CHAPTER 8
Glossary and Acronyms

8.1 Glossary

A number of technical terms are used in the refining industry and at the Valero Benicia Refinery (Refinery) to describe the operations and equipment that are in use there. This glossary includes selected definitions and in some cases expanded descriptions of these terms that allow the reader of this document who is unfamiliar with the refining industry to understand the basic operations within a refinery. In addition, these expanded descriptions also present how these processes specifically take place at the Refinery.

API Gravity The industry standard unit of measure of crude's density (heavy or light). The higher the *API gravity* number, the lighter the crude which means the barrel of crude contains more light (small) hydrocarbon molecules; heavy crudes contain more large hydrocarbon molecules and have lower API Gravity numbers.

Barrel In the petroleum industry, a volume of 42 gallons.

Bottom-unload Tank car unloading method in which tank cars would be emptied into a single pipeline located between the two rail spurs at slightly below ground level.

Catalyst In classical chemistry terms, a *catalyst* promotes a chemical reaction without itself being consumed in the reaction. A catalyst accelerates a chemical reaction so it will proceed at a reasonable rate at lower temperatures and pressures than the reaction would without a catalyst. Typically, refinery catalysts are round or cylindrical in shape and are materials called zealots, or alumna, or are silica or elemental carbon, called coke. These catalysts deteriorate over time and require replacement or regeneration when their activity drops below a specified level.

Coker Unit A type of *process unit* that converts residual oil into *petroleum coke* and lighter process streams.

Cracking *Cracking* is used to produce more gasoline from each barrel of crude oil than naturally exists. The heavier cuts or *fractions* from the crude distillation unit and the *gas oils* that are produced as *feedstocks* consist of large, heavy *hydrocarbon* molecules, which are too large to have the desired properties. However, when hydrocarbons are heated to about 900°F they begin to break, or crack, into smaller molecules. *Cracking* converts some of the larger molecules of heavy oils into shorter-chained molecules.

Criteria Air Pollutant

An air pollutant for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. Examples include: ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), and PM_{10} and $PM_{2.5}$.

Crude oil

Crude oil is the basic petroleum feedstock that is processed at the Refinery. Crude oil contains many different hydrocarbon molecules, usually with a wide range of boiling points, representing many potential products such as propane, butane, gasoline, jet fuel, diesel oil, and fuel oil. Because crude oil is a natural product, there is a wide variation in the characteristics of a crude depending mostly on the wells from which it is obtained. Crude oils usually contain some sulfur; crudes that contain low percentages of sulfur, 0.5% or less, are called "sweet" crudes, while crudes that contain high percentages of sulfur, 2.5% or more, are called "sour" crudes. Crudes with sulfur percentages in between are called "intermediate". Crude oils also may contain other organic compounds that include nitrogen and metals, along with inorganic salts and water, again, depending on the origin of the crude.

Crude oil consists mainly of hydrocarbons, chemical compounds made up of hydrogen and carbon atoms that are combined into molecules of different sizes, shapes, and configurations. The smallest hydrocarbon molecules, with only a few atoms of hydrogen and carbon, such as methane, ethane, propane and butane, are gases under normal conditions, while somewhat larger hydrocarbon molecules, such as gasoline and diesel, are liquids and very large hydrocarbon molecules, such as asphalt and tar, are solids. These basic physical properties result mainly from the number of carbon atoms in each compound and give the crude the name "light" or "heavy", depending on the fractions of lighter and heavier hydrocarbons in the crude oil.

Cut points

During *distillation*, for example, a refiner must determine the particular range of hydrocarbon weights for each fraction produced. This is known as setting the "cut points" or boiling points of each range.

Distillation

Distillation is the first step in the refining process and is separating each of the chemical hydrocarbon compounds (*fractions*) in the crude oil mixture by heating the mixture.

