2.0 Project Description

Phillips 66 Company (Phillips 66) proposes to modify the existing rail spur currently on the southwest side of the Santa Maria Refinery (SMR) located in unincorporated San Luis Obispo County California (see Figure 2-1). Modifications to the rail spur are being proposed to allow Phillips 66 to receive crude oil at the refinery via train. The project would include an eastward extension of the existing rail spur as well as a railcar unloading facility. Trains would deliver crude oil to the SMR for refining. The unloaded crude oil would be transferred from the new unloading facility to existing crude-oil storage tanks via a new on-site above-ground pipeline. No crude oil would be shipped out of the refinery as part of this project except for any off-spec crude[1] that is delivered by rail. No Bakken crude would be delivered to the SMR as part of the project.

The proposed tracks and unloading facilities would be designed to accommodate unit trains and manifest trains. Unit trains consist of approximately 80 tank cars and associated locomotives and other supporting cars that stay together as one assembly. Manifest trains may have a variety of car types and cargos and are not fully dedicated to a single cargo as are unit trains. Manifest trains may deliver one or more cars to the refinery and then continue to other destinations to deliver other cargo.

2.1 SMR Rail Project Purpose and Objectives

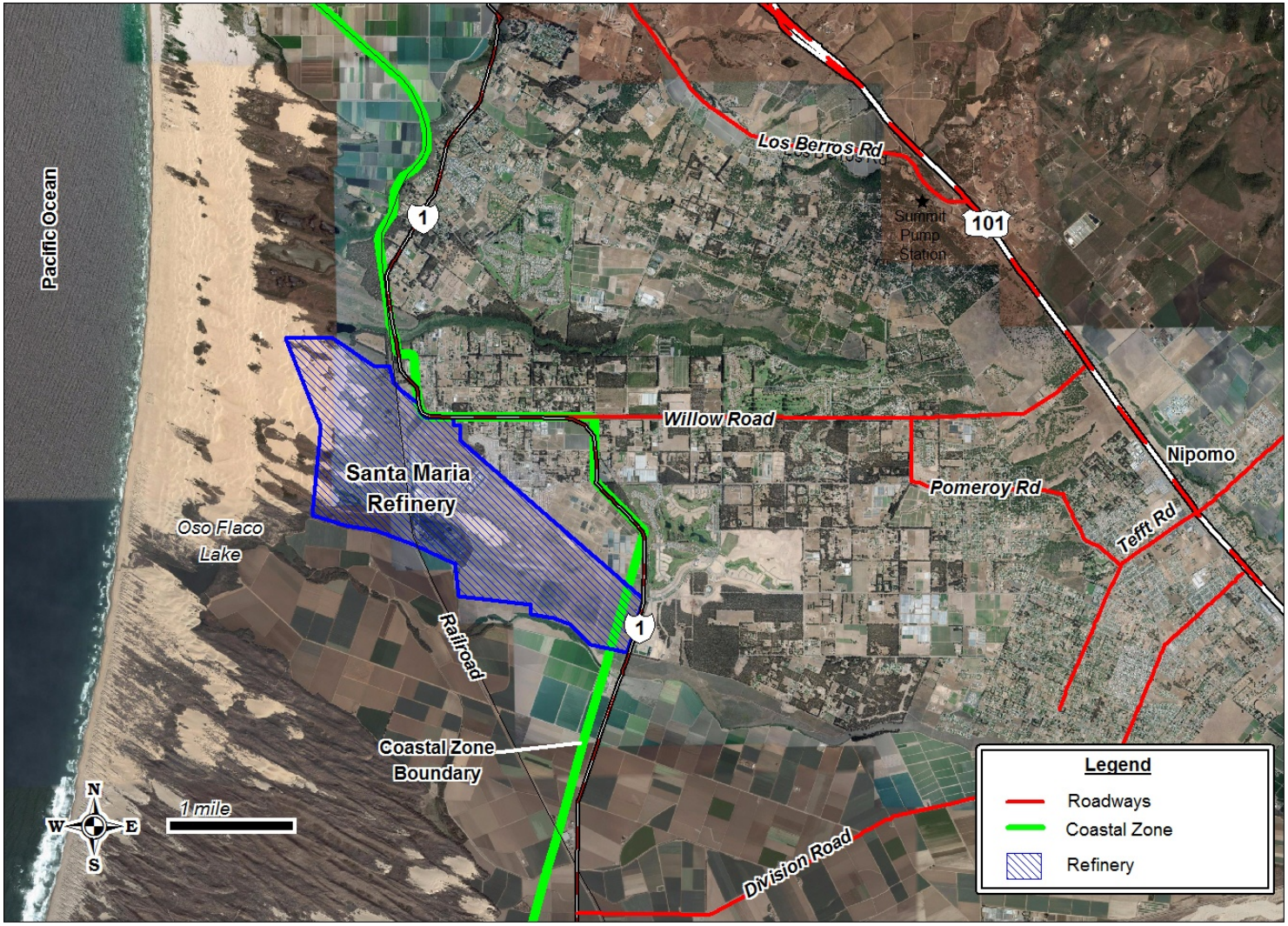
Pursuant to Section 15124(b) of the CEQA Guidelines, the description of the proposed project is to contain "a clearly written statement of objectives" that would aid the lead agency in developing a reasonable range of alternatives to evaluate in the EIR, would aid decision makers in preparing findings and, if necessary, a statement of overriding considerations.

The objectives of the project as defined by the Applicant are the following:

- Allow the refinery to obtain a range of competitively priced crude oil by providing the capability to obtain raw material from North American sources that are served by rail.
- Extend the existing rail spur within the refinery and install the necessary infrastructure to safely and efficiently transfer crude oil from rail cars to the existing refinery storage tanks for processing.
- Avoid and minimize environmental and community impacts, and mitigate any unavoidable impacts to the maximum extent feasible.

[1] Off-spec crude would be crude that does not meet the agreed upon specification between P66 and the producer. Typically off-spec crude has higher amounts of water than allowed by the refinery. It is not expected that much off-spec crude would be delivered to the refinery and would likely be limited to one or two tank cars per year.

Figure 2-1 Santa Maria Refinery Location



Note: While the UPRR tracks pass through the refinery property, Phillips 66 does not own the railroad right-of-way. This property is owned by UPRR.
Source: MRS.

- Develop a project that is consistent with the objectives of the San Luis Obispo County General Plan and Local Coastal Program.
- Design, construct, and operate a project that complies with all local, state, and federal regulatory requirements.
- Maximize the use of existing infrastructure and resources to support the economic vitality of the County and State.

2.2 Refinery Site Background

The SMR was built on the Arroyo Grande mesa in southern San Luis Obispo County (SLOC) in 1955 (see Figure 2-1). The facility is surrounded by industrial, recreational, agricultural, residential land, and open space (see Table 2.1). The SMR operates 24 hours per day and 365 days per year, except when shut down for maintenance.

Table 2.1 General Project Site Information

Item	Description
Assessor parcel numbers	091-141-062, 092-391-021, 034, 092-401-005, 011, 013, 092-411-002, 005
Supervisorial district #	4
Planning area	South County Coastal
Land use category	IND - Industrial
Combining designation(s)	Flood Hazard Area Coastal Appealable Zone
Existing uses	Phillips 66 Company Santa Maria Refinery
Topography	Generally flat, coastal dunes
Vegetation	Coastal, dune vegetation
Parcel size	2.5 square miles (~1,644 acres)
Surrounding Land Use Categories and Uses	
North	Industrial and Residential Suburban (IND and RS). Mobile home storage and residential uses.
East	Industrial, Agricultural, and Recreation (IND, AG, and REC). Vacant, farming, residential, and golf course.
South	Agricultural (AG). Farming.
West	Open Space and Recreational (OS and REC). Sensitive resource area and dune recreation.

Source: SLOC 2010

The SMR was previously owned by several companies, including Union Oil Company of California, Tosco, Phillips Petroleum, and ConocoPhillips. Since 1955, the land use has been petroleum oil refining.

The SMR and the Rodeo Refinery (located in the San Francisco Bay area), are linked by a 200-mile pipeline and comprise the San Francisco Refinery (see Figure 2-2). The SMR is designed to process heavy, high-sulfur crude oil. The refinery is not designed to process large quantities of light crude oil.

Figure 2-2 Facility Location and Pipeline Route to Rodeo Refinery

Source: MRS

Semi-refined liquid products from the SMR are sent by pipeline to the Rodeo Refinery for upgrading into finished petroleum products. The semi-refined products that are shipped via pipeline to the Rodeo Refinery include naphtha and gas oils[2]. Products leaving the SMR are: (1) semi-refined petroleum by pipeline; (2) solid petroleum coke by rail or haul truck; and (3) solid recovered sulfur by haul truck.

2.3 Proposed SMR Rail Project

Phillips 66 proposes to extend the existing rail spur from the southwest side of the refinery extending east to add an unloading facility, on-site pipelines, and replacement coke rail loading tracks (see Figure 2-3). Additionally, an existing agricultural road would be improved as an unpaved eastern Emergency Vehicle Access route between the eastern end of the rail spur and State Route 1. The tracks and unloading facilities would be designed to accommodate trains of approximately 80 tank cars and associated locomotives in unit trains or manifest train configurations. These trains would deliver crude oil to the facility for processing. The unloaded material would be transferred to the existing storage tanks via a new pipeline that would be constructed across the existing coke storage area and along an existing internal refinery road. The project would occur entirely within the existing Phillips 66 boundary.

The project would also include work within the existing refinery connecting and upgrading existing infrastructure. This includes adding a new electricity cable to an existing pipeway and adding a new fire water pipeline to an existing pipe rack. The rails on the existing rail spur would also be replaced.

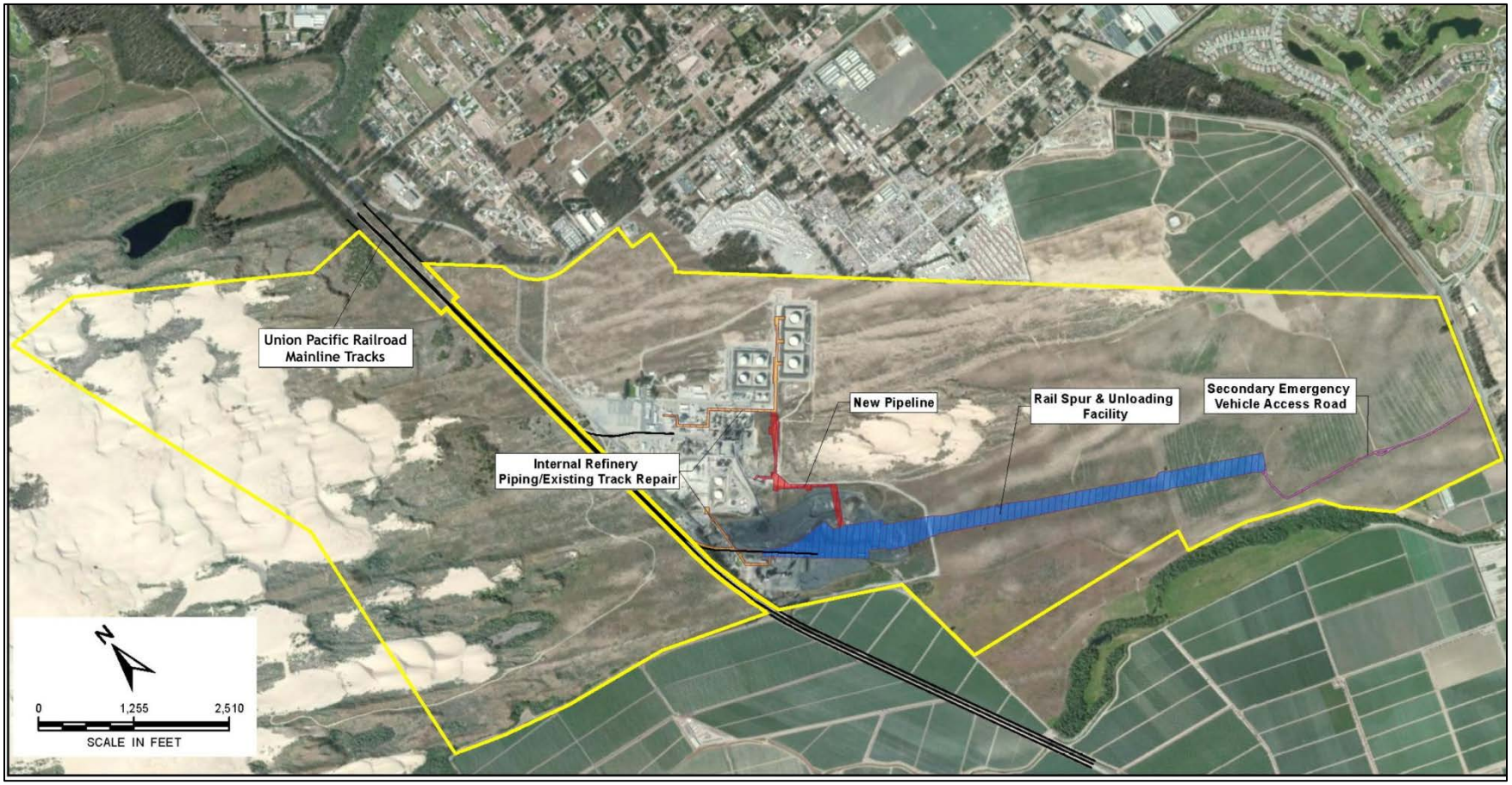
The new rail spur lines would extend from the terminus of the current spur. The unloading facility would be located at the end of the existing coke storage area and along an existing internal refinery road.

