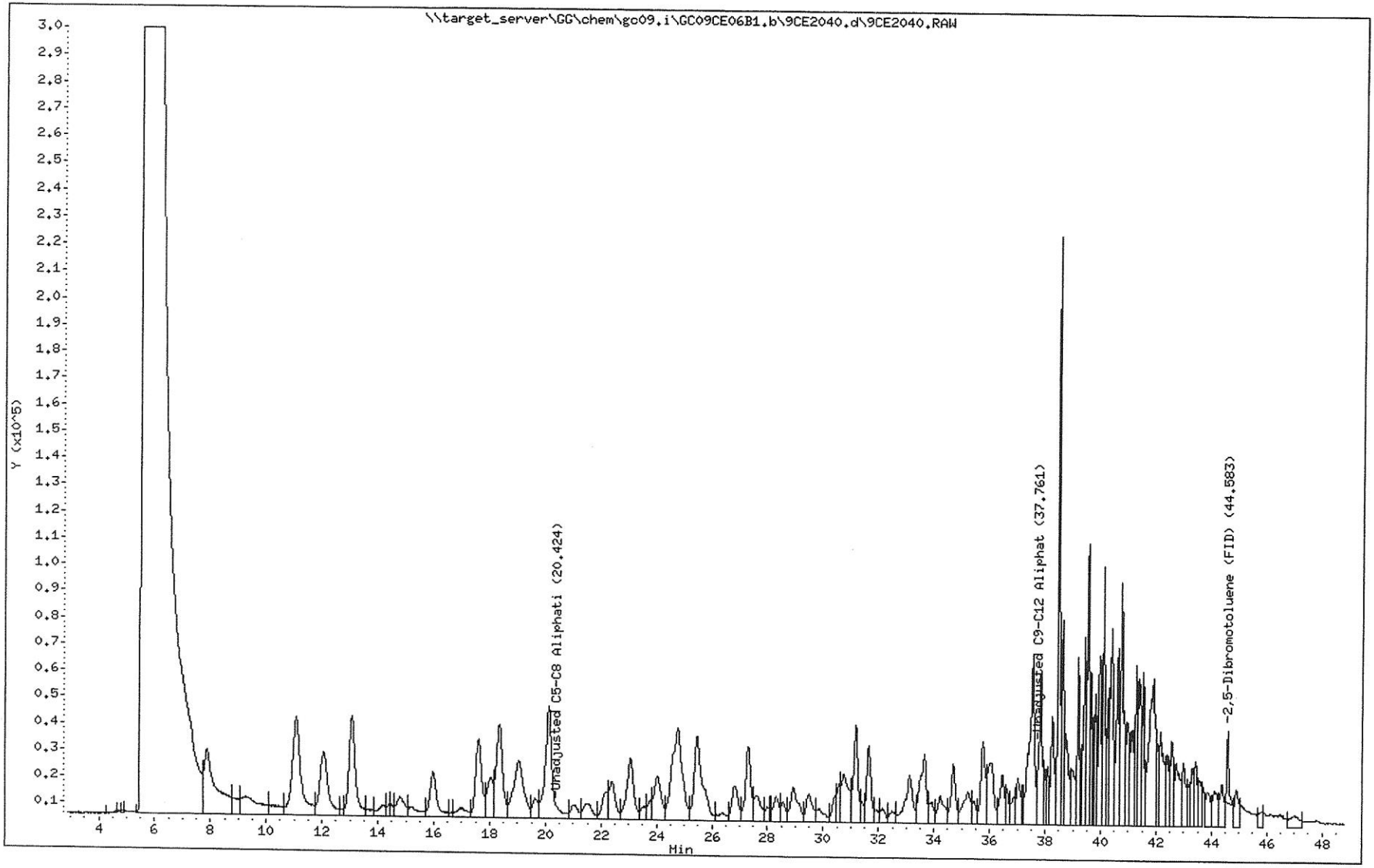
- VPH / EPH methods divide petroleum hydrocarbons into two subgroups, Aliphatics and Aromatics.



