Martinez
Refining Company

3485 Pacheco Boulevard
Martinez, CA 94553

VIA UPS

December 1, 2021

Chief, Transportation and Toxics Division
California Air Resources Board
1001 I Street Sacramento, CA 95814
Sacramento, CA 95812

Subject: MRC Terminal Plan for At-Berth Rule

To Whom It May Concern:

The purpose of this submittal is to provide the Terminal Plan required under California Air Resources Board's (CARB) Control Measure for Ocean-Going Vessels at Berth (California Code of Regulations, Title 17, Section 93130.14) for the Martinez Refining Company LLC (MRC). The required plan is attached to this letter.

Please contact Rick Shih at (925) 313-3743 or richard.shih@pbfenergy.com for any questions concerning these comments.

Sincerely,

Gordon Johnson
Manager, Environmental Affairs
Martinez Refining Company

Attachments

Martinez Refining Company
At-Berth Terminal Plan

This Terminal Plan has been prepared pursuant to California Code of Regulations (CCR), Title 17, Section 93130.14 of the Control Measure for Ocean-Going Vessels At Berth. In addition to the information provide below, MRC refers the California Air Resources Board to the "California Air Resources Board's (CARB) Ocean-Going Vessels at Berth Regulation Emissions Control Technological Assessment for Tankers" prepared by DNV for the Western States Petroleum Association (DNV Assessment)[1]. The DNV Assessment supplements the information provided in this Terminal Plan and provides more information on shore power and control and capture control strategies, the technical feasibility of those strategies, and the multiple challenges and barriers to implementation.

1. GENERAL INFORMATION	
Terminal Contact Name: Rick Shih	
Phone Number: (925) 313-0586	***Email***: Richard.shih@pbfenergy.com
Berths Included in this Plan:	
Name:	Approximate Geographic Boundary Coordinates:*
1. Berth 1	3. 38°01'51.1" N, 122°07'57.5" W
2. Berth 2	4. 38°01'55.9" N, 122°07'49.0" W
** The geographic boundary coordinates are approximates only.*	

[1] DNV, CARB Ocean-Going Vessels at Berth Regulation Emissions Control Technology Assessment for Tankers, Report Number 2021-9470

2. STRATEGY DETAILS

Strategy/strategies used to comply with the requirements for ocean-going vessels visiting each berth:

The MRC Terminal receives tanker vessels that carry various hydrocarbon liquids, which have unique hazards compared to other types of vessels, and therefore require appropriate safety precautions and equipment to mitigate those hazards.

Given that control equipment is not currently commercially available that meets performance and safety standards specifically for tanker vessels, a single control strategy cannot be selected at this time. For the purposes of the Terminal Plan, MRC has identified three potential strategies that MRC will continue to evaluate as more information becomes available. The appropriate strategy will be selected once equipment that meet the necessary performance and safety requirements for tanker vessels are available.

2.1 Strategy 1: Shore Power System

Identification and description of all necessary equipment, including whether it will be located on the vessel, wharf, shore, or elsewhere:

Strategy 1 would include the design, construction, and operation of a shore power system. Since not all equipment that meets the necessary performance and safety standards (e.g., appropriate size/type connection not being rated for the hazardous area) are currently available, only a rough estimate of the key necessary equipment can be described here. Once the necessary equipment becomes available, the information below will be revised.

- **New substation**: 15 kilovolt (kV) to 480 V and 6600 V bulk power substation (BPSS) located within the refinery fenceline and close to the wharf approach. The existing infrastructure does not have the capacity or configuration to the supply the necessary load needed by vessels.
- **New cable system from main distribution to new substation**: 2 miles of cable tray and 15 kV cable from one of MRC's main distribution substations to the new bulk power substation.
- **New frequency converter:** Converter system at wharf that converts frequency (hertz) to accommodate different vessel electrical systems (50hz vs 60hz).
- **New cable and distribution system from substation to wharf:** 1 mile of cable tray and cables from the bulk power substation to shore power distribution system that would include the following (located at the wharf):
    - disconnect switches
    - breakers
    - electrical protective devices
    - safety interlock systems
    - human machine interface (HMI) screens for monitoring and control
    - beacons
    - horns
    - receptable boxes

- **New cable management:** Cable management system that would include cranes to move the large and heavy cables at the wharf.

