

THE ONLY FEASIBLE OPTION: REPLACE MHF



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1984 BHOPAL: WORLD'S WORST CHEMICAL DISASTER



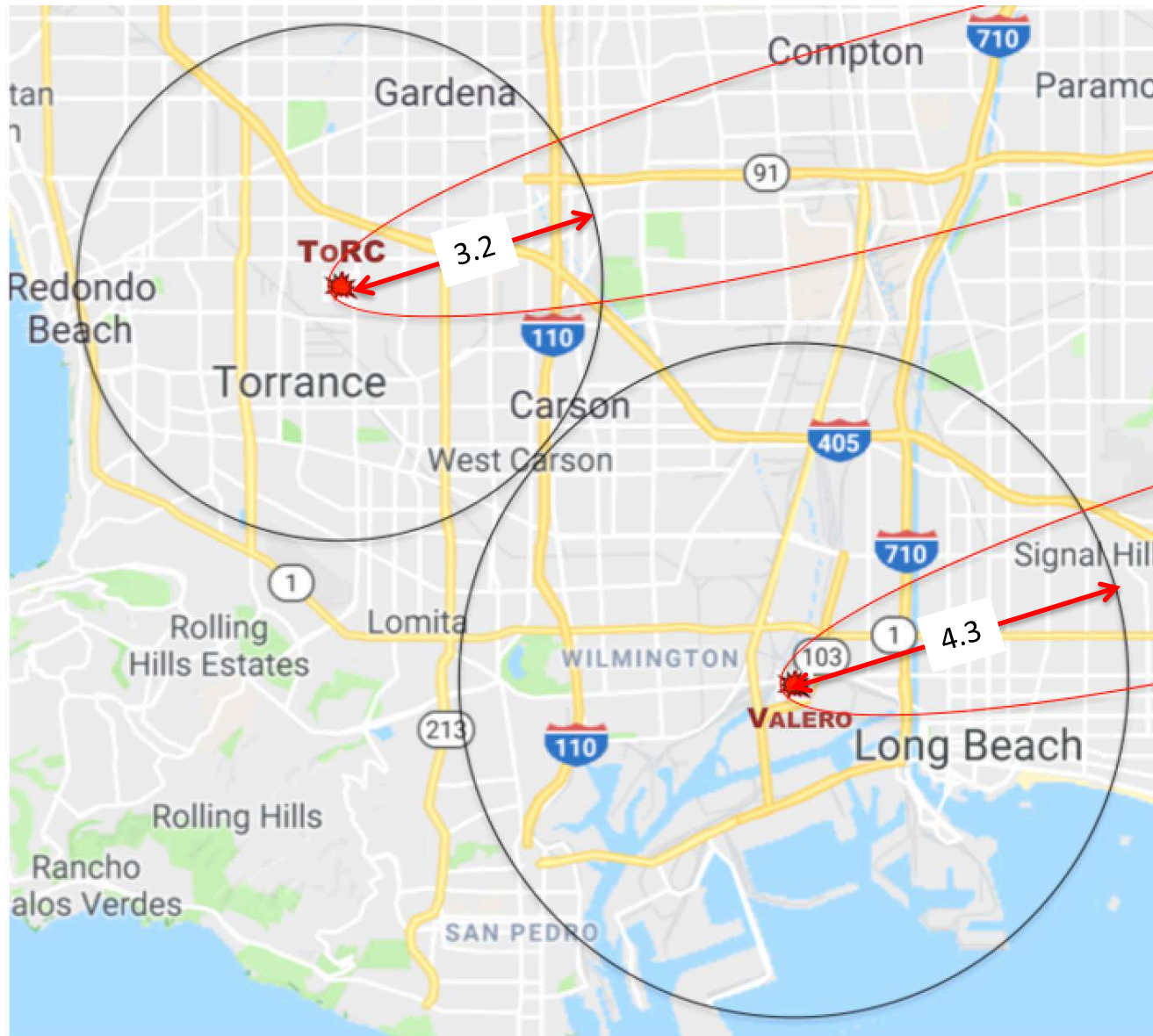
A “failsafe” **American Union Carbide plant** in Bhopal, India,
Release of 60,000 lb. of a **toxic volatile** chemical, MIC.
30,000 deaths, 500,000 permanently injured/disabled

1987 TORRANCE HF UNIT FIRE AND NEAR MISS



Mobil told arriving TFD firefighters to hose down the HF unit, or it might explode and “kill everyone within 3 miles”

CATASTROPHIC RELEASE POSSIBLE DESPITE “SAFETY” CLAIMS



Official EPA MHF hazard zones

assume MHF is 90% less deadly

Toxic Distances (radii)
3.2 mi Torrance
4.3 mi Valero

Serious irreversible health effects (death close in) inside zones 1-hr exposure.