Data File: \\target_server\GG\chem\gc09.i\GC09CE06B1.b\9CE2040.d
Date : 07-MAY-2009 01:11
Client ID: TR-1
Sample Info: VPHB035A.M,GC09CE06A1.B,1,SC2033-2
Purge Volume: 0.0
Column phase: RTX-502.2

Instrument: gc09.i

Operator: EKC
Column diameter: 0.53



VPH

- Each subgroup is further divided into smaller ranges which cluster around a “reference compound” (i.e. C5-C8 with C6 Hexane as the RC for risk estimation).
- VPH quantitated as
  - C5 through C8 Aliphatic
  - C9 though C12 Aliphatic
  - C9 through C10 Aromatic
  - Targeted VPH Analytes (MTBE, BTEX, and Naphthalene).

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http: … rain.pdf

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Cert No E87604

Volatile Petroleum Hydrocarbon (VPH) Analysis

Client:	Maine DEP	**SDG:**	SC2033
Client Sample ID:	TR-1	**Date Collected:**	27-APR-09
KAS Sample ID:	SC2033-2DL	**Date Received:**	28-APR-09
Analytical Method:	MA DEP VPH 04-1.1	**Date Extracted:**	04-MAY-09
Prep Method:	SW846 5030B	**Date Reported:**	08-MAY-09
Matrix:	SL	**Percent Solids:**	84.

VPH Range Results	Results	PQL	Units	DF	Date Analyzed	Qual
Unadjusted C5-C8 Aliphatics	370	150	mg/Kgdrywt	5	07-MAY-09	
Unadjusted C9-C12 Aliphatics	440	150	mg/Kgdrywt	5	07-MAY-09	
C5-C8 Aliphatics	370	150	mg/Kgdrywt	5	07-MAY-09	
C9-C12 Aliphatics	160	150	mg/Kgdrywt	5	07-MAY-09	
C9-C10 Aromatics	280	150	mg/Kgdrywt	5	07-MAY-09	

Targeted VPH Analytes	Results	PQL	Units	DF	Data Analyzed	Qual
Benzene	7.6	7.6	mg/Kgdrywt	5	07-MAY-09	U
Ethylbenzene	7.6	7.6	mg/Kgdrywt	5	07-MAY-09	U
Methyl tert-butylether	7.6	7.6	mg/Kgdrywt	5	07-MAY-09	U
Naphthalene	7.6	7.6	mg/Kgdrywt	5	07-MAY-09	U
Toluene	7.6	7.6	mg/Kgdrywt	5	07-MAY-09	U
m+p-Xylene	15	15	mg/Kgdrywt	5	07-MAY-09	U
o-Xylene	7.6	7.6	mg/Kgdrywt	5	07-MAY-09	U

VPH Surrogate Recoveries	Recovery	Acceptance Range	Date Analyzed	Qual
2,5-Dibromotoluene (FID)	114	70-130	07-MAY-09	
2,5-Dibromotoluene (PID)	91	70-130	07-MAY-09	

1 Hydrocarbon Range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range.
2 C5-C8 Aliphatic Hydrocarbons exclude the concentration of Target Analytes eluting in that range.
3 C9-C12 Aliphatic Hydrocarbons exclude the concentration of Target Analytes eluting in that range AND concentration of C9-C10 Aromatics Hydrocarbons.

