State of California Department of Industrial Relations Occupational Safety and Health Standards Board

Petition File No. 601

Board Staff Evaluation Submitted by Kevin J. Goddard, MPA, ASP Senior Safety Engineer

April 22, 2024



State of California

Gavin Newsom, Governor

INTRODUCTION

Petition File No. 601 (Petition) was received from Tracy W. Scott, United Steel Workers Local 5, President, Staff Representative, on January 15, 2024. The Petition requests the Occupational Safety and Health Standards Board (Board) adopt an emergency temporary standard (ETS) to expand the application of title 8, section 5189.1, Process Safety Management for Petroleum Refineries, to include refineries that are refining renewable feedstock (biofuel) using much of the same equipment and processes they used for refining petroleum.

REQUESTED ACTION

The Petitioner requests the Board adopt an ETS to expand the application of section 5189.1 to include refineries that are processing renewable feedstocks in place of petroleum.

BACKGROUND/HISTORY

History of the Regulations for Process Safety Management (PSM)

On November 15, 1990, Public Law 101-549, Clean Air Act Amendment (CAAA) of 1990 was signed into law and required Federal Occupational Safety and Health Administration (OSHA) to promulgate a chemical process safety standard designed to protect employees from hazards associated with accidental releases of highly hazardous chemicals in the workplace. These requirements were integrated into 42 United States Code (U.S.C.) Chapter 85, Air Pollution Prevention and Control. Further, the United States Environmental Protection Agency (EPA) adopted requirements under 40 Code of Federal Regulations (CFR) 300 et seq.

On June 1, 1992, pursuant to 29 U.S.C Section 655, Federal OSHA adopted 29 CFR 1910.119 Process Safety Management of Highly Hazardous Chemicals.

On May 28, 1992, the Occupational Safety and Health Standards Board (Board) adopted title 8, section 5189, Process Safety Management of Acutely Hazardous Materials pursuant to Labor Code (LC) 7856.

In February 2014, Governor Brown's Interagency Working Group on Refinery Safety released a report titled *Improving Public and Worker Safety at Oil Refineries*. The report identified ways to improve public and worker safety through enhanced oversight of refineries and to strengthen emergency preparedness in anticipation of any future incident. In accordance with these recommendations the Board adopted title 8, section 5189.1, Process Safety Management for Petroleum Refineries on September 15, 2016. This new standard included elements that safety experts had learned were necessary to the safe operations of refinery, including: applying a hierarchy of controls to implement first and second-order inherent safety measures; conducting damage mechanism reviews; applying rigorous safeguard protection analyses; integrating human factors and safety culture assessments into safety planning; involving frontline employees in decision-making; conducting root-cause analysis following significant incidents; and performing comprehensive process hazard analyses.

On October 1, 2017, section 5189.1 became operative. The scope of 5189.1 supersedes title 8 section 5189 for petroleum refineries that are defined in 5189.1(c) as "industrial site[s] engage[d] in activities set forth in the North American Industry Classification System Code 324110" (NAICSC 324110). NAICSC 324110 identifies petroleum refineries as "establishments primarily engaged in refining crude petroleum into refined petroleum consisting of one or more of the following activities: (1) fractionation; (2) straight distillation of crude oil; and (3) cracking."

On March 18, 2021, the Board granted, in part, Petition 584. Petition 584 asked the Board to revise several definitions and to amend the High Hazard Control Analysis hierarchy in section 5189.1. The Board's grant created a representative advisory committee to consider the Petitioner's requests. This advisory committee is still active, but there are currently no meetings scheduled.

<u>Background of Petroleum Refineries Being Converted to Process Renewable Feedstock in</u> California

According to academic literature using biomass for fuels dates back to the 1820's¹, however the processing of renewable feedstock at petroleum refineries is new and the existing literature is limited.² The California Energy Commission June 2022 report on petroleum refineries stated refineries in California are being driven to process renewable feedstock due to the changing nature of the transportation fuels market. The report also stated that, "Petroleum refineries make ideal locations for renewable fuels facilities. Processes used to produce petroleum fuels, such as hydrotreating, are similar to processes used for production of renewable fuels. A conversion is faster and more cost effective than building a brand-new renewable fuels facility because it ensures usage of existing equipment, existing expertise of operations and maintenance, and reduced permitting requirements."³

Currently, a title 8 process safety management (PSM) regulation that could cover refineries that process renewable feedstock is section 5189. The scope and purpose of 5189 is "for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable or explosive chemicals. The establishment of process safety management regulations are intended to eliminate to a substantial degree, the risks to which employees are exposed in petroleum

¹ Guo, Mingxin, et al. "Bioenergy and Biofuels: History, Status, and Perspective." Renewable & Sustainable Energy Reviews, vol. 42, 2015, pp. 712–25, https://doi.org/10.1016/j.rser.2014.10.013.

