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VIA E-MAIL: pfine@aqmd.gov

August 1, 2017

Philip Fine, Ph.D
Assistant Deputy Executive Officer
Planning and Rules
South Coast Air Quality Management District
21865 Copley Drive
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Re: **Comments on South Coast Air Quality Management District's July 28, 2017 Presentation for the Proposed Rule 1410 Fourth Working Group Meeting**

Dear Dr. Fine,

Torrance Refining Company LLC ("TORC") is very disappointed and concerned with the release of the July 28, 2017 South Coast Air Quality Management District's (the "District") presentation for the fourth Working Group meeting on August 2, 2017 related to Proposed Rule 1410, Hydrogen Fluoride Storage and Use at Petroleum Refineries ("PR 1410"). For months TORC has been meeting and working collaboratively with District staff to provide them with voluminous testing results, technical analysis, and modeling data related to modified Hydrofluoric Acid ("MHF").

In fact, TORC recently met with the District on June 28, 2017 to discuss the MHF testing data, Airborne Reduction Factor ("ARF"), and Rainout Model. Based on this meeting, the District requested additional information regarding testing data specific to Torrance Refinery's MHF Alkylation Unit operating conditions, how the Rainout Model works, and additional Rainout Model runs. As a result, TORC has been working towards providing the District responses to its questions from the meeting. Never in this meeting or in other meetings or conversations did the District give any indication that it would be forging ahead with a PR 1410 conceptual framework prior to giving TORC an opportunity to respond to questions from the District related to MHF testing results, technical analysis, and modeling data.

Unfortunately, without the benefit of this information, which will further substantiate the efficacy of MHF, the District chose on a Friday night, July 28th, days before the fourth Working Group meeting scheduled for August 2nd, to post a presentation entitled "PR 1410 Working Group Meeting #4." This document prematurely concludes "[b]ased on information received to date, insufficient evidence that a dense vapor cloud does not form" from a potential release of MHF" and that a "phase-out of the use of HF is a preemptive measure to prevent an air pollution episode" is alleged to be warranted.

This premature position is hard to reconcile with the voluminous MHF testing results, technical analysis, and modeling data provided to the District to date, which was the basis of a decision by a well-respected Los Angeles Superior Court Judge approving MHF technology finding it as safe as

and possibly safer than Sulfuric Acid under the City of Torrance Consent Decree. It also contradicts the District's own prior conclusions regarding the use of the exact same technology. For example, in 2003, the District issued a press release announcing an "enforceable agreement" with Valero to phase-out the Wilmington Refinery's use of HF with MHF by 2006.

In the press release, the District states:

> "Once this refinery stops using concentrated hydrogen fluoride, we will have virtually eliminated the potential for a catastrophic accidental release of this compound in our region," said Barry Wallerstein, executive officer of the South Coast Air Quality Management District."
>
> "The agreement fulfils one of the 23 Environmental Justice goals adopted by AQMD's Governing Board last fall."
>
> "Switching to modified HF will minimize the possibility of a catastrophic accidental release not only at the refinery, but along Southland transportation corridors, as the additive is added to the chemical before shipping."

See Highly Toxic Chemical to be Phased Out at Valero Refinery: SCAQMD, Feb. 7, 2003.

By endorsing and permitting Valero Wilmington's Reduced Volatility Alkylation Process (ReVAP) project, which was the project that modified the Wilmington Refinery's Alkylation Unit to use MHF under the enforceable agreement, the District further reinforced the efficacy of MHF by stating in its California Environmental Quality Act ("CEQA") Environmental Impact Report ("EIR") for the project the following about the efficacy of MHF:

> "ReVAP incorporates a suppressant in the HF that reduces volatility in the event of an accidental release with a concurrent reduction in safety risks (i.e., distance that the HF could travel and number of persons exposed) in the surrounding area. Use of this modified process meets the SCAQMD's objectives with respect to elimination of concentrated HF."

See District's Ultramar Inc. – Valero, Wilmington Refinery, Alkylation Improvement Project, Statement Of Findings, Statement Of Overriding Considerations, And Mitigation Monitoring Plan, p. 3, (SCH #20030536, December 2004).

> "An accidental release of HF could migrate off the Refinery property and expose individuals in the surrounding community. The proposed project will substantially reduce the potential hazard impacts associated with an accidental release of HF."

Id., p. 9.

