

Bay Area Air Quality Management District  
939 Ellis Street  
San Francisco, CA 94109

APPROVED MINUTES

Advisory Council Technical Committee Meeting  
9:30 a.m., Thursday, August 7, 2003

- 1. Call to Order – Roll Call.** 9:35 a.m. Quorum Present: Robert Harley, Ph.D., Sam Altshuler, P.E., Louise Bedsworth, Ph.D., Stan Hayes, John Holtzclaw, Ph.D., Norman Lopera. Absent: William Hanna.
- 2. Public Comment Period.** There were no public comments.
- 3. Approval of Minutes of Joint Public Health & Technical Committee Meeting of June 30, 2003.** Dr. Holtzclaw moved approval of the minutes; seconded by Mr. Hayes; carried. Mr. Lopera abstained.
- 4. Presentation Refinery Flare Emissions Distribution Frequency.** Kevin Buchan, Western States Petroleum Association, presented a slide entitled “Refinery Flare Emissions (tons/day),” noting that aggregate flare emissions from Bay Area refineries have decreased from 7 tons per day (tpd) in February of 2002 to 0.2 tpd in March of 2003. Voluntary monitoring began in June of 2002.

Allan Savage, Environmental Manager, Tesoro Refinery, Martinez, presented “Refinery Flaring Statistical Analysis: June 2002 – May 2003,” which addresses flaring extent and frequency, as well as the special and common causes of flaring. He noted that average emissions of non-methane hydrocarbon (NMHC) emissions from all Bay Area refineries from June 1, 2002 to May 31, 2003 have decreased by 50% from 5 tpd to 2.5 tpd. Tesoro was emitting an average of 2 tpd of NMHCs in June of 2002 and by May of 2003 had reduced this to 0.5 tpd. Following the installation of gas recovery compressors at Tesoro in February of 2003, emissions of NMHCs were reduced from about one ton to one-tenth of a tpd. This comprises approximately one-fifth of the total quantity of current emissions from refinery flaring.

Special causes of flaring events were distinguished from common causes for all five refineries and plotted over time to discern any pattern. Fewer events occur in the winter than in the summer. Analysis of emissions from flaring events in tons per month reveals that for all five refineries there were greater levels in the summer than in the winter of 2002. No relationship was found between tonnage and the extent or size of the events: (a) 180 events were each from zero to one-half tpd; (b) six events were greater than 3.5 tpd; and (c) one was 6.5 tpd. The size of an event can be related to both the rate at which emissions occurred and the duration of the event. A destruction efficiency rate of 98% was used in the calculations, although refineries believe it is 99.5%. Refinery flares have high BTU levels and steam and/or air mixing at the flare tip to improve combustion. On Spare the Air Days, ambient wind flow is usually stagnant and would not affect combustion efficiency. A baseline was established from June to September of 2002 for special causes of flaring and flare NMHC emissions from the five refineries, after which a downward trend in emissions appears. Prior to February of 2003, the Tesoro refinery emitted one-half of the aggregate flare emissions.

Results from the statistical analysis on the number of special and common events are as follows:

- start up, turnaround and shut downs – 90
- emergency upset/emergency shutdowns – 68
- flare equipment problems – 68
- normal operating/ maintenance procedure – 23
- flare equipment maintenance – 12
- unit equipment problem – 3
- other – 2
- human factors – 1

The order of priority changes when tpd are assigned to each of the foregoing events:

- flare equipment problems - 0.85tpd
- unit upset/emergency shutdown - 0.25tpd
- unit startup/shutdown/turnaround 0.16tpd
- flare equipment maintenance - 0.2tpd
- normal operating/maintenance procedures - 0.2tpd
- other - 0.1
- human factors - .05

The analysis of event causal factors prior to February 8, 2003 show the following priority:

- unit startup/shutdown/turnaround - 0.85tpd
- flare equipment problems - 0.45tpd
- unit upset/emergency shutdown - 0.32tpd
- flare equipment maintenance - 0.2tpd
- normal operating/maintenance procedure - 0.2tpd
- other - 0.1tpd
- unit equipment problem - 0.1tpd
- human factors - 0.05tpd

The order of priority for event causal factors after February 8, 2003 changes as follows:

- flare equipment problems – 0.175tpd
- unit upset/emergency shutdown – 0.14tpd
- unit startup/shutdown/turnaround - 0.1tpd
- flare equipment maintenance - 0.2tpd
- normal operating maintenance procedure - 0.2tpd
- other - 0.1tpd
- unit equipment problem - 0.1tpd
- human factors - 0.05tpd

Regarding causal factors after February 8, 2003 for all five refineries, Tesoro contributed 75% of the total problem related to flare equipment. This derived from the installation of, and adjustments to, the flare compressors. Their reliability has recently been greatly improved. Tesoro contributed to 20% of the .13 tpd from unit upset/emergency shutdowns, and approximately 30% to unit startup/shutdown/turnaround. Data gathered today would probably show flare equipment problems ranked in third rather than first place. Each refinery has a specific area in which it can improve.