The construction areas are summarized below and shown on Figure 2-3:

- 6,915 feet – Length of spur extension (including approximately 2,445 feet within the existing industrial coke plant area);
- 270 feet – Maximum width of construction area for rail extension;
- 2,325 feet – Length of the new pipeline route from the unloading facility to the internal refinery (an additional 2,800 feet would be constructed within the existing refinery connecting to the existing storage tanks and existing steam boilers); and
- 2,400 feet – Length of new steam pipelines from the unloading facility east between Tracks 1 and 2.

[2] Naphtha is a mixture of hydrocarbon molecules generally having between 5 and 12 carbon atoms. Gas oils are a mixture of hydrocarbons molecules that generally have between 13 and 25 carbon atoms. Both of these are intermediate products that are typically used at refineries to produce gasoline and other transportation fuels.

Figure 2-3 Proposed Project Areas



Notes: Yellow line the boundary of the SMR property.

While the UPRR tracks pass through the refinery property, Phillips 66 does not own the railroad right-of-way. This property is owned by UPRR.

Source: Arcadis 2013.

The maximum width of the temporary construction area for pipeline installation would be 25 feet. The construction and permanent facilities would affect the acreages shown in Table 2.2. Acreage breakdown (temporary + permanent) are summarized below:

- 41.6 acres – Rail Spur and Unloading Facility (25.3 acres permanent),
- 3.8 acres – New Pipeline (1.8 acres permanent), and
- 1.6 acres – Secondary Emergency Vehicle Access (1.6 acres permanent).

Collectively, the entire project, including temporary and permanent impacts, would affect approximately 47 acres. Of this area, 19.5 acres would occur within the existing refinery and coke area, and 27.5 acres would occur in undeveloped areas outside the refinery and coke facilities.

Detailed maps showing temporary and permanent areas of disturbance are provided in Appendix A (see pages A-9 through A-11).

Table 2.2 Proposed Project Impacted Areas

Area	Construction Disturbed Area (acres)[a]	Permanent Disturbed Area (acres)
Rail Spur Within Currently Undisturbed Areas Outside of The Refinery and Coke Facilities	25.9	16.7
Pipeline Route Within Currently Undisturbed Portions of the Coke Area	0.6	0.4
Rail Spur and Unloading Area Within Currently Disturbed Portions of the Coke Area	15.7	8.6
Pipeline Portion Within Currently Undisturbed Areas of the Refinery	1.1	0.8
Pipeline Portion Within Currently Disturbed Areas of the Refinery	2.1	0.6
Secondary Emergency Vehicle Access[b]	1.6	1.6
Total Area Currently Undisturbed	28.3	18.6
Total Area Currently Disturbed	18.7	10.1
Total Area	47.0	28.7

a. Acreages include both temporary and permanent disturbance areas.
b. Existing dirt road disturbed area is 0.9 acres. Improved road disturbance area would be 1.6 acres. New disturbance for access road would be 0.7 acres.
Source: Applicant drawing 5632-SK-A-200A-C dated 8/8/2013. See Appendix A pages A-9 through A-11.

Currently undisturbed areas, temporarily affected during construction, would be returned to pre-project conditions following completion of construction. The construction grading would create approximately 139,775 cubic yards of cut and 113,675 cubic yards of fill. Note that the final volumes may differ based on final engineering design plans.

The proposed project would consist of the following components:

- Rail Spur Modifications,
- Mainline Turnout,
- Unloading Facility,
- Unloading System,
- Fire Protection and Safety System,
- Pipelines
- Access Roads,
- Secondary Emergency Vehicle Access,
- Security Fence,
- Spill Containment and Response Facilities, and
- Support Buildings.

Each of these is described below.

2.3.1 Rail Spur Modifications

The unloading facility would be designed around "train slots" (a track that can contain an entire unit train). Union Pacific bases the number of slots on the number of trains arriving per day and/or the yearly tonnage, and the 'dwell period' (the hours that the train would be at the facility.) Phillips 66 would unload up to five trains per week. Phillips 66 estimates that a complete 80-car train would be unloaded within 10 to 12 hours, including time for positioning and preparing the train for departure. The proposed two-slot facility (Tracks 1/2 and Track 3) would allow adequate capacity unloading.

Modification of the existing rail spur would include constructing five parallel tracks (as the tracks extend east, some rail tracks would merge). In addition, two new coke rail loading tracks (Coke Track 1 [CT1] and Coke Track 2 [CT2]) would be installed north of the new crude oil unloading tracks to allow for easier and shorter access to the coke storage area. Additionally, the two existing coke rail storage tracks (Track 765 and the end of Track 764), south of the crude oil unloading tracks, would have new rails installed and would no longer be used for loading coke, but would be used as part of the rail unloading facilities as described below. A line diagram of the rail tracks at the SMR is shown in Figure 2-4.

The existing rail spur (Track 764) on the southern portion of the property will have its track replaced. Track 764 currently provides rail access to the coke storage area (end of Track 764 and Track 765) and would provide a common entry point for the new tracks. Two tracks would surround an unloading rack and then would come together to form a common track that extends to the east of the loading area to allow for the entire train to be parked off of the mainline track and unloaded. Three additional tracks would extend the full length of the rail spur and run parallel to the unloading area.

Figure 2-4 Proposed Rail Track Line Diagram

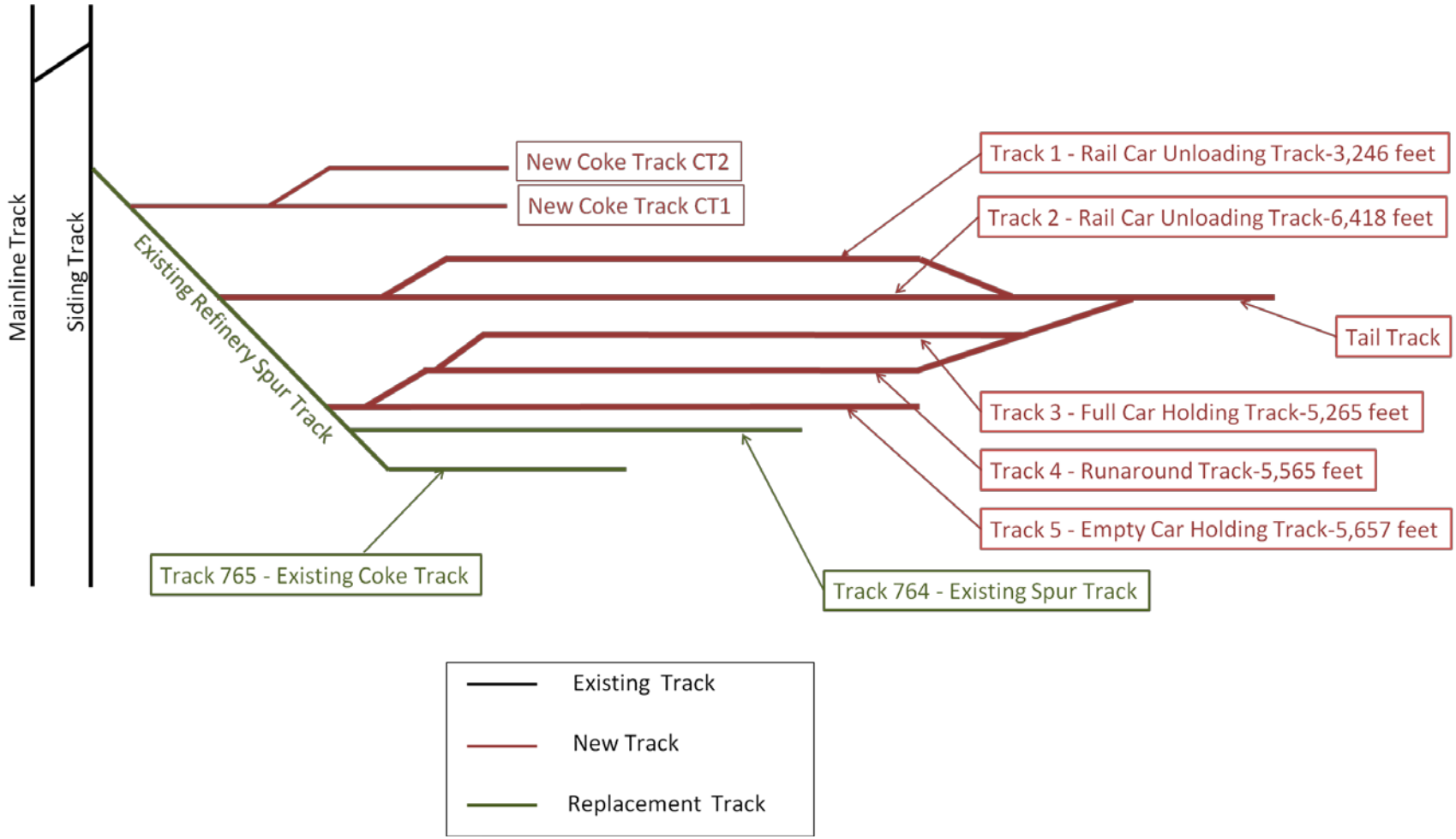


Diagram is not to scale.
Track distances are total length available for track and may include some overlap with other tracks.
Source: Developed by MRS from Union Pacific Rail Track Drawings. See Appendix A.

The system has been designed to allow for up to two full trains to temporarily be on the Refinery Site at one time in case a second train arrives while the first is still being unloaded.

The tail track would have a connection at the eastern end that would allow the locomotives to return to the common entry and leave the facility, if required, and would also allow the locomotive to return to the entry area and the loading rack area and switch the tank car strings onto and off of the unloading rack. This "tail" track would be long enough to accommodate three locomotives.

The track area within the refinery located between the mainline and the loading area is called the "lead" track and this would be long enough for 10 tank cars and the switching locomotives. The tracks associated with the rail spur project are summarized below.

- ***Existing Refinery Spur Track (Track 764)* –** The existing refinery spur track provides access from the UPRR siding track to the refinery and the coke loading area, and can currently be used to load coke onto rail cars. This existing track would be replaced as part of this project. The coke cars shall be queued on this track prior to leaving full. This track would only be used for queuing and moving rail cars into and out of the SMR.
- ***Track 1 (Rail Car Unloading Track)* –** This unloading track would run next to the unloading rack to allow for rail car unloading and merges with Track 2 after the unloading rack. The unloading rack on Track 1 is designed to unload 10 rail cars at a time.
- ***Track 2 (Rail Car Unloading Track)* –** This is a second unloading track that runs next to the unloading rack (on the opposite, south side as Track 1) to allow for rail car unloading and runs the entire length of the rail spur. This track is designed to handle the full length of a unit train and is also designed to unload 10 rail cars at a time.
- ***Track 3 (Full Car Holding Track)* –** This track runs the entire length of the spur and would receive a full unit train should Tracks 1 and 2 be occupied by unloading trains.
- ***Track 4 (Runaround Track)* –** This track runs the entire length of the spur and would allow locomotives to return to the front of the facility after dropping off an 80-car train on Tracks 1 or 2. This track would be empty most of the time.
- ***Track 5 (Empty Car Holding Track)* –** This track would run the entire length of the spur and would be used for queuing up empty cars after the unloading process is complete;
- ***Tail Track* –** This is a short section of track located at the far eastern end that would allow locomotives to switch between Tracks 2, 3, and 4, and move from the front to the back of the rail cars.
- ***Coke Tracks (CT1 and CT2)* –** Two new coke tracks would be installed to service rail loading of coke from the coke area. The new coke tracks are needed since the proposed rail tracks for the crude oil unloading would be placed between the coke piles and the existing coke rail track. By moving the coke rail tracks to the north side of the proposed crude unloading tracks, the front end loader, which is used to load coke into rail cars, would not have to cross the proposed new tracks.
- ***Refinery Spur Track (Track 765)* –** Track 765 shall be repurposed as a "Bad Order" Track. This existing refinery spur track provides storage for crude railcars that cannot be unloaded

and for rail cars requiring inspection and/or repair before continued use, as needed. The rails on this existing track would be replaced as part of this project.

