

# AQMD HEARING ON TORRANCE REFINERY

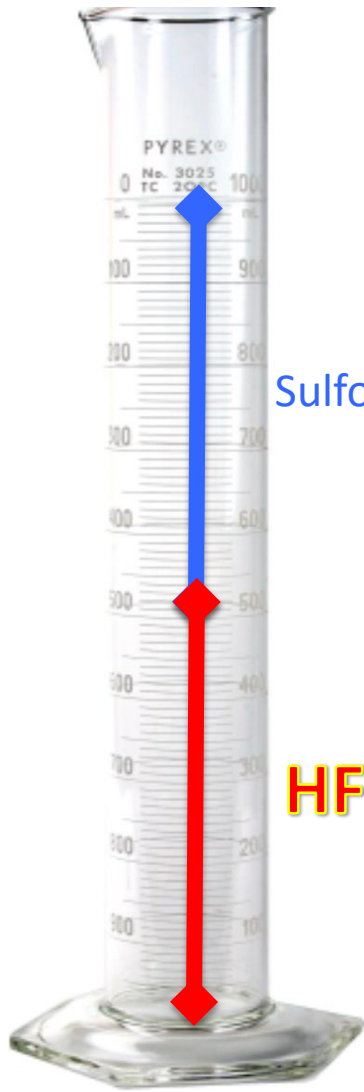


SALLY HAYATI, PH.D.  
PRESIDENT, TRAA  
APRIL 1, 2017

TRAA MEETING: 1<sup>st</sup> and 3<sup>rd</sup> Monday each month, 6:00-8:00 p.m.  
Sizzler, 2880 Sepulveda Blvd, Torrance. CONTACT: [info@safetorrancerefinery.org](mailto:info@safetorrancerefinery.org)  
WEBSITE: [SafeTorranceRefinery.org](http://SafeTorranceRefinery.org); TWITTER: @TraaNow  
PETITION: <http://chn.ge/1Wf1Hav> LIKE US ON FACEBOOK; share posts.



1990



Sulfolane 50%

HF 50%

1998-on



Sulfolane 10%

HF 90%

1998-on



Sulfolane 2%

HF 98%

**MHF: % by weight**

**% by molecule count**

# TRAA Science Advisory Panel

## **Dr. Sally Hayati**

Pres. TRAA. Torrance res  
BS, MS degrees: **Berkeley**  
MS & Ph.D. degrees: **USC**  
Retired, Aerospace Corp

## **Dr. George Harpole**

PhD, **Chem. Eng., UCLA**  
Northrop Grumman  
**HF** in lasers; 14 Patents. TRW  
Chairman's Awards.

## **Dr. Christopher Shih**

PhD **Chem. Eng., Stanford** TRW,  
retired. **Hazardous waste**  
**disposal** expert.  
Dir Chem & Materials Tech

## **Dr. James Eninger**

BS, MS, PhD, **Stanford**  
**Fluid Mech, Gasdynamics**  
Retired TRW; **HF** safety in  
high energy chem lasers

## **Dr. Charles Clendening**

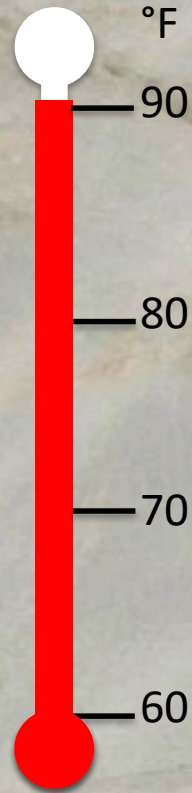
PhD **Physics, Cornell**  
Northrop Grum retired  
Awards: TRW Chairman,  
Distinguished Patent, AIAA

## **Judith Scott**

MS in **Chemistry, Boston U.**  
TRW, retired.  
**Manager Chem Tech Dept**  
Also Shell Chemical Co.