The management of a release takes into account the quantity of gas and the design specifications per unit, and controls the release to the flare accordingly. However, some units may not allow for a totally systematic throttling of fuel gas. Heating factors and the capacity of the recovery compressor must also be accounted for in depressurizing a vessel. Tesoro is further conducting a review of the startup and shutdown procedures in relation to recovery compressor capacity.

Of the five refineries, Tesoro was the major contributor of common causes of NMHC emissions from June 2002 to September 2002 and from October 2002 to February of 2003. After the installation of the recovery compressors in February 2003 at Tesoro, common cause flaring emissions were reduced from 2 tpd to a few pounds a day. In reply to a question from Messrs. Hayes and Lopera about the difference between the District's 22 tpd and the refineries' 2 tpd estimates, Mr. Savage noted that Tesoro typically runs an NMHC content of 11%. The District's assumption of a 75% NMHC content did not adjust for each refinery. The District included methane in its calculations, which is only 20% of the fuel content at Tesoro. The District audited Tesoro's flow rates and analyzed half of the refinery samples. The flare-monitoring rule will provide more accurate data on which to base public policy. Overall, the statistical analysis indicates that flaring has been significantly reduced to levels well below the levels published in the District's Technical Assessment Document (TAD).

In reply to Chairperson Harley, Mr. Savage agreed that increased summer driving increases summer refinery work, which may cause shutdowns to occur disproportionately in the winter. Recovered gases and their sources increase in the summer, thereby reducing the ability of the system to reject heat and condense those gases and retain them in the system. Further analysis is needed regarding seasonal common cause effects associated with heat rejection. In reply to Mr. Altshuler, Mr. Savage noted that the recovery compressors recycle the HCs and CO<sub>2</sub> emissions into the refinery fuel gas system where they are combusted at a very high destruction efficiency.

Gary Kendall, District Technical Division Director, inquired as to how hydrogen levels vary in a flaring event and if there were flow data for the year 2000. Mr. Savage replied that further analysis of assigned causes is necessary. Some data for the year 2000 is available from Tesoro but not for all five refineries. Mr. Hayes inquired as to worst-case events on high ozone days, and how these interface with emissions forecasting for purposes of ozone attainment planning. Mr. Savage replied that probability forecasts would have to be extrapolated to assess the impact on ozone.

Mr. Hayes inquired if the difference between the District and refineries' estimates of HC tonnage is due primarily to different assumptions or to tracking to emissions at different points in time. Mr. Savage replied that the refineries would willingly join the District in analyzing the components that lead to that discrepancy. Mr. Altshuler observed that in some air districts data from an extraordinary release event that leads to an exceedance is thrown out as being atypical. Mr. Kendall clarified that such data is not discarded but flagged and classified as an exceptional event.

Mr. Buchan stated that flares are safety devices. Flaring emissions in 2003 are about one-half of a ton per day. The South Coast AQMD has implemented a flare-monitoring rule and is gathering data from it before it moves ahead with a flare control rule. The District has only very recently passed a flare-monitoring rule and yet is discussing a flare control rule. This appears premature.

- 5. Presentation on Refinery Flaring Impacts, Monitoring and Emissions Reduction.** Due to a schedule conflict that was experienced by the guest speaker, this presentation was canceled.

6. **Discussion of South Coast AQMD Refinery Rule 1118.** Kelly Wee, Director of Enforcement, stated that the South Coast AQMD's proposed refinery flare control rule is in internal staff review. Alex Ezersky, Air Quality Specialist, stated that in estimating HC emissions, the District and the refineries used two different data sets, with the District using some historical data. Staff had some concerns over the validity of the data provided by the refineries. One refinery submitted several sets of adjusted data, and another refinery data arrived a week prior to publishing the TAD. Due to the lack of actual data in some cases engineering judgments and assumptions were also made. HC content could reach 100% or be lower. The purpose of the TAD was to address the broad picture, and so it addressed methane and sulfur. It is a living document and will be revised with new data.

The purpose of the South Coast Rule 1118 is to monitor and gather data on refinery and related flaring operations for analysis to determine if there is a need for, or level of, any controls required to minimize flare emissions. It seeks data on fuel flow rates, heating values, composition and sulfur content. It requests facilities to present a plan describing the flare system, classifying the flaring service and identifying alternatives as to how to arrive at the composition and flow data. The District's flare monitoring rule seeks to identify what flows to the flare and has detailed reporting requirements on fuel composition changes, whereas Rule 1118 uses federal emission factors for criteria pollutants and heating values for sulfur. The District's rule contains an option to install continuous analyzers to improve understanding of fuel composition, and requires flow verification every six months. It also has a provision for video monitoring based on public demand. The South Coast AQMD is still analyzing its flare monitoring data, and it will move forward with its flare control measure after it completes its internal review. The District is proceeding forward today with preliminary discussions with the refineries on a flare control rule.

