# PR 1410 Working Group Meeting #8

SEPTEMBER 6, 2018

SCAQMD Headquarters

Diamond Bar, California

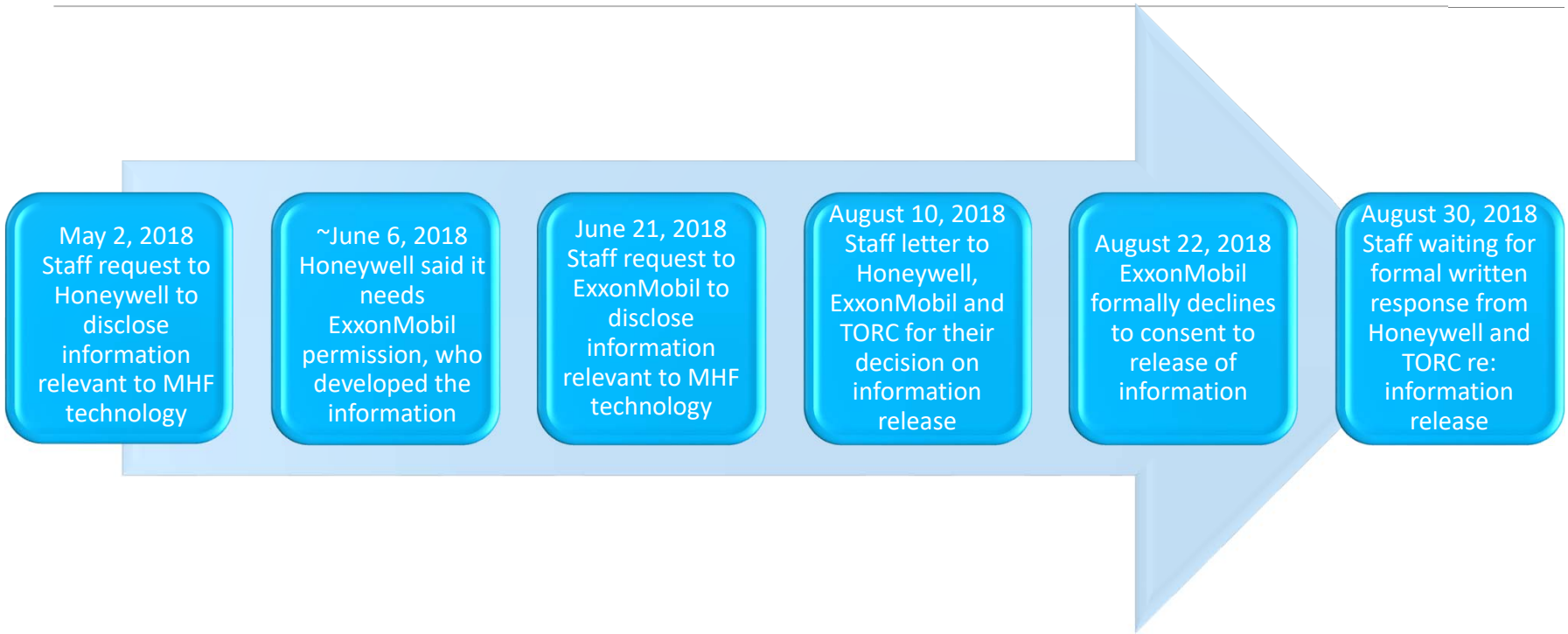
# Agenda

- Summary of Rulemaking Progress
- Mitigation Concepts
- Long-Term Phase Out Alternative
- Schedule

# Summary of Rulemaking Progress

- Hired two consultants who have expertise in HF and risk assessments to assist in mitigation development
  - Quest Consultants
  - Hazard Analysis Consulting (Dr. Ronald Koopman)
- Reached out Honeywell/UOP, ExxonMobil and Torrance Refining Company (TORC) on release of confidential MHF information
- Reached out U.S. Geological Survey for seismic analysis information in the South Bay region
  - Consulting with TORC and Valero on their seismic protocols
- Investigating HF use in other industries

# Status of Request to Release Information on MHF Technology



# Initial Findings of HF Use in Other Industries

- Queried “hydrofluoric acid” from SCAQMD permit universe 2011–2017
- Forty-nine active facilities using HF
  - Various types of business
    - Metal plating and metal finishing
    - Manufacturing (aerospace, semiconductor, anodizing, optical components, electric lighting, etc.)
    - Testing facilities
  - HF used alone or mixed with other acids (e.g., nitric acid)
  - HF concentrations range from 2% to 49%
  - Lower volume usage (e.g., 5 gallons/month)
  - Unheated and air sparged

# Summary of Rulemaking Progress (cont'd)

- Exploring two mitigation approaches
  - Regulatory approach; or
  - Memorandum of Understanding (MOU)
- MOU mitigation concepts can be designed for each refinery
- Need for public process or CEQA compliance
- Continuing to propose mitigation
- Reviewing proposed safety enhancement mitigation from TORC