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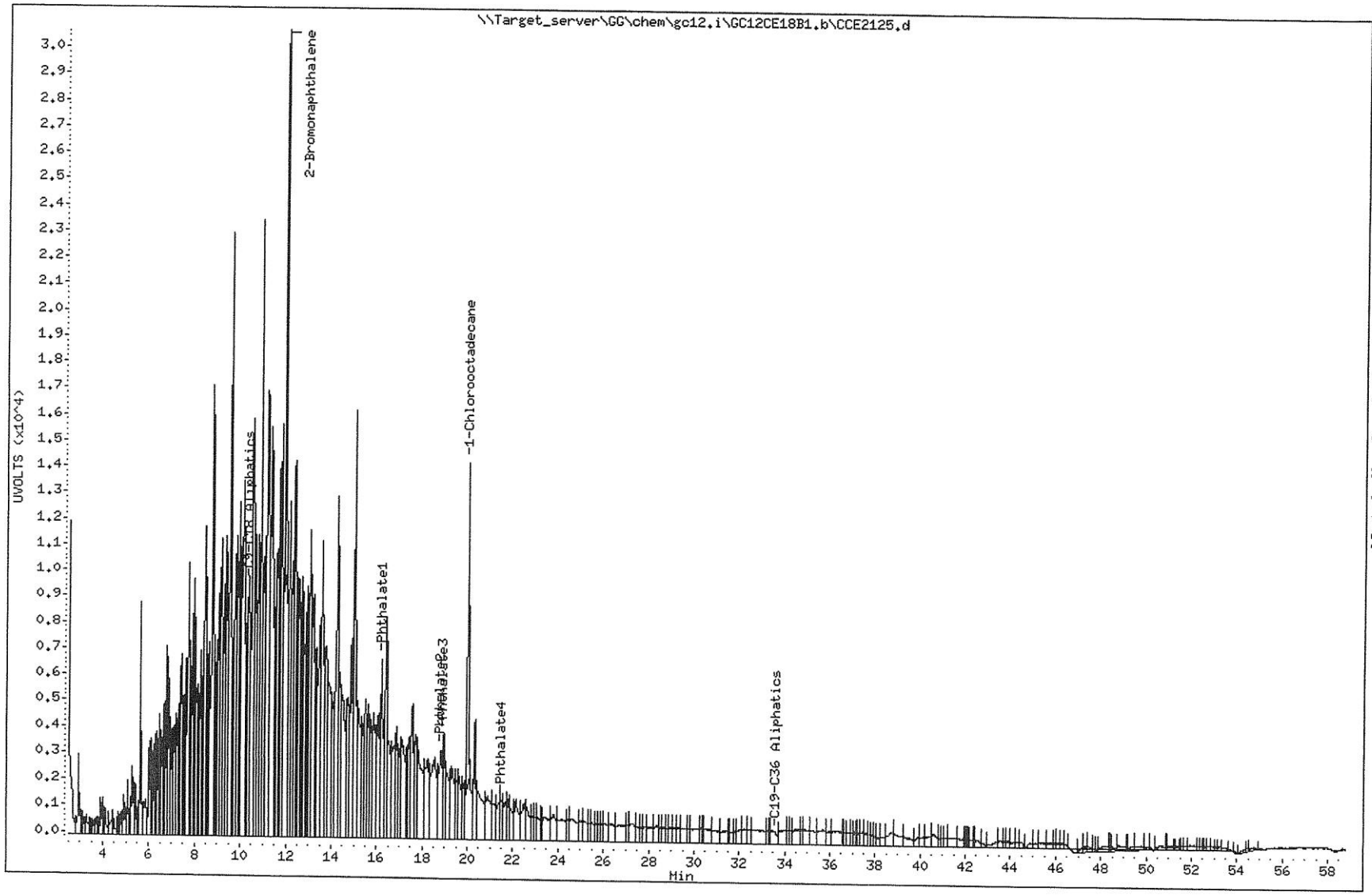
Data File: \\Target_server\GG\chem\gc12.i\GC12CE18B1.b\CCE2125.d
Date : 18-MAY-2009 15:41
Client ID: TR-1
Sample Info: ALIB028A.M,GC12CE18B1.B,5,SC2033-2
Purge Volume: 0.0
Column phase: ZB-1

Instrument: gc12.i
Operator: KGT
Column diameter: 0.25



Extractable Petroleum Hydrocarbon (EPH) Analysis

Client: Maine DEP
Client Sample ID: TR-1
KAS Sample ID: SC2033-2
Analytical Method: MA DEP EPH 04-1.1
Prep Method: SW846 3540
Matrix: SL

SDG: SC2033
Date Collected: 27-APR-09
Date Received: 28-APR-09
Date Extracted: 06-MAY-09
Date Reported: 19-MAY-09
Percent Solids: 84.