> "The proprietary additive is a non-volatile, non-odorous, low toxicity material that is completely miscible in the acid phase. It has very limited affinity for other hydrocarbons, including the alkylate product and acid soluble oil (ASO) by-product, similar to the organic

> polymer produced in the current process. The unique physical properties of the additive substantially reduce the volatility of the acid at ambient conditions. This reduction in volatility proportionately reduces the amount of HF that can vaporize and subsequently disperse off-site from a given liquid release quantity. *The modified HF catalyst reduces acid vapor pressure sufficiently to suppress the usual flash atomization process of hydrofluoric acid, causing most of the acid to fall to the ground as an easily controlled liquid and reduces the potential for off-site consequences of an accidental HF release.*"

See Ultramar Inc. – Valero, Wilmington Refinery, Alkylation Improvement Project, Final EIR, Chapter 2, p. 2-7, (SCH #20030536, August 2002) (emphasis added).

This is consistent with what the District had previously concluded regarding the efficacy of MHF in its CEQA Addendum to the Torrance Refinery's MHF Alkylation Unit project. In the Addendum for the project, the District specifically noted:

> "The experimental testing indicated that the addition of the Mobil additive to HF was an effective method for reducing or elimination the amount of aerosol formed during a release. The additive is a water-soluble, thermally stable compound that is solid at ambient conditions. In addition, the health data indicate that the additive has very low toxicity and limited health impacts as compared to HF which has more severe health impacts."

See District's Addendum, Mitigated Negative Declaration, Mobil Modified Hydrogen Fluoride Conversion Project, p. 2, (July 9, 1997).

> "*In summary, after review of the available test data and performing release/dispersion modeling, under similar release conditions, the addition of the Mobil additive to an HF alkylation unit was determined to result in a reduction of HF hazard zones for equivalent releases*. The amount of reduction will be a function of the additive concentration, and will vary with many parameters which govern the release/dispersion process. *In all cases, addition of the additive to the alkylation unit will reduce the distance traveled by HF in the event of a release. At any concentration of additive, the vapor pressure of the HF will be reduced, thus reducing the potential for public exposure to HF.* Therefore, modification to the HF alkylation unit and the use of MHF at the Mobil Refinery are expected to have a beneficial impact on the environment by reducing the potential impacts associated with an accidental release from the alkylation unit."

Id., p. 4, (emphasis added).

Neither the MHF Alkylation technologies employed by TORC at its Torrance Refinery, nor, to TORC's knowledge, those employed by Valero at its Wilmington Refinery changed since this time. In fact, safety systems, training, and knowledge of the MHF Alkylation process and equipment have improved related to MHF alkylation, which has been the case at the Torrance Refinery. Torrance used Hydrofluoric Acid ("HF") in the Alkylation Unit without any HF offsite impact from 1966 until

1997. In 1997, the Refinery began using MHF to comply with the City of Torrance Consent Decree, and the MHF Alkylation Unit has been operating since then without any MHF offsite impact.

Accordingly, it defies science and technology that the District would now change its position, especially since TORC is still in the process of providing the District with requested information related to testing data specific to Torrance Refinery's MHF Alkylation Unit operating conditions, how the Rainout Model works, and additional Rainout Model runs.

In Attachment A to this letter, TORC offers detailed comments and responses to specific slides related to the District's July 28th PR 1410 Working Group Meeting #4 presentation to address the premature nature of the District's PR Rule 1410 conceptual rulemaking framework it has put forth. These comments must be considered and addressed before the District continues with its PR Rule 1410 conceptual rulemaking framework.

* * *

In closing, TORC commends the District for working closely with it and other stakeholders over the past months in what has been to date been an informative and open rulemaking process. However, as discussed above and in detail in Attachment A, TORC believes that the District currently does not have a basis to conclude that "[a] phase-out of the use of HF is a preemptive measure to prevent an air pollution episode". As a result, TORC requests that the District not make any premature determinations regarding a phase-out of MHF until at a minimum it has all the information it has previously requested regarding testing data specific to Torrance Refinery's MHF Alkylation Unit operating conditions, how the Rainout Model works, and additional Rainout Model runs.

Accordingly, we urge the District not to rush this rulemaking and take the additional time necessary to address TORC's and other stakeholders' comments.

We look forward to continuing to work collaboratively and openly with the District to arrive at PR 1410 rulemaking that is based on sound science and technology and the current state of Alkylation technologies.

Please note that in submitting this letter, TORC reserves the right to supplement its responses and comments as it deems necessary, especially if additional or different information is made available to the public regarding the PR 1410 rulemaking process.

