Deepwater Port License Application for the

Texas Gulf Terminals Project

Volume II – Environmental Evaluation (Public)

Section 1:

Project Description, Purpose, and Need

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ACRONYMS AND ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
API	American Petroleum Institute
Applicant	Texas Gulf Terminals Inc.
ATBA	Area to be Avoided
bbl	barrel(s)
BOEM	Bureau of Ocean Energy Management
bpd	barrels per day
bph	barrels per hour
BSEE	Bureau of Safety and Environmental Enforcement
CAA	Clean Air Act
CALM	Catenary Anchor Leg Mooring
CCSC	Corpus Christi Ship Channel
CFR	Code of Federal Regulations
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DOI	U.S. Department of the Interior
DOT	Department of Transportation
DWP	deepwater port
DWPA	Deepwater Port Act of 1974, as amended
DWPL	Deepwater Port License
DWT	deadweight tonnage
E&I	Electrical & Instrumentation
EFH	Essential Fish Habitat
EIA	Energy Information Administration
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCC	Federal Communications Commission
ft.	feet
GIWW	Gulf Intracoastal Waterway
GOM	Gulf of Mexico
gpm	gallons per minute
GPS	Global Positioning System
HAZID	Hazard Identification
HAZOP	Hazard and Operability
HDD	Horizontal Directional Drilling
HHP	high holding power
hp	horsepower
HSSE	Health, Safety, Security, and Environemental
IMO	International Maritime Organization
LOOP	Louisiana Offshore Oil Port
m	meter
MARAD	Maritime Administration

MARPOL	The International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978
MHT	mean high tide
MMbpd	Million barrels per day
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Land Act of 1953
OSTF	onshore storage terminal facility
PHMSA	Pipeline and Hazardous Material Safety Administration
PLEM	Pipeline End Manifold
POCC	Port of Corpus Christi
Project	Texas Gulf Terminals Project
RHA	Rivers and Harbors Act
SPM	single point mooring
STS	Ship-to-ship
T&E	Threatened and endangered
U.S.	United States of America
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
VLCC	Very Large Crude Carrier
WOUS	Waters of the U.S.

1.0 PROJECT DESCRIPTION, PURPOSE, AND NEED

1.1 Project Purpose and Need

1.1.1 Project Objectives

The purpose of the proposed project is to provide a safe, efficient and cost-effective logistical solution for the export of crude oil to support the continued economic growth of the United States of America (U.S).

The natural gas and oil industry is a critical part of the U.S. economy. In 2015 these energy resources supported 10.3 million jobs and contributed more than $1.3 trillion to the U.S economy (API).

Based on the need for the proposed Project, as described in the following sections, and the alternatives analysis conducted for the Project (Volume II, Section 2), the applicant proposes to construct the Texas Gulf Terminals Project to allow for the loading of very large crude carriers (VLCCs) at the proposed deepwater port (DWP) via a single point mooring (SPM) buoy system. The applicant has identified critical Project objectives required for the fulfillment of the purpose and need of the proposed Project which will serve as the basis for consideration throughout the alternatives analysis process detailed in Section 2.0. The overall Project objectives have been defined as follows:

Environmental Objectives

- Minimizes impacts to waters of the U.S. (WOUS), including wetlands, and special aquatic resources
- Minimizes impacts to threatened and endangered (T&E) species and their associated habitats
- Minimizes impacts to cultural resources
- Minimizes impacts to navigation and navigation safety
- Minimizes impacts to commercial and recreational fisheries and essential fish habitat (EFH)
- Existing land use compatibility, availability, and suitable for the proposed Project
- Project location within proximity of existing and planned crude oil infrastructure, thereby reducing Project footprint and environmental impacts
- Project design that allows for the maximization of offsite fabrication in a controlled setting thereby minimizing offshore impact as a result of on-site construction activities