Detailed track diagrams are included in Appendix A (pages A-1 through A-5).

2.3.2 Mainline Turnout (Siding)

Unit train service would not require substantial changes to the turnout from the Union Pacific mainline running north-south adjacent to the refinery since this track is adequately built for the anticipated weight. The turnout guides north- and southbound trains off the mainline onto the siding and then into the refineries rail spur. Trains going south can move directly onto the siding and into the refinery rail spur. Trains coming north must pass the mainline siding and then back onto the mainline siding for access to the refinery rail spur.

Union Pacific may require a small change in the angle of the turnout; however, if required, the construction of the new turnout would be a minor change from the current configuration and the construction would occur entirely within the existing disturbed track area on UPRR right-of-way. Because other trains continually pass through the Arroyo Grande/Santa Maria area on the Union Pacific mainline, the turnout must allow a unit train to clear the mainline without stopping.

2.3.3 Unloading Facility

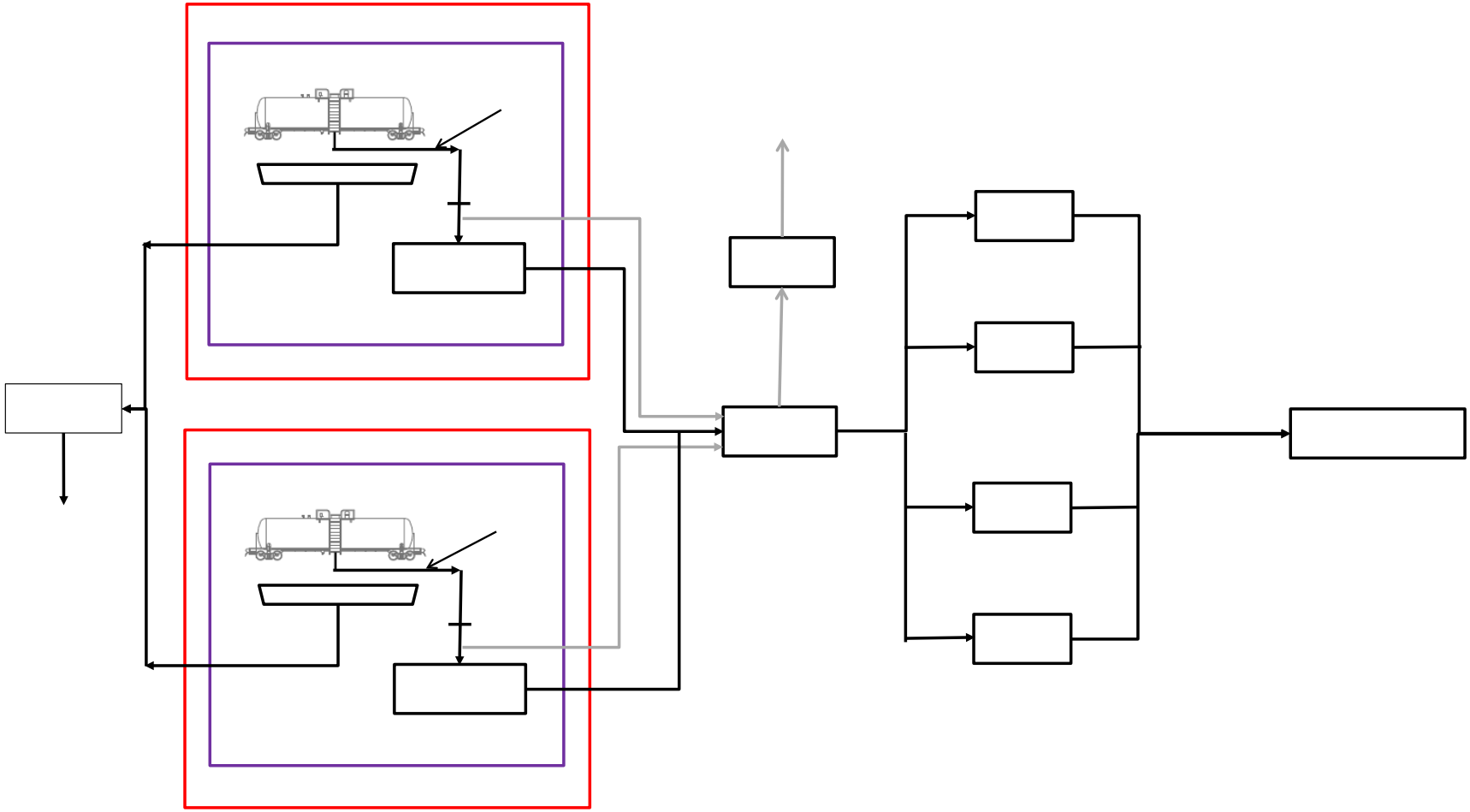
The unloading facility would include an access platform and a system of pumps and meters, suction lines from the railcars, carbon beds for vapor treatment, steam lines and steam condensate vessel, and a common pipeline leading to the refinery's existing tank farm. Figure 2-5 provides a simplified block flow diagram of the unloading facilities. Figure 2-6 provides a plot plan of the unloading facility that shows the location of the major components (the carbon beds would be located on the metering pad shown in Figure 2-6). Appendix A provides plan and cross-section views of the proposed rail unloading facility (see pages A-6 through A-8).

The access platform would run parallel to the railcar unloading tracks, with an individual gangway and safety cage at each rail car unloading station.

The access platform and tracks would be supported by reinforced concrete construction. This area would provide structural support, spill containment (see Section 2.3.10 below), and a clear, solid work surface for the operators.

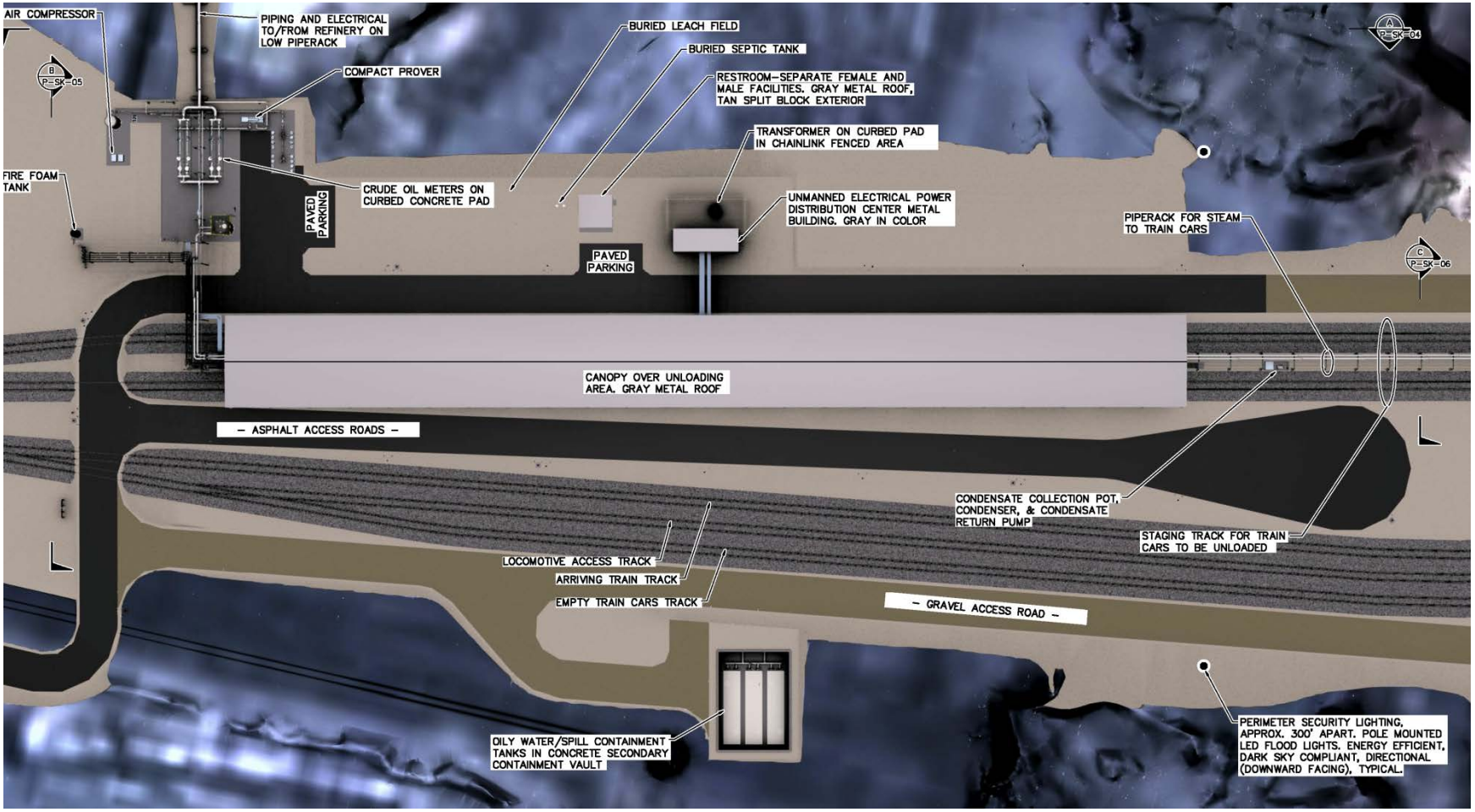
Phillips 66 would unload up to five trains per week. Phillips 66 estimates that a complete 80-car train would be unloaded within 10 to 12 hours, including time for positioning and preparing the train for departure. The proposed two-slot facility (Tracks 1/2 and Track 3) would allow adequate capacity unloading.

Figure 2-5 Simplified Block flow Diagram of Rail Unloading System



Source: Developed by MRS from Phillips 66 Land Use Application.

Figure 2-6 Plot Plan of Rail Unloading Facility



Source: Phillips 66 updated drawing, 2014.

2.3.4 Unloading System

The unloading facility would be equipped with two 10-car unloading systems allowing 20 rail cars to be unloaded at one time. The unloading rack is configured to unload two 10-car strings simultaneously (one 10-car string on Track 1 and one 10-car string on Track 2). The 600-foot-long center platform would provide access to the tops of the railcars.

Each of the rail car unloading stations would consist of an unloading line and a positive displacement pump (See Figure 2-5).

The system used to unload each car would consist of an adapter unit to connect the rail car to couplings, hoses, valves and piping connecting to a 400 gallon-per-minute (gpm) positive displacement pump.

The unloading system would be equipped with one air eliminator and associated carbon beds and four flow meters. Upon exiting each of the unloading pumps the crude oil from each unloading system would be commingled into a common pipeline that would flow through the air eliminator to remove any air and then to one of four flow meters specifically associated with particular pumps. Upon exiting the flow meters the crude oil from the two unloading systems would again be commingled and transported via a new pipeline to the existing refinery crude oil storage tanks (see Figure 2-5). The SMR has three existing crude oil storage tanks (TK-901/TK-903-98,771 barrels each, and TK-900-98,144 barrels).

The air eliminator would be used to remove vapors (mostly air) potentially mixed in with the crude oil. Air is typically present at the beginning and end of unloading when crude oil levels are low and the inlets to the unloading pumps are empty. Air removal reduces the potential for an explosive atmosphere, protects the system's flow meters and ensures accurate flow measurement. This air/vapor flow from the air eliminator would be passed through two carbon beds to remove any hydrocarbon vapors before the air is vented to the atmosphere (see Figure 2-5).

The carbon beds would be piped in series to provide primary removal and final polishing. These carbon beds would be located onsite as part of the crude oil metering system. The filter medium would be removed by a vendor and replaced with fresh medium as needed during operations.

In addition, a small volume 'prover' would be installed to allow frequent proving of flow meters.