Sincerely,

Steve Steach
Refinery Manager

cc: Wayne Nastri, via e-mail
Susan Nakamura, via e-mail and hand delivery
Mike Krause, via e-mail and hand delivery
Dr. William A. Burke – Governing Board Chairman, via overnight mail
Ben Benoit – Governing Board Vice-Chairman, via overnight mail
Marion Ashley – Governing Board Member, via overnight mail
Joe Buscaino - Governing Board Member, via overnight mail
Michael A. Cacciotti - Governing Board Member, via overnight mail
Sheila Kuehl – Governing Board Member, via overnight mail
Dr. Joseph K. Lyou - Governing Board Member, via overnight mail
Larry McCallon - Governing Board Member, via overnight mail
Judy Mitchell – Governing Board Member, via overnight mail
Shawn Nelson - Governing Board Member, via overnight mail
Dr. Clark E. Parker, Sr. - Governing Board Member, via overnight mail
Dwight Robinson – Governing Board Member, via overnight mail
Janice Rutherford - Governing Board Member, via overnight mail

Attachment A
TORC's Comments and Responses

TORC offers the following detailed comments and responses to the following specific slides related to the District's July 28th PR 1410 Working Group Meeting #4 presentation to address the premature nature of the District's PR Rule 1410 conceptual rulemaking framework it has put forth. These comments must be considered and addressed before the District continues with its conceptual PR Rule 1410 rulemaking framework.

Slide 4 - Findings from MHF Alkylation Technology and Slide 5 - Necessity of Phase-out MHF Technology

In slide 4, the District indicates it "[c]ould not locate an experiment based on all current operating conditions (pressure, temperature, weight % HF)". The District also states that "[b]ased on information received to date, insufficient evidence that a dense vapor cloud does not form."

In slide 5, the District continues this theme by stating that "[s]taff initial conclusion is that the testing/modeling information provided by TORC did not sufficiently demonstrate MHF would not flash atomize and form dense HF cloud" and prematurely concludes that "[a] phase-out of the use of HF is a preemptive measure to prevent an air pollution episode."

Regarding barriers, in slides 4 and 5, the District makes several unclear and unsupported statements about the Torrance Refinery's reliance on barriers and that the barriers "do not guarantee adequate protection in the unplanned event such as a major accident or earthquake causing equipment failure".

TORC's Response To The District's Premature Statements Related To The MHF Testing Results, Technical Analysis, And Modeling Data

As has been explained to the District, the extensive MHF testing was performed on a parametric basis to evaluate MHF efficacy on each operating condition for the Torrance Refinery's Alkylation Unit. Each individual parameter (i.e., temperature, pressure, and concentration) was tested at ranges that include current MHF Alkylation Unit operating conditions. The results of this testing were used to create and validate a first principles thermodynamic model that accurately predicts liquid rainout of HF across all of the Refinery's MHF Alkylation Unit's operating conditions.

As presented to the District on several occasions, the Additive range of concentrations were tested at equal to or less than 20 percent by weight ("wt%") in 1991, 1992, 1993, and 1994. These tests confirmed the Additive increases ARF even at low concentrations.[1]

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[1] Specifically, the extensive testing that was completed by Mobil as presented in DAN 95M-0874 - MHF Airborne HF Reduction Estimates, clearly supports this:

> "Mobil has performed small ... and large scale release tests ... to understand the effect of storage composition, temperature and pressure and release orifice size on the fraction of released HF that becomes airborne. A key finding of the experiments was that the addition of the additive causes a significant fraction of the released HF to fall on the ground as liquid rainout. The set of experiments ... showed that the presence of the additive eliminates flash atomization of the released jets. More specifically, no flash atomization was observed for compositions containing as much as 85 wt% HF upto 140° F.

As the District has been informed, ARF is calculated as a function of acid strength, Additive, water, and reactor temperature. The Rainout Model results are consistent with the ARF test results. Importantly, the MHF data and information TORC is working to provide the District in response to its questions from the June 28th meeting validates this consistency and the efficacy of the Rainout Model, and in turn, the efficacy of MHF at the current MHF Alkylation Unit current operating conditions.

The totality of all the MHF testing, analysis, and modeling data and information provided to the District to date shows that MHF prevents a dense vapor cloud from forming, prevents flash atomization, and promotes rainout of liquid MHF at current Torrance Refinery MHF Alkylation Unit operating conditions. The modeling and testing results support that any potential release would be contained onsite by the combination of the passive and active mitigation measures that are employed in the Torrance Refinery's MHF Alkylation Unit safety systems.

