



MHF Alkylation Safe Operations at the Torrance Refinery

AQMD Refinery
Committee Meeting
June 22, 2019

Agenda

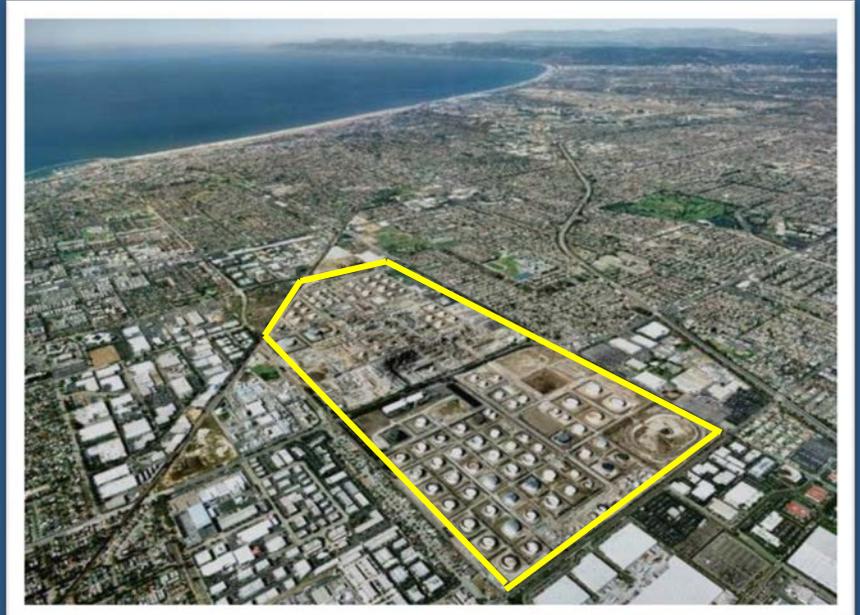
- A Safe, Proven Technology
- Lack of Proven or Reasonable Alternative Technologies
- Existing Mitigation Systems
- Proposed Enhanced Mitigation Systems
- Conservative Performance Standard
- A Sustainable Future



Torrance Refinery

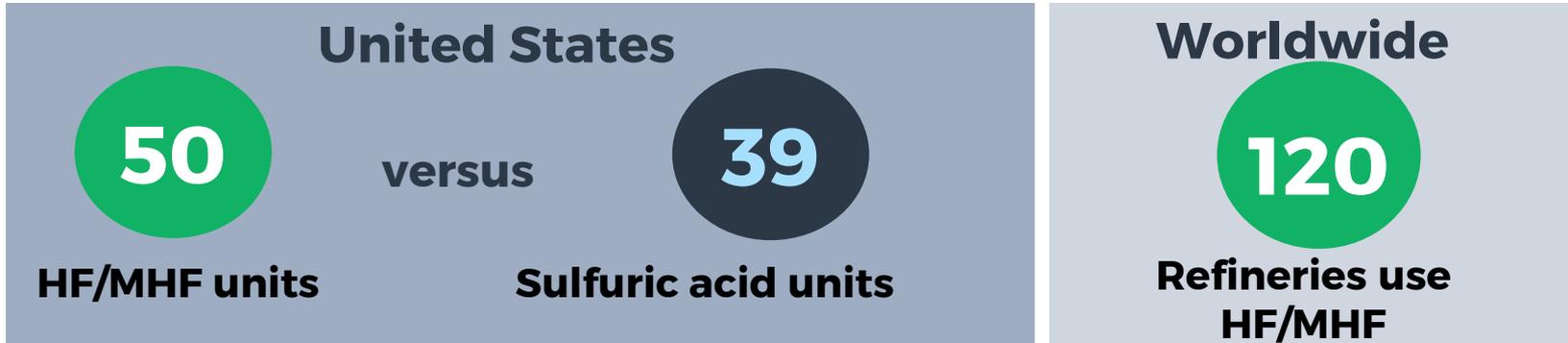


- Community member since 1929, celebrating our 90th anniversary
- Dedicated public partner devoted to earning the right to operate in our neighborhood
- Primary company goal is to always ensure the safety of workers and our community
- We have been working cooperatively with staff for over two years as part of the PR 1410 process and are excited to move this towards a positive, technically justified conclusion