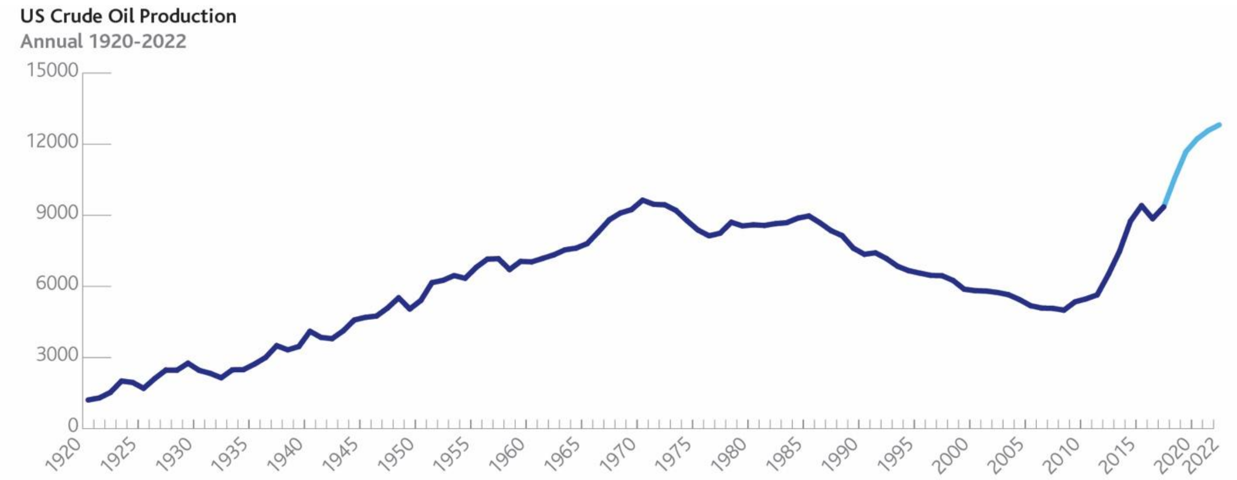
Project Objectives

- Provides a logistical solution for the safe, efficient, and cost-effective export of crude oil to support U.S. economic growth
- Minimizes any additional Health, Safety, Security, and Environmental (HSSE) impacts not listed in the Environmental Objectives
- Ability to safely, fully, and directly load a VLCC
- Ability of infrastructure to support loading rates of approximately 60,000 barrels per hour (bph) for the loading of approximately 8 VLCC's per month

1.1.2 U.S. Crude Oil Production

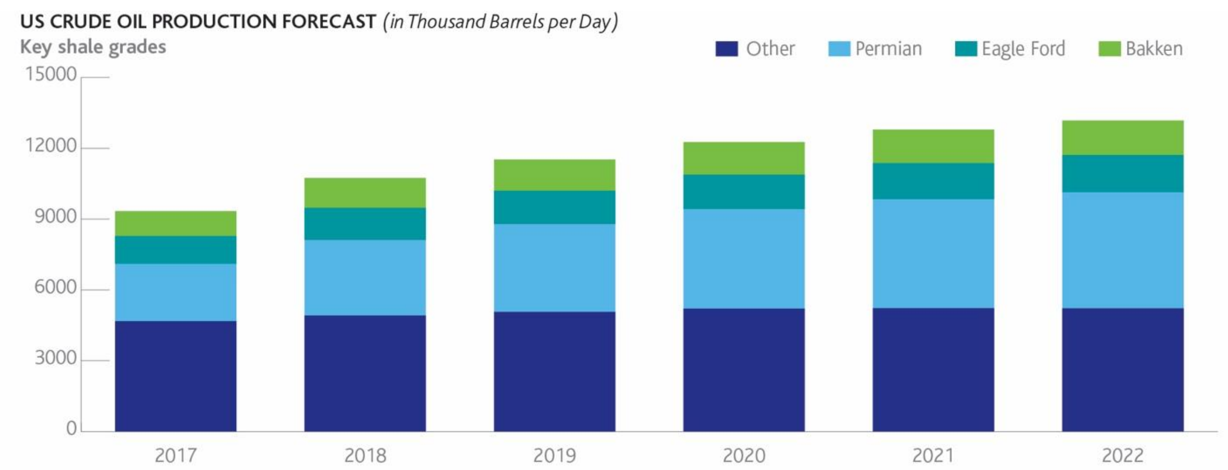
U.S. crude oil production is increasing.

The U.S. has been producing crude oil since the mid-1800s (Figure 1-1). In 2017, the U.S. produced over 9.4 million barrels per day (MMbpd) of crude oil. The Department of Energy expects production to continue to grow rapidly, averaging 10.8 MMbpd in 2018 and 11.8 MMbpd in 2019. Forecasts from Turner Mason & Company predict that U.S. crude oil production could surpass 13.0 MMbpd by 2022. The majority of the growth in U.S. crude oil production is in Texas (Permian and Eagle Ford Shales, Figure 1-2). The increase in U.S crude oil production can be classified as light, low sulfur crude oil. Light, low sulfur crude oil can typically be defined as greater than 25 API and 0.5wt% sulfur (Table 1-1).



Source: US Energy Information Administration, Turner Mason & Co.

Figure 1-1: U.S. Crude Oil Production 1920-2022



Source: Turner Mason & Company

Figure 1-2: U.S. Crude Oil Production Forecast

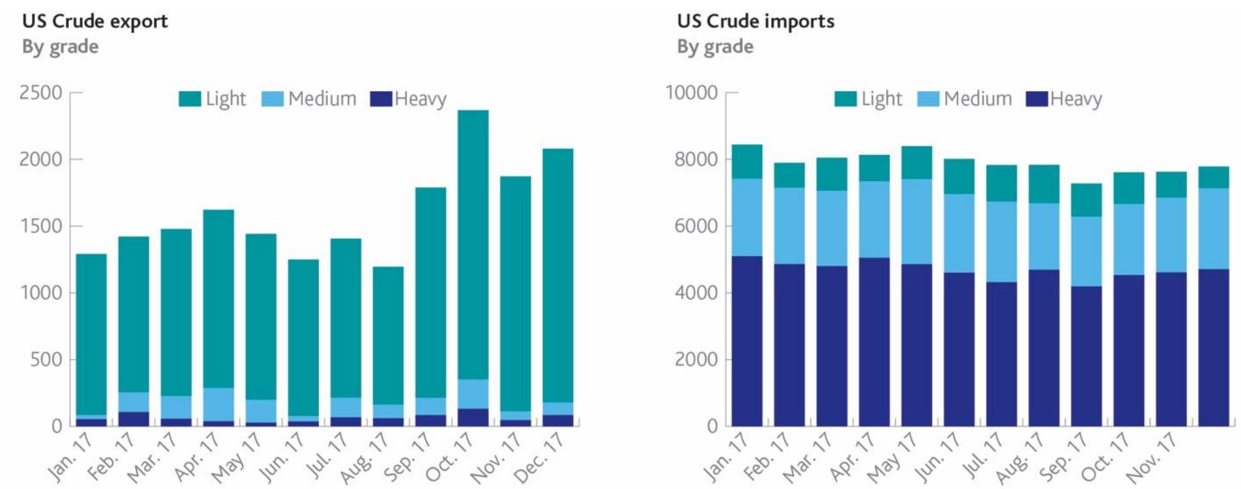
Table 1-1: U.S. Crude Oil Quality Vs Typical Import Quality

