

# STATE OF THE PRACTICE: RISK ASSESSMENT AND MANAGEMENT OF METABOLITES AND DEGRADATION PRODUCTS FROM TOTAL PETROLEUM HYDROCARBONS



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# INTRODUCTION

- 1** Genesis of Session
- 2** Goal of Platform and Poster sessions
- 3** Total Petroleum Hydrocarbon (TPH) Context
- 4** Weathering
- 5** Sampling and Analytical Issues
- 6** Toxicology and Risk Assessment Issues
- 7** Conclusions

# GENESIS OF THE SESSION

*2016 Battelle  
Sediments Conference*

**TPH panel discussion**

*2016 ITRC*

**Initiation of ITRC TPH Document**

*2017 Battelle  
Sediments Conference*

**TPH technical sessions**

# GOAL OF PLATFORM & POSTER SESSIONS

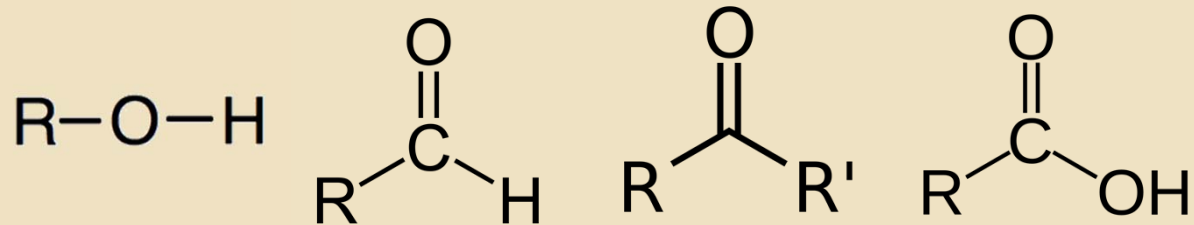
- **Convey a sense of**
  - **the nature of the TPH metabolite/degradation product challenges**
  - **the importance of the issues**
  - **what the nature of the solution needs to be**
- **Promote the informed, constructive dialog toward a practical solution**

# TPH CONTEXT

- **TPHCWG approach**
- **ITRC re-evaluation and update to TPH Approach**
- **Multiple exposure routes**
- **Separate treatment of hydrocarbons and metabolites/degradation products**
- **Metabolites and degradation products**
  - **Metabolite and degradation product evaluation focus on “diesel” range TPH**

# WEATHERING

- Weathering of TPH - long recognized
- Where does the weathered TPH go?
  - It doesn't really just go away
    - TPH  $\rightarrow$  CO<sub>2</sub> and H<sub>2</sub>O
  - Intermediate polar metabolites and degradation products
    - Alcohols, aldehydes, ketones, acids



# FOCUSED REGULATORY HISTORY

*Mid-  
1990s*

Nationwide regulatory attention on TPH metabolites.

*1999*

Local regulatory guidance recommended SGC to focus on HCs (SF RWQCB 1999; DTSC HML 1999).

*2011 -  
present*

Various states in flux about metabolites.