This is demonstrated by the fact that in 1997 the Refinery began using MHF to comply with the City of Torrance Consent Decree. Since this time, the MHF Alkylation Unit has been operating without any MHF offsite impact. Importantly, Torrance Refinery used HF in the Alkylation Unit without any HF offsite impact from 1966 until 1997, a period that includes the 6.7 magnitude Northridge Earthquake in 1994.

As noted above, the District has already recognized the efficacy of MHF as a preemptive measure to prevent an air pollution episode in its CEQA and permitting of the Valero Wilmington Refinery's ReVAP project:

> "An accidental release of HF could migrate off the Refinery property and expose individuals in the surrounding community. The proposed project will substantially reduce the potential hazard impacts associated with an accidental release of HF."

See District's Ultramar Inc. – Valero, Wilmington Refinery, Alkylation Improvement Project, Statement Of Findings, Statement Of Overriding Considerations, And Mitigation Monitoring Plan, p. 9, (SCH #20030536, December 2004).

TORC's Response To The District's Unclear and Unsupported Statements Related To Barriers

It is unclear what forms the basis of the District's concerns and statements related to barriers. TORC has provided the District with the 1990's barrier testing results that proves the effectiveness of the barriers. Moreover, the District has seen in person and been provided video evidence of the robustness of the Torrance Refinery MHF Alkylation Unit barriers. As the District has been informed, flange shrouds are tested annually with the Torrance Fire Department ("TFD") and the solid steel settler pans/pump shrouds are inspected twice per shift by Unit operators to ensure their integrity and functionality.

> Mobil has also developed an aerosol model … to interpret the experimental data and to predict the airborne fraction of HF in releases with conditions outside the range of variables experimentally tested. The model predicts small and large scale release data in the subcooled and superheated regimes of interest."

(Internal references omitted.)

Attachment A
TORC's Comments and Responses

In regards to the loss of power scenario referred to in the District's slide 5, TORC experienced two Refinery-wide external Southern California Edison power outages in 2016 with no impacts to the Refinery's MHF Alkylation Unit's safety systems. The MHF Alkylation Unit has backup power and uninterruptible power supplies for its safety critical devices and safety systems to ensure that these systems still function during emergencies, including power outages.

The basis for the District's concern in slide 5 regarding the potential lack of water or water pressure to the MHF Alkylation Unit in the event of a major incident scenario is unclear. The Torrance Refinery has an adequate water supply and pressure that meets the National Fire Protection Association's standards. The Refinery's fire water system, which includes the MHF Alkylation Unit, runs on diesel driven pumps and does not rely on electrical power. Therefore, the MHF Alkylation Unit will always have the required water supply and pressure for its safety system in the event of an emergency or major incident.

On May 16, 2017, District staff participated in a tour of the Refinery's MHF Alkylation Unit, its robust safety systems, and witnessed first-hand the scheduled weekly test of one of the unit's high flow water cannons. Also during the tour, the District was provided a detailed overview by one of the unit's Console Team Leads of how the unit's water system and mitigation works in tandem with the unit's high-resolution remote cameras.

Subsequently, TORC presented at the May 18th Working Group Meeting, the MHF Alkylation Unit's water system and mitigation capabilities, which consists of:

- Nine remotely controlled water cannons;
- Used in tandem with console cameras to target a specific release point;
- Local fire monitors;
- Deluge systems on major pumps; and
- Fire sprays on vessels.

Finally, in the context of an earthquake it should be emphasized, that the Torrance Refinery conducts a seismic assessment every five years pursuant to the CalARP regulations. The regulation is intended to reduce likelihood of release of significant quantities of regulated substances in the event of an earthquake.

TORC's Response To The District's Basis For Phasing Out MHF

The totality of all of the MHF testing, analysis, and modeling data and information provided to the District to date does not support its basis or conclusion that "[a] phase-out of the use of HF is a preemptive measure to prevent an air pollution episode". As a result, TORC requests that the District not make any premature determinations regarding a phase-out of MHF until at a minimum it has all the information it has previously requested regarding testing data specific to Torrance Refinery's MHF Alkylation Unit operating conditions, how the Rainout Model works, and additional Rainout Model runs.

Attachment A
TORC's Comments and Responses

Slide 6 - SCAQMD's Regulatory Authority to Regulate Hydrogen Fluoride (HF)

In Slide 6, the District lists its purported regulatory authority to regulate HF. TORC is still researching and reviewing this authority and reserves its right to further supplement these responses and comments on this topic.

