AGENDA: 3

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Bay Area Refinery Update

Stationary Source and Climate Impacts Committee Meeting

December 20, 2021

Damian Breen
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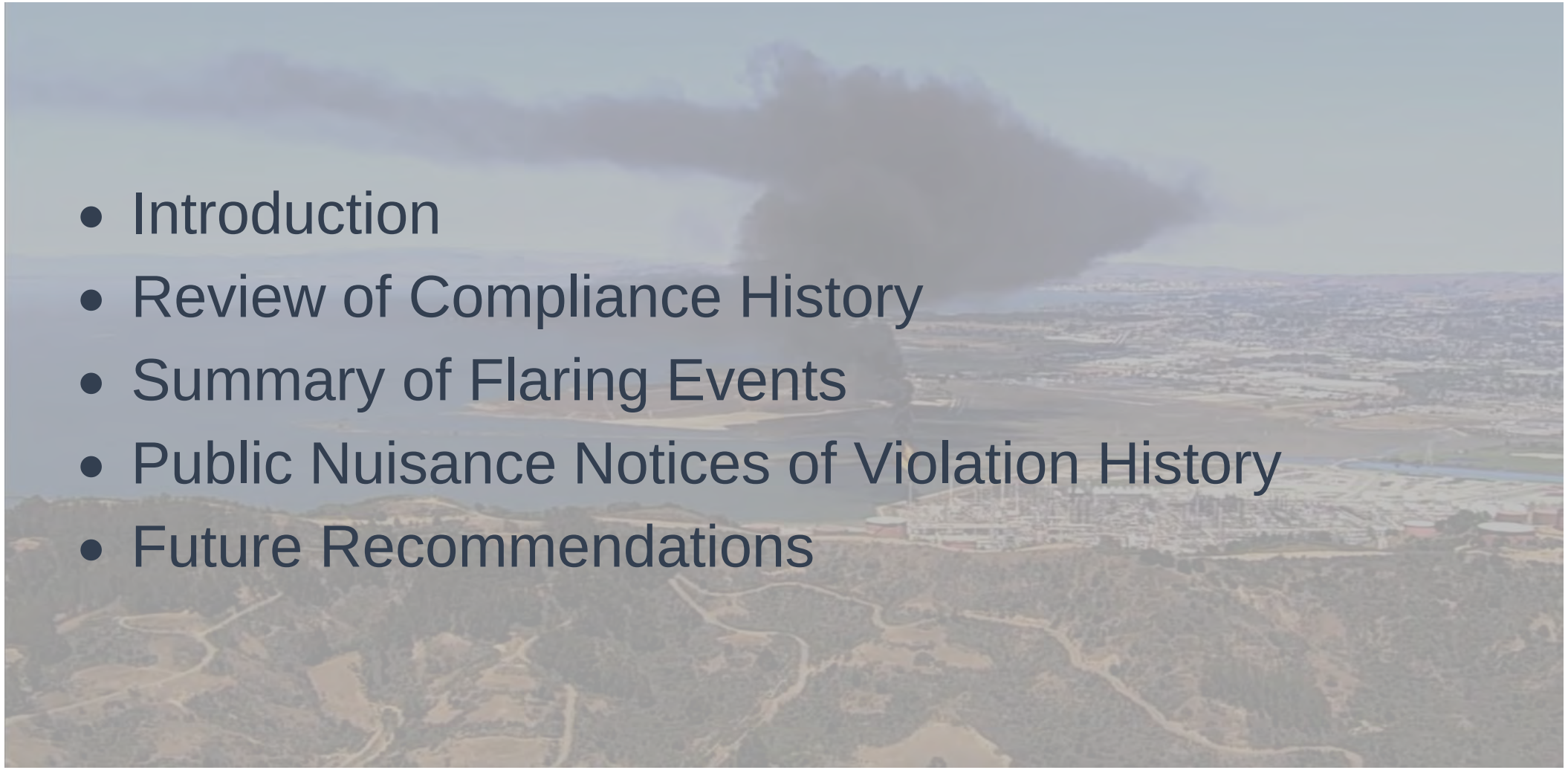
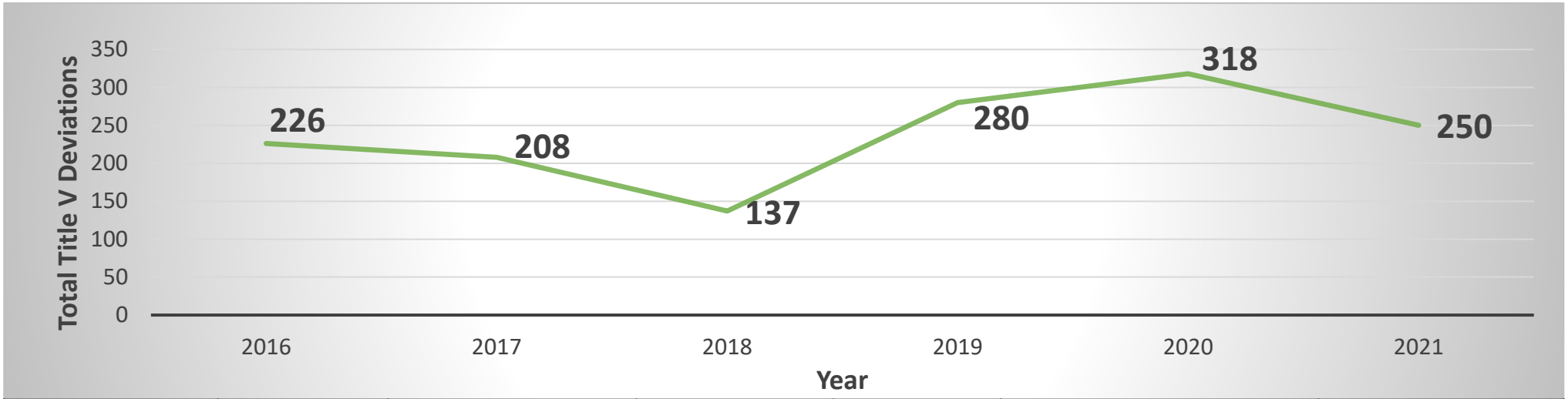
Overview