EPH Range Results	Results	PQL	Units	DF	Date Analyzed	Qual
Unadjusted C11-C22 Aromatics	350	24	mg/Kgdrywt	1	18-MAY-09	
C11-C22 Aromatics	340	24	mg/Kg	1	18-MAY-09	
C9-C18 Aliphatics	500	120	mg/Kgdrywt	5	18-MAY-09	
C19-C36 Aliphatics	170	120	mg/Kgdrywt	5	18-MAY-09	

Targeted PAH Analytes	Results	PQL	Units	DF	Data Analyzed	Qual
Naphthalene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
2-Methylnaphthalene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Phenanthrene	3.8	.24	mg/Kgdrywt	1	18-MAY-09	
Acenaphthylene	1.3	.24	mg/Kgdrywt	1	18-MAY-09	
Acenaphthene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Anthracene	0.69	.24	mg/Kgdrywt	1	18-MAY-09	
Benzo(a)anthracene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Benzo(a)pyrene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Benzo(b)fluoranthene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Benzo(g,h,i)perylene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Benzo(k)fluoranthene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Chrysene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Dibenzo(a,h)anthracene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Fluoranthene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Fluorene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Indeno(1,2,3-cd)pyrene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U
Pyrene	0.24	.24	mg/Kgdrywt	1	18-MAY-09	U

EPH Surrogate Recoveries	Recovery	Acceptance Range	Date Analyzed	Qual
o-Terphenyl	44	40-140	18-MAY-09	
2-Fluorobiphenyl	44	40-140	18-MAY-09	
2-Bromonaphthalene	17	40-140	18-MAY-09	*
1-Chlorooctadecane	61	40-140	18-MAY-09	

* Fractionation Surrogates.

1 Hydrocarbon Range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range.

2 C11-C22 Aromatic Hydrocarbons exclude the concentration of Target PAH Analytes.

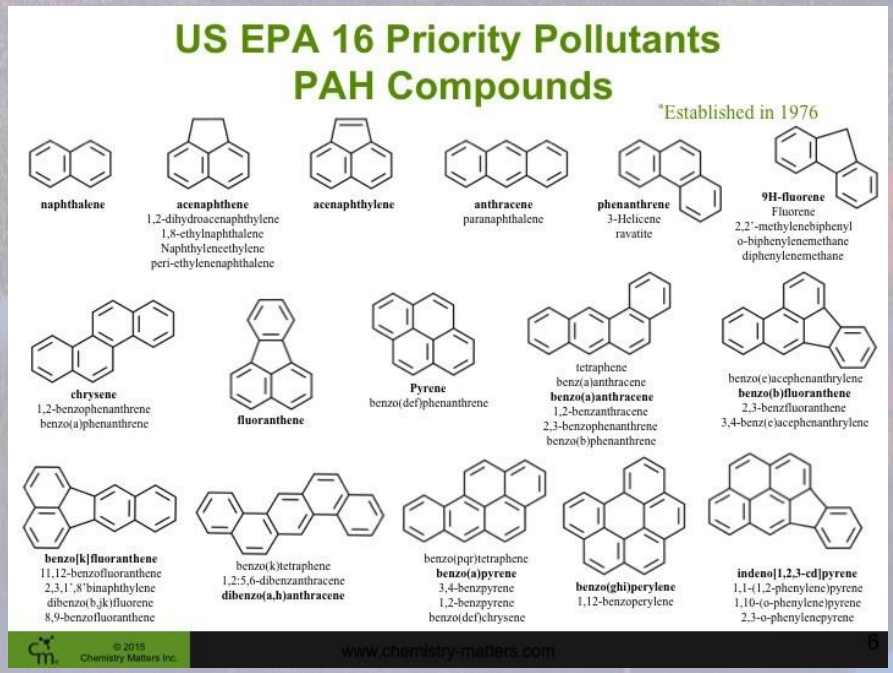
3 Diesel PAH Analytes.