Crude	API	Sulfur (wt%)
Permian (WTI Midland)	44.0	0.34
Eagle Ford (Gen Grade)	47.0	0.08
Maya Heavy	21.5	3.40

1.1.3 U.S. Refinery Capability and Capacity Limitations

U.S. refineries are either not designed to process light, low sulfur crude oil, or are at maximum processing capacity. Surplus crude oil production will be exported.

Refineries are a complex series of processing units designed to convert a specific type of crude oil into refined products, such as gasoline and diesel. Existing U.S. refineries are either designed to process heavy, high sulfur crude oils or their ability to process light, low sulfur crude oil is currently at maximum capacity. The U.S. continues to import heavy, high sulfur crude oil to support its existing refining system. Tens of billions of dollars in infrastructure improvements would be required to allow U.S. refineries to process the incremental U.S. light, low sulfur crude oil. The incremental light, low sulfur crude oil produced in the U.S. will need to be exported to support U.S. economic growth (Figure 1-3).



Source: US Energy Information Administration

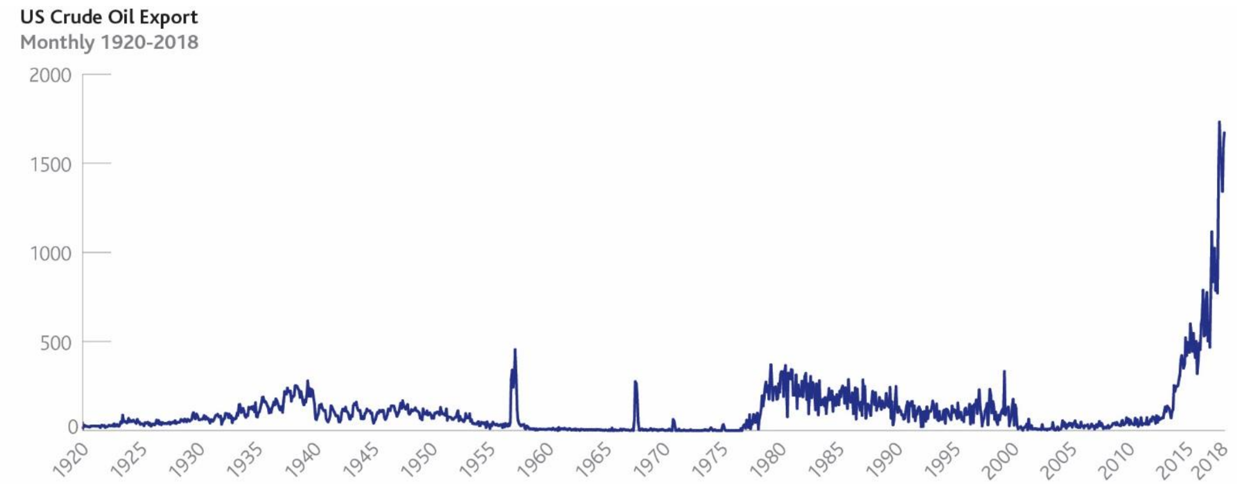
Figure 1-3: U.S. Crude Oil Imports and Exports by Quality

1.1.4 Global Demand of Crude Oil

Global demand for U.S. light, low sulfur crude oil is increasing.

The end of the U.S. crude oil export ban in 2015 allowed U.S. crude oil producers to market crude oil internationally. Instead of relying solely on U.S. refineries to process light, low sulfur crude oil, the crude oil can now be sold to foreign refineries thereby supporting U.S. crude oil production and U.S. economic growth.

Global demand for U.S. crude oil is increasing strongly (Figure 1-4). Investment in global refining capacity has been significant (Table 1-2). Energy Aspects estimates more than 3.0 million bpd of new refining capacity is coming onstream over the next 2 years, compared to 0.04 million bpd in the U.S.