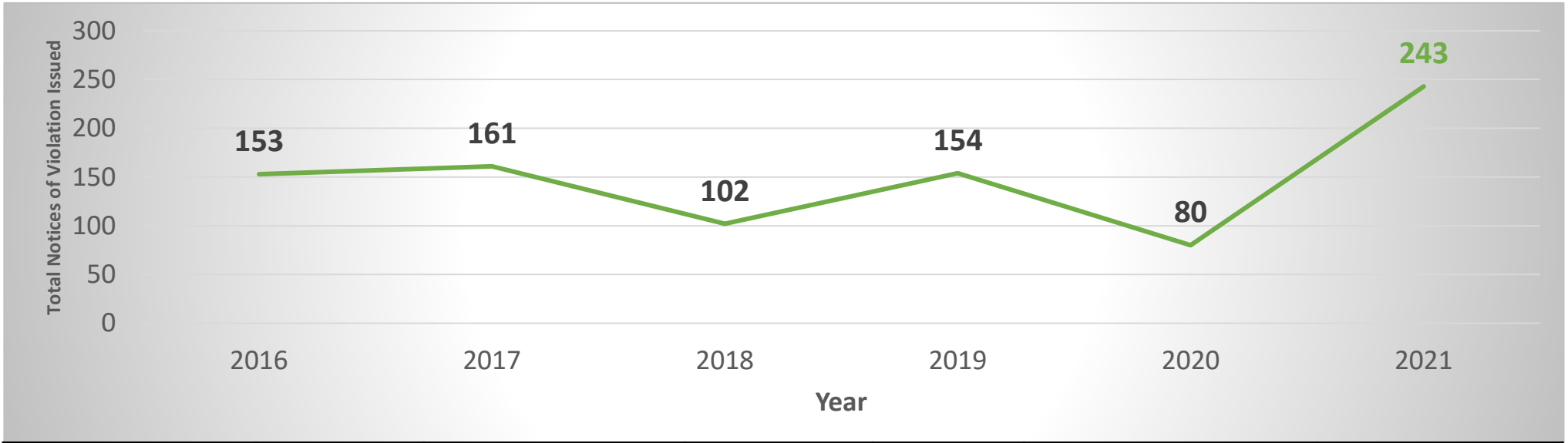
- Introduction
- Review of Compliance History
- Summary of Flaring Events
- Public Nuisance Notices of Violation History
- Future Recommendations