Mr. Ezersky reviewed the timeline for the District's flare monitoring rule, and noted that the District and the refineries are in agreement as to the need for flare monitoring. They differ on the matter of confidence in the historical data, the assumptions used in making estimates of HC content, and on whether the destruction efficiency estimate should be 99.5% or 98%. The latter is supported by the majorities of studies. The District is closely following flare efficiency studies in Texas and Alberta, Canada. Staff has not yet had the opportunity to closely examine the data presented by Mr. Savage today. Refineries have provided the District with relevant data on rates and hydrocarbon content of flows to their flare stacks, and District staff have audited the measurement methods that were used at each refinery to determine this information. This has been accomplished despite disagreements surrounding the District's initial estimate of 22 tons/day of HC emissions from flare systems at Bay Area refineries.

Wayne Kino, Supervising Air Quality Specialist, stated that the District is looking preliminarily at flare emission controls regarding startup/shutdown emission reduction potential, casual flow that reduces compressor capacity to handle episodic emissions, and episodic prevention measures. At this time there is no timeline for a flare control rule. Mr. Hayes stated that the flare monitoring rule timeline would not ensure the creation of a database for use in the April 2004 Ozone Attainment Plan. Therefore, engineering judgments will be required. Mr. Ezersky noted that the emissions reductions from the flare recovery compressors could be included in the ozone plan.

Mr. Savage stated that the staff concerns about refinery data accuracy are problematic when staff asked for refinery data but never identified such concerns. None of Tesoro's 400 samples confirm the 75% composition assumption in the TAD. District use of historical data by definition excludes the reductions from the recovery compressors. The TAD specifically focuses on reducing ozone

precursors for ozone attainment. Mr. Lopera stated that he read the staff presentation differently. Mr. Savage replied that public policy will be based on the published estimate of 22 tons, and that the TAD was published without any refinery review.

Dennis Bolt, Western States Petroleum Association, stated that the South Coast AQMD collected objective data through its flare-monitoring rule for three years, and this data is not disputed. It has since been deliberating over flare controls and has not yet committed to a rule. In the Bay Area, it appears that the politics of ozone planning have overtaken good science. The District's increased estimate of 13 tons up from 200 pounds in the 2001 emission inventory was guesswork. The TAD was also based on assumptions that are refuted by six months of lab samples. Staff did not confer with the refineries on the TAD until it was published. District staff now claims that it has conducted a reasonableness analysis of flare controls for a rule. This was recently published on the District's website, affirming that it (a) has an inventory, (b) has assessed controls to reduce that inventory, (c) measured the amount of those reductions and (d) has determined that the controls that are available and cost-effective. None of these rules are in place anywhere. The process used in the South Coast AQMD works with real information rather than assumptions leading to emission estimates. The Advisory Council may be in a unique position as an objective body to assess the disconnect between the ozone planning process and the technical work. The latter must be done properly. The Committee has spent much time on this issue and will hopefully devote more time to it.

Mr. Kendall noted that staff is analyzing episodic periods in 2000 and looked for unusual refinery events. The refineries provided data on flaring events and marine loading. Staff made emission estimates for these and included them in the 2000 inventory to assess their impact on ozone formation. When the District published the TAD it did not have Tesoro's 400 samples, and the results of their analysis became available later. Also, one facility modified its flow rates several times. Another facility submitted emission estimates that were driven by flow rate and composition data and revised those two or three times. This invariably raises questions about the data quality. The District does intend to revise the TAD, which contains estimates made up to December 2002 and does not have the benefit of referring to data from the subsequent six months.

Regarding a draft set of comments for discussion at the next meeting, District Counsel Brian Bunger explained that a group of less than a quorum of the Committee could compose, circulate and discuss it. Chairperson Harley assigned Mr. Hayes, Dr. Bedsworth and himself to this group.

7. **Committee Member Comments.** Mr. Altshuler noted that manufacturers of particulate traps for diesel engines will likely not be able to meet the 20% nitric oxide limit in 2004, and the District is considering funding the installation of these high emitting traps after the state deadline. Chairperson Harley stated that, time permitting, District plans for PM trap retrofits in light of the state of the art in manufacturing will be agendized for brief discussion at the next meeting.
8. **Time and Place of Next Meeting.** 9:30 a.m., Monday, October 20, 2003, 939 Ellis Street, San Francisco, CA 94109. Board Room.
9. **Adjournment.** 12:06 p.m.

James N. Corazza  
Deputy Clerk of the Boards