APPENDIX D

Agency Correspondence

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
Federal						
United States Coast Guard - 001	NHPA Section 106 Review Area of Potential Effect	10/24/2019	M.J. Greenway (USCG)	Mark Wolfe (THC)	Letter requesting initiation of consultation under Section 106 of the National Historic Preservation Act and review of the proposed Project's Area of Potential Effect.	6
United States Coast Guard - 002	Request for Informal Consultation and Technical Assistance	4/10/2020	M.J. Greenway (USCG)	Karla Reece (NMFS)	Letter requesting informal consultation and technical assistance.	4
United States Coast Guard - 003	Request for Informal Consultation and Technical Assistance	4/10/2020	M.J. Greenway (USCG)	Charrish Stevens (NMFS)	Letter requesting informal consultation and technical assistance.	2
United States Coast Guard - 004	Request for Informal Consultation and Technical Assistance	4/10/2020	M.J. Greenway (USCG)	Dawn Gardiner (USFWS)	Letter requesting informal consultation and technical assistance.	4
United States Environmental Protection Agency - 001	New Source Review Air Permit Application Completeness Determination	6/28/2019	Jeffery Robinson (EPA)	David Ferris (BWTT)	Letter stating determination of incompleteness for air permit application.	4
United States Environmental Protection Agency - 002	Completeness Review for the Section 112(g) of the Clean Air Act Determination Request	7/19/2019	Jeffery Robinson (EPA)	David Ferris (BWTT)	Letter stating determination of incompleteness for 112(g) application.	5
United States Environmental Protection Agency - 003	New Source Review Air Permit Application Completeness Determination	7/31/2019	David Ferris (BWTT)	Jeff Robinson (USEPA)	Letter transmitting additional information requested for air permit application.	64
United States Environmental Protection Agency - 004	Title V Application Incompleteness Determination	7/31/2019	Jeffery Robinson (EPA)	David Ferris (BWTT)	Letter stating determination of incompleteness for Title V application.	2
United States Environmental Protection Agency - 005	Scoping Letter Response	8/1/2019	Arturo J. Blanco (EPA)	Myles J. Greeway (USCG)	Letter responding to request for comments on the scope of the Bluewater SPM Project DEIS.	7

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
United States Environmental Protection Agency - 006	EPA Authority Over Construction and Operation	8/6/2019	Robert D. Lawrence (EPA)	Roddy Bachman (USCG)	Letter stating determination of incompleteness for PSD permit, Title V permit, and MACT determination are incomplete.	6
United States Environmental Protection Agency - 007	Request Use of Alternative Model AERCOARE for the Bluewater Texas Terminal LLC ("BWTX") Deepwater Port Project	8/8/2019	Jesse Lovegren (DiSorbo Consulting)	Ashley Mohr (US EPA Region 6)	Letter requesting use of an alternative model AEROCOARE for the Bluewater SPM Project.	14
United States Environmental Protection Agency - 008	Title V Application Incompleteness Determination	8/15/2019	David Ferris (BWTT)	Jeff Robinson (USEPA)	Letter transmitting additional information requested for Title V permit application.	2
United States Environmental Protection Agency - 009	Completeness Review for Clean Air Act § 112(g) Determination Request	8/15/2019	David Ferris (BWTT)	Jeff Robinson (USEPA)	Letter transmitting additional information requested for 112(g) permit application.	147
United States Environmental Protection Agency - 010	Prevention of Significant Deterioration (PSD) Permit Application	11/26/2019	David Ferris (BWTT)	Cynthia Kaleri (US EPA, Region 6)	Letter transmitting additional information requested for PSD permit application.	82
United States Environmental Protection Agency - 011	Completeness Determination of Clean Air Act (CAA) Section 112(g) Case-by-Case MACT, Determination Application and Prevention of Significant Deterioration (PSD) Permit Application for the Bluewater Texas Terminals, LLC (BWTX) Deepwater Port (DWP).	2/20/2020	Cynthia J. Kaleri (EPA)	David Ferris (BWTT)	Letter stating completeness of PSD and 112(g) permit applications, development of Notice of MACT Approval, and a request for revised Title V application	2
United States Environmental Protection Agency - 012	Cost Effectiveness Calculation for Vapor Combustor System (Offshore Platform)	7/28/2020	Jesse Lovegren (DiSorbo Consulting)	Cynthia Kaleri (US EPA, Region 6)	Standalone cost effectiveness spreadsheet calculations.	1