Bay Area Refinery Title V Deviations Filed 2016 - 2021



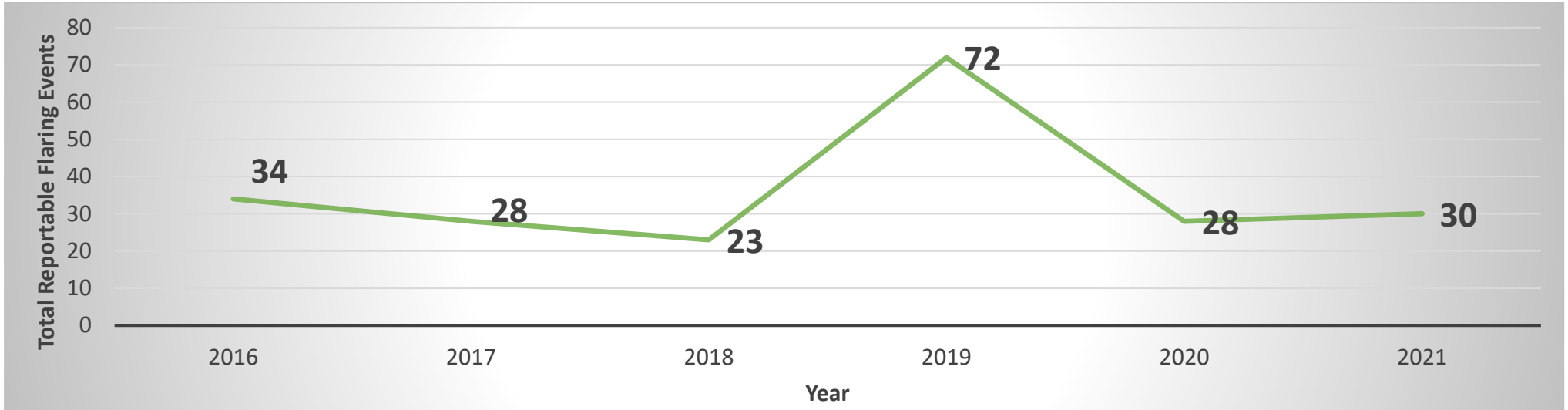
Year	Chevron	MRC (formerly Shell)	Phillips 66	Valero	Marathon (formerly Tesoro)	Annual Total
2016	73	24	27	27	75	**226**
2017	62	47	18	30	51	**208**
2018	42	25	19	13	38	**137**
2019	168	23	24	34	31	**280**
2020	219	33	23	18	25	**318**
2021	201	14	14	8	13	**250**
Total	765	166	125	130	233	

Bay Area Refinery Notices of Violation 2016 - 2021



Year	Chevron	MRC (formerly Shell)	Phillips 66	Valero	Marathon (formerly Tesoro)	Annual Total
2016	60	12	26	14	41	**153**
2017	37	37	10	42	35	**161**
2018	26	15	13	18	30	**102**
2019	97	7	17	26	7	**154**
2020	64	6	2	4	4	**80**
2021*	200	12	12	7	12	**243**
Total	484	89	80	111	129	*Projected

