BAY AREA AIR QUALITY MANAGEMENT DISTRICT

AGENDA: 2

Update on the Role of the Ad Hoc Refinery Committee, Background on Refinery Operations, and Applicable Regulations in the Bay Area

Ad Hoc Refinery Oversight Committee Meeting
April 09, 2018

Nicholas Maiden, P.E.
Principal Air Quality Engineer

Committee Purpose

Refinery Knowledge

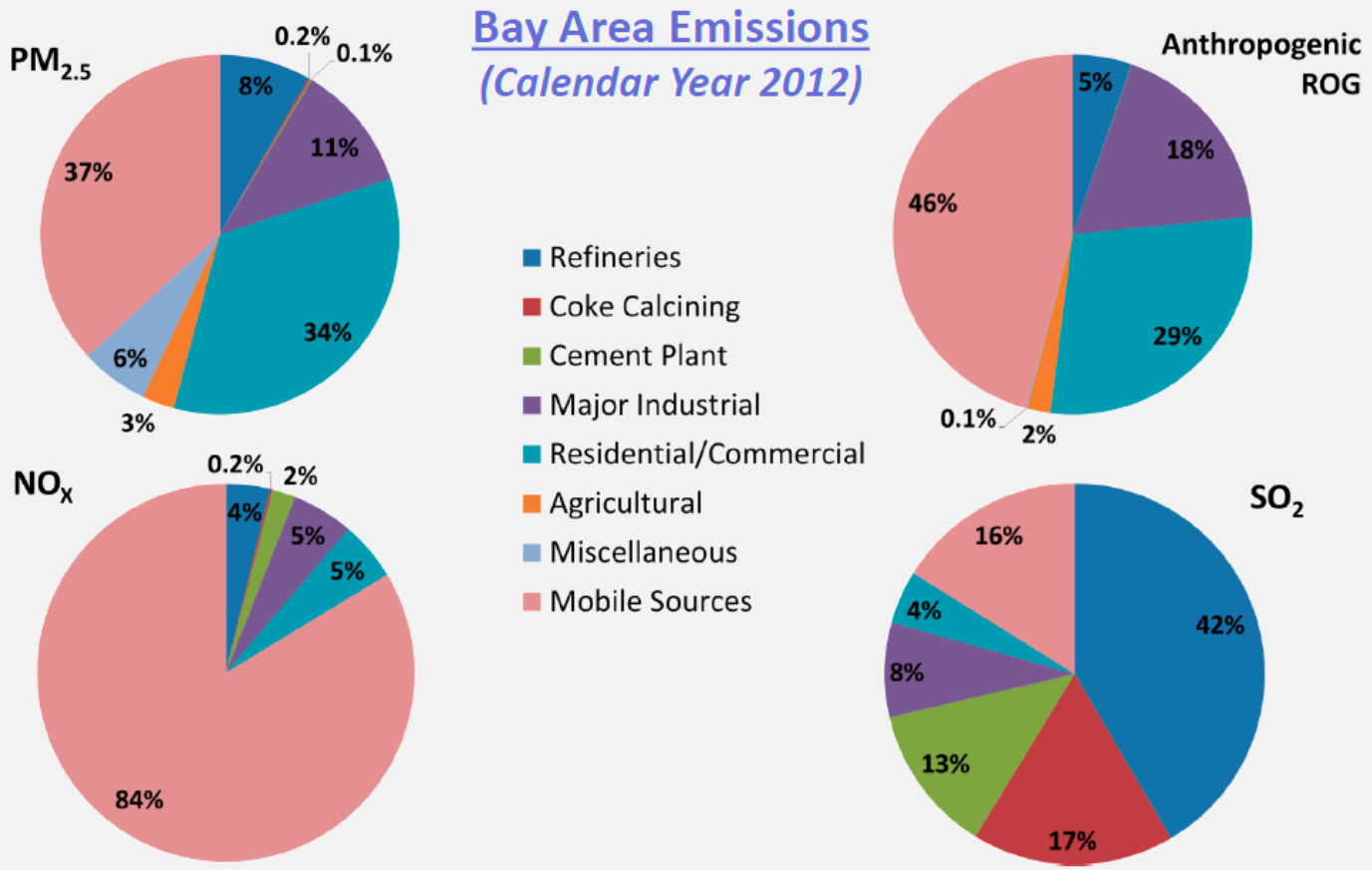
Board Updates of Refinery Actions

Forum for Refinery Issues

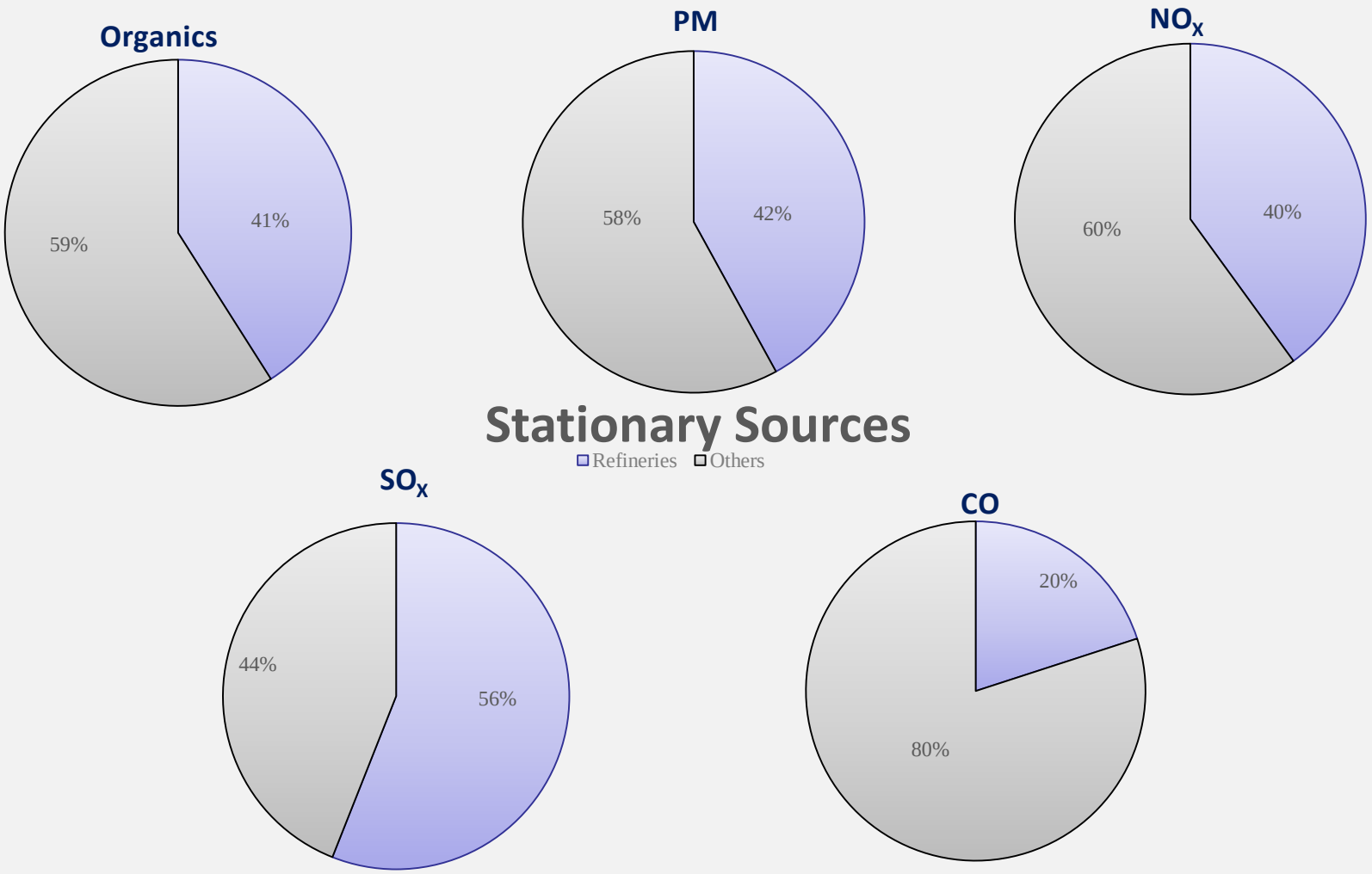
Air District & Board Permitting Roles

ROLES & RESPONSIBLITIES

Refinery Criteria Emissions



Refinery Criteria Emissions



Types of Permits

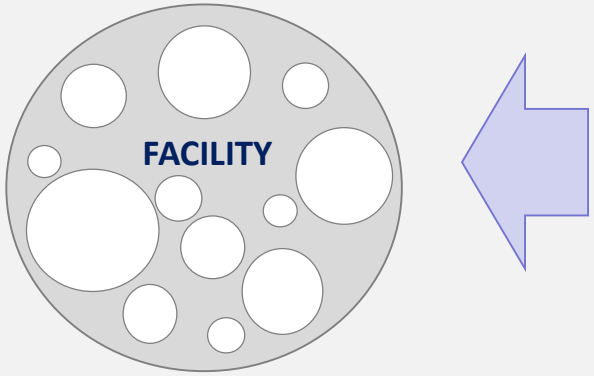
PRECONSTRUCTION REVIEW PERMIT

- Prevention of Significant Deterioration