² Zhang, Lifeng, Ana Inés Torres, Bingzhen Chen, Zhihong Yuan, and Ignacio E. Grossmann. "Optimal Retrofitting of Conventional Oil Refinery into Sustainable Bio-refinery under Uncertainty." AIChE Journal, 2024. https://doi.org/10.1002/aic.18371.

³ California Energy Commission. "June 2022 Petroleum Watch. https://www.energy.ca.gov/sites/default/files/2022-06/2022-06_Petroleum_Watch_ADA.pdf. Accessed on March 15, 2024.

refineries, chemical plants and other facilities." Section 5189(b) identifies that the regulation applies to "a process which involves a chemical at or above the specified threshold quantities listed in Appendix A or a process which involves a Category 1 flammable gas (as defined in Section 5194) or a flammable liquid with a flashpoint below 100 °F (37.8 °C) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more."

PETITIONER'S ASSERTIONS

The Petitioner asserts:

- The physical properties of petroleum crude oil versus renewable fats, oils and greases may be different, but those differences end at the point of delivery to the facility where the feedstock is processed. Both types of feedstocks are processed into highly flammable gasoline, jet fuel, diesel and industrial chemicals.
- Section 5198.1 is California's groundbreaking process safety regulation for oil refineries that the Standards Board adopted unanimously in 2017. To this day, it stands as the most far-reaching and protective process safety standard worldwide. We know from first-hand experience that 5189.1 has made California's refineries substantially safer. Washington State adopted section 5189.1 in December 2023.
- Section 5189 is ineffective. In 2023-2014 the reports of the U.S. Chemical Safety and Hazard Investigation Board (CSB) and Governor Brown's Interagency Working Group on Refinery Safety determined that the weaknesses of section 5189 contributed substantially to the deferred maintenance, poor safety culture, and lack of accountability on the part of Chevron management that ultimately led to the catastrophic pipe failure at the Richmond, Chevron plant in August 2012. That incident endangered the lives of 19 workers who were caught in the flammable vapor cloud, and it caused some 15,000 residents to see medical attention for symptoms related to smoke exposure.⁴
- Jerome Serrano, a USW member was critically burned at the Marathon Refinery in an incident involving a loss of containment of flammable liquids.
- Cal/OSHA and DIR and have allowed one of the state's largest refineries that produces millions of gallons of highly flammable liquids to escape coverage under 5189.1, [California's] hard-won refinery PSM regulation.
- Section 5189 does not provide sufficient protection to workers or residents from refinery hazards, and yet at California's renewable refineries, this is what Cal/OSHA and DIR have allowed.

⁴U.S. Chemical Safety and Hazard Investigation Board. Final Investigation Report, Chevron Richmond Refinery Pipe Rupture and Fire. August 6, 2012. https://www.csb.gov/file.aspx?DocumentId=5917

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH (Cal/OSHA) EVALUATION

In their evaluation dated April 15, 2024, Cal/OSHA recommends that Petition 601 be granted to the extent that it requests Cal/OSHA to expedite normal rulemaking to ensure renewable refineries are covered by section 5189.1.

STAFF EVALUATION

Board staff discussed Petition 601 with the Petitioner, Cal/OSHA Process Safety Management (Refinery) and (Non-Refinery) Unit, Contra Costa Health, California Environmental Protection Agency (Cal/EPA) environmental scientists, the United States Environmental Protection Agency (EPA) and a PSM consultant for a petroleum refinery that is in the process of being converted to process renewable feedstock. Board staff also reviewed previous petitions and rulemaking packets on this topic. Board staff reviewed the relevant federal, state and consensus standards identified in the Relevant Standards section below. Board staff also reviewed books and peer-reviewed articles concerning the various methods of processing renewable feedstocks and converting petroleum-refineries to process renewable feedstocks.