Once all equipment is available and standards are in place, a complete evaluation of the existing Terminal will need to be conducted, including a structural design review. The Terminal currently meets the Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS). However, the wharf may need to be retrofitted to support the additional weight of the shore power system and in a way that continues to meet MOTEMS requirements. In addition, the wharf would have to be made larger to accommodate the new equipment. Since the equipment and standards are not currently available, it is not known if these modifications are technically feasible at this time.

In addition, MRC will need to evaluate the operational and safety consequences of the loss of power from the internal MRC electrical distribution system and how that can be mitigated.

Section 6.2 of the DNV Technological Assessment further describes the major components that will be needed for a typical shore power system and performance and safety considerations for such components.

Berths where equipment will be used:

The portion of the above equipment that will be constructed at the wharf will need to be located to accommodate both berths.

2.2 Strategy 2: Barge-Based Capture and Control

Identification and description of all necessary equipment, including whether it will be located on the vessel, wharf, shore, or elsewhere:

There is currently no ready to use barge-based capture and control technology for tanker vessels. However, for this purposes of this Terminal Plan, MRC is identifying a barge-based capture and control system as Strategy 2 and as a technology that MRC will reevaluate once a system is available for tankers.

If technically feasible, the control equipment for Strategy 2 is expected to consist of:

a. **New barge-based emissions capture system**: A barge-mounted crane/boom, stack adaptor/hood, and flexible ducting.
b. **New barge-based emissions control system:** Inlet ducting, treatment system (possible with ammonia and activated carbon), exhaust fan, stack, solid waste management system and power supply.

A significant concern for a barge-based capture system is having sufficient space for vessels to travel passed the Terminal through the narrow channel. This will need to be evaluated closely once equipment is commercially available and meets appropriate standards to determine if a barge-based system is even feasible.

Berths where equipment will be used:

The above equipment would be used on barges near both berths.

2.3 Strategy 3: Wharf-Based Capture and Control

Identification and description of all necessary equipment, including whether it will be located on the vessel, wharf, shore, or elsewhere:

While there is currently no ready to use wharf-based capture and control technology for tanker vessels, Strategy 3 assumes one will become available. For the purposes of this Terminal Plan, MRC is identifying a wharf-based capture and control system as a technology that MRC will reevaluate once a system is available for tankers.

If technically feasible, the control equipment for Strategy 3 may consist of:

a. **New wharf-based emissions capture system:** A wharf-mounted, crane/boom, stack adaptor/hood, and flexible ducting,
b. **New wharf-based emissions control system:** Inlet ducting, treatment system (possibly with ammonia, activated carbon, and/or thermal oxidizer), exhaust fan, stack, solid waste management system and power supply.
c. **New substation**: 15 kV to 480 V and 2400/4160 V substation, located within the refinery fence line and close to capture and control equipment. The existing infrastructure does not have the capacity or configuration to supply necessary load needed by a wharf-based capture and control system.
d. **New main distribution to new substation**: 2 miles of cable tray and 15 kV cable from one of MRC's main distribution substations to the new substation for the wharf-based control and capture equipment.

An evaluation of the existing Terminal will need to be conducted including a structural design review. The Terminal currently meets the Marine Oil Terminal Engineering and Maintenance Standards (MOTEMS). However, the wharf may need to be retrofitted to support the additional weight of the shore power system and that meets MOTEMS requirements. In addition, the wharf may have to be made larger to accommodate the above equipment. Since the equipment is not currently available, it's not possible to determine if these modifications are technically feasible at this time.

Berths where equipment will be used:

The above equipment will be used at both berths.

3. VESSEL INFORMATION

Number and origin vessels expected to use the above strategies (annual):

MRC expects to receive approximately 200 vessels per year. These vessels come from all over the world including

- Belgium
- Bermuda
- China
- Germany

- Greece
- Japan
- Monaco
- Norway
- South Korea
- United States

These vessels need to be compatible with the selected control technology. Since the vessels will come from a wide variety of global locations with their own standards and requirements, it will be difficult to ensure all vessels that come to the port have the necessary equipment that is compatible with the proposed technologies.