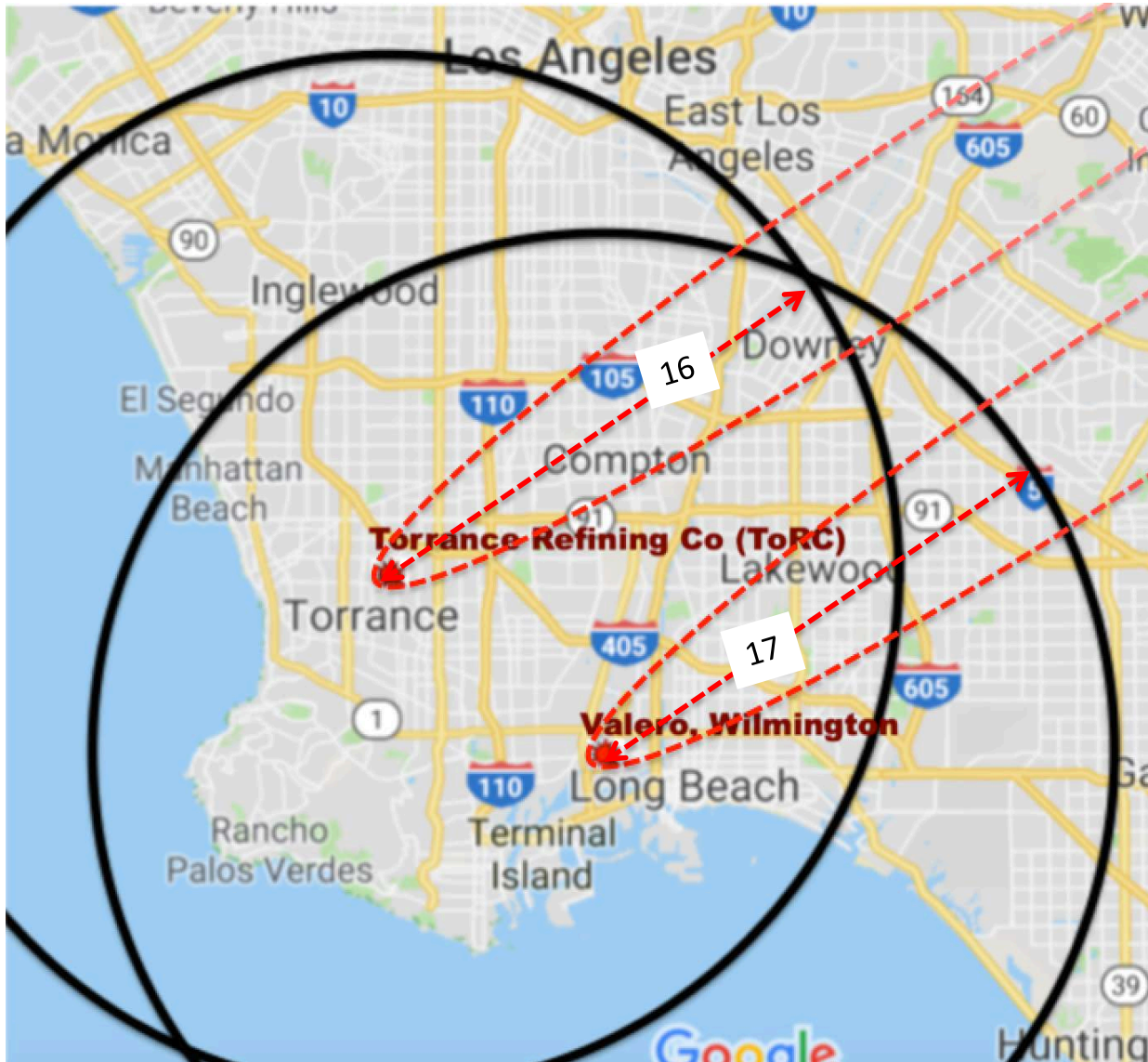
≥616,000 combined at risk in the 2 zones

40,000 – 50,000 exposed to plume inside toxic radii

MHF NOT “SAFE”!!