Feedstock

The term *feedstock* (also called a "feed") is commonly used to denote the fluid material that is fed into a refinery process unit. For example, *crude oil* is a *feedstock* for the crude distillation unit. In a similar vein, the term "stream" refers to the *feedstock* and also can refer to the output of the process.

Fluid Catalytic Cracking Unit

The *Fluid Catalytic Cracking Unit* and *Hydrocracker Unit* make heavier process streams lighter by breaking larger hydrocarbons into smaller ones. See *process units*.

Fraction	Components separated from crude oil through *distillation*. The components are commonly referred to as "fractions." *Fraction* is a generic name for the groups of hydrocarbon compounds that boil between any two temperatures. Lighter fractions have relatively lower boiling points, while heavier fractions have relatively higher boiling points. Common fractions include, from lightest to heaviest, petroleum gases, naphthas, kerosene, middle distillate, gas oil, and residue.
Gas Oil	*Gas Oil* is a material that has been processed in a refinery and is one of the heavier fractions resulting from the initial distillation and separation of crude oil.
Hydrocarbons	Molecules made up primarily of hydrogen and carbon atoms. *Hydrocarbons* range in "weight," measured by the number of carbon atoms present in each molecule. The lightest hydrocarbons, for example, are petroleum gases such as methane, ethane, propane, and butane. Each molecule of these gases 1 to 4 carbon atoms. The hydrocarbons in gasoline are heavier, with anywhere from 5 to 12 carbon atoms in each molecule. The hydrocarbons in tar and asphalt are much heavier, with more than 70 carbon atoms in each molecule.
Hydrofining Unit	A type of *process unit* used by refineries to remove sulfur and other impurities from refinery streams. *Hydrofiners* remove sulfur in the form of hydrogen sulfide, which is then converted into elemental sulfur in Sulfur Recovery Units. Impurities come out of the process as solids, or in the case of sulfur, as a hot liquid (or "molten sulfur").
Hydrocracker	*Hydrocrackers* make heavier process streams lighter by breaking larger hydrocarbons into smaller ones.
Linear programming	*Linear programming* involves the use of a mathematical model to determine the most profitable operating strategy for a particular refinery. The model "inputs" include variables such as the configuration and constraints of the refinery in question, the crudes available, market demand, product prices, and product specifications. The model "outputs" include the crudes that should be purchased, the product slate that should be produced, the cut points, and the manner in which each intermediate process stream should be treated and blended.
Management of Change (MOC)	One of the Refinery's safety programs that manages changes to process streams, chemicals, technology, equipment, and procedures.
Mechanical Integrity (MI)	One of the Refinery's safety programs that monitors and evaluates piping and other equipment to determine the actual condition of the equipment.
Petroleum Coke	A carbonaceous solid derived from oil refinery *coker units* or other *cracking* processes. Other coke has traditionally been derived from coal.
Pipestill Unit	Type of Refinery *processing unit* that separates crude blends into *fractions.*

Process Units After a *crude oil* is separated into *fractions* through *distillation,* the resulting streams are treated in various *process units* and ultimately blended into marketable products. Processing units include the *Pipestill Unit, Fluid Catalytic Cracking Unit, and Hydrocracker Unit, Hydrofiing Unit, Sulfer Recovery Unit, Coker Unit,* and *Reforming Unit.*

Reforming *Reforming* modifies the chemical structure of the feedstock hydrocarbons into more valuable hydrocarbon compounds. See *Catalyst.*

Sulfur Content The *sulfur content* of crude oil generally ranges anywhere from 0.5% to 3%. Generally, crudes with a sulfur content of less than 1% are known as "sweet" crudes and crudes with a sulfur content greater than 1% are known as "sour" crudes. As a general rule, heavier crudes require more processing than light crudes, and sour crudes require more processing than sweet crudes. Thus, the "quality" of a crude oil is generally considered to be a function of its weight and sulfur content.