4. SCHEDULE

Schedule for installing equipment:

Since electrical equipment is not currently available that meets North American standards for hazardous locations and other specialized equipment, a detailed site-specific schedule for installing equipment to implement one of the proposed strategies cannot be developed at this time. However, the key phases needed to design and construct a control strategy are summarized in Table 1 below. An estimate of the duration for each phase is also provided and will be dependent on many factors, including which strategy is selected. This schedule will need to be reevaluated once equipment and specialized electrical equipment becomes available that meets appropriate standards and is listed or labeled by a Nationally Recognized Testing Laboratory (NRTL), as required by OSHA.

The timeline below does not account for the time it will take for equipment to become commercially available and that meets standards and regulations (including standards not yet established). The total time needed to have an operational control strategy would be equal to the sum of

(1) the time for such equipment to be developed and available (not estimated in the Table 1) and
(2) the projected duration in Table 1.

Given that controls systems are not yet currently available to evaluate in detail, it does not appear feasible to complete construction by the compliance start date of January 1, 2027. However, MRC will continue to evaluate options to control emissions within the scheduled specified by the rule.

Table 1. Key Phases of Design and Construction After Equipment is Commercially Available*

Task/Phase	Approximate Duration AFTER Equipment is Commercially Available*
(1) Site Specific Feasibility Study	2 Years
(2) Engineering	1 to 3 Years
(3) CEQA/Permitting (assume one year overlap with engineering)	1 to 3 Years
(4) Contracting/Material Procurement	1 to 2 Years
(5) Construction	1 to 4 Years
(6) Commissioning	1 Year
Total Duration AFTER Equipment is Commercially Available*	**6 to 13 years**

*That meets the appropriate standards including being listed or labeled by a Nationally Recognized Testing Laboratory (NRTL), as required by OSHA.

5. TERMINAL/PORT BERTHING RESTRICTIONS AND CONSTRAINTS

This section addresses the following two elements required for the Terminal Plan

1) ***Terminal/port specific berthing restrictions.***
2) ***A terminal operator claiming that a physical and/or operational constraint will delay its ability to implement its preferred CARB approved control strategy to achieve emission reductions from vessels at berth according to the requirements of section 93130 et seq., must also include with its terminal plan a technical feasibility study evaluating if there are any other emission control options that could be implemented more quickly at the terminal***

The following specifies the key restrictions and constraints of implementing the three potential strategies above for tanker vessels. The separate DNV Assessment for Tankers provides more information on the feasibility of the three control strategies, including information on further development that is needed to implement control strategies that can be operated in a safe and reliable manner.

Considering that many of these compatibility and safety issues will need to be addressed prior to designing, constructing, and implementing one of the control strategies, MRC believes these issues will delay the implementation of the control strategy. MRC will continue to evaluate these three options and alternatives, as they become available, to achieve the required reductions.

Shore Power (Strategy 1)

Examples of restrictions and constraints of a shore power system that need to be further evaluated and considered are summarized below:

1) **Electrical Capacity**: Existing distribution system does not have the capacity for the additional load from vessels at the Terminal. A new substation will need to be appropriately designed and installed to accommodate the additional load.
2) **Electrical Hazard Rating**: The Terminal is classified as Class 1, Div2, Groups C&D. Equipment installed on the Terminal must be approved by a national recognized testing laboratory (e.g., UL, FM) per OSHA 1910.307. Equipment for shore power is not currently commercially available for

installation in these hazardous areas associated with a tanker vessel (e.g., no explosion-proof socket made for marine use in this type of application).