Relevant Standards

Federal Standards

The federal counterpart for California process safety management standard 5189 is 29 CFR 1910.119. Process Safety Management of Highly Hazardous Chemicals applies to refineries processing renewable feedstocks.

Federal OSHA has not pursued promulgating a regulatory framework uniquely tailored to biofuel refineries.

California Standards

Title 8, sections 5189 and 5189.1 are California's standards for process safety management.

Section 5189. Process Safety Management of Acutely Hazardous Materials.

(b) Application:

(1) A chemical at or above the specified threshold quantities listed in section 5189, Appendix A or a process which involves a Category 1 flammable gas (as defined in section 5194) or a flammable liquid with a flashpoint below 100 °F (37.8 °C) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more.

EXCEPTIONS:

- (1) Flammable liquids with a flashpoint below 100 °F (37.8 °C) stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration.
- (2) Hydrocarbon fuels used solely for workplace consumption (e.g. comfort heating propane, gasoline for motor vehicle refueling) if such fuels are not part of a process containing another acutely hazardous chemical covered by section 5189.
- (3) These regulations do not apply to retail facilities, oil or gas well drilling or servicing operations or normally unoccupied remote facilities.

Section 5189.1. Process Safety Management for Petroleum Refineries.

(b) Application.

This section shall apply to processes within petroleum refineries. For petroleum refineries, this regulation supersedes California Code of Regulations (CCR) Title 8, Section 5189.

Consensus Standards

The American Petroleum Institute (API) publishes international standards that pertain to refinery safety. Additionally, the American Society of Mechanical Engineers (ASME) and American Institute of Chemical Engineers (AIChE) publish international standards related to equipment used in refineries. AIChE's Center for Chemical Process Safety (CCPS) also provides guidelines and safety requirements relevant to process safety in petroleum refineries. The National Fire Protection Association (NFPA) also has codes that are related to refineries. The Board is not aware of any association that is recognized for setting consensus standards for refineries that have been converted to process renewable feedstock.

Other Standards, Guidelines, Codes

The European Union (EU), the United Kingdom (UK), China, and India all have adopted some version of the process safety management regulations. China's is based on the 29 CFR 1910.119; the EU adopted the Seveso III Directive which also serves as the basis in the UK. India's regulatory framework addresses process safety management through a series of adopted rules. The Board was not able to determine how other countries are implementing PSM regulations for petroleum refineries that have been converted to process renewable feedstock.

Labor Code (LC), Part 7.5, Chapter 2 Process Safety Management Standards, subsections 7855 – 7868 provides governing legislation to "prevent or minimize the consequences of catastrophic

releases of toxic, flammable, or explosive chemicals. The establishment of process safety management standards are intended to eliminate, to a substantial degree, the risks to which workers are exposed in petroleum refineries, chemical plants, and other related manufacturing facilities" (LC 7855).

LC 7856 mandated the Standards Board to "adopt process safety management standards for refineries, chemical plants, and other manufacturing facilities, as specified in Codes 28 (Chemical and Allied Products) and 29 (Petroleum Refining and Related Industries) of the Manual of Standard Industrial Classification Codes, published by the United States Office of Management and Budget, 1987 Edition, that handle regulated substances as defined in subdivision (i) of Section 25532 of the Health and Safety Code and pose a significant likelihood of accident risk, as determined by the board."

On December 27, 2023, the Washington State Department of Labor and Industries (L&I) filed permanent rulemaking to adopt updated requirements for their PSM standard (Washington Administrative Code [WAC], Title 296, Chapter 296-67). L&I adopted Part B to the regulations (WAC 269-67-300) for petroleum refineries that implemented many aspects of title 8 section 5189.1. The changes L&I made were ones they identified as more prescriptive to fit with how petroleum refineries operate in Washington. Petroleum refineries converted to process renewable feedstock would not be covered by this newly adopted regulation and could instead be covered by Part A, which is similar to title 8, section 5189.