# Like HF, Released MHF "Flashes"

*-100% becomes airborne in a ground-hugging HF aerosol cloud-*



MHF  
90°F  
100 psi

*Flash atomization  
occurs*

MHF  
95°F  
100 psi  
*Aerosol fine  
enough to flow  
around barriers*

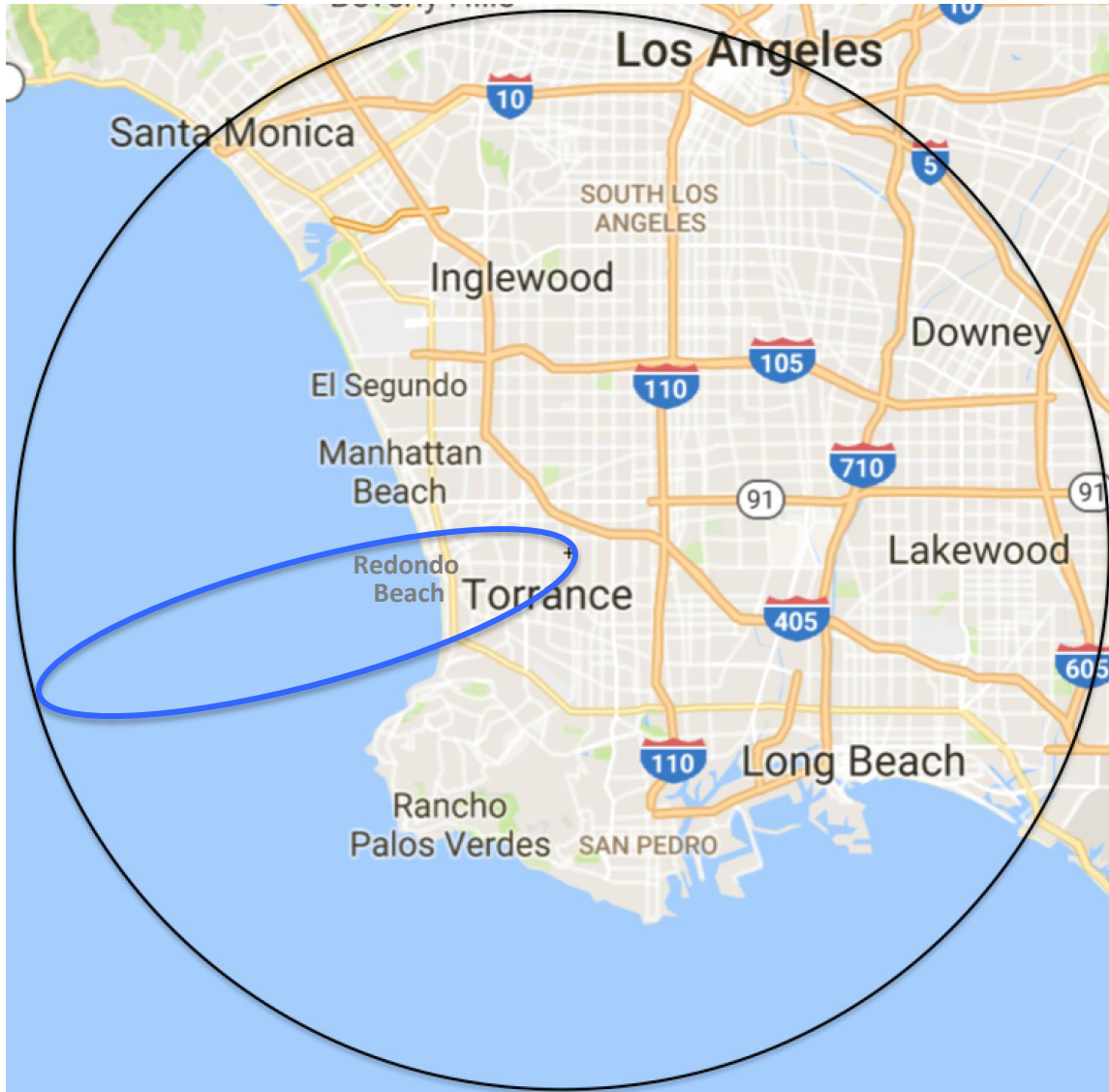
The MHF Settler Tank contains up to 50,000 lb. MHF under pressure at **105°F**

*REF: George Harpole, Ph.D., "Flash Atomization of HF and MHF," <<http://bit.ly/2jqBiGK>>.*



# WHAT THE NEAR-MISS ACCIDENT COULD HAVE BEEN LIKE

*-This is an estimate of the worst possible impact from the release of 50,000 lb. MHF-*