- New Source Review for Non-Attainment Pollutant
- Capacity Limits
- Control Technology
- Health Risk Analysis
- Emissions Offsets

Authority to Construct

OPERATING PERMIT

Permit to Operate

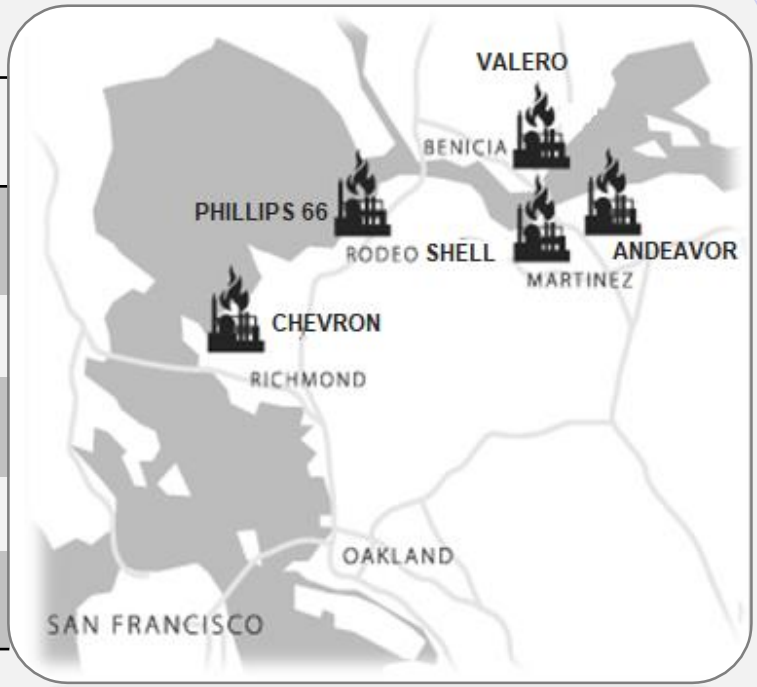


TITLE V

- List Requirements
- Additional Monitoring

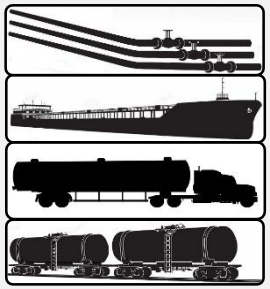
Bay Area Petroleum Refineries

Refinery	Started	Operable Capacity (bbls/day)	Size (acres)	Employees
Andeavor (Tesoro)	1913	166,000	2,200	650
Chevron	1902	245,271	2,900	3,800
Phillips 66	1896	120,200	1,110	~450
Shell	1915	156,400	1,000	~700
Valero	1968	145,000	800	~480



Capacity Source:
U.S. Energy Information Administration – Refinery Capacity Report June 21, 2017
https://www.eia.gov/petroleum/refinerycapacity/

What?