A computer system would be used to control and monitor the unloading system's pumps, air compressors, meters and its interface with the refinery's crude oil storage tank system. A new 4160V-480V power distribution center would run the pumps, ventilation system, lighting, telephones, fire alarm and fire suppression systems. Power would be supplied initially from the Carbon Plant and subsequently by extending a line from the main substation located on-site in 2015.

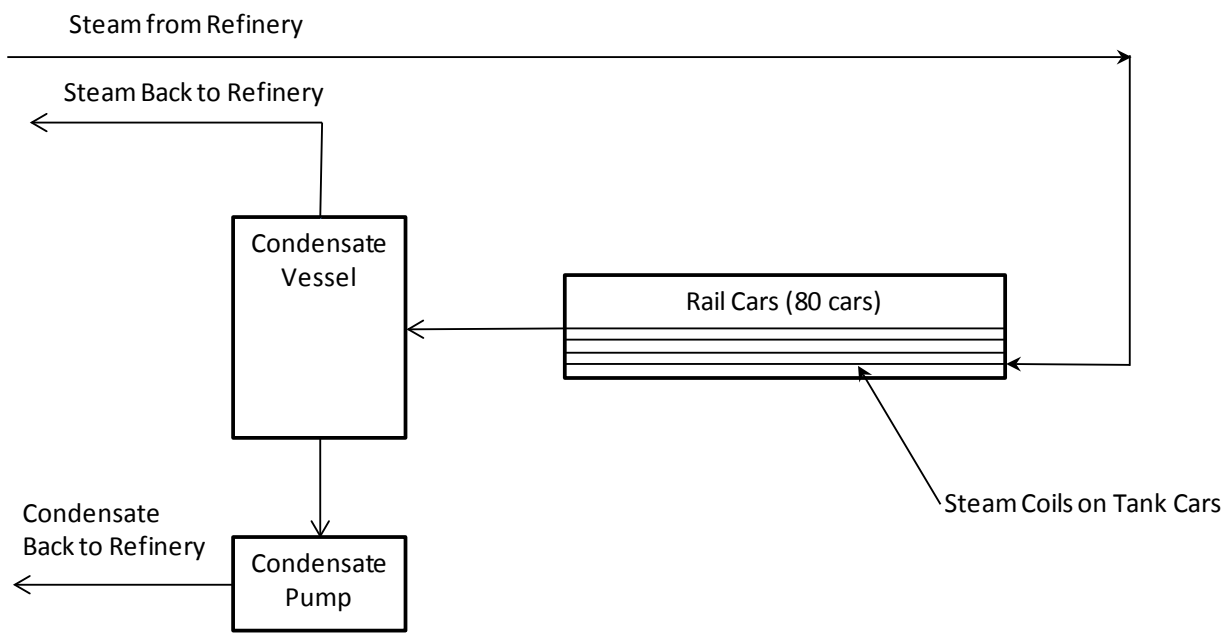
The unloading facility would also be equipped with steam lines that would allow the rail cars to be heated prior to unloading. Phillips 66 would construct new infrastructure to utilize steam already produced at SMR to heat cars that have been subject to unanticipated delays during

transit that has allowed the crude oil to cool. Phillips 66 has stated that the proposed use of the steam heating system would be used only once per year. The heating system would only be needed if a unit train was held up in transit in an area of very cold weather for two or more days and the crude cooled to a temperature below the required pour point.

The steam system would include new piping to convey steam to the rail cars and to return the "used" steam to the refinery, the installation of a condensate collection system to recover the water from further "used" steam, and piping to return the condensate back to the existing steam boilers at the refinery. The condensate collection system would include a tank and a pump to facilitate returning the condensate to the existing SMR boilers. All of the proposed infrastructure would be located in areas already disturbed or proposed for disturbance as part of the project. No new surface disturbance would be required for the installation of the steam system.

Phillips 66 would divert steam from the existing steam production system to the car heating system once per year. Phillips 66 would need to purchase an offsetting amount of electricity from PG&E during the time the steam is being used to heat the rail cars. No new steam generation would be required for the heating of the rail cars. Phillips 66 would need to divert about 30,000 lbs/hr of steam from the existing boilers. This would require Phillip 66 to purchase an additional 5 MW/hr of electricity from PG&E when the steam is diverted for use to heat the rail cars. Figure 2-7 shows a simplified schematic of the steam heating system.

Figure 2-7 Simplified Schematic of Steam Rail Car Heating System



During the heating operation, rail cars would be placed on Tracks 1 and 2 and each of the 80 cars would be connected to the steam line coming from the refinery. Each rail car would be equipped with heating coils (i.e., piping coils) located on the outside bottom half of the rail cars. The steam

would travel from the inlet steam pipe to the heating coils on each tank car and then to the return steam line. The return steam line would pass through a condensate collection tank, where any condensed steam (i.e., water) would be removed. The remaining steam would then travel via pipeline back to the SMR boiler system. Any collected condensate would be pumped via pipeline back to the SMR boiler system. The rail cars would be heated for about 21 hours and then the normal unloading operations would begin. During the heating process, all of the locomotives would be shutdown.

2.3.5 Fire Protection and Safety System

A new fire protection and safety system would be installed for the unloading rack, consisting of fire detection equipment, safety showers, eyewash stations, hydrants, controls and piping. The unloading rack would be equipped with a foam sprinkler deluge system and firewater monitors with foam generators at the unloading rack periphery. The foam spray system would require a foam concentrate storage tank. The system specifications are provided below.

- Foam/Water Deluge System.
- Square footage under canopy: 32,860 ft^2, 26.5 feet high.
- Divide under canopy area into 5 zones of 6,572 ft^2 each.
- Assume two adjacent zones would be activated in a fire.
- Design density = 0.16 GPM/ft^2.
- Flow rate required =3 x 6,572 x 0.16 = 3,155 GPM.
- Provide additional flow of 2 x 500 GPM monitors = 1,000 GPM.
- Total fire water flow required = 4,155 GPM.
- Activation of deluge valves via manual pull stations (valves) or pilot sprinkler line.
- Pilot sprinkler line shall have fusible heads rated at 175^oF.
- Bladder tank for foam concentrate storage sized for two consecutive activations of two adjacent zones.
- Pressurizing of line downstream of deluge valve activates pressure switch for remote alarm and pressurizes hydraulic valve that opens to allow foam concentrate flow to ratio proportioner.
- Assumed foam concentrate is 3% type.

Foam/Water Monitors would be self-educting nozzles with foam totes. The monitors shall be mounted at grade a minimum of 50’ away from unloading cars.

Water Supply System would consist of the following:

- Install approximately 1,200 feet of 8-inch pipe from the existing water line at the Coke Control Room to the unloading rack area. The supply for this pipe comes from incorporating

the existing 6-inch water line and another 6-inch pipe in the area. The two lines would come together to supply the lower portion of the loop.

- Install approximately 2,700 feet of 8 inch pipe from the existing 10" water line to the unloading rack area. Provide 8-inch fire water loop around the unloading rack.
- Provide two Fire Department Connections (FDC's) with check valve between for boosting of pressure in fire water loop at unloading rack (if necessary).
- Two new lines would tie together for a short run to allow for re-pumping by refinery fire truck pump into looped system around rack.

The project would also include a secondary Emergency Vehicle Access route from the eastern end of the rail spur to State Route 1, which is discussed below in Section 2.3.8. A copy of the Draft Fire Protection Plan prepared by the Applicant is provided in Appendix F.

2.3.6 Pipelines

Downstream of the two unloading facility meter assemblies, a new 24-inch above ground crude oil pipeline would be routed along an existing internal dirt road on the Phillips 66 property between the unloading facility and the refinery. This pipeline would connect with the existing refinery crude oil storage tanks. The route for this crude oil pipeline is shown in Figure 2-3. This dirt road accommodates periodic on-site traffic only associated with refinery personnel traveling at low-speeds. The new crude oil pipeline would be approximately 3,525 feet in length. The crude pipeline to the existing storage tanks would be equipped with electrical heat tracing that would be used to keep the heated crude warm until the next train load of crude can be used to push it into the existing storage tanks.

New steam and condensate pipelines would be installed from the existing SMR boilers to the unloading rack. The steam lines would then run east from the unloading rack between Tracks 1 and 2. Two 6-inch above ground steam lines would be installed along with one 2-inch condensate line. The route for these pipelines is shown in Figure 2-3, and would use the alignment as the crude oil pipeline. The total length of the steam pipelines would be approximately 6,300 feet. The total length of the condensate pipeline would be about 2,300 feet.

2.3.7 Access Roads

Paved access roads would be constructed around the unloading rack (1.7 acres). Crushed miscellaneous base would be used around the rail spur for access by operations, safety, and maintenance crews. The road surrounding the rail spur would be 24 feet in width along the southern side of the spur and 12 feet in width along the northern side for a total of 4.6 acres. Appropriately sized turn-around areas meeting County and CAL FIRE standards and a mid-way track crossing are also included to maximize efficiency in the event of an emergency. Figure 2-3 shows the location of the access roads.

2.3.8 Secondary Emergency Vehicle Access

An Emergency Vehicle Access route would be constructed from the eastern end of the rail spur 3,000 feet to State Route 1 following existing agricultural roads. Figure 2-3 shows the location of the secondary emergency access road. Total area of the emergency access road would be 1.6 acres including 1 foot shoulders (with 0.6 acres currently an existing dirt roadway). The secondary access road would be improved with crushed miscellaneous base (most likely decomposed granite or comparable surfacing) to support emergency vehicles as prescribed by CAL FIRE but would not be paved.

2.3.9 Security Fence and Lighting

As required by the U.S. Department of Homeland Security, an extension of the existing eight-foot in height chain link fencing topped with barbed wire would be required around the periphery of the new tracks. The security fence would not extend east around the perimeter of the secondary emergency access road. Additional lighting would also be required for the rail unloading facility. LED flood lights would be mounted on standards. The security fence lighting would be on standards that are 15-feet high and spaced 500 feet apart. The unloading facility lighting would be on standards that are 25-feet high and spaced 150-feet apart. Each light would have a rating of 13,138 lumens[3]. The lights would be dark sky compliant and be downward facing to minimize nighttime glare. The approximate location of the light poles is shown in Figure 2-6. A lighting diagram for the unloading facility is provided in Appendix A (pages A-24 through A-28).

2.3.10 Spill Containment and Response Facilities

Trench drains would feed below-grade 16-inch-diameter drain lines routed to three parallel 20,000 gallon rectangular storage tanks (approximately 60,000 gallons total volume) located in an open top vault for containment. The system would be sized to contain the contents of one rail car as well as the foam and water that would be released from the fire suppression system. The spill containment system is shown in Figure 2-6. Oil and water would be extracted from the spill containment storage tanks with vacuum trucks, which would in turn dispose of the liquids at the refinery oily water system, or offsite at a designated petroleum waste disposal facility.

Phillips 66 has a number of existing process safety policies and procedures that would apply to the SMR rail project, including the equipment and operating procedures. These programs are designed to prevent releases of hazardous materials, minimize risk, and ensure the refinery's ability to process crude without increasing risk of releases. For example, the Mechanical Integrity Program covers equipment used to process, control, and store hazardous chemicals and assigns responsibility for equipment inspection and testing as well as maintenance. This program meets the requirements of CCR Title 8 Sec 5189, "Process Safety Management of Acutely

[3] Lumens is a measure of light output. For example a 75-watt incandescent bulb casts 1,190 lumens, and a 150-watt incandescent bulb produces 2,880 lumens.

Hazardous Materials" (f), (j) and 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" (j). These programs would be applicable to the operational aspects of this proposed project. The refinery uses a Positive Material Identification (PMI) program to ensure the integrity of all mechanical and pressurized systems. This program is overseen by the refinery's Inspection Supervisor.

Any new feedstock coming to the refinery undergoes a complete Management of Change (MOC) analysis to ensure that all hazards, as well as the refinery's systems are safe and operable. The MOC program is part of the refinery's Process Safety Management program and tracks equipment modification, addition of new systems and process changes. MOC covers all changes that involve specific chemicals at or above threshold limits as defined in California Code of Regulation, Section 5189, Appendix A or flammable liquids or gasses as defined by California Code of Regulations, Section 5194(c) including new construction, modifications, changes in chemicals or materials, changes in feedstock, and changes in concentrations, temperatures, pressures, or flow rates outside of established Safe Process Limits.