A Proven Technology

- Hydrofluoric acid (HF) was developed in the 1700's and has been used in manufacturing for over **250 years**
- Refineries represent less than  of the global use of HF in manufacturing industries
- HF/MHF technology is the **predominant alkylation technology** used in the United States and throughout the world



- Experience allows for robust and detailed technical understanding of all aspects of MHF systems and mitigations, ensuring stout, methodical designs and standards

MHF is still the newest, proven alkylation technology

A Phase-out Is Not Justified

- Only alternate proven technology is Sulfuric Acid
- Sulfuric acid units are three times larger than HF/MHF units and would:
 - Increase emissions due to required regeneration and incineration process
 - Consume more energy
 - Have a larger GHG footprint
 - Significantly increase truck traffic
- Per the finding of a LA Superior Court Judge, MHF technology with mitigations is as safe or safer than sulfuric acid for Torrance
- No refinery has even switched from one technology to the other
- Alternate technologies are not commercially viable



Safe Operating History

- There **has never been an offsite fatality** resulting from a release of HF/MHF in the history of refining alkylation operations
- Neither MHF alkylation unit in California has ever experienced an offsite release of HF in **over 100 combined years** of operation
- The Torrance MHF Unit is strictly regulated and operated **consistent with multiple mandates and standards**, including:
 - 📋 Cal/OSHA Process Safety Management (PSM)
 - 📋 CalARP Program Four RMP
 - 📋 EPA Risk Management Program
 - 📋 American Petroleum Industry's Recommended Practice 751, Safe Operation of Hydrofluoric Acid Alkylation Units (API RP-751)



History of MHF Technology

Torrance Refinery implemented MHF under the mandate of a L.A. Superior Court Judge

The 1995 Consent Decree found that MHF, with applied mitigation systems, **was as safe or safer than sulfuric acid alkylation at Torrance**

- ✓ Finding was based on extensive testing showing that MHF provided a substantial benefit and additional safety factor over traditional HF units

AQMD permitted the construction of the MHF unit in 1996

Torrance Refinery has been safely operating the MHF unit since 1997 as required by the Consent Decree, under the agreement with the City of Torrance

The safety of Torrance's MHF unit and its associated system integrity is highly regulated by the City of Torrance, Cal/OSHA and EPA, among other agencies



Proven Mitigation Systems

- The Torrance MHF Alkylation Unit utilizes world-class layered mitigation systems
- Specifically tailored and detailed programs ensure process fluids stay in the pipes
- Mitigation systems have proven extremely effective in preventing potential releases and mitigating issues when they are small to ensure large incidents cannot occur
- Existing systems include:
 - Modified HF Acid
 - Field personnel in direct contact with Console Supervisor
 - Surveillance cameras with video playback
 - Emergency simulation drills
 - Barrier Technology
 - Dozens of point and line of site laser sensors
 - Acid Evacuation System
 - Acid Detecting Paint
 - Alarmed Safety Showers
 - Remote operated water mitigation cannons
 - Multiple local water mitigation options



Mechanical Integrity Programs

The MHF Alkylation unit, as with all refinery units, is designed to meet or exceed stringent mechanical integrity standards



Fundamental mechanical principles combined with robust mechanical integrity programs limit potential for a large release

- Leaks can occur due to predictable corrosion or erosion factors
 - ✓ Follow the “**leak before break**” principle
 - ✓ Potential leaks points are monitored and mitigated
- “**Bend before shear**” principle makes shearing of nozzles or small bore piping unlikely