HF HAZARD ZONES = ACTUAL MHF RISK

Based on EPA WCS parameters and using official ToRC & Valero Scenarios



DEATH first 8-9 MILES

Serious irreversible harm
16 mi (Torrance) 17 mi (Valero)

5,000,000 at risk
inside 652 mi² zone

~300,000 exposed to
plume inside toxic zone

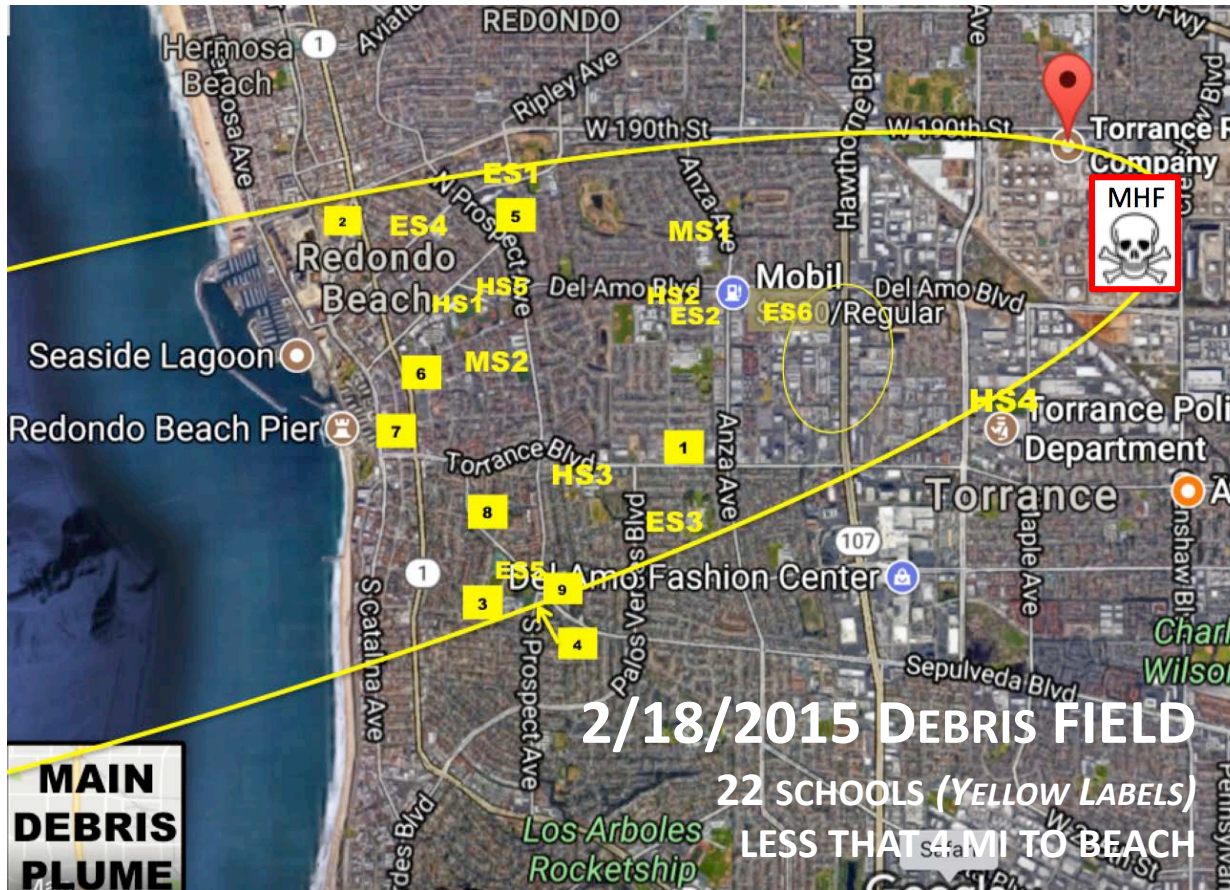
Tens of thousands
exposed to less toxic
concentrations beyond

Release from acid settler
nearly struck in 2015

US HF refineries' average
Toxic Distance = 15 mi

Kerr-McGee HF release
plume went 18 mi.

83% “MITIGATED” RELEASE? STILL DISASTROUS



2015 Torrance Explosion
Near miss on 50k lb. MHF



9am, school in session. If 8,300 lb. of settler tank's 50000 lb. stayed airborne, 50,000 could've died in 10-20 min on that "very still morning... [with] no wind."

EVACUATION NOT FEASIBLE; SHELTERING IN PLACE INADEQUATE

Husky Evacuation Zone



70 sq. mi. zone

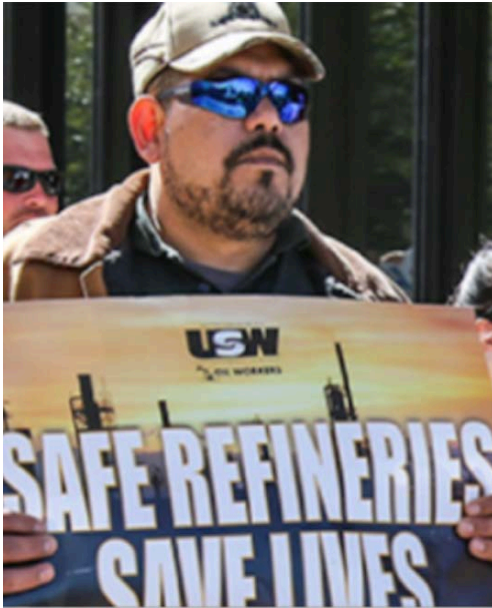
~700,000 residents

LAX, 405, 105, & 110 FWYs

Southerly winds are common in the a.m.