The standards, guidelines and codes for facilities processing renewable feedstock into fuel are diverse since there are a wide variety of sources and processes. However, since the Petitioner is only asking the Board to consider an ETS to expand the application of section 5189.1 to include refineries processing renewable feedstocks in place of petroleum, the research done for this evaluation focused on those facilities and processes.

Staff Analysis

Petition 601 is asking the Board to consider an emergency temporary standard (ETS) to expand the application of title 8, section 5189.1(b) to include refineries that are processing renewable feedstock in place of petroleum. The Petitioner claims that the differences between petroleum and renewable feedstock end at the point of delivery to the facility where the feedstock is processed. This alleges that employees are being exposed to the same hazardous processes that section 5189.1 was developed to protect employees from.

For the finding of an emergency, Government Code (GC)section 11346.1(b)(2) must be met:

⁵ U.S. Department of Energy. Alternative Fuels Data Center. Renewable Diesel. https://afdc.energy.gov/fuels/renewable-diesel. Accessed on April 19, 2024.

Any finding of an emergency shall include a written statement that contains the information required by paragraphs (2) to (6), inclusive, of subdivision (a) of Section 11346.5 and a description of the specific facts demonstrating the existence of an emergency and the need for immediate action, and demonstrating, by substantial evidence, the need for the proposed regulation to effectuate the statute being implemented, interpreted, or made specific and to address only the demonstrated emergency. The finding of emergency shall also identify each technical, theoretical, and empirical study, report, or similar document, if any, upon which the agency relies. The enactment of an urgency statute shall not, in and of itself, constitute a need for immediate action.

A finding of emergency based only upon expediency, convenience, best interest, general public need, or speculation, shall not be adequate to demonstrate the existence of an emergency. If the situation identified in the finding of emergency existed and was known by the agency adopting the emergency regulation in sufficient time to have been addressed through nonemergency regulations adopted in accordance with the provisions of Article 5 (commencing with Section 11346), the finding of emergency shall include facts explaining the failure to address the situation through nonemergency regulations.

Upon review of the information provided by the Petitioner and other available resources, there is not currently "substantial evidence" as required by GC section 11346.1(b)(2) to demonstrate that there is the need for an ETS to amend title 8 section 5189.1 to include refineries that are processing renewable feedstock. During the development of this evaluation the Board staff reached out to several state and federal agencies who investigate workplace incidents. Experts from these agencies stated that this industry is at the beginning stages of petroleum refineries being converted to process renewable feedstock and that there is limited information available at this time.

The Petitioner cites the November 19, 2023 incident at Marathon Petroleum Corporation facility in Martinez, California, to demonstrate the dangers employees are facing working at petroleum refineries that have been converted to process renewable feedstock into fuel. According to a report published by the United States Chemical Safety Board (CSB), "On November 19, 2023, at approximately 12:21 a.m., a metal tube ruptured within a reactor charge furnace during a unit startup at the Martinez Renewables facility... The ruptured tube released renewable diesel and hydrogen, resulting in a fire that seriously injured one Marathon

Employee."⁶ According to the CSB incident report, the incident occurred during the initial startup of a hydrodeoxygenation (HDO) unit, a process unit that was converted from a diesel hydrotreater unit in the original petroleum factory." The report goes on to say that "minutes before the rupture, all tube temperature indicators were in excess of the high-temperature alarm setpoints and audio and visual high temperature alarms were triggered inside the control room." In an effort to reduce temperatures staff increased the flow of material through the furnace and directed a field operator to turn off two of the furnace burners. Just after the field operator completed this action, a tube within the furnace ruptured exposing the employee to hot renewable diesel and hydrogen, leading to third-degree burns to most of their face and body. After the incident, employees of Marathon "discovered that a normally closed manual bypass valve upstream of the furnace was open (misaligned), which created a potential flow path around the furnace" and that "although safety interlocks existed to automatically shut down the furnace during low renewable diesel flow to the furnace and high temperatures downstream of the durance, none of these conditions were detected by the instrumentation and did not activate."