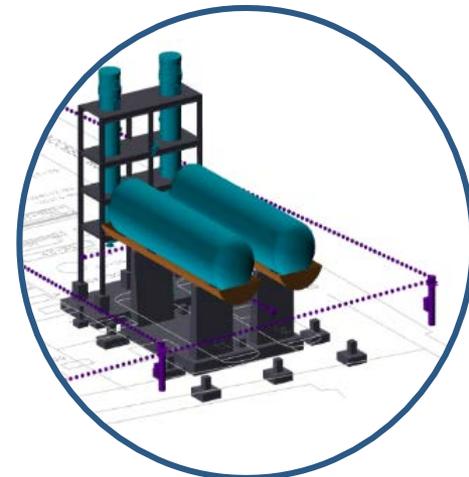
CalARP seismic design requirements, inherent tensile strength, and flexibility of refinery bolting and piping mitigate earthquake risk

- Torrance Refinery has survived large scale events such as Sylmar and Northridge with no impact
- AQMD USGS expert stated that through best practices and good engineering, hazards can be effectively mitigated

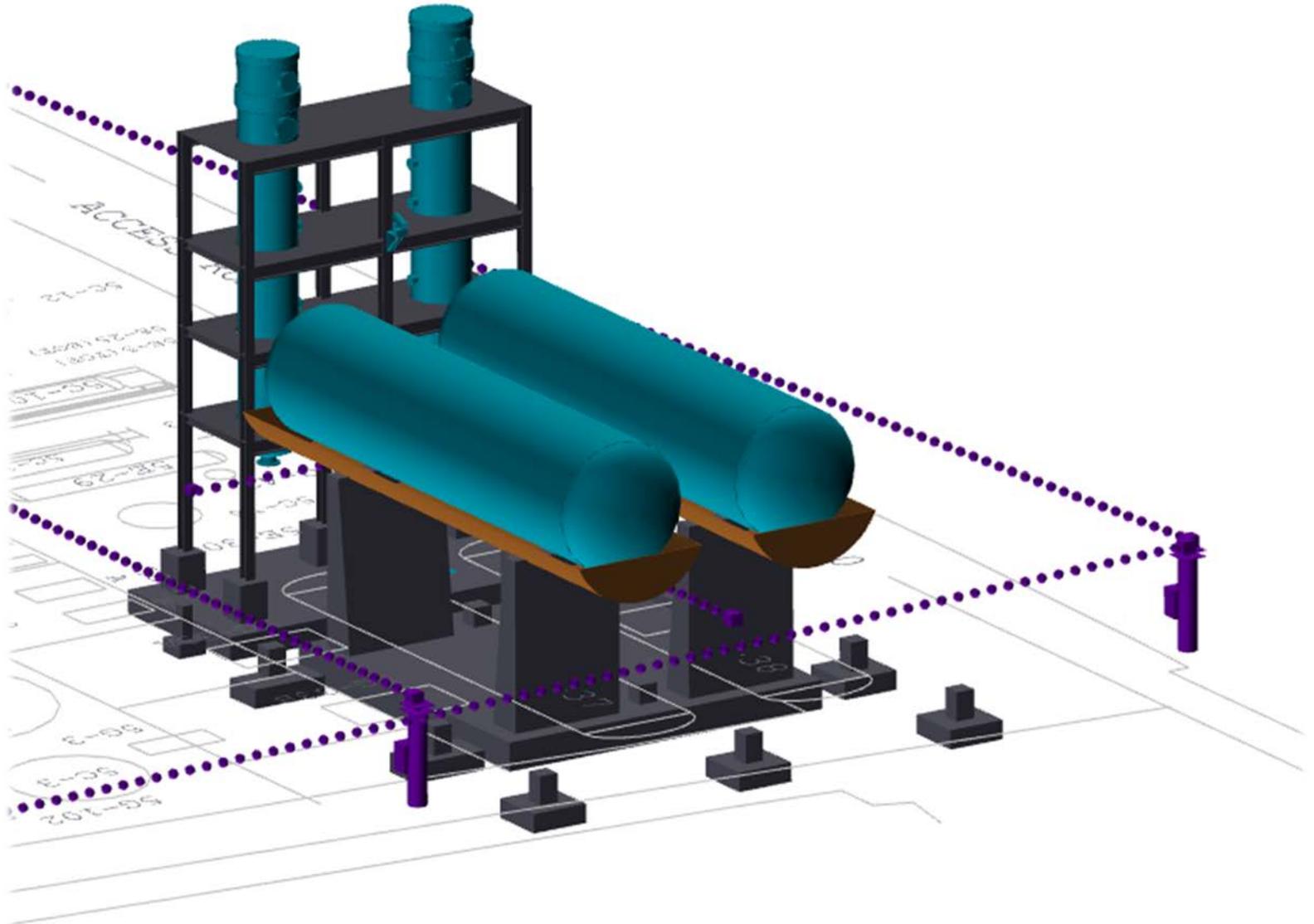
Enhanced Mitigation Systems

Torrance is willing to install additional enhanced mitigation systems to reduce risk and further protect workers and the community