Storage Tanks In the Refinery, large tanks are used to store incoming petroleum raw materials such as crude oil, which are unloaded and pumped via pipelines to crude oil storage tanks within the Refinery. All raw materials and products are pumped through pipelines that connect the tanks, refinery process units and refinery shipping terminals. The tanks typically are equipped with a special floating roof to reduce the evaporation of raw hydrocarbons into the air.

Sulfur Recovery Unit Type of *process unit* where *hydrogen sulfide* is absorbed from refinery gases to reduce their sulfur content so that they can be burned for heating refinery intermediate streams. The hydrogen sulfide is desorbed by steam heating the solution and the hydrogen sulfide is burned to form sulfur oxides which are absorbed and converted to molten sulfur using the Claus process.

Turnaround The term *turnaround* refers to scheduled maintenance actions when refinery equipment is not available to process *feedstocks*, as opposed to refinery equipment's typical 24 hour a day, 365 day a year operation. Turnarounds are termed major when significant portions of the refinery are shut down; minor turnarounds may affect only certain units, or parts of the total refinery.

8.2 Acronyms and Abbreviations Used in This EIR

AAR	Association of American Railroads
AB	Assembly Bill
ABAG	Association of Bay Area Governments
AISC	American Institute of Steel Construction
ANS	Alaskan North Slope
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
AB	Assembly Bill
BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BART	Bay Area Rapid Transit
bbl	Barrel
BCDC	Bay Conservation and Development Commission
BDCP	The Bay Delta Conservation Plan
bgs	Below ground surface
BMP	Best Management Practice
BTU	British Thermal Unit
BO	Biological Opinion
CAA	Clean Air Act
CAP	Clean Air Plan
CAAQS	California Ambient Air Quality Standard
CalARP	California Accidental Release Prevention
CAL FIRE	California Department of Forestry and Fire Protection
Cal OES	California Governor's Office of Emergency Services
Cal/OSHA	California Occupational Safety and Health Program
Caltrans	California Department of Transportation
Cal/VPP	Cal/OSHAVoluntary Protection Program
CARB	California Air Resources Board
CBC	California Building Code
CBSC	California Building Standards Commission
CCR	California Code of Regulations
CDFW, or CDFG	California Department of Fish and Wildlife (formerly known as the Department of Fish and Game, or CDFG)
CDMG	California Division of Mines and Geology
CEC	California Energy Commission
CFR	Code of Federal Regulations
CGS	California Geological Survey (formerly California Division of Mines and Geology)
CEQA	California Environmental Quality Act
CH_4	Methane

CMA	Congestion Management Agency
CML	Condition monitoring locations
CMP	Congestion Management Plan
CNDDB	California National Diversity Data Base
CNPS	California Native Plant Society
CRHR	California Register of Historical Resources
CSLC	California State Lands Commission
CO	Carbon Monoxide
CO_2e	Carbon Dioxide Equivalents
Corps	U.S. Army Corps of Engineers
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
dB	decibels
dBA	A-weighted decibels
DG	Decomposed granite
DNL	Day-Night Noise Level (L_{dn})
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPM	Diesel Particulate Matter
DPR	California Department of Parks and Recreation
DSOD	California Division of Safety of Dams
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMT	Emergency Response Technician
ESA	Endangered Species Act
^oF	Fahrenheit
FAST	Fairfield and Suisun Transit
FCCU	Fluid Catalytic Cracking Unit
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHSZ	Fire Hazard Severity Zone or Zoning
FIRM	Flood Insurance Rate Map
FRA	Federal Railroad Administration
FRP	Facility Response Plans
FTA	Federal Transit Administration
FTC	Federal Trade Commission
GHG	greenhouse gases
gpm	gallons per minute
HARP	Hotspots Analysis and Reporting Program