3) **Interconnection Standards, Rules, and Regulations**: Before a shore power system can be designed, procured, and constructed, appropriate standards and specifications for safely interconnecting the vessel to onshore power distribution systems needs to be in place (e.g., for voltage, frequency, electrical connections). These standards include requirements to prevent injuries or death related to power connections. For example, there are safety concerns around grounding, stray currents, step potential, and touch potential (electrical shock potential). Such standards and specifications are not currently in place. In addition, there are no standards in place for safety training of this type of system on either the shore or vessel side.
4) **Compatibility with North American Standards**: Electrical systems installed in North America/ California are not compatible with European standards. This issue will need to be resolved prior to designing a shore power system.
5) **Vessel vs. Shore Power Electrical Rating:** Electrical equipment must be rated for the available Short Circuit Current Rating (SCCR). If the shore power equipment has a higher SCCR than the vessel, then it cannot be connected to the vessel's equipment.
6) **Coordination of Protective Devices**: The shoreside switchgear protection schemes must be coordinated with vessel switchgear. The scheme could be different for each tanker, and so the MRC would need to know the vessel's protection scheme in advance.
7) **Varying Size and Heights of Vessels:** As stated in the DNV assessment, tanker vessels arriving in California terminals varied in length between 340 and 1100 feet. MRC will need to evaluate the varying sizes and heights of vessels received by the Terminal and determine if that will restrict the ability to safely connect to certain vessels (e.g., limitations caused by crane reach and cable lengths). This evaluation would need to consider industry standards that will need to be developed in the future to address connection issues.
8) **Inability to Disconnect in 30 minutes:** California Code of Regulations, Title 2, Section 2340 (c)(28), requires a system in place so that a tank vessel can be moved away from the berth within 30 minutes. Given the complexity of shore power connections and cable management systems, it will take longer than 30 minutes to disconnect shore power.
9) **Lack of Space on Wharf**: MRC does not believe the existing wharf has the available real estate to install the equipment needed to supply shore power.

Barge and On-shore Capture and Control System (Strategies 2 and 3)

Examples of restrictions and constraints of a capture and control system that need to be further evaluated and considered are summarized below

1) **Technology Not Currently Available for Tanker Vessels**: A technically feasible capture and control systems are not currently available specifically for tanker vessels. An existing capture and control system is approved for container vessels, but these types of vessels have very different characteristics compared to a tanker vessel. For example, a tanker vessel may have higher exhaust flows than a container vessel and so the existing system may not have the capacity for tanker vessels. Also, a tanker vessel specific system needs to be designed that can operate in the hazardous zones of a tanker vessel to avoid fire and explosion hazards. In addition, metal-to-metal contact between the capture control system hood and vessel stack can result in sparks and these hazards will need to be addressed (e.g., by developing standards first to minimize these hazards).

2) **Varying Size, Heights, and Number of Stacks on Vessels**: The capture and control systems must have a hood of the appropriate size and sufficient reach to cover the vessel stack. Given the wide range of stack size, orientation, and location, a single capture and control system is not expected to be compatible with all vessels. In addition, tanker vessels may have up to 4 emission sources and stacks, which is more than a typical container vessel. Thus, existing capture and control technology designed for container vessels may not work for tanker vessels that may have up to 4 stacks.
3) **Inability to Disconnect in 30 minutes:** As stated previously, California Code of Regulations requires a system that would allow a tanker vessel to move away from the berth within 30 minutes. There are concerns that the added time to disconnect a capture and control system would prevent a vessel from meeting this requirement.
4) **Narrow Channel:** The MRC Terminal is along the Carquinez Strait, which has vessels traveling through a narrow channel and under a nearby bridge, both of which restrict vessel movement. A barge-based system may be more than 100 feet long by 60 feet wide and would need an external tugboat to move the barge alongside a vessel. Given the footprint needed for a barge-based capture and control system and the current vessel congestion and proximity of vessels, there may not be sufficient space to allow for vessels to safely pass the MRC Terminal along the narrow channel.
5) **Site Specific Hazard Evaluation**: Once a technically feasible capture and control system is available, MRC will need to carefully evaluate the risks associated with barges operating alongside a ship actively loading and unloading hazardous material.
6) **Lack of Space on Wharf**: A shore-based capture and control system may not fit on the existing wharf.

6. SIGNATURE

By signing below, the terminal's responsible officer confirms that he/she has reviewed this plan under penalty of perjury and understands this plan is subject to verification by CARB staff.

Name: Gordon Johnson	Title: Manager, Environmental Affairs
Signature:	Date: 11/30/2021