Slide 7 - Initial Concept for PR 1410

In slide 7, the District shows a block flow diagram with its PR 1410 conceptual rulemaking structure, including a phase-out of MHF with Sulfuric Acid or Alternative Alkylation Catalysts.

As noted above, it is premature for the District to contemplate a MHF phase-out and there is no justification for it. Since 1997, the Torrance Refinery's has been safely using MHF and there have been no offsite impacts. Additionally, the Torrance Refinery used HF in the Alkylation Unit without any HF offsite impact from 1966 until 1997.

Below TORC addresses the current issues associated with transitioning from a proven and safe Alkylation technology to Sulfuric or so called Alternative Catalysts.

Slide 8 - Implementation Timeframe

In slide 8, the District seeks "input on implementation timeframe for enhanced mitigation measures and phase-out of MHF" as part of its PR 1410 conceptual rulemaking structure.

Again as noted above, it is premature for the District to contemplate a MHF phase-out and there is no justification for it. Again, since 1997, the Torrance Refinery's has been safely using MHF and there have been no offsite impacts. Additionally, the Torrance Refinery used HF in the Alkylation Unit without any HF offsite impact from 1966 until 1997.

In addressing any implementation schedule associated with the District's current PR 1410 conceptual rulemaking structure, it is worth emphasizing that the Torrance Refinery's MHF Alkylation unit produces a critical blending component for making all grades of cleaner-burning CARB gasoline for Southern California and the State of California. Alkylate is required to meet stringent state-mandated gasoline specifications. The Torrance Refinery supplies approximately 20% of daily regional demand and approximately 10% statewide.

Accordingly, any PR 1410 rulemaking effort resulting in a phase-out of MHF could have significant impacts to the two refineries targeted by the rule – TORC Torrance and Valero Wilmington – as well as California's petroleum fuels market. To understand the impact of a potential phase-out of MHF, TORC retained Stillwater Associates ("Stillwater") to conduct an economic study regarding the potential impacts of a MHF ban. Stillwater is a transportation fuels consulting firm specializing in downstream markets that are recognized by industry and government agencies as experts in the supply, demand, distribution, and price of energy related to downstream fuel markets.

Stillwater's economic study entitled "Impact of an HF Ban on Southern California Transportation Fuels Supply" (dated June 23, 2017), which was reviewed with the District on July 26th, concluded:

1. Alkylation is an important refining process. CARBOB cannot be produced by Southern California refineries without alkylate.
2. Should HF be banned, it appears unlikely that impacted refiners would replace current process units, due to the high cost.
3. The impacted refineries are unlikely to be viable without alkylation.
4. Should the impacted refineries cease operations, 25% of regional demand would have to be imported.
5. With only three fuels refiners left in Southern California, the market will have less competition.
6. Offshore refiners will produce the products and ship them half way around the world to the California market.
7. As a result, average spot prices could rise 25 cents per gallon or more, and ultimately the California consumer would pay the price.

See Slide 42.

The Stillwater study was reviewed by the California Energy Commission ("CEC") as part of its 2017 Integrated Energy Policy Report ("IEPR") process, which is required every two years and an update every other year by Senate Bill 1389 (SB 1389, Bowen and Sher, Chapter 568, Statutes of 2002)[2].

CEC at its July 6, 2017, 2017 IEPR Commissioner Workshop on Transportation Energy Supply Trends stated the following regarding a potential ban on MHF:

- If an HF ban were compelled it is uncertain if either or both companies would elect to make such changes to their facilities
  - Alkylation process unit projects are extremely expensive
    - A recent project approved for the Valero Houston refinery is estimated to cost $300 million for an alkylation unit with a capacity of 13,000 barrel per calendar day
    - Capacity of the alkylation units at Valero Wilmington and PBF Torrance are 22,000 and 24,200 barrels per day capacity, respectively

[2] Senate Bill 1389 requires the CEC to:

> "[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety."

See CA Pub. Res. Code § 25301(a) (emphasis added).

- These alkylation unit capacities are each nearly twice the capacity, meaning the potential costs for such projects at the two California refineries could, at a minimum, easily approach or exceed $500 million *per facility*

– These estimated costs for such a replacement project could be at or near the value of the refinery when one considers that ExxonMobil sold the entire Torrance refinery to PBF Energy for $537.5 million

- It would therefore be uncertain as to whether such an expenditure could be justified by either or both companies should an HF alkylation ban ultimately be approved by the SCAQMD

See Slide 11, CEC's "*Transportation Fuel Issues*".