The refinery is also covered by the California Accidental Release Prevention (CalARP) program, which is designed to prevent accidental releases potentially harming the public and the environment and to satisfy community right-to-know laws. Phillips 66 has prepared the required Risk Management Plan (RMP) to analyze the potential for accidents and development of operating procedures, training and maintenance requirements, compliance audits and incident investigation. The refinery additionally has an approved Spill Prevention, Control and Countermeasure Plan (SPCC).

2.3.11 Support Buildings

The unloading facility would include a small parking area and restroom facilities. Both men's and women's restroom facilities would be served by potable water and a septic system for wastewater disposal. Figure 2-6 shows the location of the support buildings. All septic system components would be constructed in accordance with applicable State and County regulations and State Regional Water Quality Control Board standards.

2.4 Construction Activities

Construction would require contractor mobilization, construction site preparation, establishment of a staging and equipment laydown area (within existing refinery disturbed areas), clearing and grading, removal of the existing rail turnout, laying new track, and assembling the unloading facility and pipeline. The last stage of construction would include demobilization, soil stabilization, restoring vegetation, and removal and disposal of construction wastes (e.g., demolition materials, packaging, and other solid waste).

After contractor mobilization, the site would be prepared, the limits of disturbance would be clearly marked, and initial clearing and grubbing would occur within the construction area. The site would be graded and any remaining soil would be used for the emergency access road, revegetation, or other access road work in the project area.

If specified by Union Pacific, the existing rail turnout would be modified to accommodate the planned unit trains, including demolition/removal of approximately 1,300 feet of existing track and placement of a new turnout track and signal, if needed. This work would occur within the existing track corridor and would not require impacts outside the existing disturbed area.

The primary facilities, including the rail extension, unloading station and pipeline, would be constructed by Phillips 66 construction contractors. The number of construction workers would peak at approximately 150[4] during the construction of the pipeline, rail, and unloading area. Trucks would import construction materials and components (e.g., track segments, pipe), which would be stored on site in a laydown area. If feasible, some materials may be imported by rail, but this impact analysis considers a 'worst-case' scenario that the construction materials need to be delivered by truck. Track construction would include grading, soil compaction and stabilization, placement of sub-ballast and installation of rail, ties and ballast. Track ballast is used to form the rail track bed to allow drainage and to bear the weight of the rail cars. Delivery of construction materials would avoid peak traffic hours.

The unloading facility and system would be assembled adjacent to the completed tracks with connections to the refinery crude oil storage tanks, stormwater collection system, firewater system, and steam system.

2.4.1 Construction Schedule

The overall construction is anticipated to occur over a period of 9 – 10 months. In some cases, portions of the individual tasks below would occur concurrently. The anticipated construction schedule is listed below and is based on a hypothetical approval date in spring 2016:

- Demolition – July 2016 (1 month)
- Turnout track replacement (if needed) – July 2016 (1 month)
- Grading – September – November 2016 (4 months)
- Soil Transport – September – November 2016 (4 months)
- Construction of Rail – Mid November 2016 – Mid December 2016 (1 month)
- Construction of Pipeline – December 2016 – March 2017 (4 months)
- Construction Unloading Area – December 2016 – March 2017 (4 months)
- Commissioning/Turnover – April – May 2017 (2 months)

[4] The number of construction workers would vary depending on the construction activity and number of construction equipment required. Details on construction workers are provided in Appendix A (page A-30).

2.4.2 Construction Equipment

Construction equipment proposed for the construction of the facilities is listed in Table 2.3 below.

Table 2.3 Construction Equipment

Phase Name	Equipment Type	Equipment Number	Daily Usage (hours)	Horse Power	Load Factor
Demolition	Dump Truck	2	4	381	0.38
	Bulldozer	2	4	358	0.40
	Backhoe with Chipper	1	4	75	0.37
	Water Truck	1	4	381	0.38
Turnout Track Replacement	Bulldozer	3	8	358	0.40
	Tractor	4	8	75	0.37
Grading	Excavator	1	4	157	0.38
	Grader	2	4	162	0.41
	Dump Truck	4	4	381	0.38
	Bulldozer	2	4	358	0.40
	Scraper	2	4	356	0.48
	Water Truck	1	4	381	0.38
Soil Transport	Dump Truck	5	4	381	0.38
	Bulldozer	2	4	358	0.40
	Water Truck	1	4	381	0.38
Construction of Rail	Pile Driver	1	2	82	0.50
	Flatbed Truck	2	4	381	0.38
	Concrete Truck	1	4	381	0.38
	Water Truck	1	4	381	0.38
	Dump Truck	2	4	381	0.38
	Paver	1	5	89	0.42
	Compactor	1	2	8	0.29
	Bulldozer	1	4	358	0.40
	Backhoe	1	4	75	0.37
Construction of Pipeline	Cranes	1	3	208	0.29
	Flatbed Truck	3	6	381	0.38
	Paver	1	5	89	0.42
	Water Truck	1	4	381	0.38
	Compactor	1	2	8	0.29
	Backhoe (trench)	1	4	75	0.37
Construction of Unloading Area	Crane	1	7	208	0.29
	Forklift	3	8	149	0.20
	Generator Set	1	8	84	0.50
	Tractor	3	7	75	0.37
	Welder	1	8	46	0.30
Commissioning/ Turnover	None				

Source: Developed by MRS from Phillips 66 Land Use Application and Phillips 66 comments on Project Description.

2.4.3 Construction Vehicles

Equipment and materials would need to be transported to and from the site, as well as employee vehicles. Trucks would be used to deliver piping, railroad track, ties, and ballast as well as the equipment to be installed and the construction equipment. Peak daily trips are summarized in Table 2.4 below. Appendix A shows the details of the work and truck trip estimates (pages A-29 and A-30).

Table 2.4 Vehicle Trips, Peak Day, One-Way Trips

Phase Name	Worker Trip Number	Truck Trip Number	Total Trip Number
Demolition/Removal of Existing Track	16	36	52
Turnout Track Replacement	18	18	36
Grading	40	66	106
Unloading Area and Pipeline Construction	320	110	430
Construction of Rail	24	218	242
Commissioning	40	8	48

1. Peak vehicle trip estimates do not account for vehicle movements that are confined to the project site.
2. See Appendix A for details on Vehicle Trips.

Source: Developed by MRS from Phillips 66 Land Use Application and Phillips 66 comments on Project Description.

2.5 Operations

Project operations would include unloading of up to five trains per week, with an annual maximum number of trains expected to be approximately 250. Trains would arrive from different oilfields and/or crude oil loading points depending on market availability. Trains could arrive at the Phillips 66 site from the north or the south. The refinery feedstock definition (meaning the materials that could be transported by train into the proposed facility) excludes gaseous feeds, natural gas liquids (NGL), liquefied petroleum gas (LPG), finished refined products, and Bakken crude. The feedstock would be sourced from oilfields throughout North America based on market economics and other factors.

Crude oil would be shipped to the refinery in non-jacketed CPC-1232 tank cars (i.e., post October 1, 2011 tank cars). Appendix A provides the specification for the tanks cars (pages A-31 and A-32). These cars have a capacity of approximately 31,808 gallons per car. Each car has a weight limit of 210,700 pounds of crude oil. Each tank car would be approximately 60 feet long. The total length of a unit train would be about 5,190 feet long (three locomotives at 90 feet, two buffer cars at 60 feet, and 80 tank cars at 60 feet).

Phillips 66 proposes to use CPC-1232 tank cars. In August 2011, the AAR Tank Car Committee adopted new industry construction specifications for tank cars and the CPC-1232 design became the standard for all tank cars built after October 2011. The rail cars would be designed to meet DOT Packing Group I requirements, which is the highest rating. The tank cars would be equipped with half height head shields, double couplers, and all stainless steel valves. The relief valve would be designed for high flow.

In a unit train configuration, each train would consist of three locomotives, two buffer cars, and 80 railcars each carrying approximately 27,300 gallons for a total of about 52,000 barrels of crude oil per unit train. The tank cars would be limited to this range of volume due to the estimated weight of the oil that would be delivered to the SMR. With the delivery of five unit trains per week the average daily delivery of crude oil would be 37,142 barrels, which is less than the SLO Planning Department permitted capacity of 44,500 barrels per day.

Due to the weight of the train and the steep grade, an additional two locomotives would be required for the portion of the route between Santa Margarita, California and San Luis Obispo, California coming over the Cuesta Grade (a distance of approximately 15 miles).

In a manifest train configuration, varying number of railcars would be dropped off at SMR by a passing train. A dedicated locomotive would remain on-site to move cars. This would be a small locomotive that would only be capable of moving a few rail cars at a time, and would not be used for unloading of unit trains. In a manifest train configuration, a number of crude oil railcars would be dropped at the refinery and then the train would continue to other destinations. Rail cars delivered via manifest train would meet the same specifications as discussed above for the unit train tank cars. The refinery would have a dedicated locomotive that would be used to move the railcars from the manifest train while they are on site. This dedicated locomotive would only be used for manifest deliveries.

Because trains would arrive at different times throughout the week, the number of workers would vary depending on the number of trains and worker arrival and departure time would vary throughout the day and night. Additional employees over the current refinery employees would be required in order to unload and manage the trains, with the increase ranging as high as 12 additional employees at one time.

Consistent with current operations, the crude oil delivered by rail and pumped to the storage tanks at the refinery would be processed at the SMR and then the semi-refined products would be transported by pipeline to the Rodeo refinery in the Bay Area. No crude oil or refined product would be transported out of the refinery by rail except for any off-spec crude that is delivered by rail. No crude oil would be moved from the refinery via pipeline.

2.5.1 Train Routes to the Santa Maria Refinery

Trains would arrive from different oilfields and/or crude oil loading points depending on market availability. The exact location of the source of crude oil that would be delivered to the refinery is unknown and could change over time based upon market conditions and availability. Union Pacific Railroad (UPRR) would be responsible for delivering the trains to the SMR. The main UPRR train routes within the United States are shown in Figure 2-8. Trains could enter California from at least five different locations (one at the north end of the state from Oregon, two at the northeast from Nevada, one at the southeast from Nevada, and one at the south from Arizona). Depending upon the route taken by the train they could arrive at the Phillips 66 site from the north or the south.

It is unknown what route UPRR would use to deliver the trains to the SMR and it would likely vary based on the source location of the crude oil. However, there is certainty regarding the two segments of the route on the "Coast Line" that lead to the SMR from the north and from the south where there are no alternative routes. Coming from the north, the available routes merge south of San Jose. Coming from the south, the available routes merge north of Los Angeles.