Before processes are started at refineries, employers whose facilities are covered by 5189 and 5189.1 are required to perform a series of pre-start-up procedures. Comparing these sections in both regulations shows that they are substantially the same, but there are some differences, as shown in the table below:

Table 1

Title 8, Section 5189(i)	Title 8, Section 5189.1(i)
(1) The employer shall perform a pre-start up safety review for new facilities and for modified facilities for which the modification necessitates a change in the process safety information.	(1) The employer shall perform a Pre-Start-Up Safety Review (PSSR) for new processes and for modified processes if the modification necessitates a change in the PSI, pursuant to subsection (d) and for partial or unplanned shutdowns. The employer shall also conduct a PSSR for all turnaround work performed on a process.
(2) The pre-start up safety review shall confirm that prior to the introduction of	(2) The PSSR shall confirm all of the following prior to the introduction of highly hazardous materials to a process:

https://www.csb.gov/assets/1/6/marathon martinez inv update final final.pdf.

⁶ U.S. Chemical Safety and Hazard Investigation Board (CSB). Furnace Tube Rupture and Fire at Marathon Martinez Renewables Factory (February 2024).

acutely hazardous, flammable and explosive materials to a process:	
(A) Construction and/or equipment are in accordance with design specifications;	(A) Construction, maintenance and repair work has been performed in accordance with design specifications;
	(B) Process equipment has been maintained and is operable in accordance with design specifications;
(B) Safety, operating, maintenance, and emergency procedures are in place and are adequate;	(C) Effective safety, operating, maintenance and emergency procedures are in place;
(C) For new facilities, a process hazard analysis has been performed and recommendations have been resolved or implemented before start-up; and modified facilities meet the requirements contained in subsection (I); and,	(D) For new processes, a PHA, HCA, DMR, and SPA have each been performed, as applicable pursuant to this section, and recommendations have been implemented or resolved before start-up. For new or modified processes, all changes have been implemented pursuant to the requirements of subsection (n); and,
(D) Training of each operating employee and maintenance worker has been completed.	(E) Training of each operating employee and maintenance employee affected by the change has been completed.
(3) The Pre-Start Up Safety Review shall involve employees with expertise in process operations and engineering. The employees will be selected based upon their experience and understanding of the process systems being evaluated.	(3) The employer shall involve operating or maintenance employees in the PSSR who have expertise and experience in the operations and engineering of the process being started. An operating employee who currently works in the unit and who has expertise and experience in the process being started shall be designated as the employee representative, pursuant to subsection (q).

While sections 5189 and 5189.1 both have requirements for start-up procedures that are intended to prevent workplace incidents from occurring, there currently is not enough information available to know which regulations the Marathon Refinery was and was not compliant with on November 19, 2023, and whether the employer would have been compliant with additional regulations if they applied at that time. If the main culprit in this case is determined to be the misaligned valve, that is something that should have been discovered by the person(s) responsible with making sure that everything is within its design specifications during the pre-start-up process covered by 5189(i)(2)(A) and 5189.1(i)(2)(A)-(B). Employers are also required by section 3203 to identify and correct all known workplace hazards.

In addition to the employer and CSB there are other agencies looking into this incident, including Cal/OSHA. Until the findings are published it is impossible to know everything that led to this incident and what could have been done to prevent it. However, just the fact that the incident occurred supports the Petitioner's allegations about hazards employees could be facing at these facilities.

One important thing to note is that refineries do not qualify for section 5189 unless they have processes which involve a chemical that is above the specified threshold quantities listed in section 5189, Appendix A, or a process that involves a Category 1 flammable gas or a flammable liquid with a flashpoint below 100 degrees Fahrenheit on site in one location, in a quantity of 10,000 pounds or more. Renewable diesel has a flashpoint of 125 degrees Fahrenheit.⁷ Therefore, renewable diesel by itself, would not qualify the facility to be covered by section 5189. If there are refineries that are processing renewable fuels in ways that are similar to how petroleum is processed that don't qualify for section 5189, this could be a regulatory gap that would be leaving employees exposed to occupational hazards. This may be why section 5189.1 was written to include all petroleum refineries, regardless of their size.

The Petitioner identifies renewable feedstock as fats, oils, and greases and that converting these to fuel can be done through a variety of biological, thermal, and chemical processes. The Petitioner states that one of the refineries "is using most of the same equipment it used when it processed petroleum feedstock, with the addition of some specialized equipment to process the renewable feedstock. All of the equipment is still used to do the same thing, which is to change the physical properties of the feedstock by refining and processing of the fats, oils, and greases to produce diesel & in future production jet fuel and bi products of Naphtha and Propane, just like they did and could with petroleum feedstock." According to sources, refineries in California are currently only processing renewable feedstock to create biodiesel, but that will likely expand to additional compounds in the future.