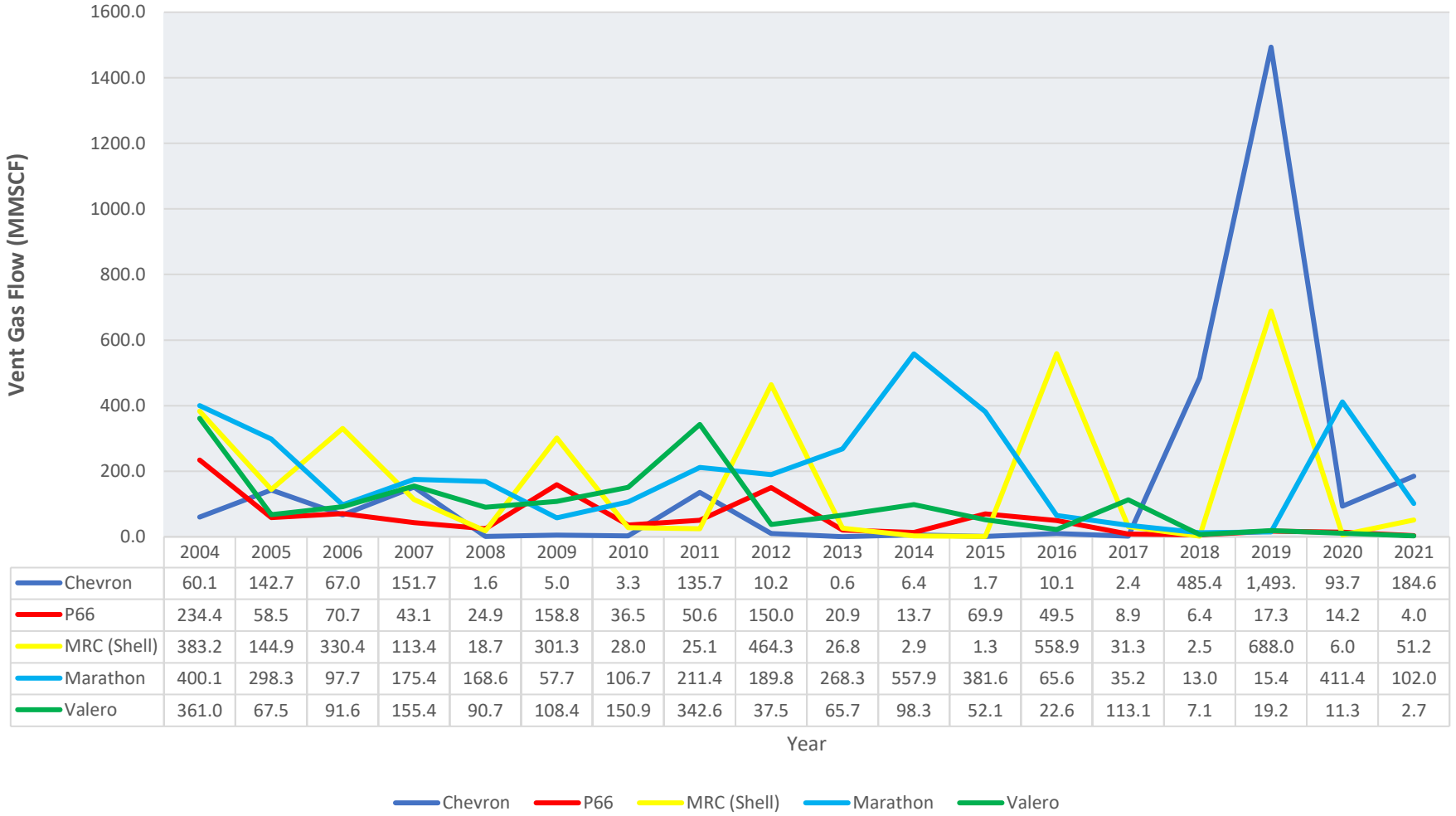
Bay Area Refinery Flaring Events 2016 through 2021