Figure 2-8 Main UPRR Rail Routes in the United States

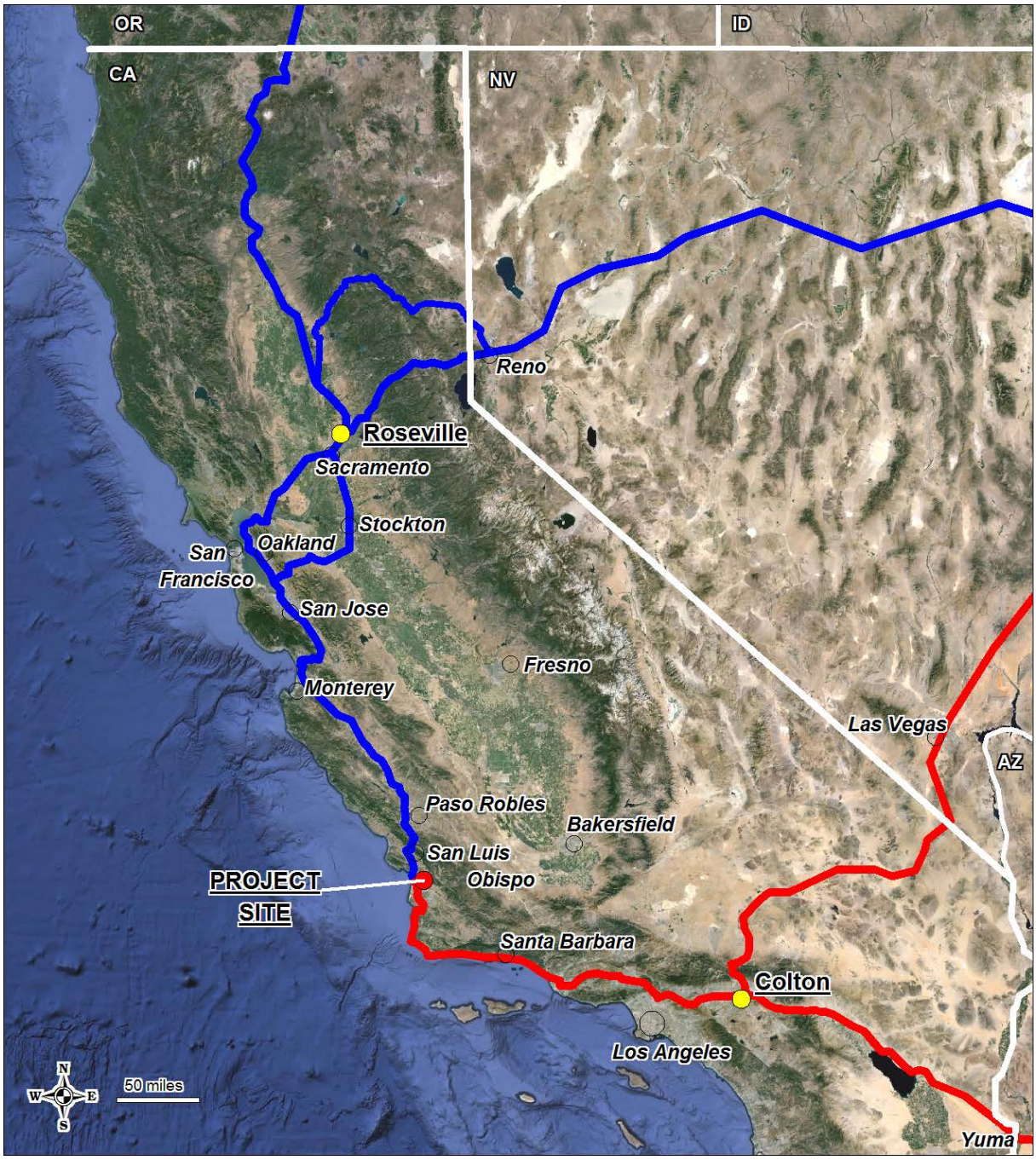
Source: UPRR website

For purposes of environmental review, this DEIR has assessed in detail the impacts from the nearest UPRR rail yards in Roseville and Colton to the SMR, though in both cases, this extends the review beyond those sections of track for which there is route certainty. Figure 2-9 shows the main UPRR train routes from the California State border to these two rail yards, and then on to the SMR. In addition, the DEIR has discussed, in less detail, the impacts of rail transportation beyond these two rail yards in the applicable issue areas.

Pursuant to the recent voluntary agreement between US railroads and the Department of Transportation, the Rail Corridor Risk Management System (RCRMS) will be utilized to determine the safest routes for trains with 20 or more cars of crude oil. The RCRMS is a

software tool that provides assistance to all Class I railroads in the routing of hazmat shipments to meet federal requirements. The RCRMS is the result of thorough analysis and prioritization of 27 risk factors identified by the Transportation Security Administration to be accounted for in all hazmat rail route planning. RCRMS undergoes modifications and updates based on continuing analysis of rail hazmat transportation data.

Figure 2-9 Mainline Rail Routes to the Santa Maria Refinery



Source: Adapted by MRS from UPRR maps.

2.5.2 Train Unloading Sequence

The tracks and unloading rack would be designed to allow for the safe and efficient movement of multiple trains and cars in and out of the facility while minimizing the required space. Figure 2-4 provides a line diagram of the track layout. The unloading sequence described below would be for a unit train (a train with three locomotives, two buffer cars, and 80 tanker cars). The sequence would be similar for rail cars delivered via a manifest train, but the number of railcars handled would be substantially less. The train arriving at the refinery would be assembled and delivered to the site by UPRR. The final configuration of the train would be determined by UPRR. Based upon discussions with Phillips 66 and UPRR, a possible unit train configuration would be two locomotives at the front of the train, followed by two buffer cars, 80 tanker cars, with the third locomotive at the end of the train. This is the train configuration that has been used in the EIR to evaluate the impacts of the unloading operations.

The rail spur has been designed to allow for unit trains to arrive at the refinery from the north or the south on UPRR's main line track. The trains would enter the existing refinery spur from the north after having pulled off onto the UPRR siding track. Once the unit train was at the refinery the unloading sequence would begin.

Once the train is on the refinery site, operation of the train would be turned over to Phillips 66 and it would follow the following typical sequence.

1. ***Position Train on Tracks 1 and 2 –*** The train would pull into the facility down Track 2, which has one of the two unloading racks (unloading rack #2). The 80th tanker car would be positioned at the first rail car unloading line. This would position the last ten tanker cars at unloading Rack #2. The third engine, which would be at the back of the train, would be decoupled and would move to the end of Track 764 and shutdown. The train would be uncoupled between tanker car 40 and 41. The two engines at the front of the train would pull the remaining section of the train past the intersection of Tracks 1 and 2 in an easterly direction. At this time two locomotives would be positioned on the Tail Track. The train would then be pushed up Track 1 till the 40th car is positioned at the front loading line of unloading Rack #1. The engines would then decouple from the train and then move back down to the Tail Track and then move back up Track 4, which is the runaround track, to the area nearest the refinery. The engines would be decoupled and one engine would move on to Track 2, one engine would move on to Track 1. These two engines would be used in the unloading operations as discussed below.

2. ***Train Unloading –*** Unloading would occur at two racks, and each rack would be capable of unloading 10 cars. At each rack the first unloading would be connected to the first car and the pump started. Then the second unloading line would be connected and the pump started. This process would continue till all 10 cars on each rack were unloaded. After each car is unloaded, the unloading line would be disconnected. It is estimated that it would take about two hours to unload a set of 20 cars (10 at each of the two racks) including moving, switching and decoupling. Once the first set of ten tanker cars at each unloading rack is unloaded, one of the engines would pull the train forward (in a westerly direction) by 10 cars, thereby lining up the next ten tanker cars for unloading. The empty tanker cars would be moved to Track 5, the empty car holding track. This process would repeat three times until

all forty tanker cars had been unloaded at each of the two unloading racks. Once all of the unloading was completed, and the empty cars would be located on Track 5, the two remaining buffer cars would be moved from Track 1 to Track 5 and placed at the front of the empty cars. Finally, the train would be reassembled on Track 5 and made ready for departure from the refinery. The moving of the tanker cars at each unloading rack would be done by one locomotive. The unloading of a unit train is expected to take approximately eight hours, which includes the unloading, switching and repositioning activities.

3. ***Third Locomotive* –** The third locomotive is not needed for the unloading operations. This locomotive would be at the end of the train when it arrives at the refinery. This locomotive would be disconnected from the back of the train and moved to the end of Track 764. This locomotive would shut down until the empty car train is ready to leave the refinery.

4. ***Idle Time Prior to Departure* –** Once the unloading operations are complete, the two locomotives that were used for the unloading operations would connect to front of the empty car train located on Track 5. These two locomotives would idle until the train left the refinery. During this period the rail car brakes would be pumped up with compressed air. In addition, UPRR would inspect the train to ensure all the cars are connected properly and the brakes are correctly pumped up. The idle time would depend upon how long the train had to wait until the UPRR scheduled departure. Based upon an 11.5 hour turnaround, it would be about 1.4 hours.

5. ***Train Departure* –** Just prior to departure, the third locomotive on Track 764 would connect to the back of the train. The empty train would leave the refinery and head back on to the UPRR mainline track. It is anticipated that each train would be at the refinery for about 10 to 12 hours.

Table 2.5 provides a summary of the train operations and the estimated times associated with each operation listed above. The total time a train would be at the refinery would be approximately 10 to 12 hours, of which about eight hours would be needed for unloading, switching and repositioning activities.

Locomotive refueling for the unit trains would not need to be conducted at the refinery since the main line engines would be used to handle the cars while at the refinery. UPRR would ensure the main line engines were adequately fueled prior to arrival on site. However, refueling of the dedicated locomotive that would be used with manifest trains would need to occur on site. Diesel fuel for the onsite locomotive would be delivered to the refinery by tanker truck. The fuel would be pumped from the tanker truck directly to the locomotive. The amount of refueling needed would depend upon the frequency of delivery of manifest railcars. The maximum refueling would be one tanker truck per week. Each tanker truck would carry about 4,000 gallons of diesel fuel.

Table 2.5 Timing for Train Unloading Operations

Task	Locomotive #	Locomotive Mode (Minutes)				Total (hrs)	Comments
		Switching	Idle	Off	Total		
Position Train on Track 1 and 2	1	75	25	0	100	1.7	It would take about 1.7 hours to position the tanker cars on track 1 and 2. During this time each locomotive would have varying amounts of switching and idling time depending upon the activity that is occurring. Both locomotives would be in switching mode when moving the tanker cars. When only the locomotives are moving one would be in switching mode, and the other would be in idle mode. This task covers the time it would take to pull the train down Track 2 and line up the 80th car with the first unloading line, disconnect the train between cars 40 and 41, pull the train east down the track and then push the first 40 tanker cars back up Track 1 west so that the 40th car is lined up with the first unloading line on Track 1. The two locomotives would then disconnect from the tank cars and move onto Track 4 (runaround track) back to the end nearest the refinery where they would be used for the unloading operations.
	2	41	59	0	100	1.7	
Unloading	1 and 2	70	410	0	480	8.0	Each unloading rack is designed to unload 10 tanker cars at a time. Four unloading operations would occur at each unloading rack per train (10 tanker cars/rack x 2 unloading racks x 4 unloading operations = 80 tanker cars). Each unloading operation would include about 45 minutes to connect/disconnect the unloading lines to the tanker car and 70 minutes to unload the rail cars. This would give a total of 460 minutes of unloading time per train. There would be 70 minutes of switching time per locomotive during the unloading operations. This switching time is needed to move the tanker cars from the unloading tracks to the empty car track and rebuild the empty train. The total time for unloading operations including switching of tanker cars and rebuilding the empty train would be about 480 minutes (8 hours).
Third Locomotive	3	32	65	584	680	11.3	The third locomotive, which would be at the back of the train, would be disconnected from the train upon arrival at Track 2. The locomotive would then move to the end of Track 764. Once in this position, the locomotive would be shut down until the train is ready to depart the refinery. On cold days the engine may automatically idle for short periods of time to keep the engine warm. It has been assumed that the engine would idle 10% of the time it is at the end of Track 764 during all days.
Idle Time Prior to Departure	1 and 2	0	83	0	83	1.4	This is the time between completing the unloading operations and waiting for the train to depart the refinery. This would include about 20 minutes

Table 2.5 Timing for Train Unloading Operations

Task	Locomotive #	Locomotive Mode (Minutes)				Total (hrs)	Comments
		Switching	Idle	Off	Total		
							for pump up of the rail car brakes and about 60 minutes for UPRR to inspect the train prior to departure.
Train Departure	1, 2, and 3	27	0	0	27	0.4	Just prior to departure, the third locomotive on Track 764 would also connect to the train. The train would depart the refinery on to the mainline UPRR track.
Total		172	518	0	690	11.5	A unit train would be at the refinery site for about 11.5 hours. This includes the arrival and departure time. There would be about 19.2 total locomotive-hours of idle on-site, 5.8 total locomotive-hours of switching, and 9.5 locomotive hour of off time. This is a total of 34.5 locomotive-hours of operation (3 locomotives x 11.5 hours = 34.5 locomotive-hours of operation). It is expected that the turnaround for a train at the refinery would be between 10 and 12 hours.

Notes:

1. Assumes a total time that train is at the site is 11.5 hours.
2. Assumes two locomotives are used for switching. One locomotive for each of the unloading racks.
3. Assumes the two locomotives used for the unloading operations are idling when not actively switching rail cars.
4. The unloading times are per rack and assume that the two racks are used simultaneously to unload rail cars.
5. Assumes a switching speed of 3 miles per hour.
6. Assumes the third locomotive idles 10% of the time and is shutdown 90% of the time when at the end of track 764. This is an approximation and could vary depending upon the season.
7. The hours for the "third locomotive engine" occur concurrently with the other operations, so are not counted in the total time.
8. The hours for the second locomotive during the positioning operation occur concurrently with the first locomotive so they are not counted in the total time.
9. Train departure times end when tail end of the train leaves the SMR. During the majority of this departure time the locomotives at the head of the train would be on the UPRR mainline tracks.
10. Train arrival times start when the locomotives at the head of the train enters the SMR. During the majority of the arrival time the locomotive at the tail of the train would be on the UPRR mainline tracks.

See Appendix A for detailed timing calculations (pages A.1-33 and A.1-34.

Source: Data developed by MRS with input from Applicant and their rail consultants.