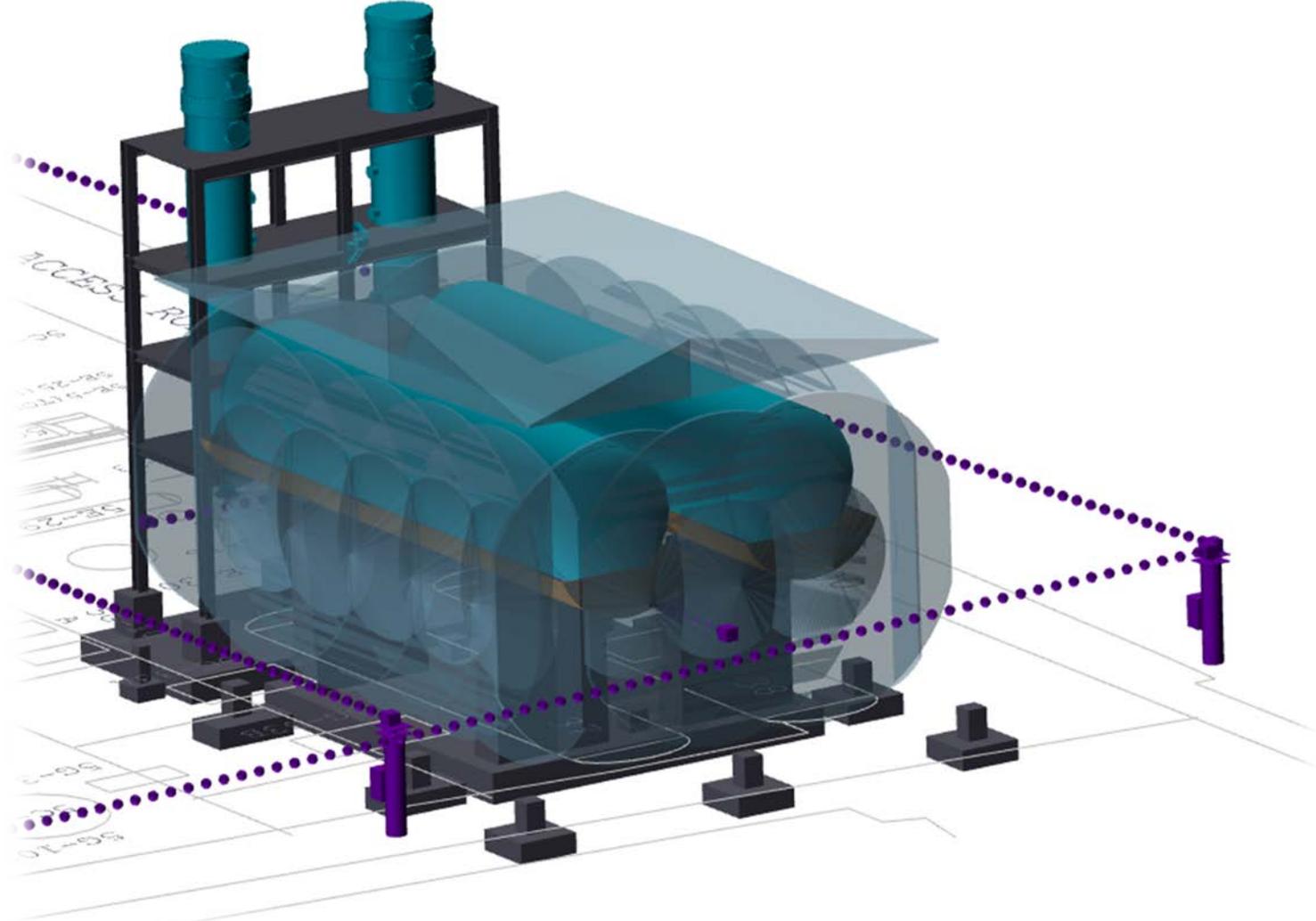
- Systems would be designed to protect large acid volumes from external impacts and automatically apply copious volumes of water on any release
- **Potential Enhanced Mitigation measures would include:**
 - Steel structure over and around acid settlers
 - Two new automated water systems that would supply water in excess of a 60/1 ratio for a substantial release scenario
 - New laser detection capability to allow automation of enhanced water systems
 - New high definition camera for visual detection