Receive

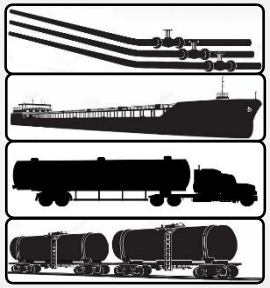
Store

Prepare

Petroleum Refinery

Process

Store

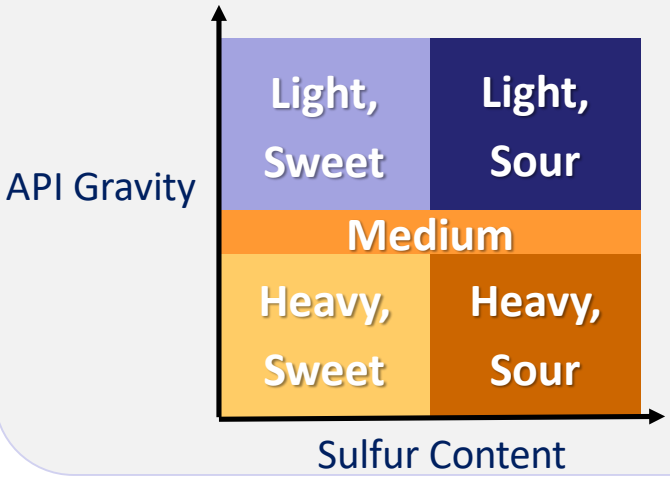


Send

Crude Oil is Crude Oil, Right?

Light → Heavy

Processing Effort

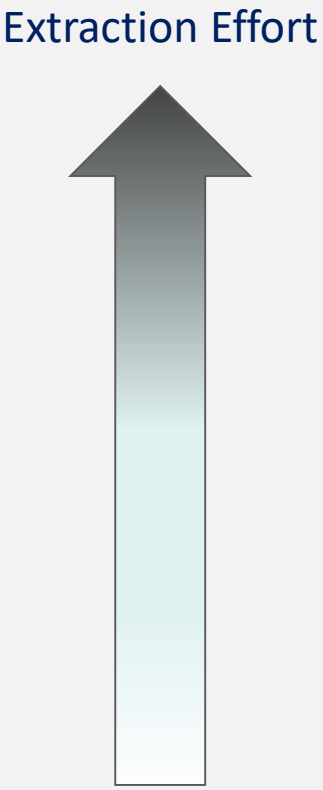


Crude Oil – How?

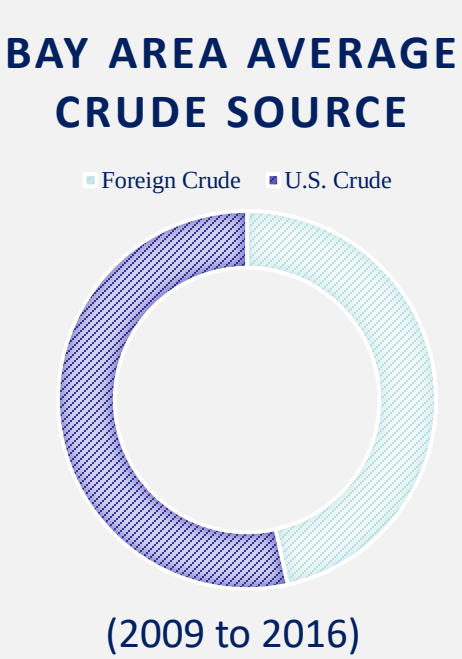
Oil Sands?

Fracking?

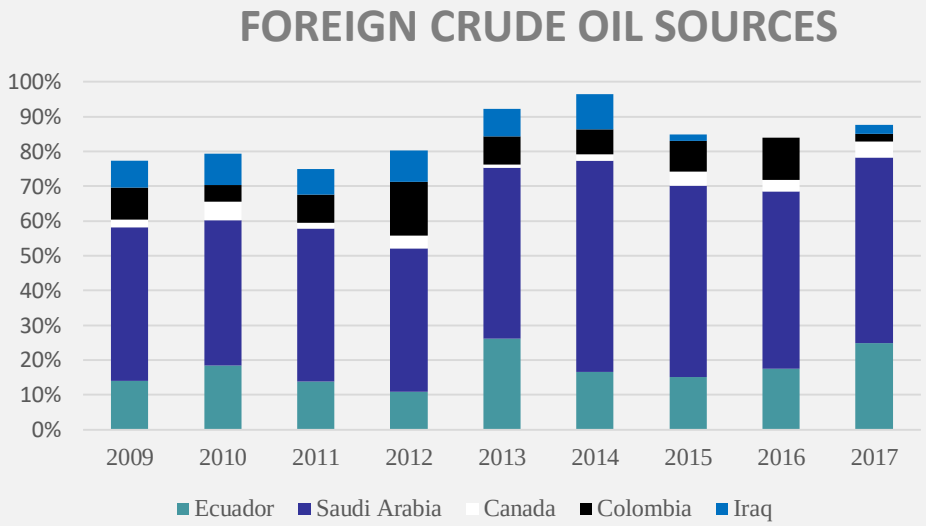
Conventional?



Crude Oil – From Where?

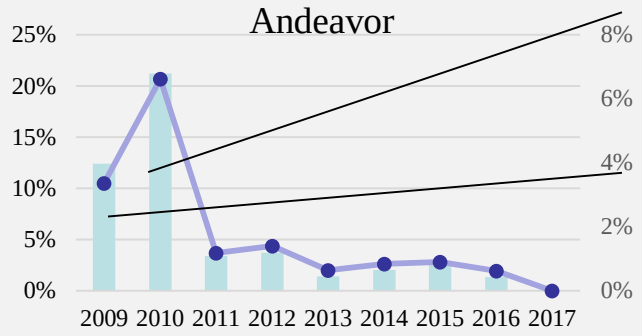


(2009 to 2016)



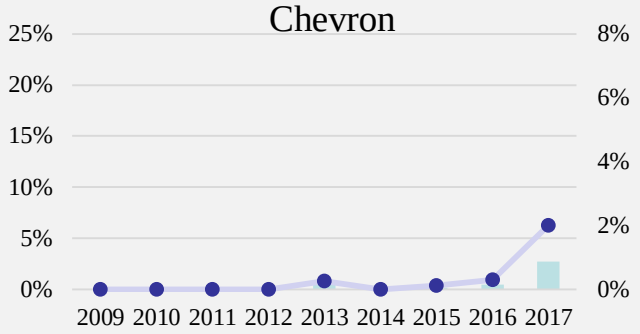
Foreign Crude Oil Data Source:
U.S. Energy Information Agency: Publicly-Available Crude Imports by Refinery (Volumes, API Gravity, Sulfur Content)
https://www.eia.gov/petroleum/imports/browser/?src=-f8#/?d=0&dt=RF&vs=PET_IMPORTS.WORLD-US-ALL.A
https://www.eia.gov/petroleum/imports/companylevel/archive/