2.5.3 Control Systems

Control of the unloading rack and appurtenances would be Programmable Logic Controller (PLC) based. All local pumps, valves and instrumentation would be controlled and or monitored by a new PLC. This PLC would have a local HMI screen, dual redundant processors, power supplies and ethernet fiber ports for communication to the remote control center.

The PLC would be configured to communicate with the Refinery Distributed Control System (DCS) to receive crude oil tank level signals and for the refinery control center to monitor operations and alarms from the unloading rack. Within the local PLC, pump operation and control, air compressor operation and control, meter and prover control would be monitored.

The PLC would communicate with the Refinery DCS system for Alarm display and monitoring functions. A single mode fiber-optic cable would be used to communicate with the DCS system via an Ethernet IP (or Modbus TCP) protocol. Additional Fibers would be used for Switchgear communication with the Main Substation for SCADA.

The PLC and HMI for the Unloading Rack would be located in the Electrical & Control Power Distribution Center (PDC) building. The location of this facility is shown in Figure 2-6. This area of the building would be partitioned from the Electrical area by a wall for isolation from high voltage electrical magnetic force. There would be a UPS complete with batteries and external Maintenance Bypass located nearby to power the PLC.

2.5.4 Rail Car Unloading Utility Requirements

The rail spur operations would utilize electricity to operate pumps and unloading equipment, which would be received from the SMR electrical generation systems and/or the grid. Electrical demand for the additional equipment and operations would average 900 kW. The peak power consumption would be about 1,000 kW.

It is anticipated that on occasion a train would arrive requiring heat to facilitate unloading. This could occur for example if weather forced an extended delay in a cold climate on the way to the SMR. Phillips has indicated that once per year steam could be necessary to heat the rail cars prior to unloading. Steam would be diverted from the existing refinery boilers to heat the rail cars. This steam is normally used to generate electricity for the refinery. Phillips 66 would divert approximately 30,000 lbs/hr of steam for 21 hours from electrical production (an existing process and set of hardware) to warm the rail cars. Phillips 66 would have to buy approximately 5 MW/hr (the amount of electricity which the steam would normally generate) of power for the 21 hours the steam is being used to heat the rail cars.

On an annual basis, SMR produces about 43,800 megawatt-hours (MWH) and purchases from the grid about 23,718 MWH for a total of 67,518 MWH. The additional electrical purchases during rail car heating would be 105 MWH which is an approximately 0.4% increase in purchased power for the year.

The rail unloading operations would not use any natural gas or refinery gas other than the refinery gas that is used to generate the steam discussed above.

2.5.5 Current Rail Car Operations

Currently, the rail operations at the SMR consist of the export of petroleum coke for commercial use throughout the U.S. and abroad. A train typically arrives every Wednesday and drops off 18 to 20 empty cars. After delivering the empty cars, the engine picks up any full cars and leaves the SMR. This operation typically takes a few hours. Each full car hauls approximately 100 tons of coke. The delivered empty cars are filled with coke during the following week and moved around on site by the 'Shuttlewagon.' The Shuttlewagon, also referred to as a 'switching locomotive' is a small unit compared to an actual train locomotive. The Shuttlewagon operates less than two hours per week. Fuel consumption is typically less than five gallons of diesel per week.

2.6 Crude Oil Changes from Rail Spur Project

The SMR is designed to handle heavy sour crude. SMR partially refines the crude oil to extract intermediates and gases, and uses the heavier crude oil components to produce petroleum coke. The SMR refinery is not designed to handle light sweet crudes such as Bakken, and is not designed to produce finish grade petroleum products such as gasoline, diesel fuel, jet fuel, etc.

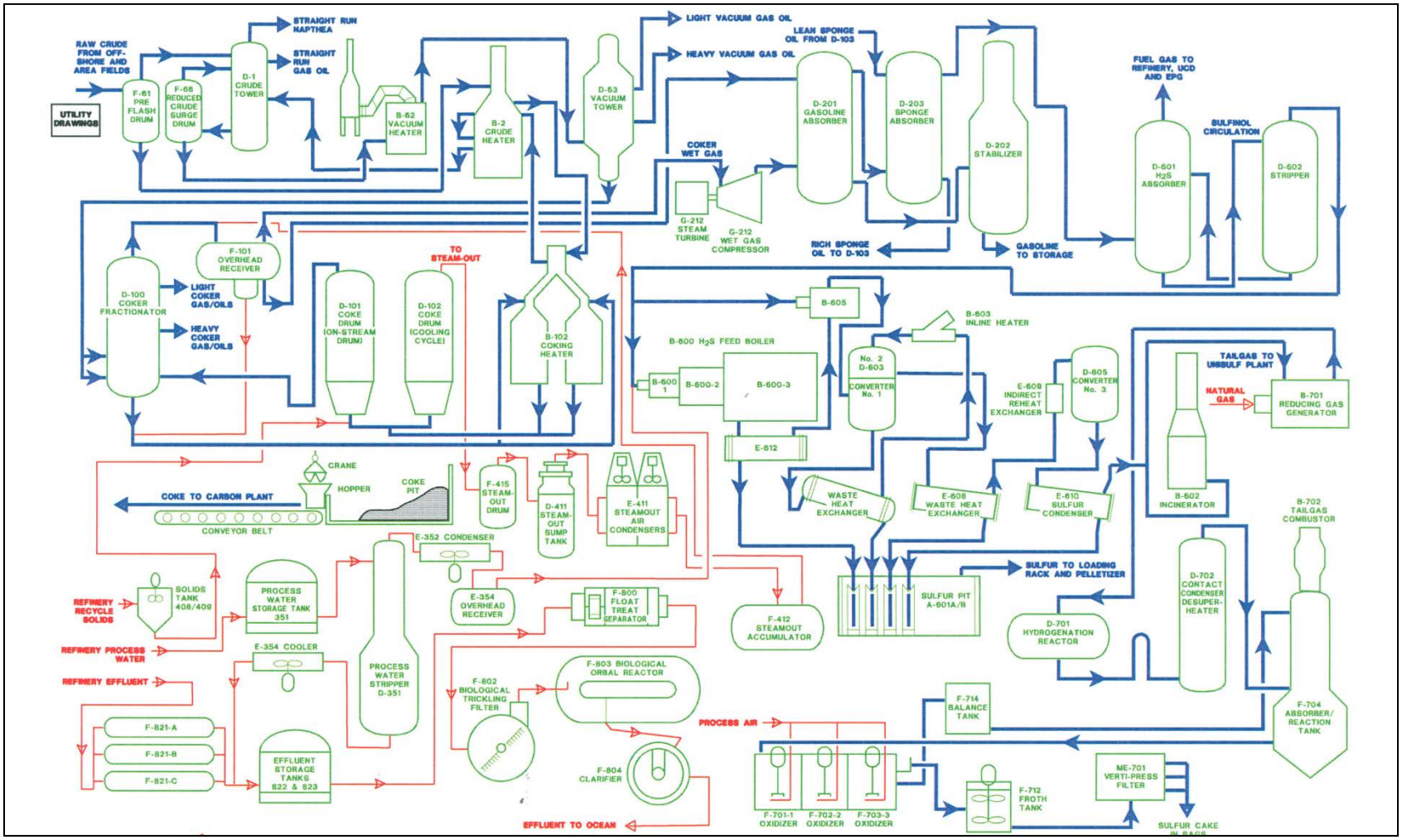
Figure 2-10 provides a simplified flow diagram of the SMR. Crude entering the refinery is first processed through an atmospheric distillation unit, which produces gas oil, pressure distillate (naphtha), and some fuel gas. The majority of the propane/butane contained in the crude oils processed at the SMR ends up in the refinery fuel gas. As shown in Table 2.6 below, the amount of liquefied petroleum gases (LPG-propane and butane) in the expected crudes that would be delivered by rail are similar to what is currently being processed at the refinery.

The remaining oil is sent to a vacuum distillation unit where additional gas oil is extracted. Residual oil is finally delivered to the coking unit where thermal decomposition makes it into green coke, gas oils, and fuel gas. Green coke produced by the coking units is sold.

Gases produced at the refinery are processed in a sulfur removal system and then used as fuel at the refinery. Sulfur removed from the gas is converted to elemental sulfur and sold. Gas oil and naphtha recovered as part of the distillation and coking processes are shipped by pipeline to the Phillips Rodeo Refinery in the San Francisco Bay area for processing into gasoline, diesel fuel, and other petroleum end-use products.

Prior to pipeline shipment to the Rodeo Refinery the naphtha and gas oils are stored in tanks located at the SMR. The naphtha and gas oils are shipped via a common carrier pipeline system to the Rodeo Refinery located in the Bay Area. The pipeline system goes from the SMR through the San Joaquin Valley on to the Bay Area. During transit, the naphtha and gas oils can be routed into storage tanks in the San Joaquin Valley.

Figure 2-10 SMR Block Flow Diagram



Source: Conoco Phillips Increase Throughput EIR, 2012.

The SMR currently receives all crude oil for processing by pipeline coming from various sources, including the Outer Continental Shelf (60-85%), Price Canyon/Santa Maria Valley/San Joaquin Valley (5-20%), San Ardo (5-10%) and Canada (2-7%). Crude oil is stored in three tanks at the SMR. Table 2.6 provides a list of the existing storage tanks at the SMR and their capacities.

Table 2.6 Existing Oil Storage Tanks at SMR

Tank ID Number	Material Stored	Capacity (barrels)
1	diesel #2	504
100	recovered oil	10,195
101	recovered oil	10,195
115	gland oil	645
550	naphtha	55,940
551	naphtha	55,940
800	gas oil	81,250
801	gas oil	81,250
900	crude oil	98,144
901	crude oil	98,771
903	crude oil	98,771

Source: Data provided by Phillips 66.

The bulk of the crude oil processed at the SMR comes from offshore platforms in the Outer Continental Shelf of Santa Barbara County and from oil fields in the Santa Maria area.

In addition, to the material shipped to SMR directly by pipeline from the source, crude oil from some onshore areas, such as the Arroyo Grande (Price Canyon) oil field and the San Joaquin Valley is delivered by truck to the Santa Maria Pump Station and then pumped into a dedicated pipeline to the SMR. The SMR has been processing Canadian crude for about one year. The Canadian crude processed at the SMR has been Kearl Lake dilbit crude (i.e., diluted bitumen crude), which is a heavy, high sulfur crude mixed with a diluent, which is a less viscous hydrocarbon. Canadian crude has made up 2-7% of the crude processed at the SMR.

The Canadian crude is shipped via rail to a crude unloading facility near Bakersfield California and then is trucked to the Santa Maria Pump Station for delivery into the dedicated pipeline, which carries crude oil to the SMR.

Crude oil is classified by a number of different factors including weight, density, sulfur content, and volatility. Thin and volatile oils are characterized as “light,” whereas thick and viscous oils are “heavy.” The American Petroleum Institute (API) rates light oils with a gravity of 30 to 40 degrees, which means the density is much less than that of water, and therefore these oils float on water. In contrast, some heavy oils with an API gravity of less than 12 degrees are so dense that they sink in water. Sour crude are ones that have high sulfur content.

The characteristic properties as reported in literature or otherwise of interest of the typical crude blend and range of major crudes processed at the SMR are provided in Table 2.7.

Table 2.7 Properties of Current and Potential Future Crude Oils at the Santa Maria Refinery

Property	Unit of Measure	Current SMR Operations		Potential Crude by Rail Sources	
		Typical Crude Blend	Range of Major Crude Sources	Access Western Blend	Peace River Heavy
API Gravity	°API	18.6	12.2-21.0	22.8	20.4
BTEX Percentage	Volume %	0.81	0.8-0.89	1.25	0.99
LPG Percentage	Volume %	0.9	0-1.0	0.73	0.89
Sulfur Concentration	Weight %	4.2	2.1-5.2	4.0	5.0
Vanadium Concentration	wppm	208	41-400	190	167
Nickel Concentration	wppm	85	71-118	73	56
Total Acid Number (TAN)	mgKOH/g	1.0	0.4-4.0	1.7	2.5

1. Typical blend properties based upon 3-year average.
2. Range of major crudes represent the major sources of current crudes to the refinery and include a number of OCS and local onshore sources.
3. Both potential crudes by rail are Canadian tar sand dilbits.