Accordingly, as concluded by the Stillwater study and recognized by the CEC, any phase-out of MHF would have substantial economic impacts to TORC, Valero, and the California's petroleum fuels market, particularly to the California consumers who rely on clean-burning fuels produced by TORC and Valero, which meet the strictest fuel standards in the world, to meet their daily needs.

The District should not lose sight that through the City of Torrance Consent Decree process, the Court determined that "the modified HF catalyst (including mitigation) presents no greater risk than a sulfuric acid alkylation plant producing a comparable amount of alkylate" only after it was proven to the Court-appointed independent Safety Advisor that "that the catalyst as modified would not form an aerosol or dense vapor cloud upon release". As a result, building a grass roots Sulfuric Acid Alkylation unit would be in contradiction to the Consent Decree and does NOT make environmental, process safety, or economic sense. Moreover, TORC after a diligent search has found no record of a conversion from HF/MHF Alkylation Unit to a Sulfuric Acid Alkylation Unit.

The use of sulfuric acid as an Alkylation Catalyst presents its own challenges and impacts that run counter to the District's air quality goals, including increased emissions versus MHF, which have been previously documented to District. *See* TORC letter to Wayne Nastri entitled "Norton Engineering Alkylation Technology Study, related to the use of Hydrofluoric Acid in Refinery Alkylation Units" dated December 8, 2016.

As discussed with the District on July 26th, the cost of a new grass root Sulfuric Acid Alkylation Unit at the Torrance Refinery would be cost prohibitive. In order to determine the cost, TORC retained Burns & McDonnell ("B&McD") to estimate the total installed cost ("TIC") to build such a unit for the Torrance Refinery. B&McD's Report Brief Alkylation Study & Estimate (July 2017), which was provided to the District on July 26th, concludes that the TIC to build such a unit at the Torrance Refinery would be approximately $600MM.[3]

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[3]. The report specifically states:

> "The total installed cost for the new alkylation unit and associated infrastructure (outside the battery limits - OSBL) is estimated at nominally $600 MM, including an owner's cost of $50 MM provided by PBF. This cost is comprised of $56 MM in direct bare equipment cost, $270 MM in additional direct costs associated with labor and materials and $226 MM in indirect costs. Indirect costs include engineering, construction management, escalation, contingency,

As the District was informed on July 26th, B&McD's Report Brief did not include the cost of spent sulfuric acid regeneration. However, TORC understands from discussions with an industry consultant that the cost of a new grass roots spent acid regeneration of sufficient capacity to serve a Sulfuric Acid Unit at the Torrance Refinery could cost up to $300MM, making the total cost of approximately $900MM.

Importantly, there is no guarantee that all permits needed to build a new Sulfuric Acid Alkylation Unit can be obtained. Even if they could be obtained, which again there is no guarantee, going through the CEQA process, obtaining right-of-ways for pipelines if required, meeting the District's New Source Rule, Best Available Control Technology, and offset requirements for a District permit, could take many, many years and that would be before any construction could begin.

Regarding Alternative Alkylation Catalysts, PBF has been evaluating Alternative Alkylation Catalyst technologies since it announced the acquisition of the Torrance Refinery in September 2015. PBF and TORC have met with experts from Honeywell/UOP, Stratco/DuPont, B&McD, KBR, and CB&I, as well as independent Alkylation experts to explore alternatives. Solid catalyst and liquid ionic alkylation have been in development for decades and currently there are no commercially viable units running worldwide. Specifically, based on PBF's / TORC's evaluation to date the status of these technologies is as follows:

- Solid Acid Catalyst ("SAC"): One small unit in a chemical plant in China - 2,700 barrels per day ("BPD"):
    - Issues with catalyst regeneration cause the plant to shut down.
    - **NO** commercial plant in the U.S.
    - Testimony at April 1st District Hearing about European refinery to SAC:
        - Have inquired about this technology through various refining, governmental, and technology licensing sources, as well as a United Kingdom labor union;
        - Have been unable to obtain any information about or confirm this conversion; and
        - Request Again the District to provide verifiable information regarding this conversion so that this technology can be technically evaluated and confirmed.
- Liquid Ionic Catalyst ("ILA"): nascent technology is only in initial test phase:
    - Only one approximately 10 BPD demonstration unit running today.
    - Chevron plans to install small 4,500 BPD unit in Salt Lake City – "Model No. 1, Serial No. 1".
    - There is no information relative to commercial viability, costs, or scale up to the size of the Torrance Refinery's MHF Alkylation Unit.

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and contractor fee. The contingency for this estimate was set at $110.6 MM which represents 20% of the total project cost."