Year	Chevron	MRC (formerly Shell)	Phillips 66	Valero	Marathon (formerly Tesoro)	Annual Total
2016	5	7	12	6	4	**34**
2017	4	4	4	9	7	**28**
2018	9	3	2	4	5	**23**
2019	39	9	10	6	8	**72**
2020	11	4	4	5	4	**28**
2021	25	2	1	0	2	**30**
Total	93	29	33	30	30	

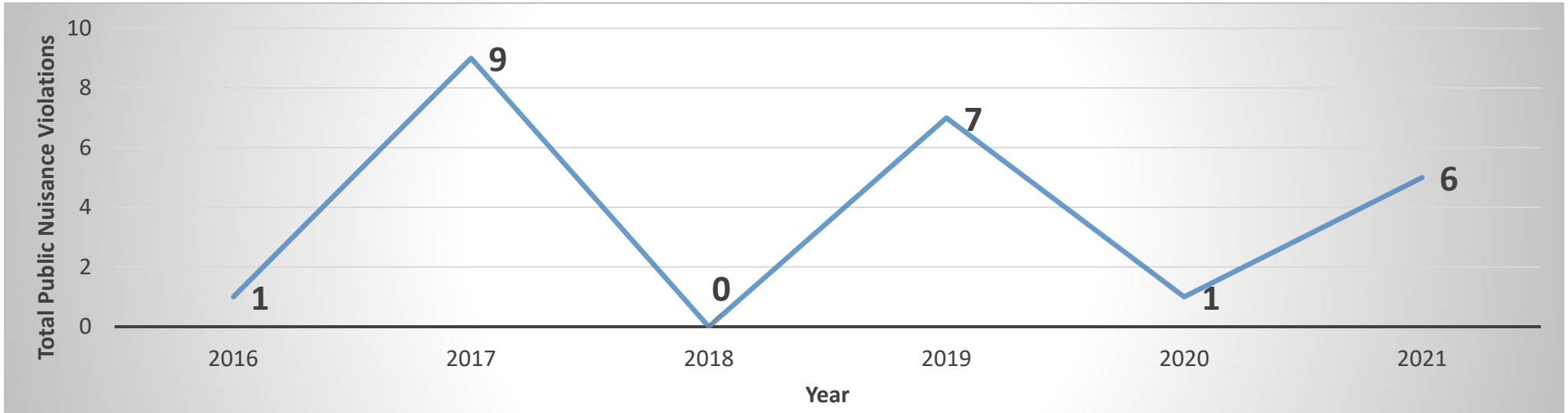
Bay Area Refinery Flaring Data

Refinery Vent Gas Volume Flared 2004-Sept. 2021



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Chevron	60.1	142.7	67.0	151.7	1.6	5.0	3.3	135.7	10.2	0.6	6.4	1.7	10.1	2.4	485.4	1,493.	93.7	184.6
P66	234.4	58.5	70.7	43.1	24.9	158.8	36.5	50.6	150.0	20.9	13.7	69.9	49.5	8.9	6.4	17.3	14.2	4.0
MRC (Shell)	383.2	144.9	330.4	113.4	18.7	301.3	28.0	25.1	464.3	26.8	2.9	1.3	558.9	31.3	2.5	688.0	6.0	51.2
Marathon	400.1	298.3	97.7	175.4	168.6	57.7	106.7	211.4	189.8	268.3	557.9	381.6	65.6	35.2	13.0	15.4	411.4	102.0
Valero	361.0	67.5	91.6	155.4	90.7	108.4	150.9	342.6	37.5	65.7	98.3	52.1	22.6	113.1	7.1	19.2	11.3	2.7

Bay Area Refinery
Public Nuisance Violations Issued 2016 - 2021



Year	Chevron	MRC (formerly Shell)	Phillips 66	Valero	Marathon (formerly Tesoro)	Annual Total
2016	1	0	0	0	0	**1**
2017	5	0	1	3	0	**9**
2018	0	0	0	0	0	**0**
2019	1	0	0	6	0	**7**
2020	1	0	0	0	0	**1**
2021	5	0	1	0	0	**6**
Total	13	0	2	9	0	