# Estimated Timeline for PR 1410 and MOU with CEQA

| Required Action Items PR 1410 | MOU with CEQA Process | Estimated Timeline |
|---|---|---|
| Refinery Committee | | September 22, 2018 |
| Send Draft Mitigation Measures To HF Expert Consultants | | Late-September 2018 |
| Release of 1st Draft of PR 1410 | Release of 1st Draft of MOU | Late-October 2018 |
| CEQA Notice of Preparation/Initial Study (NOP/IS) | | November 2018 |
| CEQA Scoping Meeting | | December 2018 |
| Working Group Meeting #9 | | December 2018 |
| Prepare/Release Draft Environmental Impact Report (DEIR) | | January/February 2019 |
| Release 2nd Draft of PR 1410 | Release 2nd Draft of MOU | March 2019 |
| Working Group Meeting #10 | | March 2019 |
| Public Workshop | | April 2019 |
| Circulate Socioeconomic Impact Assessment | | April 2019 |
| Refinery Committee | | End of April 2019 |
| 30 day Public Hearing Notice | Notification of MOU Signing | End of April 2019 |
| Finalize 30 day package – 3rd Draft Rule | Release of 3rd Draft of MOU | May 2019 |
| Set Hearing | | May 2019 |
| Public Hearing | Sign Final MOU | June 2019 |
| **Total Months** | | **9 Months** |

# Estimated Timeline for PR 1410 and MOU without CEQA

| Required Action Items PR 1410 | Estimated Timeline | MOU without CEQA or Socioeconomic Analysis | Estimated Timeline |
|---|---|---|---|
| Refinery Committee | September 22, 2018 | Refinery Committee | September 22, 2018 |
| Send Preliminary Draft Rule Language To HF Expert Consultants | Late-September 2018 | Send Draft Mitigation Measures To HF Expert Consultants | Late-September 2018 |
| Release of 1st Draft of PR 1410 | Late-October 2018 | Release of 1st Draft of MOU | Late-October 2018 |
| CEQA Notice of Preparation/Initial Study (NOP/IS) | November 2018 | | |
| CEQA Scoping Meeting | December 2018 | | |
| Working Group Meeting #9 | December 2018 | Working Group Meeting #9 | November 2018 |
| Prepare/Release Draft Environmental Impact Report (DEIR) | January/February 2019 | | |
| Release 2nd Draft of PR 1410 | March 2019 | Release 2nd Draft of MOU | December 2018 |
| Working Group Meeting #10 | March 2019 | Working Group Meeting #10 | December 2018 |
| Public Workshop | April 2019 | Public Workshop | January 2019 |
| Circulate Socioeconomic Impact Assessment | April 2019 | | |
| Refinery Committee | End of April 2019 | Refinery Committee | February 2019 |
| 30 day Public Hearing Notice | End of April 2019 | Notification of MOU Signing | February 2019 |
| Finalize 30 day package – 3rd Draft Rule | May 2019 | Release of 3rd Draft of MOU | February 2019 |
| Set Hearing | May 2019 | | |
| Public Hearing | June 2019 | Sign Final MOU | March 2019 |
| **Total Months** | **9 Months** | | **6 Months** |

# Proposed Mitigation

# Guiding Principles for Mitigation Requirements

- Improve early detection of an MHF leak
  - Enhancement of existing mitigation
  - Addition to existing mitigation
- Decrease reaction time to activate mitigation measures
  - More automation
- Protect alkylation unit from external impacts
- Multi-faceted approach to address large consequential release of MHF that could lead to off-site impacts
  - Series of water mitigation systems
- Expeditious implementation schedule

# Overview of Proposed Mitigation Implementation Schedule

## On or before July 1, 2019

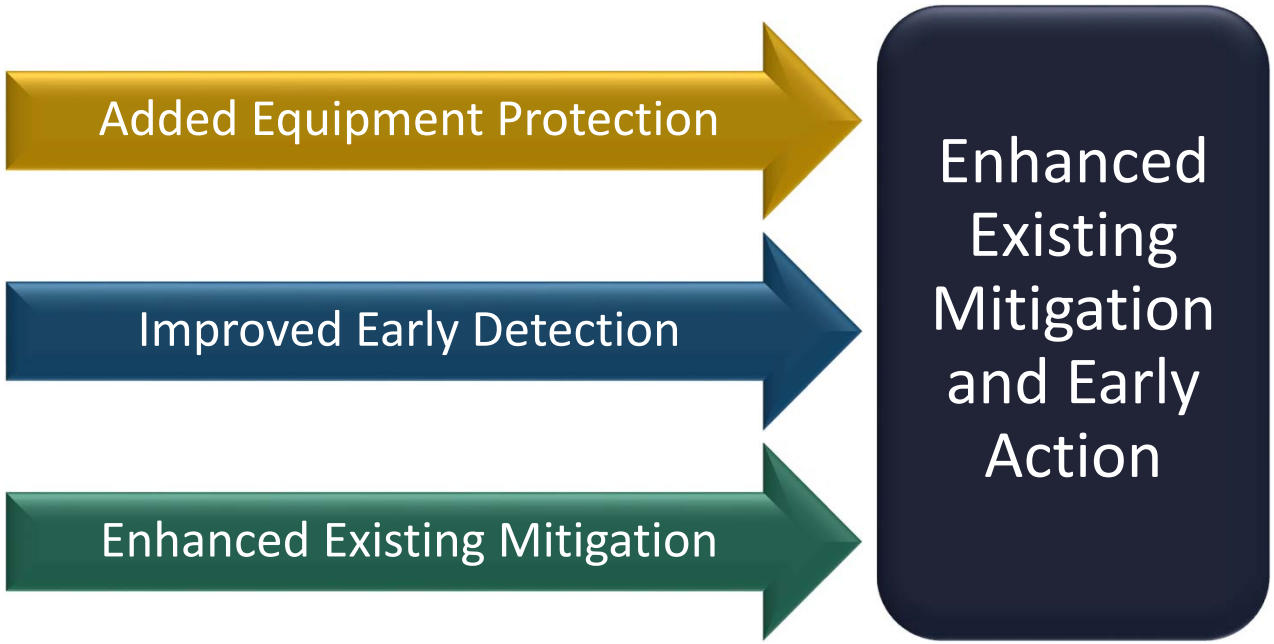
- Physical barriers
  - Enclosed catch basin
  - Protection barrier
- HF point sensors/open-path monitors
- HF paint
- Video surveillance cameras
- Acid evacuation system
- Emergency isolation block valves
- Pressure monitors
- Additive concentrations
- Seismic upgrade