Attachment A
TORC's Comments and Responses

TORC concurs with Valero that the following information should be provided from the licensors of these emerging Alternative Alkylation Catalyst technologies in order for the District and the impacted regulated entities – TORC and Valero – to understand the fundamental viability, status, impacts, and costs of these technologies:

1. Name of Licensor
2. Name of process technology
3. Location of unit
4. Definition of unit (demonstration unit, bench scale, pilot scale, intermediate scale, full scale, etc.)
5. Olefin feed rate to unit
6. When unit was put into operation
7. Regardless of definition, does the location have a parallel alkylation process of equal or greater size
8. Iso-Butane (or other paraffin consumed) feed rate to unit
9. Alkylate product rate from unit
10. Type of acid catalyst used and supplier
11. Specific feed composition (C4= only, specific C4=, C3=, C5=, other limits)
12. Type of feed pre-treatment used
13. If no specific feed treatment is implemented what are the acceptable feed contaminant levels such as (water, sulfur, diolefins, other)
14. Corrosion history of equipment
15. Special materials of construction requirements
16. Alkylate product quality (RON, MON, sulfur, EP, etc.)
17. Special product treatment for any product streams such as propane, butane, alkylate
18. Does the unit include acid regeneration?
    a. If so, how is that performed?
    b. If not, how is the catalyst regenerated?
    c. What is the cost of regeneration?
    d. How often does it need to be replaced?
19. What is the plot space for the unit? What is the estimated plot space for a unit of approximately 30 MBPD of alkylate production, including any regeneration facilities?
20. What are the results of any Process Hazard Analysis (PHA) conducted on the unit?
21. Were environmental impact reviews performed in connection with permitting the unit? If so what were the results of that review?
22. What is the energy consumption associated with the unit (MMBTU/bbl alkylate or similar measure)?
23. What waste streams / material are generated from the unit
24. What has been the run length between required Maintenance and Inspection? Is this consistent with projected Turnaround cycles?
25. What is the estimated cost for a unit of approximately 30 MBPD of alkylate production?

Before transitioning from MHF Alkylation to a catalyst other than Sulfuric Acid at the Torrance Refinery, the new technology has to be commercially viable in scope and scale to the Torrance Refinery's existing MHF Alkylation Unit and must be inherently safer than MHF Alkylation. At a minimum to be considered commercially viable, the emerging Alternative Alkylation Catalyst technologies need to be constructed at scale and run at California standards through two four-year turnaround cycles to establish baseline operating and reliability data before their commercial viability can be determined.

TORC is confident the Torrance Refinery's MHF Alkylation Unit safety systems protect Refinery employees and the community while reliably producing CARB gasoline. Specifically, since using MHF in the Refinery's Alkylation Unit starting in 1997, there has not been an HF offsite release of HF at the Torrance Refinery. Additionally, the Torrance Refinery used HF in the Alkylation Unit without any HF offsite impact from 1966 until 1997.

As TORC has previously public stated, it will continue to evaluate emerging Alternative Alkylation Catalyst technologies.

Slide 9 - Enhanced Interim Control Measures

In slide 9, the District indicates that it is considering enhanced interim control measures as part of the PR 1410 rulemaking conceptual structure.

From this slide and the prior Working Group meetings, it appears that the District is basing its enhanced interim control measures on the American Petroleum Institute's ("API") Recommended Practice 751 ("API-751"). TORC looks forward to working with the District in potentially including in PR 1410 API-751 as the framework for a MHF performance standard. API-751 is a recommended practice for MHF/HF Alkylation Units that provides proven industry practices to support the safe operation of MHF/HF Alkylation Units. The API is recognized by the U.S. government and globally as the standards-setting organization for the petroleum industry.

Slide 10 - Proposed Enhanced Mitigation

In slide 10, the District provides the following list of enhanced interim control measures that it is potentially contemplating as part of the PR 1410 rulemaking conceptual structure.