Canadian Crude Oil Imports



Line: % of refinery operable capacity

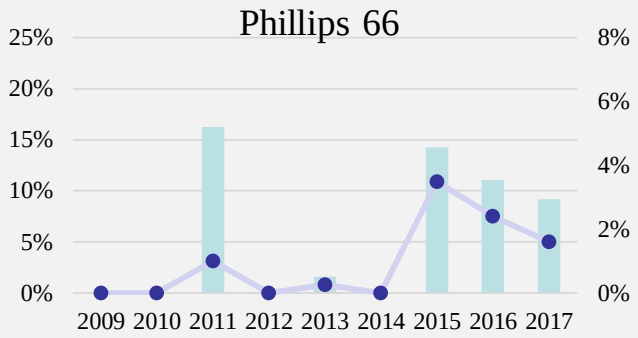
Bars: % of total refinery crude imports

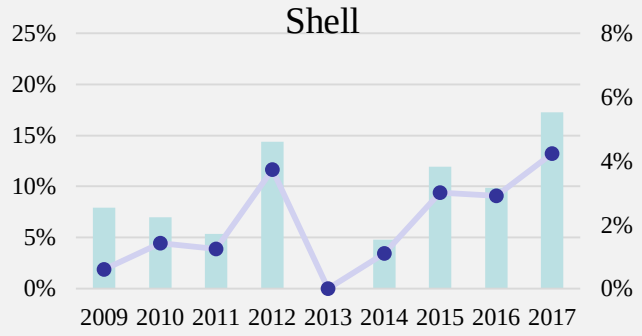


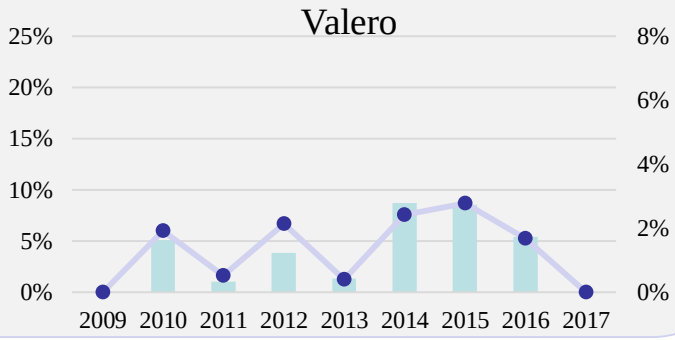
Source:
District analysis of U.S. EIA Imports Data

% of Refinery Imports = $\frac{Refinery\ Canadian\ Imports}{(Total\ Refinery\ Crude\ Imports)}$

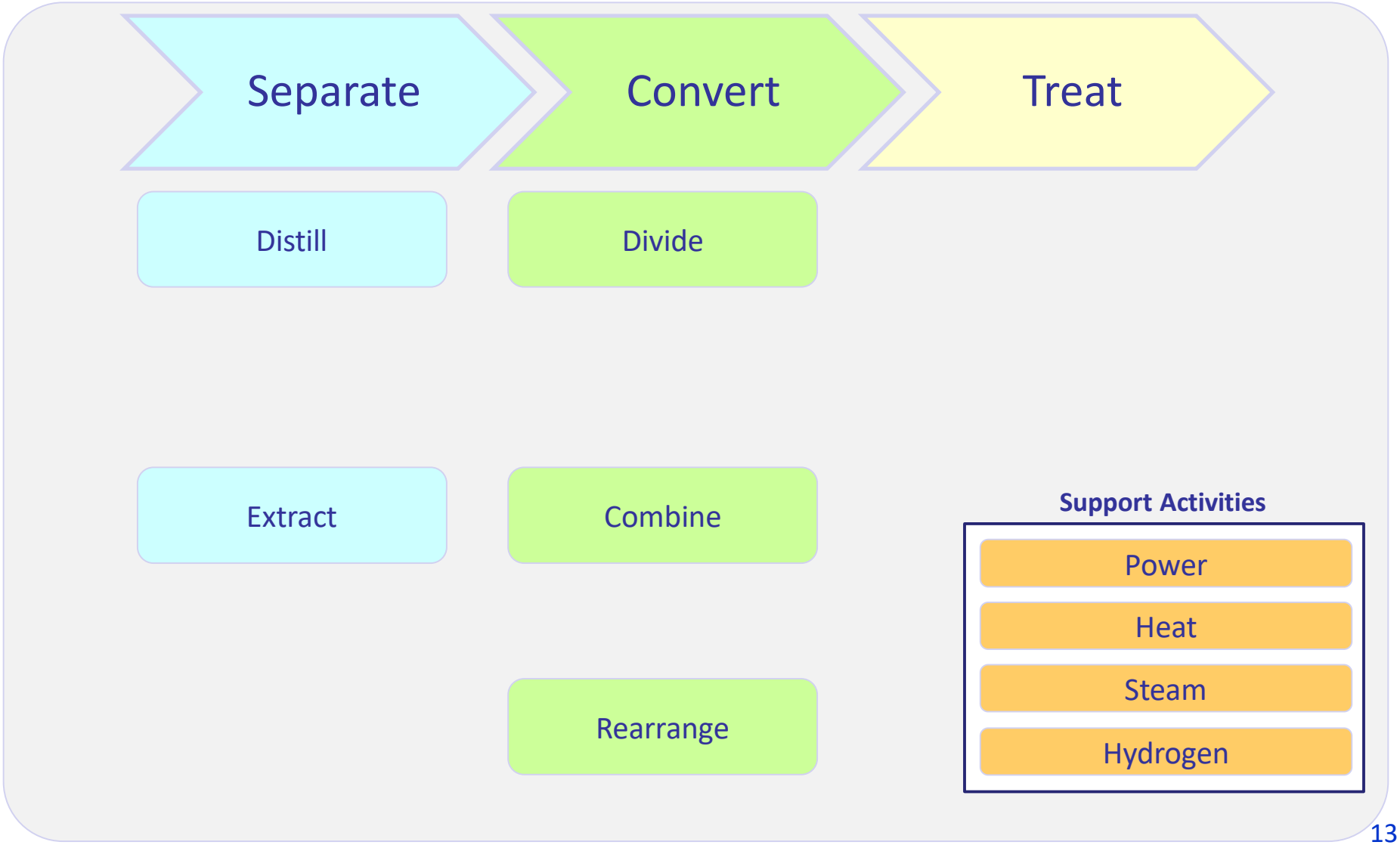
% of Operable Capacity = $\frac{Canadian\ Imports}{(Operable\ \ Capacity\ \ x\ 365)}$







Petroleum Refining – How?