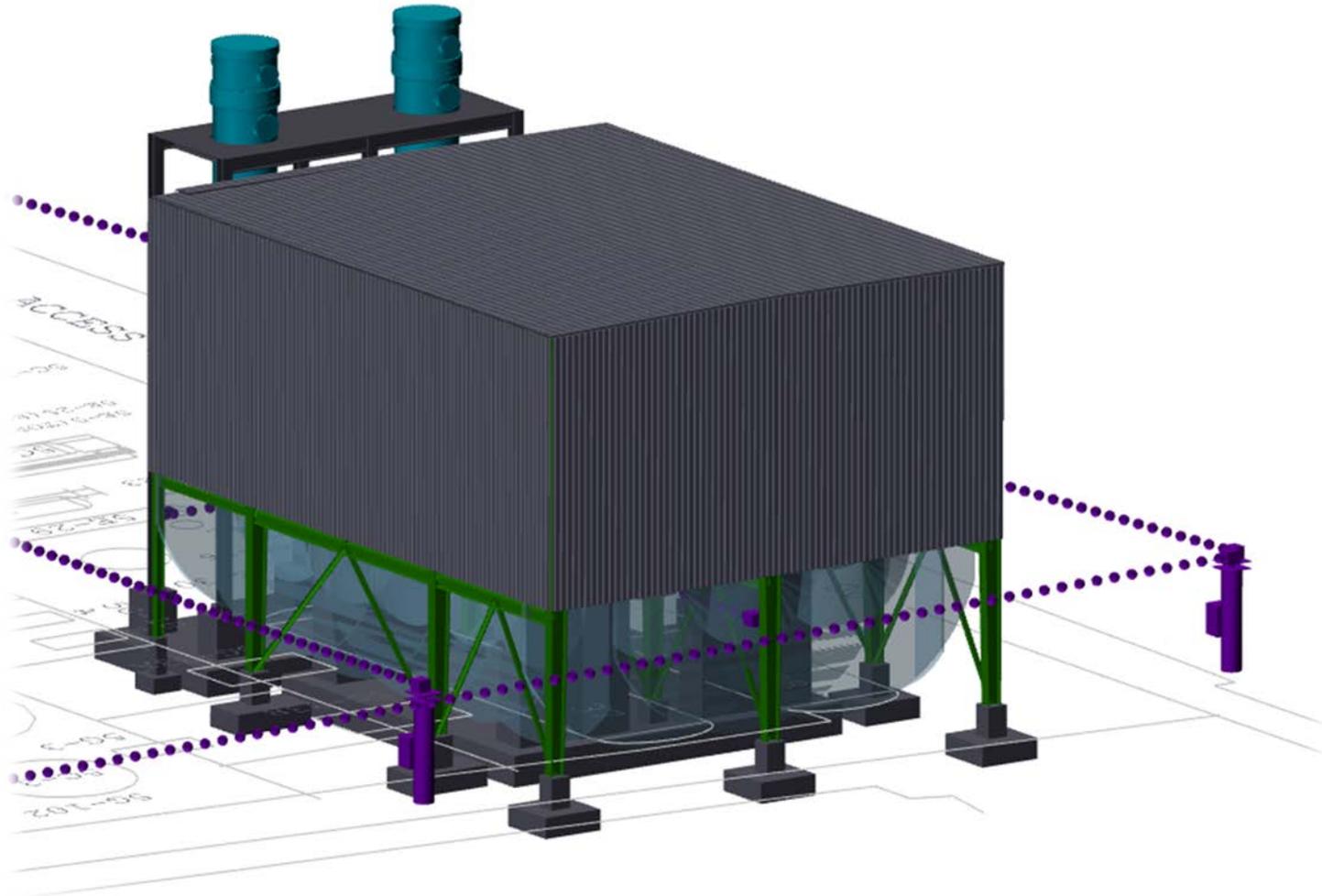
Enhanced Mitigation Systems



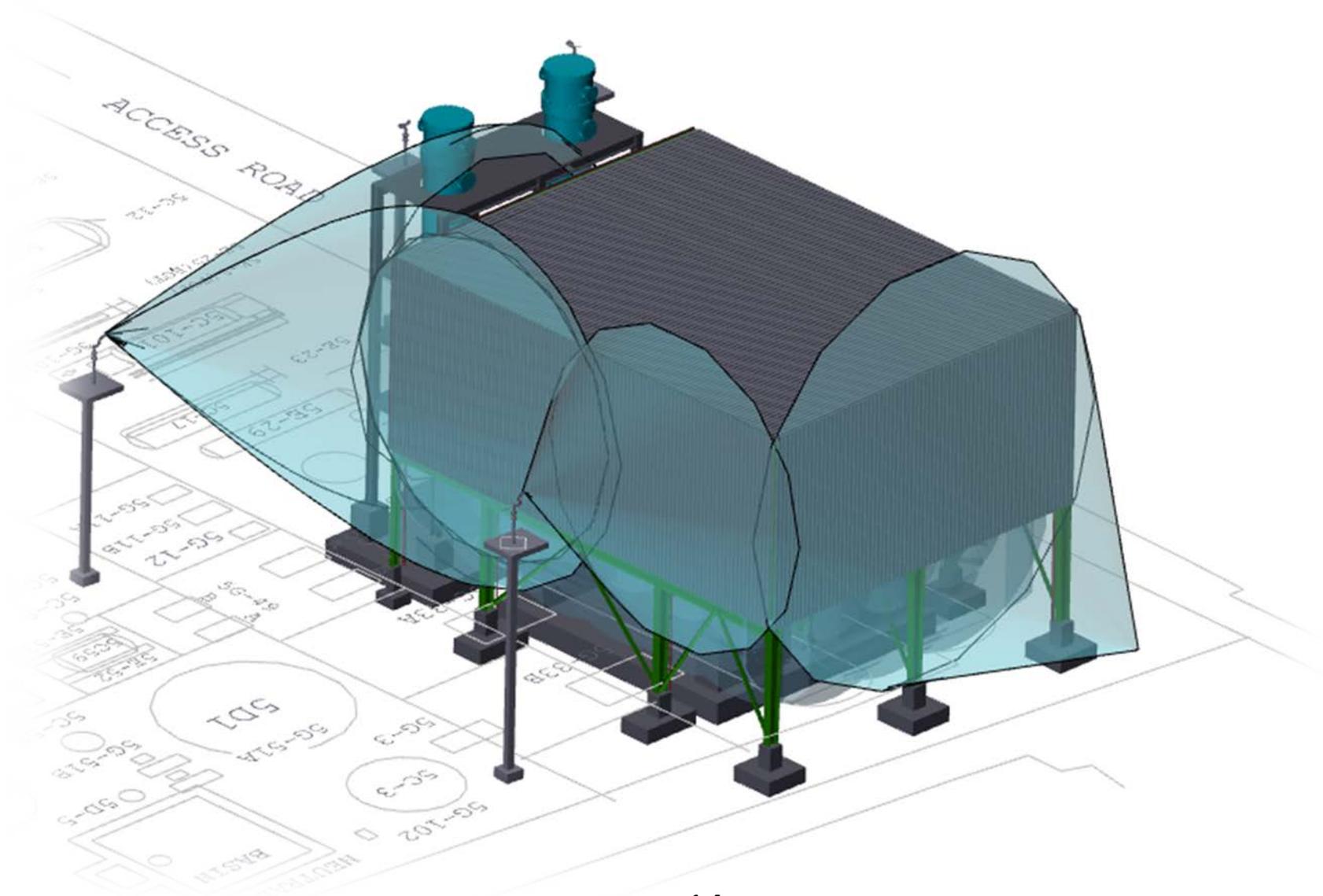
Enhanced Mitigation Systems



Enhanced Mitigation Systems

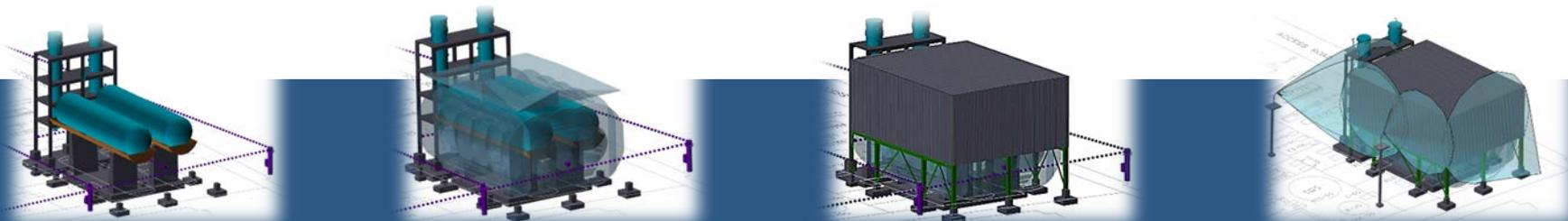


Enhanced Mitigation Systems



Enhanced Mitigation Systems Efficiency

- The proposed enhanced mitigation systems would provide **100%** mitigation for large, credible releases
- The proposed structure, in tandem with the existing barrier systems, will ensure break-up of any jet momentum and allow 100% contact with the water mitigation systems
 - MHF chemistry and the presence of barriers will provide substantial liquid rainout of HF
- The first and second stage water will provide greater than a **60/1 water to HF ratio** for the remaining vapor fraction
 - This provides > 95% scrubbing efficiency of the released volume, ensuring minimal potential dispersion