- Beyond the current mitigation efforts
  - HF Detection Systems
  - Water Mitigation Systems
  - Physical Mechanisms
  - Uninterruptible power and water supply
  - Procedures/Training
  - Inventory Control
  - Inspections/Safety Audits

- More automatic activation –make active mitigation more passive
  - Water Mitigation Systems
  - Emergency Block Valves
  - Acid Transfer/Evacuation System

As TORC presented at the May 18th Working Group Meeting, the Torrance Refinery's MHF Alkylation Unit already meets or exceeds all of API-751's passive and active mitigation measures. The Refinery's MHF Alkylation Unit has robust release prevention, monitoring, and response systems, which include the following:

- **Preventive Safety Systems**
  - Specialized PPE and training required for all personnel entering the unit
  - Robust inspection and audit program
    - Follow API 751 HF Recommended Practices
    - Industry standard practice recognized by OSHA and other agencies
  - Two Operators stationed on unit each shift in contact with Console Supervisor
  - Eight surveillance cameras with video playback
  - Emergency simulation drills
    - Joint TORC and TFD drills
    - TORC and TFD both Hazmat trained
  - MHF
    - >50% Airborne Reduction Factor (ARF) per MHF chemistry
    - Online MHF Analyzer
- **Emergency Response Safety Systems**
  - Redundant response systems allow rapid response and mitigation to any potential loss of containment
  - Barrier technology (89% total unit ARF when combined with MHF chemistry)
    - Flange barriers
    - Settler belly pans
    - Acid circulation pump enclosures
  - Water Mitigation
    - Nine remotely controlled water cannons
    - Used in tandem with console cameras to target a specific release point
    - Local fire monitors
    - Deluge systems on major pumps
    - Fire sprays on vessels
  - 27 Point sensors located throughout unit and on perimeter
    - Detect HF down to 0.1 parts per million (ppm)
    - Alarms internally at 2 ppm
    - Reported directly to AQMD at 6 ppm
    - In the process of completing a similar alarming system to TFD
  - Line of Sight Laser system on unit perimeter
    - Detect HF down to 0.1 ppm per meter (ppm*m)

  - Alarm internally at 50 ppm*m and 75 ppm*m
- Emergency system that removes all acid from the main unit to a storage drum located behind a blast wall
  - 80% of acid is removed in ~2 min
  - The remaining 20% is transferred within 7 minutes from system activation
- Automatic valves have battery backups to allow operation in the event of a power disruption
- Painted on all flanges and connections in acid services
  - Extremely sensitive and changes from yellow to red in the presence of HF
  - Will react to HF concentrations in the parts per billion (ppb) level
- Alarmed safety showers

Despite the scope and scale of the Torrance Refinery's MHF Alkylation Unit safety and mitigation systems listed above, TORC is willing to engage with the District along with API to discuss the potential and timing for potential enhancement of safety systems.

Slide 11 - Upcoming SCAQMD Activities and Slide 12 - Schedule

In these two slides, the District provides its currently anticipated schedule related to PR 1410 rulemaking efforts. For example, slide 11 provides:

- Release preliminary draft rule language before next Working Group Meeting to solicit feedback
- Next working group meeting in September 2017

Additionally, slide 12 provides:

PR 1410 Working Group Meeting #5 (Torrance)	September 2017
Release of CEQA Notice of Preparation/Initial Study	September 2017
Public Workshops / CEQA Scoping Meeting	September 2017
Release of CEQA Draft EIR	October/November 2017
SCAQMD Refinery Committee Meeting	October/November 2017
Governing Board consideration of PR 1410	December 2017

For all the reasons discussed previously, TORC requests a delay in releasing any proposed rule language by the next Working Group meeting in September 2017. Releasing such language would be premature because the District will be receiving additional MHF testing and modeling data, and related information from TORC as requested by District staff, which will further substantiate the efficacy of MHF and that a release would not form a "dense vapor cloud" as alleged by the District. Additionally, the District will need time to review:

- B&McD cost estimate associated with building a new grass roots Sulfuric Acid Alkylation Unit at the Torrance Refinery provided to the District by TORC on July 26th;
- Stillwater study impacts to refineries and the California petroleum markets associated with a phase-out of MHF provided to the District by TORC on July 26th; and
- Licensors' information regarding emerging Alternative Alkylation Catalyst technologies that will be presented at the fourth Working Group meeting on August 2nd.

Even if the District releases proposed rule language in September 2017, it is hard to imagine how the District can then draft and release for public review and comment the following statutorily required rulemaking documents in time for a December 2017 Governing Board:

- CEQA Notice of Preparation/Initial Study;
- Draft Staff Report;
- Draft EIR;
- Draft Socioeconomic Report; and
- Revised rule language.

Considering the complexity of the type of CEQA EIR and Socioeconomic Report that needs to be done to address the District's current PR 1410 conceptual rulemaking structure, this does not seem feasible.

As a result, TORC urges the District to slow-down the PR 1410 rulemaking process and allow it to progress naturally as science and technology would dictate, particularly in light of the forthcoming information as noted above.