## On or before January 1, 2020

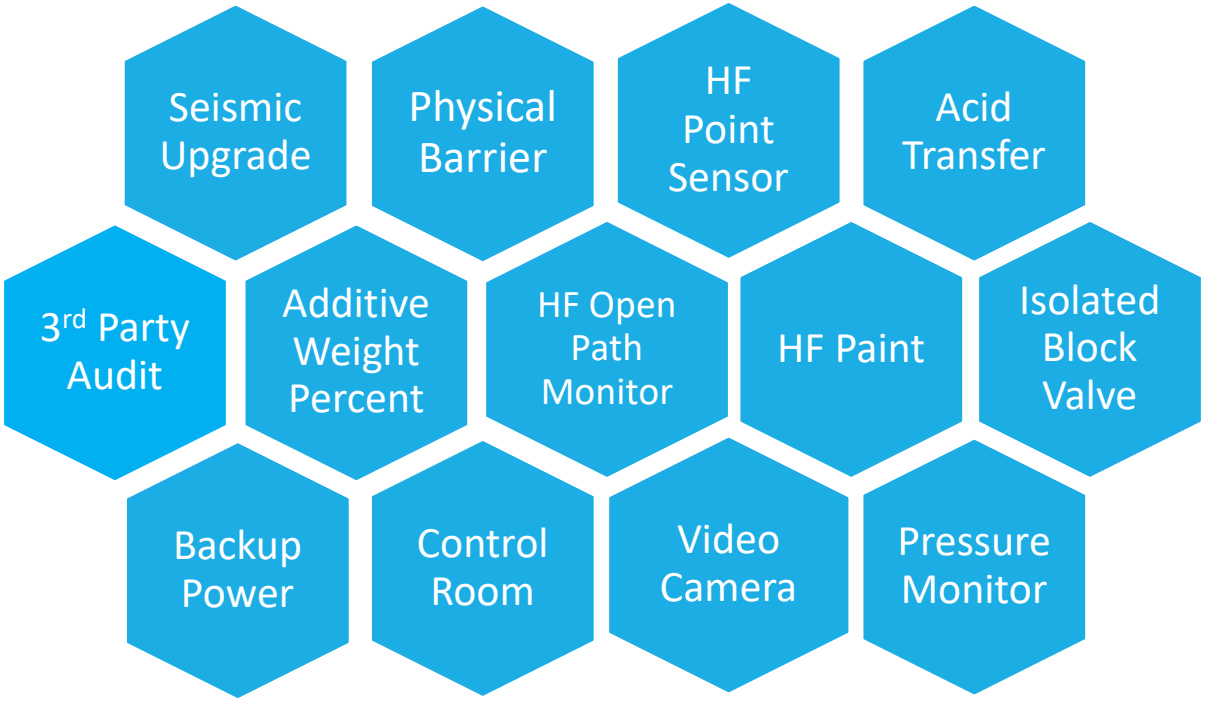
- Water deluge on pumps
  - Automated at 10 ppm leak
- Steel enclosure around acid settler integrated with:
  - Water cannons
  - Water spray curtains
- Acid evacuation simultaneously with water mitigation
- Increase water to HF ratio (60 to 1)

# Proposed Mitigation on or before July 1, 2019 (2019 Mitigation)

# Key Elements of 2019 Mitigation



# Components of 2019 Mitigation



# Physical Barrier Requirements

## Vapor barriers

- Acid settler belly pan / Acid cooler diffuser
- Acid circulation pump enclosure / Seal-less pump

## Enclosed catch basin

- Catch acid drain from acid settler pans and flange shrouds

## Protection barrier

- Alkylation unit equipment not visible off-site (e.g., wall, landscape)

# HF Point Sensor, Open-Path Monitor and Sensitive Paint Requirements


## HF point sensor

- In and outside acid containment system
- Multiple elevations
- At least 3 sensors per equipment (acid settler, storage, etc.)