Petroleum Refining – How?

Distill

"Crude Unit"
- Atmospheric Distillation
- Vacuum Distillation

Divide

Catalytic cracking
(Hydrocracker, Fluidized Catalytic Cracking Unit)
Thermal cracking
(Cokers, Visbreaking)

Hydrotreating
Blending

Extract

Solvent Deasphalting
Solvent Extraction

Combine

Alkylation
Polymerization

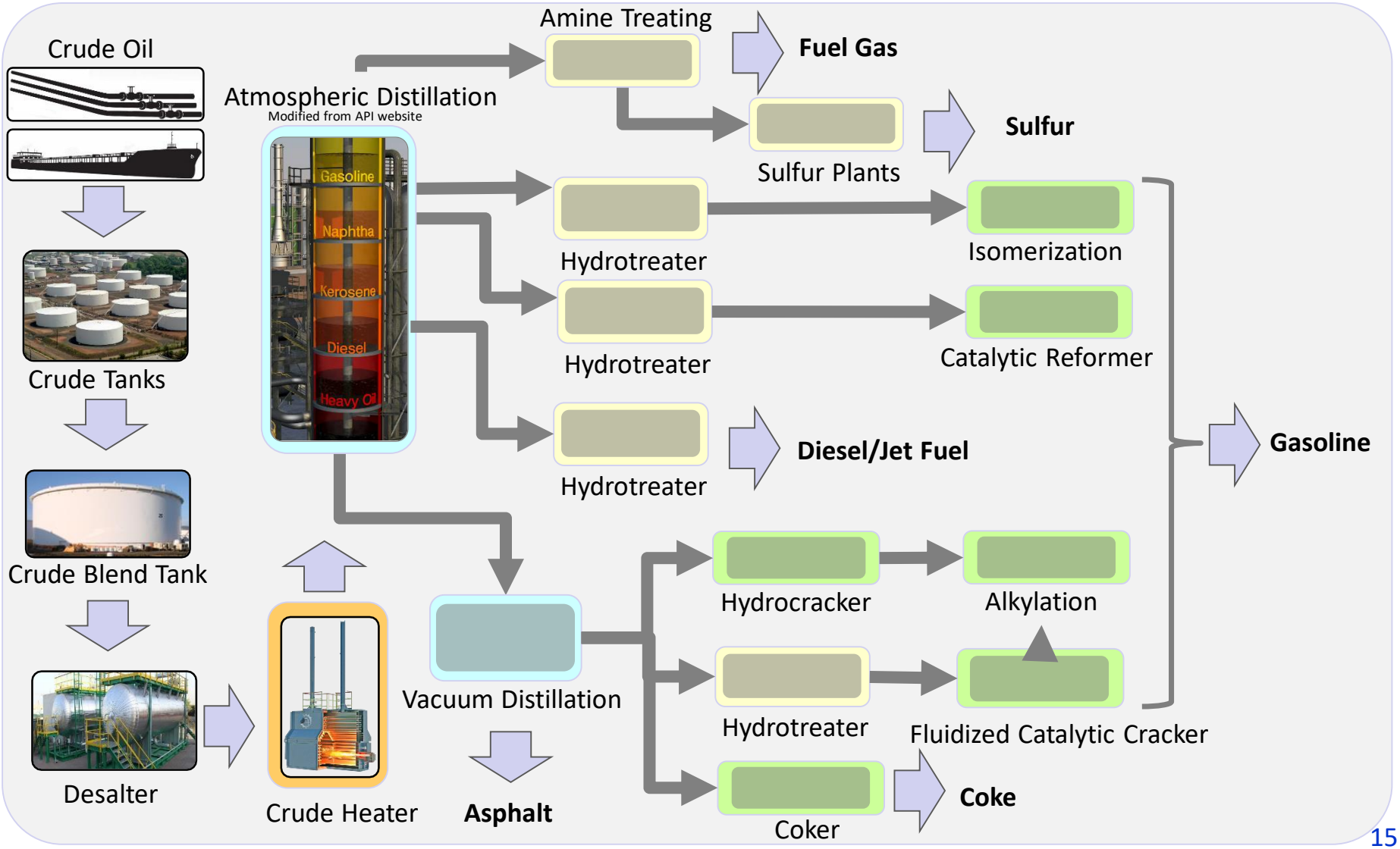
Rearrange

Catalytic reforming
Isomerization

Support Activities

- Cogen (Electricity)
- Fuel Gas/Sulfur Recovery
- Cogen (Steam)
- Hydrogen

Petroleum Refining – How?



What Are Some Emission Sources?

Stationary Combustion

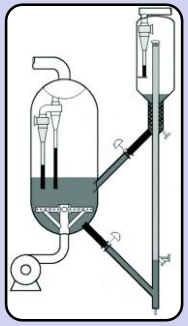
Boilers/Furnaces

Diesel Engines

Gas Turbines

Flares

Process Unit Stacks



FCCU

Sulfur Plants

Hydrogen Plants

Equipment Leaks

Valves & Connectors

Pumps

Storage

Tanks

Miscellaneous

Cooling Towers

Wastewater

Loading

Applicable Air District Regulations

REGULATION 1 - GENERAL PROVISIONS
REGULATION 2 – PERMITS
- Rule 1 – General Requirements
- Rule 2 – New Source Review
- **Rule 5 – New Source Review of Toxic Air Contaminants**

REGULATION 6 - PARTICULATE MATTER AND VISIBLE EMISSIONS
- Rule 1 – General Requirements
- **Rule 5 – Particulate Emissions from Refinery Fluidized Catalytic Cracking Units**