HCP	Habitat Conservation Plan
HFC	Hydrofluorocarbons
HMERP	Hazardous Materials Emergency Response Plan
HRM	Hazardous Materials Regulations
Hz	Hertz
IBC	International Building Code
ICCTA	Interstate Commerce Commission Termination Act
IS/MND	Initial Study/Negative Declaration
LCFS	Low Carbon Fuel Standard
L_{dn}	Also referred to as DNL- Day-night noise level
L_{eq}	The equivalent sound level is used to describe noise over a specified period of time, in terms of a single numerical value
LOS	Level of Service
LPG	Liquefied Petroleum Gas
LVW	Loaded Vehicle Weight
MBTA	Migratory Bird Treaty Act
MCE	Maximum Credible Earthquake
MEIR	Maximum Exposed Individual Residence
MEIW	Maximum Exposed Individual Worker
MI	Management Integrity
MLD	Most Likely Descendent
MM	Modified Mercalli (MM) intensity (MMI) scale
MOC	Management of Change process
MPH	Miles Per Hour
MSDS	Material Safety Data Sheets
MSR	Maximum Sensitive Receptor
MTC	Metropolitan Transportation Commission
M_w	(earthquake) Moment Magnitude
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NEHRP	National Earthquake Hazards Reduction Program
NFPA	National Fire Protection Association
NHP	Natural Heritage Program
NHPA	National Historic Preservation Act
NHTSA	National Highway Safety Administration
NIIMS	National Interagency Incident Management System
NMFS	National Marine Fisheries Service
N_2O	Nitrous oxide
NOI	Notice of Intent
NOP	Notice of Preparation

NOT	Notice of Termination
NOx	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTSB	National Transportation Safety Board
NWIC	Northwest Information Center
OGV	Ocean going vessel
OSHA	Occupational Safety and Health Administration (Federal)
OSPR	California Office of Spill Prevention and Response
OSRO	Oil Spill Response Organizations
PFC	perfluorocarbons
PG&E	Pacific Gas & Electric Company
PHMSA	Pipeline and Hazardous Materials Safety Administration
PM	Particulate Matter
PMAO	(Bay Area) Petrochemical Mutual Aid Organization
PMI	Positive Material Identification
PM_{10}	PM less than 10 microns in size
$PM_{2.5}$	PM less than 2.5 microns in size
ppb	Parts per billion
ppm	Parts per million
ppmw	Parts Per Million by Weight
PPV	Peak Particle Velocity
PRD	Permit Registration Documents
PRC	Public Resources Code
Project	Valero Benicia Crude by Rail project
PSD	Prevention of Significant Deterioration
PSHA	probabilistic seismic hazard assessment
PSM	Process Safety Management
PT-SRT	Process Team-Spill Response Team
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RF	Regulatory Floodway
RFG	Refinery Fuel Gas
RMP	Risk Management Plan or Regional Monitoring Program
RMS	Root Mean Square
ROG	Reactive Organic Gases
RQ	reportable quantities
RWQCB	Regional Water Quality Control Board
SEC	Securities and Exchange Commission
SB	Senate Bill

SCWA	Solano County Water Agency
SDC	Seismic Design Category
SDS	Safety Data Sheets
SF_6	Sulfur Hexafluoride
SFHA	Special Flood Hazard Area
SFRWQCB	San Francisco Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMLPP	Suisun Marsh Local Protection Program
SMT	Spill Management Team
SO_2	Sulfur Dioxide
SPP	Steam Power Plant
SPCC	Spill Prevention and Countermeasure Control Plan
STA	Solano Transportation Authority
SVP	Society of Vertebrate Paleontology
SWMP	Storm Water Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board (State Board)
SWPPP	Storm Water Pollution Prevention Plan
TAC	Toxic Air Contaminants
TAN	Total Acid Number
TBACT	Best Available Control Technology for Toxics
TMDL	Total Maximum Daily Loads
tpy	Tons per year
UPRR	Union Pacific Railroad
USBR	U.S. Bureau of Reclamation
USDOE	U.S. Department of Energy
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Service
VIP	Valero Improvement Project
VOC	Volatile Organic Compounds

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