## HF open-path monitor

- In and outside acid containment system
- Multiple elevations
- Link to automatic water mitigation systems

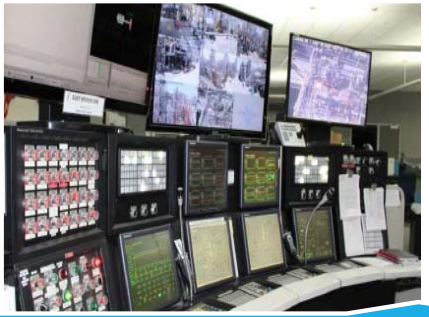
## HF sensitive paint

- Reapply every six months
- Inspect weekly
- Reapply in two days upon observation of discoloration

# Surveillance Camera and Control Room Requirements

## Video camera

- High definition day and night vision video
- Dedicate to equipment (settler, storage) and HF unloading area
- At a distance from alkylation unit in case alkylation unit is compromised



## Control room

- Dedicate to equipment (settler, storage) and HF unloading area
- Each screen clearly marked on viewing areas
- No more than 3 camera feeds per screen

# Acid Evacuation System, Emergency Isolation Block Valve, and Pressure Monitor Requirements

## Acid evacuation system

- De-inventory less than 10 minutes
- Storage must be sufficient to hold all liquids in settler
- Operate simultaneously with water mitigation

## Emergency isolation block valve

- Remotely operated
- Effective isolation of inventory with no overpressure

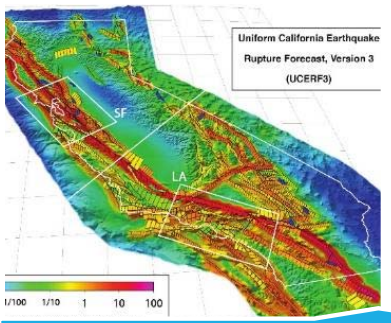

## Pressure monitor

- Monitor pressure levels in acid settler, acid cooler, and fresh HF storage vessel

# Alkylation Unit Additive Concentration, Seismic Upgrade, Backup Power Supply Requirements

## Additive concentration

- 8.0 wt% in acid settler & 15.0 wt% in fresh HF storage at a given time
- Measure 2 times a day acid, additive and water concentrations




## Seismic upgrade

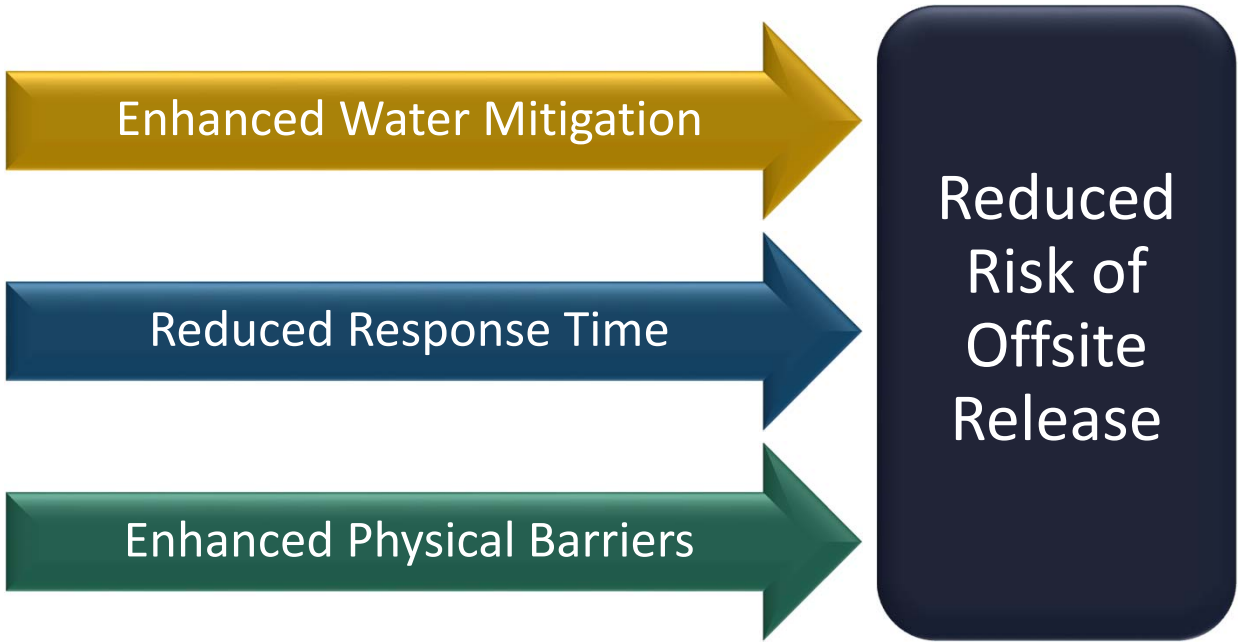
- Facility-specific seismic upgrade of structures in acid service area
- Latest International Building Code