REGULATION 7 - ODOROUS SUBSTANCES
REGULATION 8 - ORGANIC COMPOUNDS
- Rule 1 - General Provisions
- Rule 2 - Miscellaneous Operations
- Rule 5 - Storage of Organic Liquids
- Rule 6 - Terminals and Bulk Plants
- Rule 8 - Wastewater (Oil-Water) Separators
- Rule 10 - Process Vessel Depressurization
- **Rule 18 - Equipment Leaks**
- Rule 28 - Episodic Releases From Pressure Relief Devices
- Rule 37 - Natural Gas and Crude Oil Production Facilities
- Rule 43 - Surface Coating of Marine Vessels
- Rule 44 - Marine Vessel Loading Terminals
- Rule 46 - Marine Tank Vessel to Marine Tank Vessel Loading

REGULATION 9 - INORGANIC GASEOUS POLLUTANTS
- Rule 1 - Sulfur Dioxide
- Rule 2 - Hydrogen Sulfide
- Rule 3 - Nitrogen Oxides from Heat Transfer Operations
- Rule 7 – Nitrogen Oxides And Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, And Process Heaters
- Rule 8 - Nitrogen Oxides And Carbon Monoxide from Stationary Internal Combustion Engines
- Rule 10 - Nitrogen oxides And Carbon Monoxide From Boilers, Steam Generators And Process Heaters in Petroleum Refineries

REGULATION 10 – STANDARDS OF PERFORMANCE FOR NEW STATIONARY SOURCES
REGULATION 11 - HAZARDOUS POLLUTANTS
- Rule 1 - Lead
- Rule 2 - Asbestos Demolition, Renovation and Manufacturing
- Rule 7 - Benzene
- **Rule 10 - Hexavalent Chromium Emissions From Cooling Towers**
- Rule 11 - National Emission Standard For Benzene Emissions From Coke By-Product Recovery Plants and Benzene Storage Vessels
- Rule 12 - National Emission Standard For Benzene Emissions From Benzene Transfer Operations and Benzene Waste Operations
- **Rule 18 – Reduction of Risk from Air Toxic Emissions at Existing Facilities**

REGULATION 12 - MISCELLANEOUS STANDARDS OF PERFORMANCE
- Rule 11 – Flare Monitoring
- Rule 12 – Flare Control
- **Rule 15 – Petroleum Refining Emissions Tracking**

Note:
Red lettering indicates recently adopted rule subject to law suits
Green lettering indicates recently adopted rule

Regulation 11, Rule 18

Eliminate Unacceptable Health Risk to Nearby Residents, Workers, or Students

- **Facilities Identified by Health Impacts**
- **High Risk Facilities Must Implement Risk Reduction Plan**
- **Facilities Must Reduce Health Impacts or Install Best Available Retrofit Control Technologies for Toxics on All Significant Sources of Health Risk**

Regulation 12, Rule 15

Track Air Emissions and Crude Oil Composition from Petroleum Refineries Over Time

Establish Air Monitoring Systems to Provide Air Quality Data along Refinery Boundaries

- **Annual Emissions Inventories**
- **Fence-Line Monitoring**
- **Monthly Crude Oil Composition Reports**

Questions?

References/Further Learning

Petroleum Refining

API – How a Refinery Works

http://www.api.org/oil-and-natural-gas/wells-to-consumer/fuels-and-refining/refineries/how-refinery-works/refinery-processes

Interactive Animation: http://sciencenetlinks.com/interactives/energy/interactive/api_treat_012810.swf

Distillation Visualization: http://www.virtualrefinery.com/

Hydraulic Fracturing

FracFocus: Industry-website: http://fracfocus.org/

Crude Oil

U.S. Energy Information Agency - Foreign Imports by Company

https://www.eia.gov/petroleum/imports/browser/?src=-f8#/?d=0&dt=RF&vs=PET_IMPORTS.WORLD-US-ALL.A
https://www.eia.gov/petroleum/imports/companylevel/archive/

AGENDA: 3

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Project Overview and Permit Status of Bay Area Refinery Projects