 - The existing Acid Evacuation System will quickly remove the release driver while the water is mitigating the release
- These combined systems will allow the refinery to ensure compliance with a stringent performance standard



Performance Standard

- Torrance already meets a stringent performance standard as required under the Consent Decree with the City of Torrance
 - This is a health protective standard designed to minimize any impact to the community
- The Refinery is prepared to demonstrate an even more health protective standard with the AQMD using an extremely conservative, consequence based approach
 - A permanent residential receptor is a necessary consideration for such modeling scenarios
- Willing to assume extremely conservative assumptions for:
 - MHF Rainout benefit
 - Large release size (1")
 - Multiple high-consequence yet improbable scenarios
- Modeling to a time-averaged 10 minute AEGL-3 health protective standard will ensure community safety and reduce risk well below that of dozens of everyday activities



A Sustainable Future

- A phase-out of MHF is not scientifically or technically justified
- We have proven that our existing world class mitigation systems are effective in allowing us to safely operate the MHF unit at Torrance
 - We have operated over 50 years with no offsite HF release
 - This proven safe operation is not based on luck, but on the detailed, technically grounded layered mitigation systems and highly trained operations personnel
- Torrance Refinery is ready to enter into a Memorandum of Understanding (MOU) and install additional safety enhancements with appropriate design criteria
- We need closure to move forward with the implementation of our proposed world class safety enhancements for the benefit of the community and our workers
- A MOU between the SCAQMD and Torrance Refinery presents a **WINNING SOLUTION** for everyone