## Backup power supply

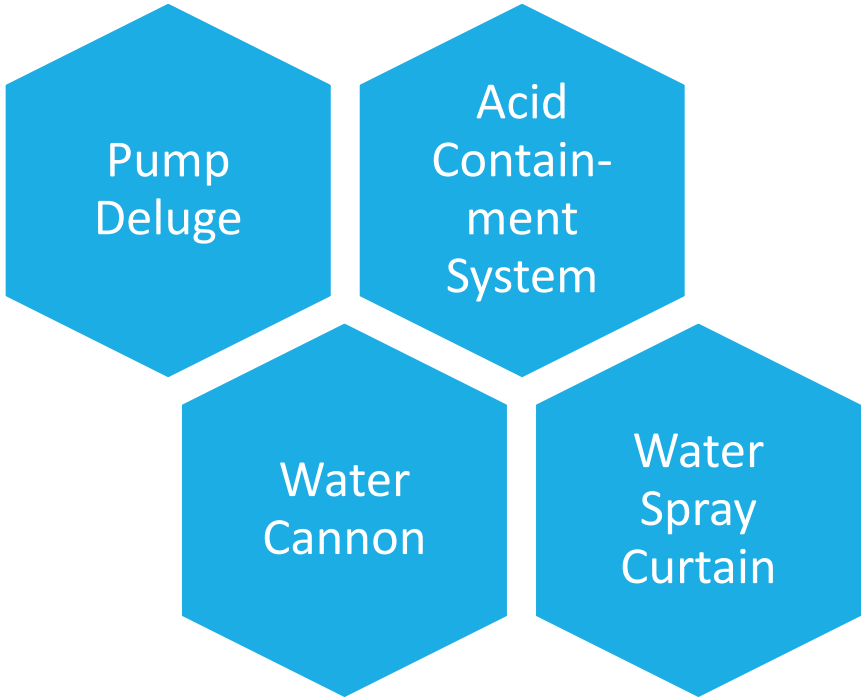
- Redundant backup power supply for all devices requiring power
- Uninterruptible operation in the event of a power disruption

# Proposed Mitigation on or before January 1, 2020 (2020 Mitigation)

# Key Elements of 2020 Mitigation



# Components of 2020 Mitigation



# Water Mitigation Requirements

## Pump Deluge

- Mitigate any release
- Audible and visual alarm with point sensor detection
- Automated activation at HF level of 10 ppm

## Water Cannon

- Break HF release jet momentum
- Provide enough gas to liquid contact area
- In and outside acid containment system

## Water Spray Curtain

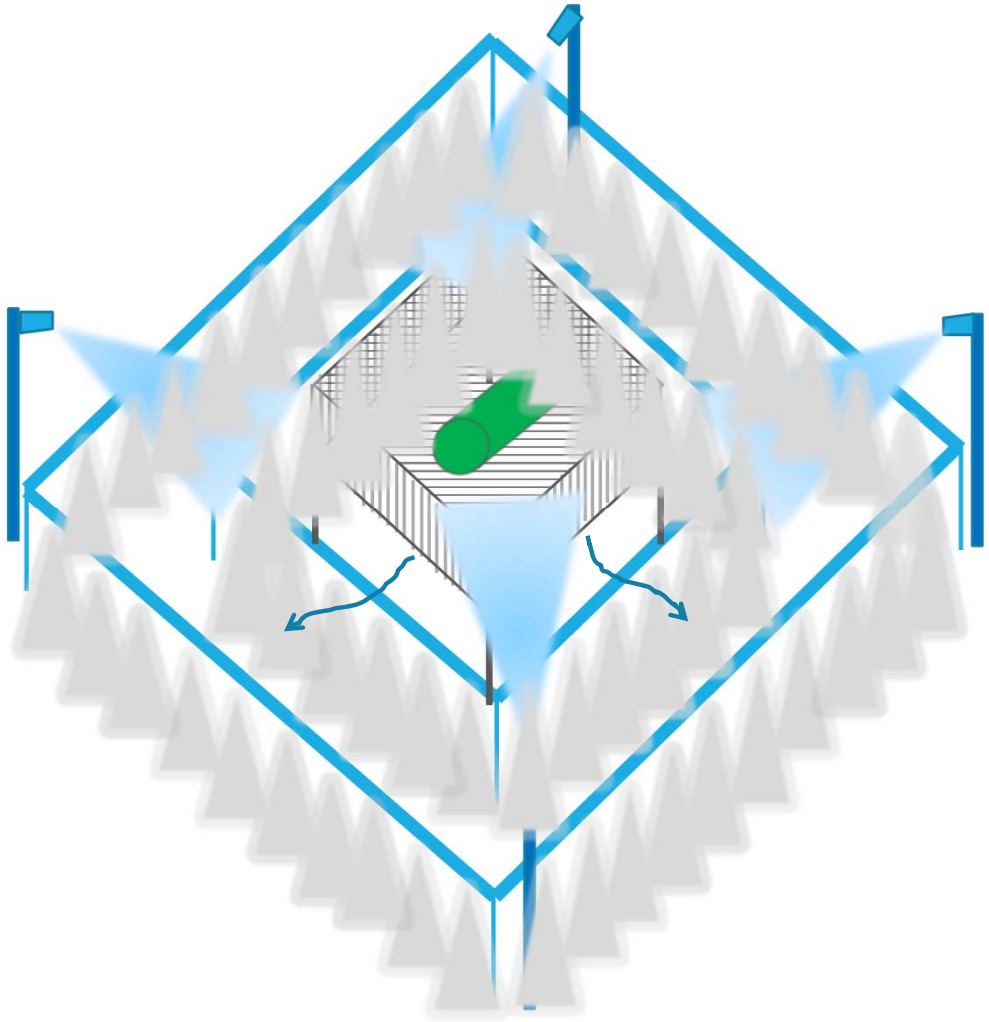
- Series of water spray curtains
- In and outside acid containment system
- Around storage vessel and HF unloading area