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
United States Environmental Protection Agency - 013	Second Supplement to PAD BACT Analysis (Control Option 3)	7/28/2020	Jesse Lovegren (DiSorbo Consulting)	Cynthia Kaleri (US EPA, Region 6)	Supplement providing additional considerations for elimination of Control Option 3.	13
United States Environmental Protection Agency - 014	Public Notice	9/12/2020	EPA	Public	Public Notice announcing 112(g) determination, PSD permit, Title V permit, and a public hearing.	3
United States Environmental Protection Agency - 015	Bluewater SPM Project-Draft Habitat Restoration Plan	6/2/2021	Paul Kasper (EPA)	Ashley Thompson (Golder)	Email providing recommendations on the Draft Habitat Restoration Plan.	2
United States Environmental Protection Agency - 016	BWTX Draft EIS Emissions	6/8/2021	Jonathan Ehrhart (EPA)	Sal Mohammad (Golder)	Email requesting VLCC loading fugitives calculation spreadsheet.	1
National Marine Fisheries Service - 001	[Non-DoD Source] Bluewater Texas Terminal Deepwater Port	5/14/2020	Michael Tucker (NMFS)	Paige Foley (USCG)	Email providing feedback on species list for the Bluewater SPM Project.	1
National Marine Fisheries Service - 002	Bluewater DWP - Proxy noise level for thrusters on dynamic positioning vessels	6/8/2021	Michael Tucker (NMFS)	Melissa Perera (CIV)	Email confirming acceptable proxy noise level for thrusters on dynamic positioning vessels.	2
National Marine Fisheries Service - 003	Bluewater SPM Project - Pile Driving Sound Sources	6/9/2021	Michael Tucker (NMFS)	Ashley Thompson (Golder)	Email requesting clarification on material of piles.	5
National Park Service - 001	Scoping Letter Response	8/2/2019	Jennifer Shelby Walker (NPS)	Roddy Bachman (USCG)	Letter providing comments on the scope of the Bluewater SPM Project DEIS.	3
National Park Service - 002	Request for use of Nesting Data	1/31/2021	Donna Shaver (NPS)	Kelsey Gocke (Golder Associates)	Email providing recent and historic sea turtle nesting numbers on Mustang and San Jose Islands.	1
Natural Resources Conservation Services - 001	Bluepoint Pipeline Project NEPA/FPPA Evaluation	3/17/2021	Mark V. Palmer (NRCS)	Jacob Trahan (Golder)	Letter providing decision on exemption from provisions of FPPA.	1
National Resources Conservation Service - 002	Farmland Conversion Impact Rating	3/17/2021	Mark V Palmer (NRCS)	Jacob Trahan (Golder)	Farmland Conversion Impact Rating worksheet	2

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
U.S. Army Corps of Engineers- 001	Bluewater SPM Project-Draft Habitat Restoration Plan	6/2/2021	Kristie Brink (USACE)	Ashley Thompson (Golder)	Email providing comments on the Draft Habitat Restoration Plan.	2
United States Fish and Wildlife Service - 001	Response to Request for Informal Consultation and Technical Assistance	5/13/2020	Charles Ardizzone (USFW)	M.J. Greenway (USCG)	Letter responding to request for informal consultation and technical assistance.	9
United States Fish and Wildlife Service - 002	Bluewater Texas Terminal (BWTT) Project - Whooping Crane Information	10/15/2020	Melissa Perera (CIV)	Mary Orms (FWS)	Email clarifying federal nexus for ESA consultation and discussion of maps for whooping crane habitat.	4
United States Fish and Wildlife Service - 003	Northern Aplomado Falcons on San Jose Island	12/3/2020	Mary Kay Shoruppa (FWS)	Jacob Trahan (Golder)	Email detailing usage of aplomado falcon nests on San Jose Island.	2
U.S. Fish and Wildlife Services - 004	Bluewater-USFWS Meeting - Eastern Black Rail	4/2/2021	Mary Lee (USFWS)	Jacob Trahan (Golder)	Email confirming habitat types for the eastern black rail.	6
State						
US Department of Transportation Maritime Administration - 001	Response to Senator Ted Cruz	3/23/2020	Mark H Buzby (MARAD)	The Honorable Ted Cruz (United State Senate)	Response to letter of support for the Bluewater SPM Project.	3
Texas General Land Office - 001	Bluewater Texas Terminal, LLC Project (MARAD-2019-0094) request for information regarding the Texas General Land Office’s pipeline policy	8/10/2020	Amy Nunez (GLO)	Roddy Bachman (USCG)	Letter detailing Texas GLO pipeline easement policy standard language.	2
Texas General Land Office - 002	Pipeline Abandonment on State Submerged Land	8/21/2020	Melony Phillips (Phillips 66)	Amy Nunez (TXGLO)	Letter providing additional information for GLO consideration of Bluewater SPM Project’s easement in regard to abandonment.	3