EPH Challenges

- Fractionation – Two solvent systems used to separate hydrocarbons based on affinity (Hexane used for Aliphatics, Methylene chloride for Aromatics)
  - **Multiple Fractions, multiple analyses**
  - **Fractionation failures (low surrogates)**
  - **Breakthrough**

Polycyclic Aromatic Hydrocarbons

- Aromatic component of DRO
- 17 std compounds
- Alkylated species
- Biomarkers
- Fingerprinting overlays



Instrumentation

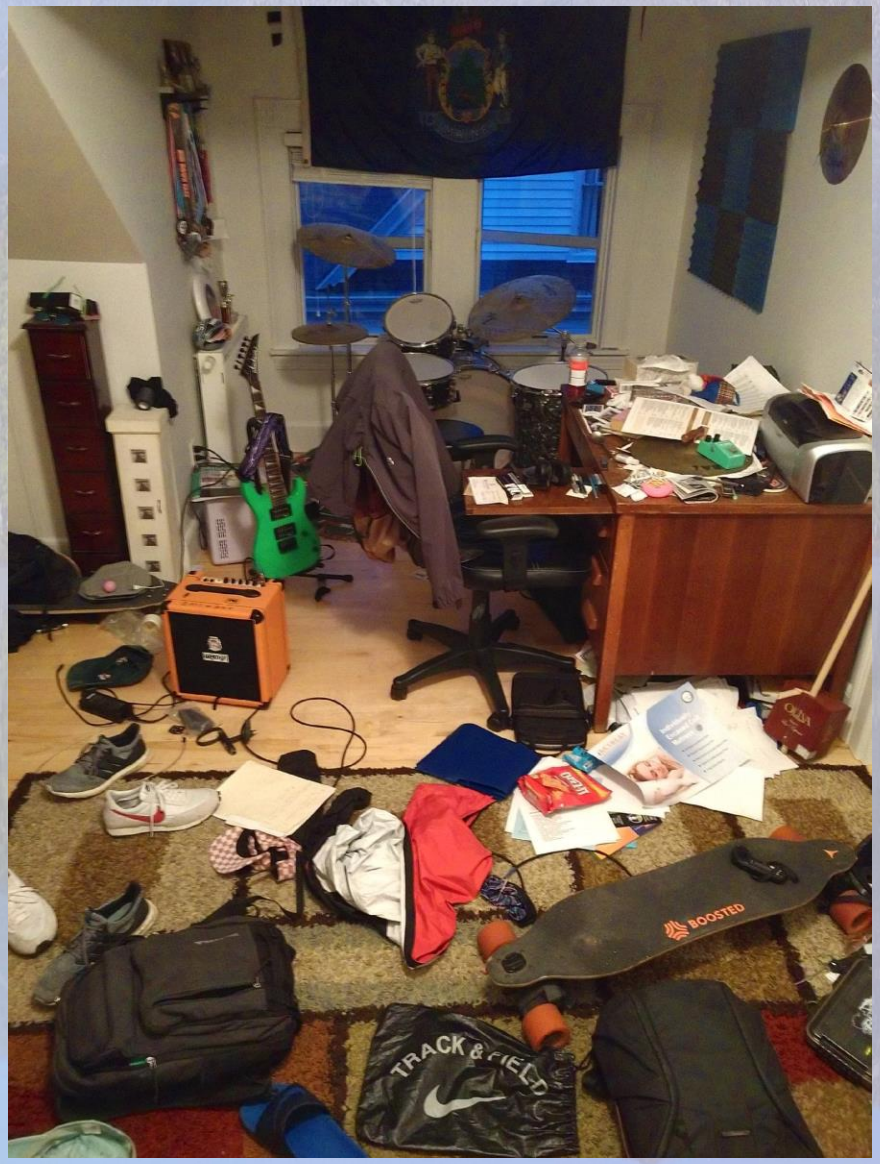
GC - PID / FID

GC - MS

Summary
GRO/DRO vs VPH/EPH

- **GRO/DRO yields summations / ranges single number (non specific - can include biogenic materials)**
- **VPH/EPH yields multiple values, Risk-based Toxicities, Composition info, "Fingerprinting"**

In closing….

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