# Acid Containment System Requirements

- Objective is to reduce release momentum and to increase effectiveness of water mitigation
- Facility-specific steel enclosure around acid settler
- Two possible types:
  - Box type
    - Rooftop and four sides with ground clearance
    - Video cameras, series of water spray curtains and water cannons in and outside the enclosure
  - Wind tunnel type
    - Rooftop and three sides with no ground clearance and one opened side
    - Video cameras, water cannons and series of water spray curtains in and outside the enclosure

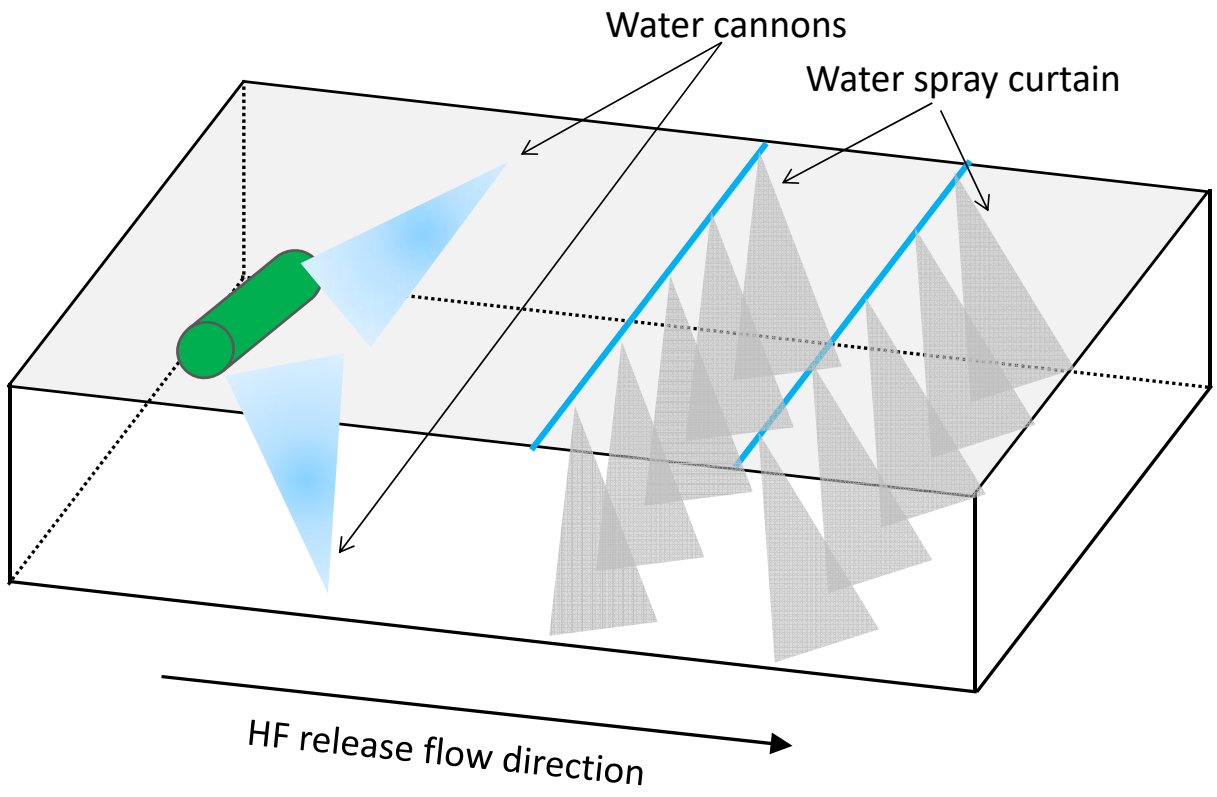
# Example 1:
# Box Type

| Mitigation Equipment | Containment System | |
|---|---|---|
| | Inside | Outside |
| HF Point Sensors | ✓ | ✓ |
| HF Open-path Monitors | ✓ | ✓ |
| Water Cannons | ✓ | ✓ |
| Water Spray Curtains | ✓ | ✓ |
| Video Cameras | ✓ | ✓ |