Ad Hoc Refinery Oversight Committee Meeting

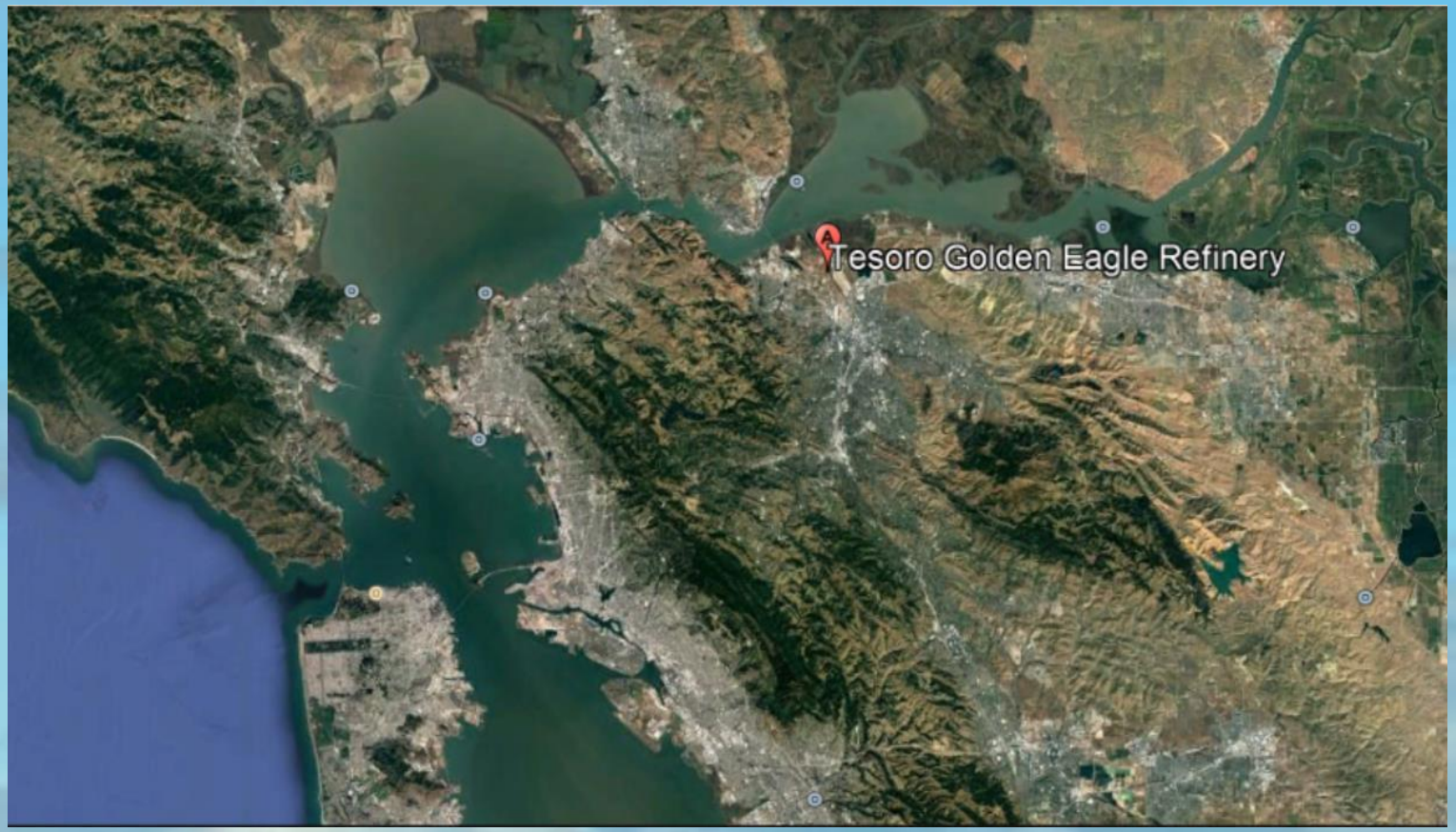
April 9, 2018

Carol Lee
Senior Air Quality Engineer

Presentation Overview

- Project Overview and Status
  - Tesoro Low Carbon Intensity Fluid Catalytic Cracking Unit (FCCU) Feed Project
  - Phillips 66 Projects
    - ✓ Unicracker
    - ✓ Marine Terminal
  - Title V Permit Renewals