Source: US Energy Information Administration

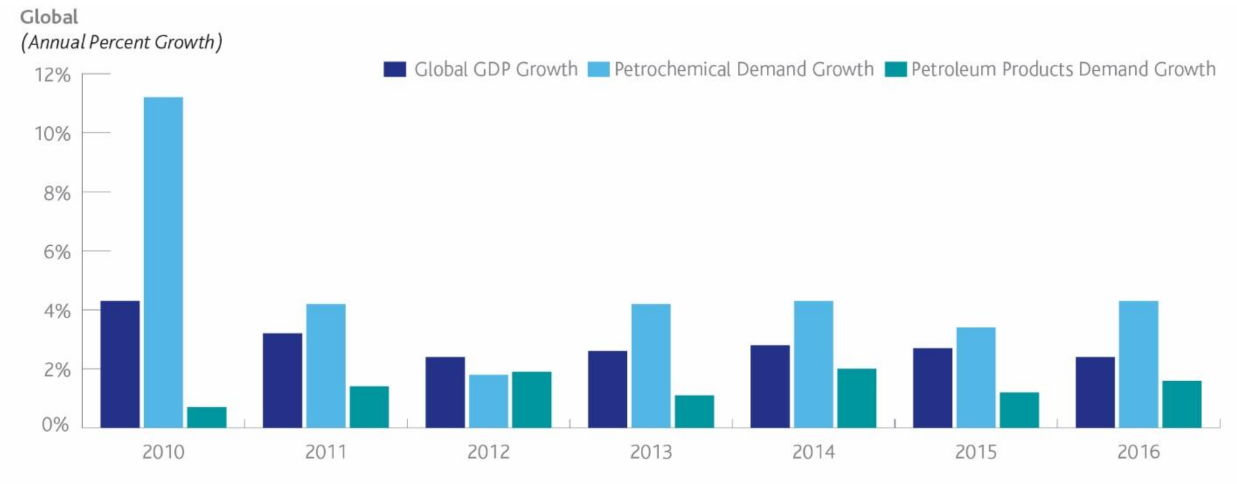
Figure 1-4: U.S. Crude Exports through 2018

Table 1-2: Global Refinery Additions

	2016	2017	2018	2019
(In thousand barrels per day)	140	100	20	40
North America	140	20	100	40
Rest of World	250	710	1,030	2,390
Total	**390**	**730**	**1,130**	**2,430**
North America	36%	3%	9%	2%

Source: Energy Aspects

Increasing worldwide petrochemical demand creates additional opportunities for U.S. crude oil exports. Light, low sulfur crude oil produces high naphtha yields which are feedstock for petrochemical plants and steam crackers. From 2010-2016, chemicals demand grew by 5%, versus 1.4% for global petrochemicals demand and 2.9% for global GDP (Figure 1-5).



Source being World Bank, IEA, and IHS Chemicals

Figure 1-5: Gross Domestic Production and Core Petrochemicals Demand Annual Growth Rate

New International Maritime Organization (IMO) regulations will incentivize refiners to run more, light, low-sulfur crude oil. In January of 2020, IMO will reduce the sulfur limit in bunker fuel from the current level of 3.5 weight percent (wt%) to 0.5wt%. The U.S. is one of the largest light, low sulfur crude oil producers and this crude oil is well suited to meet the new IMO 2020 sulfur specification. The demand for this light, low sulfur crude oil is therefore likely to rise

1.1.5 U.S. Export Logistics

Current U.S. export logistics are constrained.

A VLCC is one of the largest operating cargo vessels in the world carrying approximately 2,000,000 barrels. VLCC's measure approximately 1,540 feet (ft.) in length and 200 ft. in width (Figure 1-6). Given this significant scale advantage versus the rest of the tanker fleet, a VLCC is the most economical form of waterborne crude oil transportation used globally. However, this scale also means that VLCCs require draft depths of 71 ft., or greater when fully loaded. Draft depth is the minimum depth of the waterway required to allow a fully laden vessel to transport its cargo safely.

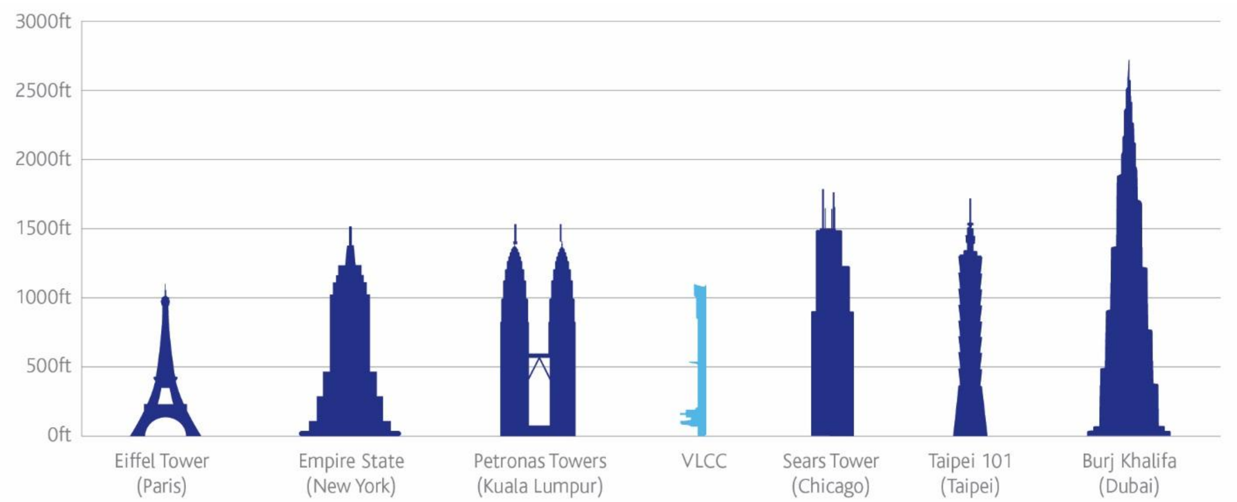


Figure 1-6: Comparison of VLCC and world's tallest buildings

Currently, U.S. inland ports cannot fully and directly load VLCCs because of two reasons:

- Limited depths within existing navigation channels. Currently, VLCC's cannot fully and directly load at any inland port in the U.S. due to draft restrictions in the ports (Table 1-3)
- Limited berthing capabilities associated with existing port infrastructures. Currently, limited inland U.S. docks can berth a VLCC due to its large size

Table 1-3: Existing Inland Gulf Coast Port Draft Restrictions

KEY GULF COAST PORT RESTRICTIONS		
Port Name	**Reported Max Port Draft (ft)**	**Estimated Draft Deficiency Vs Typical VLCC (ft)**
Brownsville	35.8	**36.2**
Corpus Christi	45.0	**27.0**
Matagorda	35.1	**36.9**
Freeport	42.0	**30.0**
Texas City	39.7	**32.3**
Houston	44.9	**27.1**
Sabine/Beaumont	40.0	**32.0**
New Orleans	46.9	**25.1**

Source: Bloomberg, Reuters Eikon, Port Authorities

Due to the draft and dock limitations, VLCC's are currently being loaded via ship-to-ship (STS) operations (Figure 1-6), also referred to as lightering and/or reverse lightering. STS operations involve the use of smaller vessel(s) requiring lesser draft depths to fully load a VLCC. The VLCC stays positioned in water depths of greater than 72 feet during the STS operation. The smaller vessels load at an inland port, transit to the VLCC, transfer their cargo to the VLCC via an STS operation and transit back to the inland port. This is repeated until the VLCC is fully loaded. As such, STS operations create several areas of HSSE concerns:

- Multiple loading operations at an inland port
- Multiple discharge operations at the VLCC
- Multiple navigations in and out of the inland ports
- Multiple emission sources
- Multiple exposures to the workforce to hazards

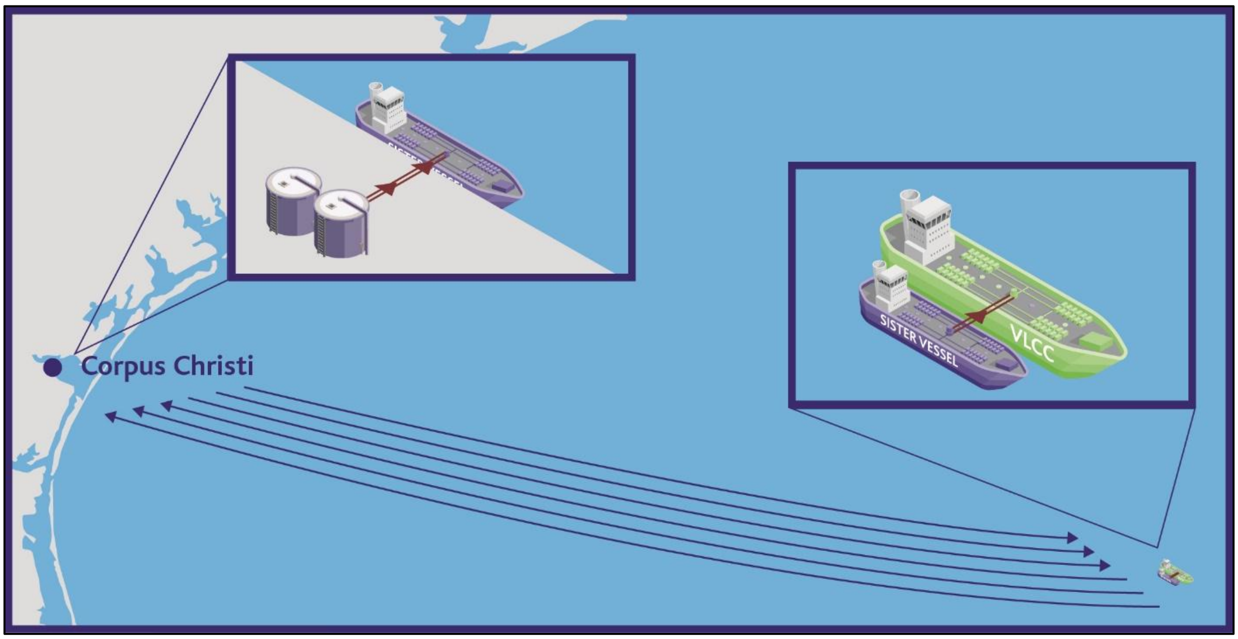


Figure 1-7: VLCC Loading via Ship-to-Ship Operations

1.1.6 Project Need Summary

- U.S. crude oil production is increasing.
- U.S. refineries are not designed to process the increased production. Surplus crude oil production will be exported.
- Global demand for U.S. light, low sulfur crude oil is increasing.
- Current U.S. export logistics are constrained.