# Example 2:
# Wind Tunnel Type

| Mitigation Equipment | Containment System | |
|---|---|---|
| | Inside | Outside |
| HF Point Sensors | ✓ | ✓ |
| HF Open-path Monitors | ✓ | ✓ |
| Water Cannons | ✓ | ✓ |
| Water Spray Curtains | ✓ | |
| Video Cameras | ✓ | ✓ |



# Design Parameters of Water Spray Curtains

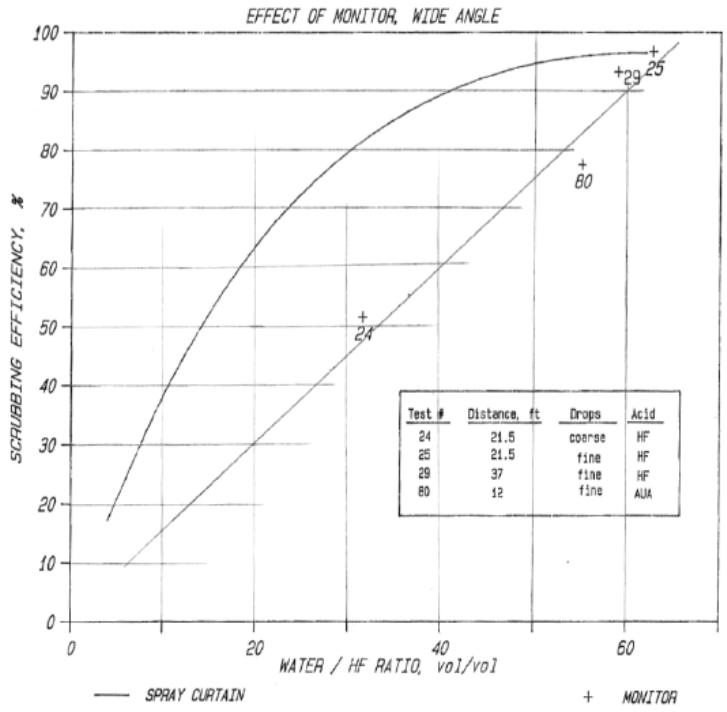
- Spray downward perpendicular to the horizontal flow of the hydrogen fluoride release
- Appropriate height of the curtain to prevent the HF cloud from going over the curtain
- Fine water droplets but large enough to remain stable against winds
- More than one water spray curtains covering a large distance from the high inventory HF acid settler
- Enough water to HF ratio in excess of 60 to 1
- Can design to activate spray nozzles only in the downwind path
- Activate simultaneously with water cannons when acid evacuation system is operated

# Design Parameters of Water Cannons

- Enough nozzle pressure to break release momentum
- Enough water to effectively mitigate
- One or more cannons dedicated at each corner
- Located at a higher elevation to capture release and provide no gap in the continuity of water wall
- Fully adjustable to aim and shoot at any potential release path
- Activate simultaneously with water spray curtains when acid evacuation system is operated

# Basis for 60 to 1 Water Mitigation Ratio

- HF is 100% water-soluble
- With a water to HF ratio of 60 to 1, water sprays were 95% effective at removing HF
- The 60 to 1 ratio may not be achieved immediately after release due to large initial mass release rate
  - Maintain water mitigation longer than release time




(Source: Schatz and Koopman, 1990 – Hawk Series Test)

# How Much of Water Is Needed?

- Example of an HF Release:
  - 470 gallons/minute from acid settler and storage *(based on Goldfish Test 1)*
  - 200 gallons/minute from others

| HF Release Rate Assumed (GPM) | Water to HF Ratio Needed | Water Release Rate Calculated (GPM) | Mitigation Duration (Minutes) | Total Water Needed (Gallons) |
|---|---|---|---|---|
| 470 | 60 to 1 | 28,200 | 10 | 282,000 |
| 200 | 60 to 1 | 12,000 | 10 | 120,000 |

- Need water storage, delivery system, and backup power for pumps

# Notification Requirements

# Guiding Principles for Notification Requirements

- Provide responsible parties advanced warnings
- Ensure necessary action is implemented as soon as possible
- Report HF leak or release to SCAQMD
- Provide a prompt warning to impacted neighborhoods for a potential release of HF
- Synchronize with emergency community alert system

# Automatic Notifications to SCAQMD and Community Alert

## HF point sensor

- 2 ppm internal
- 6 ppm SCAQMD

## HF open-path monitor

- 10 ppm-m internal
- 20 ppm-m SCAQMD
- 30 ppm-m at fence line for alert to community

# Emergency Response Requirements

# Guiding Principles for Emergency Response Requirements

- Establish an organizational structure and procedures for public response to HF release that may affect community and businesses
- Alert impacted neighborhoods
- Assist neighborhoods to evacuate as quickly as possible and move to shelter in place if needed
- Coordinate with emergency responders and local hospitals to have sufficient supplies of calcium gluconate

# Emergency Response Requirements

- Develop an emergency community alert system
  - Short text messaging, e-mail notifications, community radio and television channels
- Establish and maintain temporary, public shelter-in-place within 3 miles in radius
- Develop an evacuation plan for community (incl. shelter-in-place drills)
- Distribute practical instructions for the event of an actual release
  - Flyer, demonstration and training video
  - Available on refinery's website
- Distribute sufficient supplies of calcium gluconate gel and nebulizers in shelter and hospitals near the refinery