Tesoro Refinery in Martinez

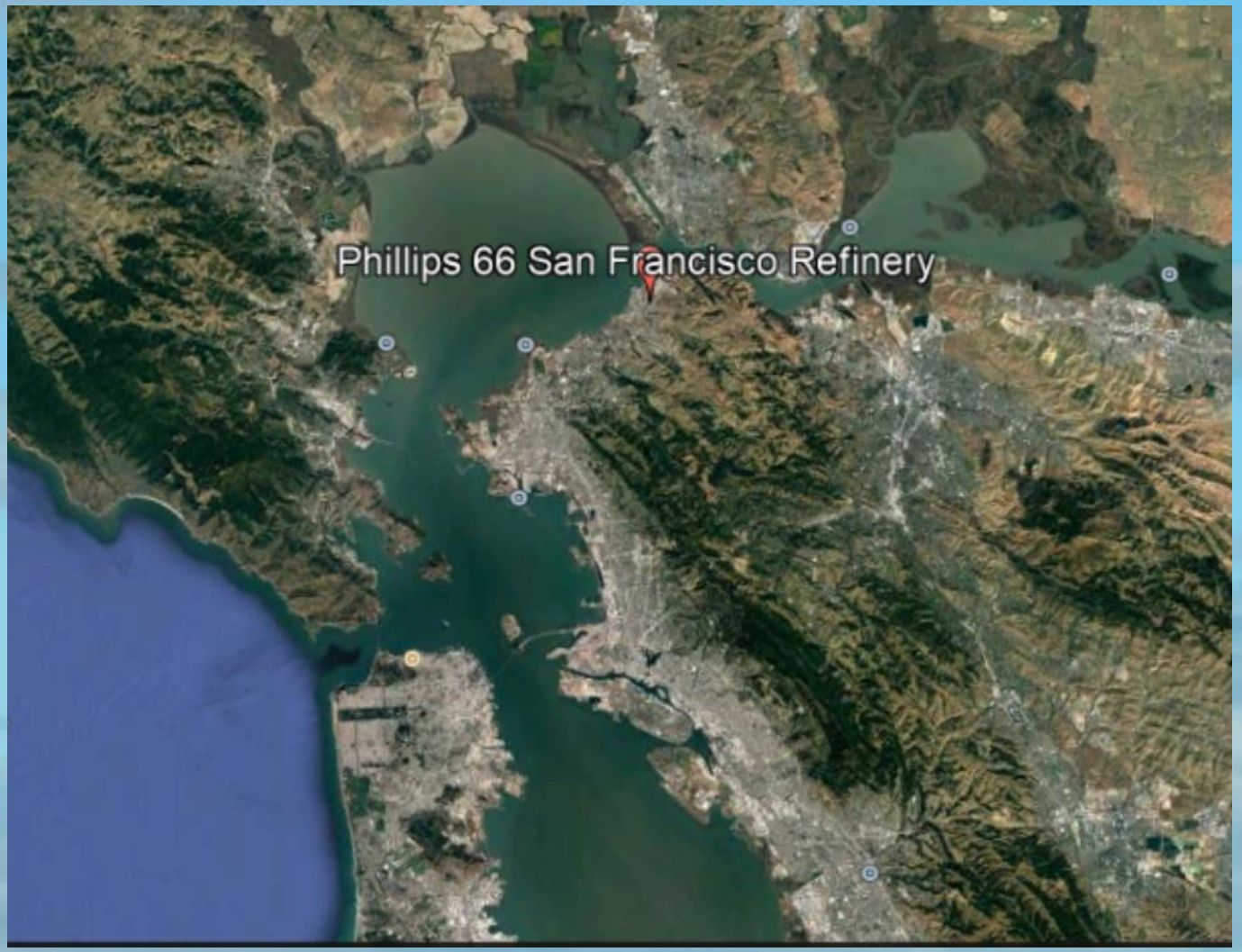


Tesoro Refinery Map

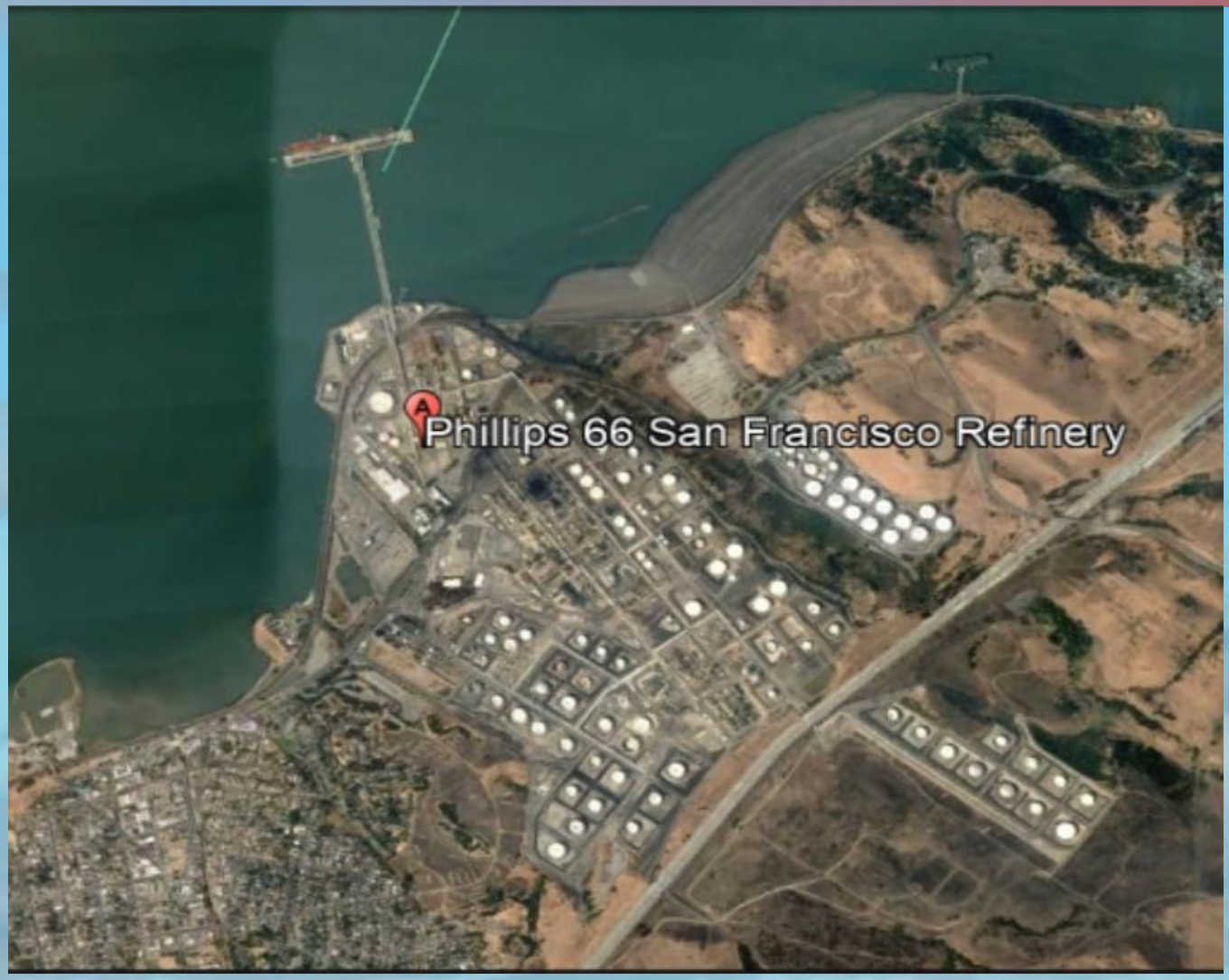
Tesoro Low Carbon Intensity FCCU Feed Project

- Introduce bio-oil feed into the FCCU
- 800 – 4000 barrels per day
- 1 to 5 % of the FCCU feed
- No increase in total throughput at the FCCU
- Delivery via 1 to 6 rail cars per day
- Three 500 barrel bio-oil storage tanks abated by a catalytic oxidizer

Phillips 66 Refinery in Rodeo



Rodeo Refinery Map



Unicracker Project Description

The Phillips 66 Refinery processes gas oil in the Unicracker complex.

- The Project proposes increase gas oil throughput in the Unicracker complex:
  - Increase permit limit by 4,000 barrels/day, from 65,000 barrels/day to 69,000 barrels/day
  - Increase annual throughput limit from 8,395,000 barrels/year to 9,855,000 barrels/year (increase of 4,000 barrel/day for 365 days/year)

Unicracker Permit Impacts

- No new construction or physical modification
- Indicated increases in 3 storage tanks
- Affected sources will remain under previously permitted limits
- No increase crude and gas oil limit at the marine terminal

Marine Terminal Project Description

- The Phillips 66 Refinery processes crude and gas oil delivered by:
  - ship or barge, and
  - pipeline.
- The Project proposes:
  - increase crude and gas oil brought by ship or barge to the Marine Terminal.
  - decrease the pipeline-delivered crude and gas oils.
  - No changes in any process equipment at the marine terminal or refinery.

Marine Terminal Permit Changes

- In 2010, imposed combined offloading limit for crude and gas oil of 30,682 barrels /day.
- In 2013, increased limit to 51,182 barrels/day:
  - Added Limit of 59 ships per year.
  - Increased Throughput Limits of Three Crude Oil Storage Tanks.
- In their current permit application, Phillips 66 has requested the following:
  - Increase Limit to 125,000 barrels /day
  - Increase Limit to 135 ships per year

CEQA and the Project

- CEQA Consultant, ASPEN, Hired
- Notice of Preparation Distributed & Filed
- Environmental Impact Report (EIR) Scoping Meetings:
  - Hercules
  - Vallejo
  - Benicia
- Over 150 Comments Received

Comments Received

- Issues and Concerns Identified
  - Oil Spills
  - Emergency Response
  - Refinery compliance status
  - Refinery capacity
  - Changing crude oil feedstocks
  - Environmental Justice analysis
- Public Safety
- Spills into the Bay

Refineries in the Bay Area

Title V Renewal Applications

Refinery	Expected Comment Period
Chevron	Fall 2018
Shell	Spring 2018
Tesoro	Fall 2018
Valero	Spring 2018

How Does the Public Access More Information?

- Title V Permits Web Page
- Public Notices Web Page
- Newspaper Notice for Title V Permit Renewals or Significant Revisions
- Title V Interest List
- New Energy Projects Web Page and Interest List (under construction)
- Email Subscription

Questions?