Source: Data provided by Phillips 66, 2014 and from http://www.crudemonitor.ca/home.php

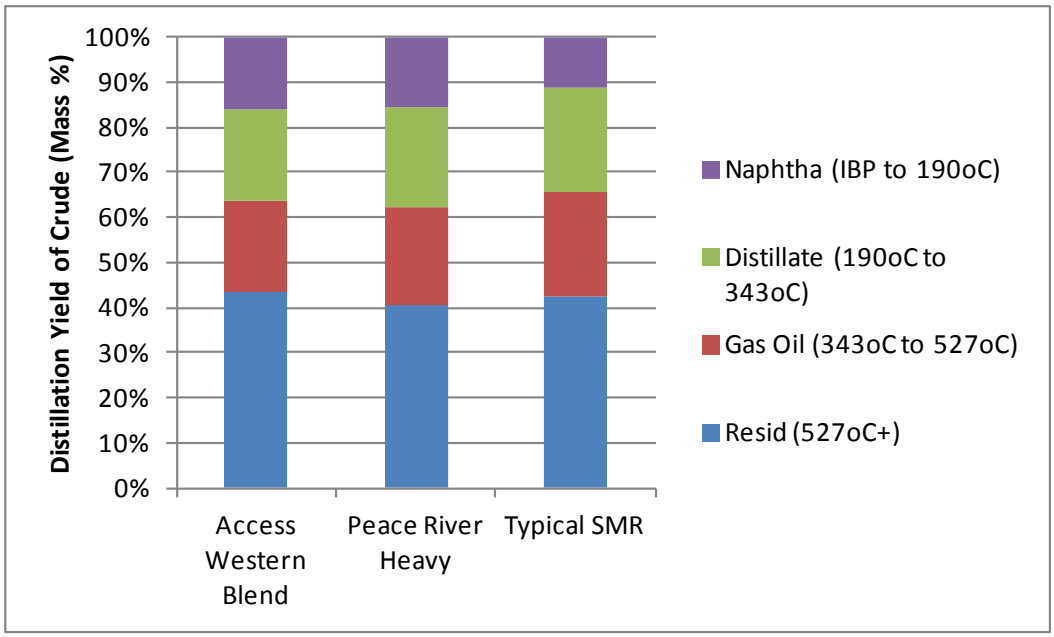
The SMR, as with all refineries, is similar to other manufacturing facilities that regularly evaluate their principal manufacturing feedstocks in terms of availability, suitability, and economics. This is certainly true of the crude oil feedstock used at the SMR. As described above, the refinery processes a range of crude oils from different sources, and the crudes vary from time to time. In addition, the refinery often blends crudes from multiple sources prior to processing. As the data in Table 2.7 shows, the SMR historically has processed and currently processes primarily heavy, sour crudes, although these are sometimes blended with other lighter, sweeter crudes in small amounts.

Phillips 66 expects to continue to receive, blend and process a comparable range of crudes in the future, and will select future crudes to be delivered by rail based upon a number of factors including availability, suitability, and economics. Table 2.7 provides the characteristic properties of two future crudes that could be delivered to the refinery by rail. Given the design of the refinery, unit trains would have to deliver heavy crudes that are similar to what is currently being processed at the SMR. The data in Table 2.7 shows that the potential crudes delivered to the refinery by rail are comparable to those currently or recently processed at the SMR.

As stated above, it is not possible to predict precisely which crude oils will be delivered to the SMR via rail. One of the objectives of the project is to provide greater access to the larger crude oil market, and the specific crudes received by rail would likely vary from time to time as has been the case for the current refinery crude slate. However, the crude oil types shown in Table 2.7 provide a reasonable representation of the range of crude oil types that could be processed based on the design limits of the refinery, current economics, and crude oil availability.

The two crudes listed in Table 2.7 as representative of crude oil that could be delivered by rail are both Canadian tar sand dilbits. Dilbit is Canadian tar sands oil, also known as bitumen, which is mixed with lighter petroleum liquid known as diluent to form a crude oil that can be shipped via pipeline, rail or truck. The diluent is typically composed of hydrocarbons in the naphtha and distillate range. Figure 2-11 shows a breakdown of the hydrocarbon distribution as a function of boiling point of the two Canadian crudes and the typical SMR crude blend.

Figure 2-11 Hydrocarbon Components of Crude Oils as a Function of Boiling Point



Canadian Crudes base upon historical averages (all samples since July 2007).
IBP-Initial Boiling Point
Sources:
http://www.crudemonitor.ca/dist.php?units=c&temp=527&submit=-%3E&recov=33.63&acr=PH&time=hist
http://www.crudemonitor.ca/dist.php?acr=AWB&time=hist
Phillips 66-Average values for 2014 and part of 2015.

As shown in Figure 2-11 the relative hydrocarbon components of the two dilbit crudes are very similar to the current SMR blend crude. While the dilbit crudes have a slightly higher naphtha component, they have a slightly smaller distillate and gas oil component. The resid component for all three is essentially the same. The diluent that is mixed with the Canadian tar sands oil would be processed in the SMR with the naphtha/distillate and gas oils being shipped via pipeline to the Rodeo Refinery consistent with the current refinery practices.

The Rail Spur Project is not predicated on any single crude, but is designed to handle a variety of crude oils that can be generically described as heavy, sour crudes. “Heavy” crudes are generally considered to be those with API gravity of approximately 20 or less. “Sour” crudes are generally considered to be those with sulfur content greater than 1.0%.

The Rail Spur Project will bring crude oils to SMR that are comparable to those historically processed at the facility, particularly with respect to sulfur concentration, metals concentration, and volume percent of crude oil fraction that is processed at the coker.

Additionally, to ensure that the operational, safety, and environmental parameters are consistently maintained at the refinery, all new feedstocks must be assessed and approved through the site’s formal Management of Feedstock Change Process, which is a requirement of the CalOSHA Process Safety Management regulations. The Management of Feedstock change is done prior to the initial receipt of any new crude source to the refinery. The purpose of

Management of Feedstock Change is to establish the chemical, physical, and operating process requirements for any feedstock changes. The primary purpose of this process is to:

1. Determine the potential impact of new feedstock on the mechanical integrity / limits of the processing equipment in order to ensure compatibility.
2. Develop a plan to monitor system integrity during the change.
3. Determine what changes to the inspection program may be required.
4. Identify any potential adverse impacts to overall refinery operations, including environmental conditions and / or product quality.

Management of Feedstock Change is required whenever a new crude source is being considered for the refinery. No new crude sources can be delivered to the refinery until the management of change process is complete and been approved by the refinery management.

The focus of the management of change process is to assure that the mechanical integrity of equipment is maintained, preventing operational upsets, and prevent adverse impacts to the environment. If the crude oil being vetted through the site's management of feedstock change process passes all of the quality, safety, and environmental assessments, and it receives all subsequent approvals by management, only then can it be processed at the facility. The feedstock cannot be introduced into the facility until final approval from the Facility Manager has been received.

2.7 Rail Spur Project Effect on Refinery Throughput

The SMR currently processes less than their allowable permit levels. The SLOCAPCD permit limits are 48,000 barrels per day (bpd) and a 12-month rolling average of crude throughput of 16,220,660 barrels per year (bpy). The County Department of Planning and Building permit limit is 44,500 bpd maximum. These were the permit limits for the refinery at the time the Notice of Preparation for the Rail Spur Project was issued.

In 2009, Phillips 66 applied to change the Land Use Permit daily limit by 10% to 48,950 bpd (the Throughput Increase Project). This was done to align the Land Use Permit limit with the APCD permit limit. An EIR was competed assuming a throughput of 48,950 bpd for 365 days which equates to 17,866,750 barrels. In March 2015, after completion of all conditions of approval, Phillips 66 received final notice to proceed from County Planning to implement the new throughput limit.

The refinery consists of two identical crude distillation processes, Coker A and Coker B. The design rate for each Coker Unit is approximately 24,000 bbls/day of crude. Operating each unit at capacity has a combined refinery throughput of approximately 48,000 bpd. The new Land Use Permit limit of 48,950 bpd provides flexibility to operate both coker units at their design rate, simultaneously.

The permitted limits for the refinery are not changing with the proposed SMR rail project. The ability of the SMR to operate at the maximum approved throughput level is based on the existing

infrastructure, equipment size and capacity. It is not dependent on, or related to, the Rail Spur Project.

Table 2.8 lists historical annual crude oil throughputs.

Table 2.8 Historical Crude Oil Production

Year	Throughput (bpy)	Average (bpd)
2003	13,813,748	37,851
2004	14,352,098	39,326
2005	15,489,149	42,442
2006	14,290,448	39,157
2007	15,810,183	43,321
2008	15,249,521	41,665
2009	13,080,967	35,838
2010	13,724,829	37,785
2011	14,126,030	38,701
2012	13,724,829	37,602
2013	15,196,669	41,635

Source: Phillips 66

Phillips 66 states that the throughput increase was not proposed as a precursor to seeking approval of the Rail Spur Project. Crude oil received by rail and/or pipeline cannot exceed the throughput limits already established by San Luis Obispo County Department of Building and Planning and the APCD.

At the time of the throughput application (submitted by Phillips's predecessor-in-interest ConocoPhillips), the SLOAPCD's permit limited throughput to 48,000 bpd and 16,220,600 bpy, whereas the County's land use permit allowed 44,500 bpd. The throughput permit application made the two agency's permits consistent and, according to Phillips allowed the refinery to maintain an annual rolling average closer to its maximum permitted levels when having to compensate for refinery closures due to long-term maintenance and repairs.

As discussed in Section 2.6, the bulk of the crude oil processed at the SMR is delivered via pipeline from offshore platforms in the Outer Continental Shelf of Santa Barbara County, from oil fields in the Santa Maria area, and other onshore sources such as Price Canyon in SLO County. This pipeline system is currently the only way that the Phillips 66 refinery can receive crude oil. Crude oil can be trucked to the Santa Maria Pump Station and then placed into the pipeline for delivery to the refinery. Truck delivery to the Santa Maria Pump Station is limited to a permitted maximum of 819,000 gallons (26,000 bbls) per day by the Santa Barbara County APCD. Having only one pipeline system available for delivering crude oil to the refinery limits the refinery's ability to obtain crude oil from sources outside of the local area.

When the refinery was built it was owned by The Union Oil Company of California, and most of the local crude production was also owned by Union Oil, so the single pipeline system made sense as a method for delivering all of the crude oil to the refinery. However, Phillips 66 (the current refinery owner) does not produce any of the local crude oil and must purchase all of the crude oil for the refinery from a wide range of producers.

This change in relationship between the refinery and the producers, limits Phillips 66's ability to source competitively priced crude oil. With recent increases in North American crude oil production, an increased number of crude oil sources have become "advantaged". "Advantaged crudes" in general terms is a subjective phrase that primarily reflects a preference for crude oil inputs based on favorable supply, demand, and pricing factors that are subject to and impacted by a dynamic, complex, and at times, volatile crude oil market. "Advantaged crudes" typically have limited pipeline capacity from the production area to refinery destinations. Phillips 66 would like to benefit from these competitively priced crudes. In the short-term (three to five years), the availability of these competitively priced crudes would be the main driver for the SMR rail project.

In the short-term, depending upon the volume of crude oil received by rail, some of the oil delivered via pipeline or via truck to the Santa Maria Pump Station could be displaced. Any displaced crude oil would likely be sold to other refineries in the Los Angeles or Bay areas. The amount, location, and destination of any displaced oil would be driven by market forces. Given the dynamics of the crude oil market, it is speculative as to what if any local crude oil would be displaced, and what would happen to any oil if it were displaced.

In the long-term, the need for the SMR rail project could be driven by declines in local production of crude oil that can be delivered by pipeline. Production from offshore Santa Barbara County (OCS crude) has been in decline for a number of years. Oil production in Santa Barbara County (both onshore and offshore) peaked at about 188,000 barrels in 1995 (County of Santa Barbara Energy Division website) and currently production is around 61,000 barrels per day for both onshore and offshore oil fields (BOEM Pacific Region and Drilling Edge websites).

There are a number of onshore oil development projects in northern Santa Barbara County that are being proposed that if approved could replace some of this lost production. However, the success and amount of additional production from these projects is currently speculative.

2.8 Project Lifetime

The SMR rail project is expected to operate for the remaining life of the SMR, which could be another 20 or 30 years, if not longer. Decommissioning and abandonment of the Rail Spur facilities would require similar equipment and durations as the construction of the facilities, which are discussed in Chapter 4.0 of the EIR. Once all of the equipment was removed the area would be graded and then revegetated.

The remaining life of the refinery is dependent on crude oil supplies, prices and overall economics. At the end of the life of the SMR, the County of San Luis Obispo would undertake an environmental review of the decommissioning and abandonment of the entire refinery complex, including the rail spur.