# Demonstration and Training Video

- Shelter-in-place location; more than one, if needed
- Signals for entering and leaving the shelter
- Steps to secure shelter from HF intrusion
  - Heating, Ventilation, and Air Conditioning (HVAC) shutdown, positive pressure, sealing of doors and windows
- List of equipment to be maintained on site
  - Communication equipment, materials for securing the shelter
- Process to ensure proper maintenance of the equipment
- Checklist for shelter-in-place drills

# Long-Term Phase-Out: Alternative Option

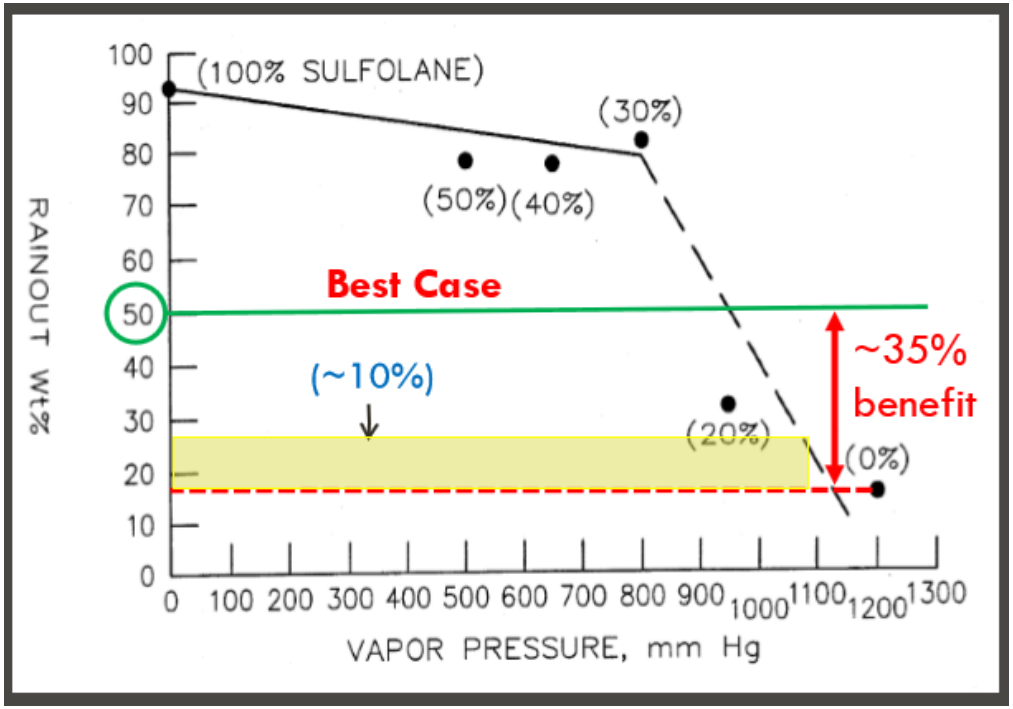
# Long-Term Phase-Out Alternative

Refinery Committee directed staff to develop mitigation measures

- Refinery Committee did not dismiss potential phase-out
- Alternative catalyst technology is available

# Why Consider Long-Term Phase-Out:

- HF reduction benefits offered by MHF are relatively small
- A large release of MHF from acid settlers could be potentially catastrophic




*(Source: January 20, 2018 Refinery Committee staff presentation)*

# What We Know and Do Not Know about MHF

- Facts
  - No field or laboratory test on similar conditions (temperature, pressure and MHF concentration) at refineries
  - API 751 says MHF is one of many mitigation measures for HF
- In the absence of data on actual behavior of MHF, assumed behavior similar to HF
  - Responsibility of the refineries to demonstrate behavior of MHF
- Still an extremely hazardous material and need to protect workers from exposure

# Why Consider Long-Term Phase-Out: (cont'd)

- Chevron's Salt Lake City Refinery is scheduled to operate a new alkylation unit in 2020 with ionic liquid catalyst
  - If successful, will be achieved in practice
  - Staff could conduct a technology assessment including a site visit

# Why Consider Long-Term Phase-Out: (cont'd)

- Potential long-term phase-out could be extended to 12 years

| | Alternative Catalyst Technology |
|---|---|
| Start Date | 2019 |
| Engineering | 12 months |
| Design & CEQA (concurrent) | 18 months |
| Permitting | 12 months |
| Logistics | 12 months |
| Order/Delivery/Installation | 18 months |
| Testing | 72 months* |
| Full Commissioning | 2031 |

** Consideration of turnaround schedule and process optimization/tune-up period*

# Next Steps

# Schedule

| Activity | Current Target Date |
|---|---|
| Refinery Committee Meeting | September 22, 2018 |
| Release 1st Draft of PR 1410 | Late-October 2018 |
| CEQA Notice of Preparation/Initial Study | November 2018 |
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| Public Workshop | April 2019 |
| Public Hearing | June 2019 |

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