Assuming EPA Risk Management Program **worst case conditions.**

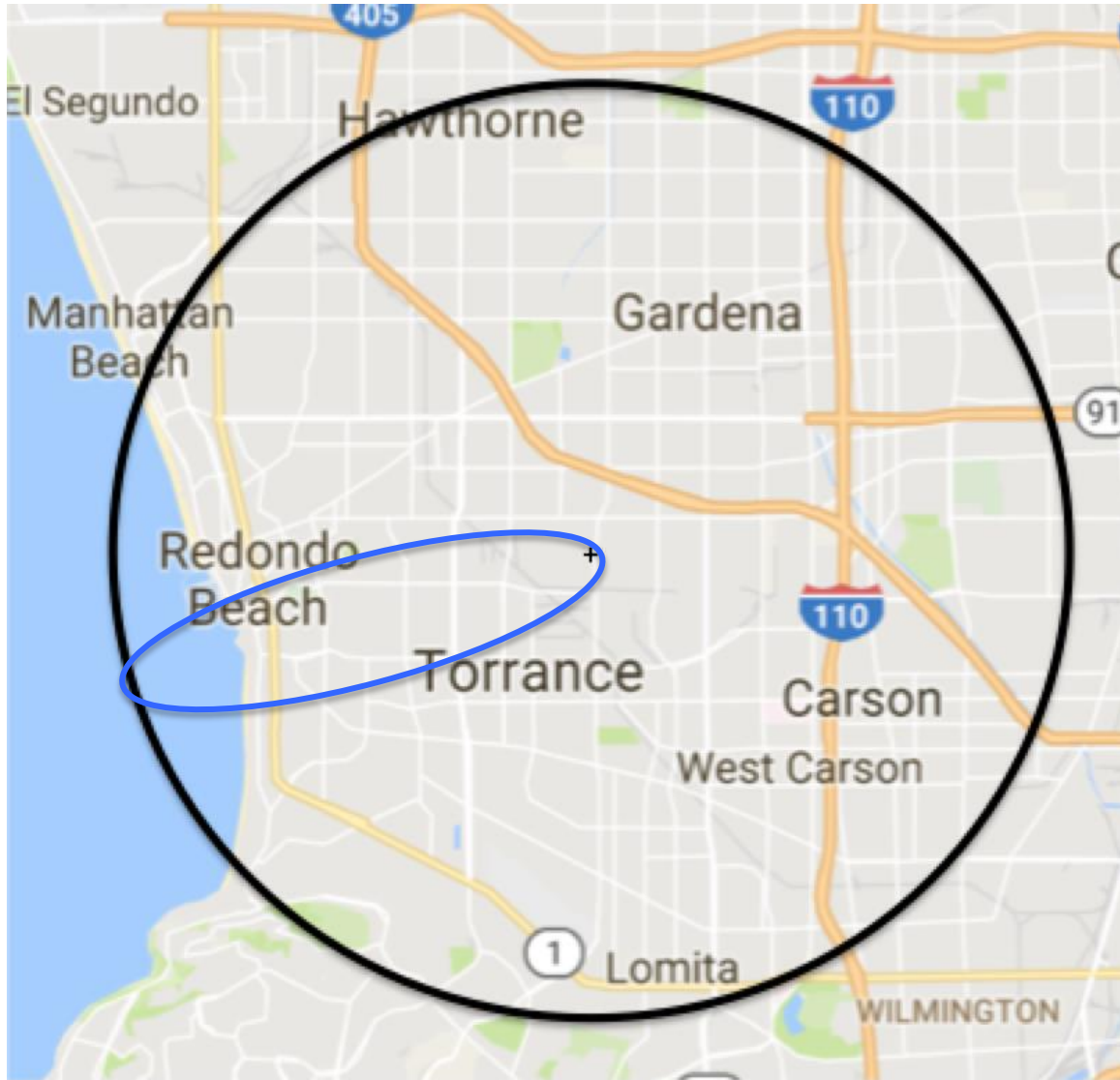
Low wind speed; calm atmosphere.  
50,000 lb. MHF released in 10 min.  
**Emergency mitigation systems fail.**

Black circle: ~15-mi radius zone of **Serious & irreversible health effects possible with short term exposure**

*Exposure to HF plume depends on wind direction. Main debris plume shows prevailing wind direction 2/18/2015.*

# COULD EMERGENCY SYSTEMS SAVE THE DAY?

*-Estimated impact of near-miss accident assuming optimal water mitigation performance-*



Low wind speed; calm atmosphere.  
50,000 lb. MHF released in 10 min.

Assume 90% HF knocked down by  
H<sub>2</sub>O or siphoned away.  
Operational systems do **much worse**.  
Remaining 10% airborne HF ~5K lb.

Instead of a 15-mi serious harm zone →  
**4.8 mile zone of serious harm**

**This is NOT “SAFE”!!**

# Quest Consultant '95 Release Tests



- 50% MHF (w/ 50% additive) + 50% Hydrocarbons
  - ***100% MHF and hydrocarbons became an aerosol upon release.***
- 50% Sulfuric Acid + 50% Hydrocarbons (HC)
  - ~2% sulfuric acid remained airborne, not as aerosol, but as liquid film on HC bubbles. When those burst, liquid sulfuric acid fell to the ground.

When acid is mixed with hydrocarbons in the alkylation unit...

- MHF forms ground hugging cloud like HF upon release at  $\geq 90^{\circ}\text{F}$
- Sulfuric acid forms no dense vapor cloud upon release

*Conditions: 2" hole, 90°F and 100 psig pressure. <http://bit.ly/2miweKw>*



# OUR COMMUNITY'S BATTLE TO BAN MHF IS PICKING UP STEAM



500 gather to demand a MHF ban in the largest Torrance protest in history, held during the worst storm in 20 years



TRAA 2/18  
March & Rally  
To ban MHF



AQMD Study of MHF Alternatives ♦ Chemical Safety Board report ♦ EPA Investigation



AQMD Rule 1410 ♦ Assemblyman Al Muratsuchi AB 1645 ♦ LA County Board of Supervisors

TRAA meeting: 1st and 3rd Monday each month, 6:00-8:00 p.m. Torrance Sizzler, Sepulveda Blvd. Contact: [info@safetorrancerefinery.org](mailto:info@safetorrancerefinery.org); Website: [SafeTorranceRefiner.org](http://SafeTorranceRefiner.org); Twitter: [@TraaNow](https://twitter.com/TraaNow)