1.1.7 Benefits of the Proposed Project

The Applicant proposes to construct the proposed Texas Gulf Terminals Project to allow for the loading of VLCCs at the proposed DWP, via a single point mooring (SPM) buoy system. The construction and operation of the proposed Project would fulfill the need for a safe, efficient, and cost-effective logistical solution for the export of crude oil from the U.S. to support the continued economic growth of the U.S. The proposed Project allows for the fulfillment of the purpose and need while meeting critical Project objectives. These Project objectives as shown in Section 1.1.1 serve as the basis for consideration throughout the alternatives analysis process detailed in Section 2.0.

1.2 Project Components

The operation of the proposed Project as described within this DWPL application requires the installation and operation of DWP, 26.81 miles of pipeline infrastructure, booster station, and onshore storage terminal facility (OSTF) to allow for the loading of vessels at the proposed DWP. The proposed Project components are described in three distinguishable segments based on locality including “offshore”, “inshore”, and “onshore”. Refer to Figure 1-8 for a Project Component Map detailing the locations of the onshore, inshore, and offshore components associated with the proposed Project.

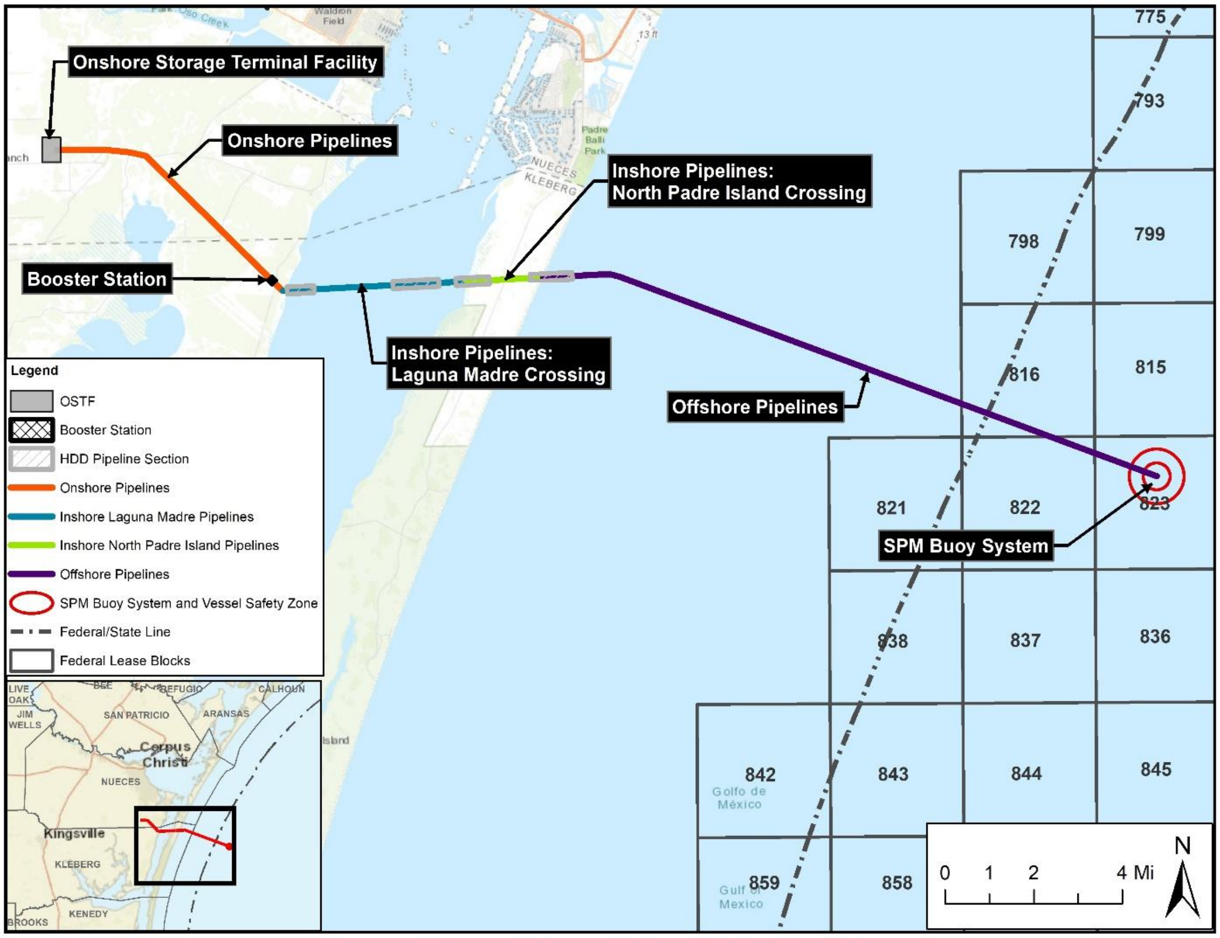


Figure 1-8: Project Component Overview Map

All Project components discussed within this DWPL application will be reviewed as a single complete Project. The Applicant is requesting authorization from MARAD under this application for offshore Project components, for which it has jurisdiction (i.e. Project components extending seaward of the mean high tide [MHT] line located at the interface of North Padre Island and the GOM). Additionally, the Applicant has also prepared and submitted a separate permit application to the U.S. Army Corps of Engineers (USACE) for the authorization under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA) for the proposed Project components, as necessary, for full authorization for the construction and operation of the proposed Project (a connected action). The following sections describe the components associated with the Project.