MHF REPLACEMENT WILL CREATE ~ 800 JOBS

- ACCORDING to ToRC's Burns McDonnell in 2017. MHF replacement...
 - *Creates 400++ jobs at each refinery during construction*
 - *Adds \$80 million++ by each refinery to work force income*
- ~40 workers temporarily displaced during 4-mo (Torrance) and 12-mo **unit** downtimes



PBF just bought the Shell Martinez refinery for \$900M. It likes CA; won't shut down. MHF replacement cost per refinery ~ \$300-400M, NOT one billion as ToRC claims.

NORMAL ACCIDENTS: OUT OF CONTROL FIRES



Torrance Mobil HF refinery, 1979 and 1987

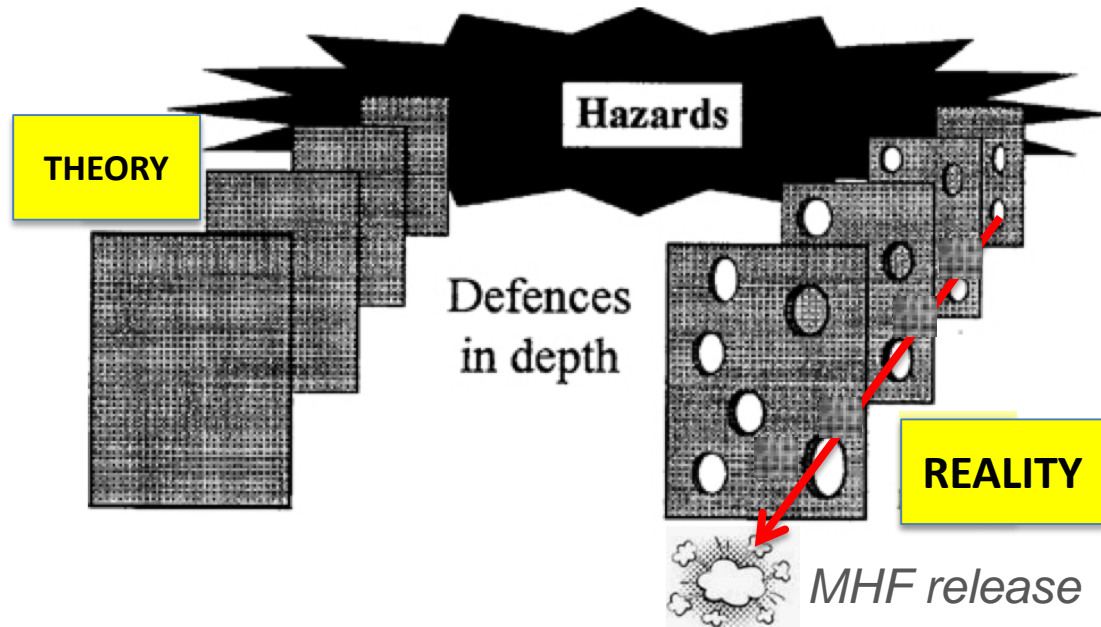


EARTHQUAKES & FIRE AFTER EARTHQUAKES



- **Tupras** 7.5 earthquake; water pipeline ruptures; **Fire raged for 5 days**
- **Cosmo** stronger seismic standards than CA. 9.0 quake 200 miles away.
 - **Fires burned out of control for 10 days**
- 1990 Torrance brief (lawsuit): “**process units are highly congested**; don’t meet Mobil's minimum fire and safety standards for between units.” Insurers warned "a domino-type catastrophe should even one unit [catch]... fire.”

“No one can foresee all the possible scenarios of disaster”



J. Reason, Fig. 1.4
Managing the Risks of
Organizational Accidents

Swiss cheese model
of safety incidents

- Ideally, all defensive layers are intact and do their jobs as expected
- But unknown *latent conditions* build up with time, forming “holes” in defense layers
 - During design, manufacturing, calibration, maintenance, testing, in response to operator actions, etc.,
- SW models can’t account for latent errors or predict “*active failures*” that cause disaster

Inability to predict, understand, and model → inability to design failsafe systems