The production capacity for renewable diesel is expected to increase in the future based on California's push to achieve net-zero carbon pollution by 2045. In 2023 Governor Newsom visited World Energy Paramount refinery located in Paramount, California that had been converted to process renewable fuels. Governor Newsom stated that "California's clean energy future is here, and there's no better example of that than this petroleum refinery-turned renewable fuels hub. The fuels of the future are clean and California is leading the way with

⁷ U.S. Department of Energy. Fuels Properties Comparison. Renewable Diesel. https://afdc.energy.gov/fuels/properties?fuels=RD. Accessed on April 19, 2024.

billions of dollars to supercharge this transition while creating thousands more good green jobs and growing our economic might."8

Further demonstrating that California's refineries are moving towards renewable energy, the California Energy Commission stated in a publication that "renewable fuels are becoming a larger part of California' transportation fuels market, as shown by announcements to invest in renewable fuel production made by several California petroleum refineries." The report goes on to say, "Petroleum refineries make idea locations for renewable fuels facilities. Processes used to produce petroleum fuels, such as hydrotreating, are similar to processes used for production of renewable fuels. A conversion is faster and more cost effective than building a brand-new renewable fuels facility because it ensure usage of existing equipment, existing expertise of operations and maintenance, and reduced permitting requirements."

Review of reportable incidents at other refineries:

The Board staff contacted both the Cal/EPA and Federal EPA to find out if either were aware of incidents occurring at petroleum refineries being converted to process renewable feedstock. Neither agency could identify facilities with reportable incidents. However, Federal EPA did state that facilities have up to six months to report incidents so there could be some that just have not been reported yet.

The Board staff used the Accident Search Results tool on the Federal OSHA website for a nationwide search of incidents search range of January 1, 2017, to April 15, 2024. When using the keyword "refinery" the search tool returned 24 reportable incidents, six of them resulting in one or more fatalities. When using the NAICS code for Petroleum Refineries 324110, the search results returned 38 incidents, nine of them resulting in one or more fatalities. The Board staff was unable to find any incidents with the keyword search terms of "renewable", "biodiesel", or "biofuel".

The Board staff reviewed the Hazmat Incidents Reports published by Contra Costa Health and found a total of 51 incident reports for 2023 and 14 for 2024. These reports are required for all incidents in Contra Costa County that meet the criteria for Public Health Advisory —Level 2, Public Protective Actions Required — Level 3 incidents or when requested by the Contra Costa Health Services Hazardous Materials Programs (CCHSHMP).

⁸ Office of Governor Gavis Newsom. "At Former Petroleum Refinery, Governor Newsom Showcases California's Clean Fuels and Clean Energy Jobs Revolution".

https://www.gov.ca.gov/2023/05/01/at-former-petroleum-refinery-governor-newsom-showcases-californias-clean-fuels-and-clean-energy-jobs-revolution/ Accessed on April 10, 2024

The Board staff also reached out to the Cal/OSHA Process Safety Management unit and spoke with people who inspect non-petroleum refineries and petroleum. The PSM representatives agreed that the refineries that are processing renewable fuels are new and many of the hazards are unknown because each facility could be designing their systems in unique ways that regulators and inspectors are not yet familiar with. What is known is that these facilities are retrofitting equipment previously used for refining petroleum and adding new equipment that is unique to the filtering and processing of renewable feedstock.

Conclusion of Analysis

Given the limited information obtained from the interviews with experts, research and the beginning stages of petroleum refineries being converted to process renewable feedstock, the Board staff believes that an Advisory Committee should be convened to discuss whether amendments to section 5189.1 or section 5189 are necessary.

STAFF RECOMMENDATION

Board staff recommends Petition File No. 601 be DENIED based on the request for an ETS to expand the application of 5189.1 to include refineries that are processing renewable feedstock into fuel. However, the Board staff believes there is merit to the Petitioner's concerns about workplace safety at these facilities and recommends that a representative advisory committee be convened to consider whether revisions to title 8, section 5189.1 or section 5189 are necessary.