1.2.1 Proposed Onshore Project Components

The onshore Project components associated with the proposed Project are defined as those components landward side of the western Laguna Madre MHT line, located in Kleberg and Nueces Counties, Texas. Onshore Project components includes an approximate 150-acre OSTF, an 8.25-acre booster station, and approximately 6.36 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the OSTF to the booster station and continue to the landward side of the MHT line of the Laguna Madre. The following sections describe the proposed onshore Project components associated with the proposed Project.

1.2.1.1 Onshore Storage Terminal Facility

The OSTF consists of an approximate 150-acre facility located in Nueces County, Texas which will serve as the primary collection and storage terminal of crude oil to be directly pumped through the proposed pipeline infrastructure to the DWP. The proposed OSTF consist of twelve (12) 500,000 barrel (bbl) American Petroleum Institute (API) 650 carbon steel, cone roof crude oil storage tanks with internal carbon steel floating roofs and one 250,000 bbl API slop tank. The proposed slop tank and crude oil storage tanks located at the OSTF would be surrounded by secondary confinement levees. The primary administration and operations building to support operations at the DWP would be located at the OSTF. The proposed OSTF would consist of a pipeline metering skids, pipeline manifolds, vapor control unit, and a firewater tank and pump.

The OSTF will consist of four electrically powered motors (approximately 6,000 horse power each) in a series, electronically locked into operation as two pumping systems delivering approximately 12,000 horse power to each pipeline. The pumping systems located at the OSTF would be located within noise abatement housings to minimize noise during operations to the maximum extent practicable. The OSTF pumping systems would pump crude oil from the OSTF, to the booster station, to continue to the proposed DWP via the proposed pipeline infrastructure. Outbound flow rates from the OSTF are anticipated to be approximately 60,000 barrels per hour (bph).

Crude oil will be received at the OSTF through one or more incoming crude oil pipeline(s). The number, precise routing, ownership, extent to which destinations other than the OSTF will be served and other details relating to the incoming pipeline(s) are currently unknown. Accordingly, TGTI currently has no basis upon which to describe the pipeline infrastructure that will feed the OSTF or to evaluate the environmental impacts potentially associated with its construction or expansion. Once more information is available about this pipeline infrastructure, TGTI may supplement this application.

1.2.1.2 Onshore Booster Station

The proposed booster station consists of an approximate 8.25-acre area located in Kleberg County, Texas, positioned approximately 0.35 miles from the western Laguna Madre MHT line. The proposed booster station would house the pumping infrastructure to support the transport of crude oils from the OSTF to the DWP through the proposed pipeline infrastructure.

The proposed booster station will consist of two pumping systems to service the two 30-inch-diameter pipelines. The booster station will consist of four electrically powered motors (approximately 5,000 horse power each) in a series electronically locked into operation as two booster pumping systems delivering approximately 10,000 horse power to each pipeline. The booster station pumping systems would be located within noise abatement housings to minimize noise during operations to the maximum extent practicable. The booster station pump manifold will be equipped with by-pass lines for pigging operations.

The booster station will also consist of a 300 bbl API tank for the purposes of clearing the pump manifold during maintenance and pigging operations, a 5,000 bbl water tank for firefighting, and a tank truck loading pump.

1.2.1.3 Onshore Pipeline Infrastructure

The proposed onshore pipeline infrastructure is a segment of the overall proposed pipeline infrastructure consisting of approximately 6.36 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the OSTF to the western Laguna Madre MHT line, located in Kleberg and Nueces Counties, Texas. The proposed onshore would connect directly to the proposed inshore and offshore pipeline infrastructure to allow for the loading of vessels berthed at the DWP. The proposed Project requires the ability to export multiple grades of crude oil. As such, the proposed pipeline infrastructure is a dual pipeline system to allow for the flushing of lines of one crude grade back to the OSTF. Each of the two (2) 30-inch-diameter pipelines will be capable of flow rates of approximately 30,000 bph allowing an overall system crude oil delivery capacity of approximately 60,000 bph to the proposed offshore pipeline infrastructure and DWP.

1.2.2 Proposed Inshore Project Components

Inshore components associated with the proposed Project are defined as those components located between the western Laguna Madre MHT line and the MHT line located at the interface of North Padre Island and the GOM. Inshore Project components includes approximately 5.74 miles of two (2) new 30-inch-diameter crude oil pipelines and an onshore valve station located on North Padre Island. The following sections describe the proposed inshore Project components associated with the proposed Project.