Future Recommendations

- Consider Legislative Change for Penalties
- Review Effectiveness of Applicable Refinery Regulations
- Propose Changes to the Regulation 12 Rule 12 Refinery Flares
  - Critical review of each flaring event, causal analysis and proposed corrective actions
  - Provide more explicit rule language regarding Flare Minimization Plans
  - Require historic look-back for similar failures that may indicate a systemic root cause, or lack of management review and control. Then propose timeline for corrective measures that will be implemented.
  - Incorporate applicable Federal flare standards into the Air District Rule

Future Recommendations (cont.)

- Consider new program to improve monitoring and measurement during incidents
  - designed together with community members and partner agencies to ensure responsiveness to community objectives
  - adequately resourced for community engagement, planning, building capacity, and implementation
  - coordinated with enforcement actions and efforts to reduce incidents

Discussion

AGENDA: 4

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Regulation 8, Rule 18 Background

Stationary Source and Climate Impacts Committee Meeting

December 20, 2021

Nicholas Maiden, P.E.
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Presentation Outcome

- Provide a background on Regulation 8, Rule 18
- Overview of the Heavy Liquids Study
- Discuss Preliminary Study Results and Next Steps

Presentation Outline

- Regulation 8, Rule 18 Background
- Board Resolution
- Settlement Agreement
- Heavy Liquids Study Overview
- Heavy Liquids Study Preliminary Findings
- Next Steps

Requested Action

None – informational presentation

Regulation 8, Rule 18

- Rule limits emissions of total organic compounds from equipment leaks at petroleum refineries, chemical plants, bulk plants, and bulk terminals
- Establishes maximum allowable leak thresholds, repair provisions
- Requires certain component types be routinely monitored for leaks using portable emissions monitoring equipment

Regulation 8, Rule 18 (cont.)

- Rule last revised in December 2015
- Prior to the revision, components that handled liquid materials with an initial boiling point greater than 302 degrees Fahrenheit were exempt from monitoring requirements
- Impacted approximately 370,000 components at the five petroleum refineries, required to be monitored either quarterly or annually

Estimated Emissions Reductions

- Baseline emissions estimated using average emission factors developed in 1980 and published by the Environmental Protection Agency and the California Air Pollution Control Officers Association

- Estimated a total emissions reduction of ~1,230 tons per year from equipment leaks at five refineries

Board Resolution Number 2015-12

- Directs staff to examine emission reduction and cost effectiveness issues related to the inclusion in Regulation 8, Rule 18 of requirements for monitoring of components in heavy liquid service
- Report the results of the examination
- Recommend modifying the rule (if appropriate) based on results

Settlement Agreement

- Conduct the heavy liquid component emissions study to assess air emissions that are directly related to refinery components in heavy liquid service
- Requires the Air District to analyze data and other findings of the study, in consultation with Petitioners
- Generate a written report documenting the results of the Heavy Liquids Study

Heavy Liquids Study Purpose

- Evaluate existing total organic compound emissions from equipment leaks from petroleum refinery components handling materials with an initial boiling point greater than 302 degrees Fahrenheit that are not currently monitored*

*Routinely monitored components are expected to have lower emissions as leaks are found and repaired

Heavy Liquids Study Overview

- Process units and process lines selected from drawings
- Selected components screened using a portable instrument to measure equipment leak concentrations of organic compounds
- Subset of screened components had mass emissions measured through physically enclosing the component and drawing a sample of the leak and sent offsite to a third-party laboratory
- Types: valves, pump seals, pressure relief devices, and connectors

Heavy Liquids Study Overview (Cont.)