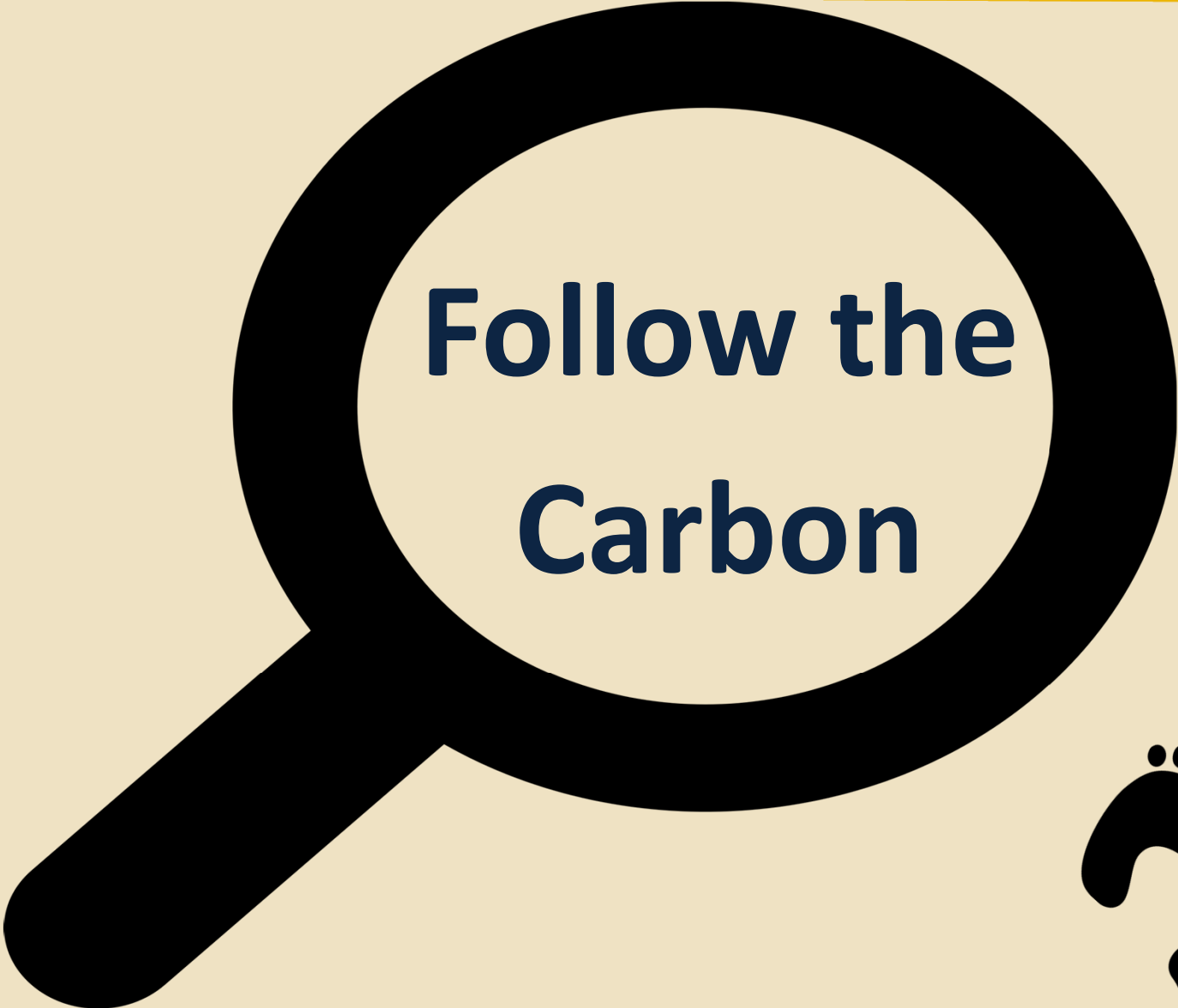
*2012*

CA SWRCB LUFT Manual acknowledged metabolites and recommended SGC to focus on HCs.

*2013 -  
2017*

SF RWQCB changed guidance on SGC.  
Other states followed SF RWQCB lead, or are developing/revising SGC/metabolite policies.

# KEY TO EVALUATING A PETROLEUM RELEASE



**Follow the  
Carbon**





# CHALLENGE: CHEMICAL ANALYSIS

- **TPH analysis is not specific to TPH**
- **Silica gel cleanup?**
  - **Silica gel cleanup removes background polars (e.g., humic acids) and metabolites**
- **State-of-art analysis not feasible for routine site assessment**

# CHALLENGE: TOXICOLOGICAL EVALUATION

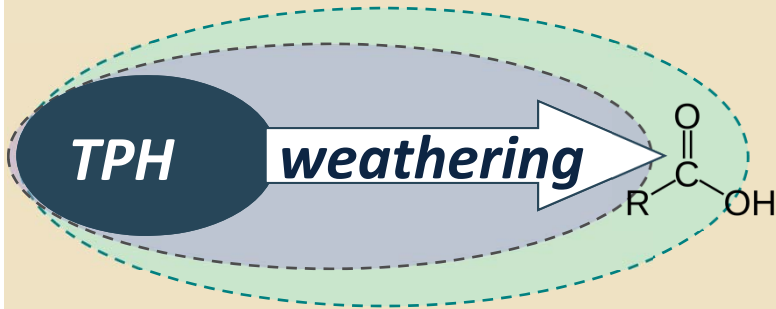
*TPH & additives*

Addressed by TPHCWG and ITRC

*Metabolites*

Concentration of mixture changes  
(generally downward)

Composition of mixture changes  
(generally toward acids)



Toxicity data sparse for individual constituents

# CONCLUSION

- **Metabolites/degradation products can be significant fraction of residue**
- **Understanding of issues is evolving**
- **No easy solution**
- **Need to develop practical approaches**
- **Goal today is to identify the key issues**
  - **Frame path forward**
  - **Advance the discussion and exchange of ideas**

# QUESTIONS?

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