1.2.2.1 Inshore Pipeline Infrastructure

The proposed inshore pipeline infrastructure is a segment of the overall proposed pipeline infrastructure consisting of approximately 5.74 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the terminus of the onshore pipeline infrastructure located at the western Laguna Madre MHT line to the MHT line located at the interface of North Padre Island and the GOM. The proposed inshore pipeline infrastructure segment crosses the Laguna Madre bay complex, the Gulf Intracoastal Waterway (GIWW), and extends across North Padre Island to the MHT line located at the interface of North Padre Island and the GOM.

1.2.2.2 Onshore Valve Station

The onshore valve station would be located on North Padre Island approximately 2,300 feet from the MHT line located at the interface of North Padre Island and the Gulf of Mexico. The proposed onshore valve station would measure approximately 12-feet by 18-feet and consist of shut off valves to allow for the isolation of offshore and onshore sections of the proposed pipeline infrastructure during emergencies and routine maintenance and inspection operations.

The onshore valve station would be housed by 12-inch-thick rebar reinforced concrete walls. The onshore valve station would house two 30-inch-diameter full bore 300 series motor operated valves designed to close upon sudden rise or fall of pipeline pressure. The onshore valve station would consist of switch gear, digital communication equipment, and ventilation fans. In the situation of a pressure drop or increase within the pipelines, communications equipment would be utilized for the emergency shut down of pumps located at the booster station and OSTF. The onshore valve station allows for the isolation of offshore and onshore sections of the proposed pipeline infrastructure during emergencies and routine maintenance and inspection operations.

1.2.3 Proposed Offshore Project Components

Offshore components associated with the proposed Project are defined as those components located seaward of the MHT line located at the interface of North Padre Island and the GOM. The Offshore Project components include approximately 14.71 miles of two (2) new 30-inch-diameter crude oil pipelines and a DWP. The following sections describe the proposed offshore Project components associated with the proposed Project.

1.2.3.1 Offshore Pipeline Infrastructure

The proposed offshore pipeline infrastructure is a segment of the overall proposed pipeline infrastructure consisting of approximately 14.71 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the MHT line located at the interface of the North Padre Island and the GOM to terminate at the designated location of the proposed DWP. The offshore pipelines would intersect portions Texas State submerged lease tracts 817, 818, 927, 928, 929, 933, and Outer Continental Shelf (OCS) Mustang Island Area TX3 Bureau of Ocean Energy Management (BOEM) blocks 816, 822, and 823.

1.2.3.2 Deepwater Port (SPM Buoy System)

The proposed DWP would utilize a SPM buoy system as the primary device for the loading vessels berthed at the DWP with crude oil. The proposed SPM buoy system would be installed offshore within the GOM within BOEM block number 823 at Latitude N27° 28’ 42.60” and Longitude W97° 00’ 48.43”, approximately 12.7 nautical miles (14.62 statute miles) off the coast of North Padre Island in Kleberg County, Texas. The SPM buoy system would be positioned in water depths of approximately 93 ft. and consist of a pipeline end manifold (PLEM), catenary anchor leg mooring (CALM) system, and floating hoses to connect the SPM buoy system to vessels berthed at the DWP.

The proposed SPM buoy system will be of the Catenary Anchor Leg Mooring (CALM) type permanently moored with a symmetrically arranged six-leg anchor chain system extending to 60-inch-diameter pile anchors fixed on the seafloor. The proposed SPM buoy system will consist of inner and outer cylindrical shells subdivided into twelve equal-sized watertight radial compartments. A rotating table will be affixed to the SPM buoy and allow for the connection of moored vessels to the SPM buoy system via mooring hawsers. A series of floating hose strings equipped with marine break-away couplings will be utilized for the transfer of crude oil from the SPM buoy system to the moored vessel. Aids to navigation would be located on the SPM buoy system and on the floating hoses extending to moored vessels.

The proposed SPM buoy system includes a PLEM system that will serve as the connection point between the offshore pipeline infrastructure and the SPM buoy. The PLEM system would be a 47-foot by 68-foot steel frame structure positioned directly beneath the proposed SPM buoy and would be anchored directly to the seafloor with piles. The PLEM system would serve as the manifold for the two (2) 30-inch-diameter crude oil pipelines extending to the OSTF. The PLEM will consist of a series of hydraulically operated ball valves which can be closed to stop pipeline flow if determined necessary. The PLEM will connect to the SMP buoy via 24-inch-diameter sub-marine hoses which will connect to floating hoses fixed to the SPM buoy for the loading of crude oil to moored vessels.

The proposed SPM buoy system would be surrounded by an area to be avoided (ATBA) the ATBA consist of a circle with a radius equal to the vessel and SPM buoy swing radius, including horizontal displacement, which has a radius of 1,614 ft. Additionally, a 1,640 ft area surrounding the ATBA would be established as a safety zone. The proposed Project also includes the establishment of a safety approach fairway from the already established safety fairway.

Refer to Appendix A – Construction, Operation, and Decommissioning Procedures for additional information concerning the construction, operation, and decommissioning of the proposed Project. Appendix A includes figures depicting the location of each of the above described Project components.

1.3 References

U.S. Energy Information Administration (EIA). 2018. Petroleum and Other Liquids. May 2018

Turner, Mason & Company Consulting Engineers. 2018. US Crude Oil Exports, Past, Present and Future. Texas Gulf Terminals Inc. April 2018.