- From estimated population:
  - Targeted 10,000 components to be screened
  - Targeted 100 components to be sampled, expanded to 165
- Screening by Air District (1.5 refineries) and refinery personnel with 3rd-party auditors (3.5 refineries)
- Sampling conducted by WSPA contractor with Air District oversight
- Air District reviewed and analyzed all results

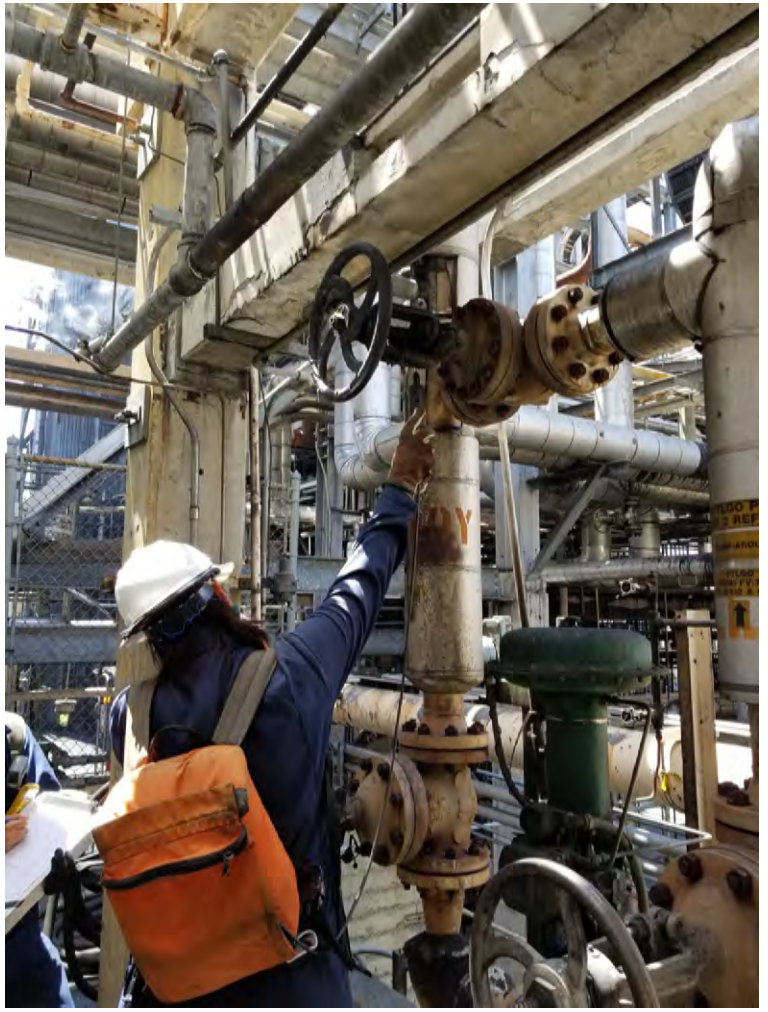
Heavy Liquids Study – Components

Component Type	Screened	Sampled
Pump Seals	734	32
Connectors	4,710	61
Valves	5,349	72
Pressure Relief Devices	30	0
Total	10,823	165

Temperature:	≤ 920° Fahrenheit
Size:	≤ 100 inches
Pressure:	≤ 3,900 pounds per square inch gage
Location:	Ground Level to Top of Column
Material:	Light (Diesel) to Heavy (Asphalt)

Heavy Liquids Study – Screening

Heavy Liquids Study – Screening (cont.)



Heavy Liquids Study – Screening (cont.)

Heavy Liquids Study – Screening (cont.)

Heavy Liquids Study – Sampling

Heavy Liquids Study – Sampling (cont.)

Heavy Liquids Study – Sampling (cont.)

Heavy Liquids Study – Preliminary Findings

- Emissions lower than previously found
- Leaks can be anywhere, most emissions from small population
- Refineries agreed to monitor heavy liquid vapor components
- Some component categories not included in emissions inventory
- Not enough information for certain component types

Next Steps

- Address any technical comments submitted by the petroleum refineries on draft Heavy Liquids Study report and finalize report
- Evaluate potential emissions reductions
- Estimate cost effectiveness
- Recommend necessary revisions to the rule

Questions or Feedback