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
Texas General Land Office - 003	Bluewater Texas Terminal, LLC Project (MARAD-2019-0094) language update to General Land Office Easement	12/4/2020	Amy Nunez (GLO)	Roddy Bachman (USCG)	Letter clarifying Texas GLO pipeline easement policy on abandonment.	2
Texas Commission on Environmental Quality - 001	TCEQ NEPA Request #2020-016	2/3/2020	Ryan Vice (TCEQ)	D'Anne Stite (TGLO)	Letter providing comments on air quality impacts from the Bluewater SPM Project.	1
Texas Historical Commission - 001	NHPA Section 106 Review Area of Potential Effect for the Bluewater Deepwater Port Project (MRAD-2019-0094)	11/22/2019	Mark Wolfe (THC)	Myles J. Greeway (USCG)	Letter providing comments on the APE for the Bluewater SPM Project.	2
Texas Historical Commission - 002	Desktop Review of Visual Impacts for Proposed Harbor Island Booster Station	1/31/2020	Victoria Myers (SWCA Environmental Consultants)	Caitlin Brashear (THC)	Letter providing a summary of visual impacts of the Bluewater SPM Project.	16
Texas Historical Commission - 003	Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas	3/6/2020	Mark Wolfe (THC)	Paige Foley (USCG)	Email providing comments from the SHPO consultation for the Bluewater SPM Project.	2
Texas Parks and Wildlife Department - 001	Deepwater Port License Application - Notice of Intent; notice of public meeting; request for comments.	8/2/2019	Roddy C. Bachman (USCG)	Rebecca Hensley (TPWD)	Letter providing comments on the scope of the Bluewater SPM Project DEIS.	12
Tribes						
USCG to Tribes - 001	Notice of Intent to Prepare Environmental Impact Statement for Bluewater SPM Project Deepwater Port License Application	7/8/2019	Roddy C. Bachman (USCG)	Bob Komardley, Chairman (Apache Tribe of Oklahoma) Martina Callahan, THPO (Comanche Nation)	Letter detailing the proposed Project, NEPA process, and request for comments.	11

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
				William Nelson, Chairman (Comanche Nation)		
				Terri Parton, President (Wichita and Affiliated Tribes (Wichita, Keechi, Waco & Tawakonie))		
				Miranda Allen, THPO (Tonkawa Tribe of Indians of Oklahoma)		
				Russel Martin, President (Tonkawa Tribe of Indians of Oklahoma)		
				Tamara Francis-Fourkiller, THPO (Caddo Nation)		
USCG to Tribes - 002	Notice of Intent to Prepare Environmental Impact Statement for Bluewater SPM Project Deepwater Port License Application	8/20/2019	Roddy C. Bachman (USCG)	Bob Komardley, Chairman (Apache Tribe of Oklahoma)	Letter detailing the proposed Project, NEPA process, and request for comments.	18
				Martina Callahan, THPO (Comanche Nation)		
				William Nelson, Chairman (Comanche Nation)		
				Terri Parton, President (Wichita and Affiliated Tribes (Wichita, Keechi, Waco & Tawakonie))		
				Miranda Allen, THPO (Tonkawa Tribe of Indians of Oklahoma)		

Organization Name and Document ID	Title	Date on Document	From	To	Description	# of Pages
				Russel Martin, President (Tonkawa Tribe of Indians of Oklahoma)		
				Tamara Francis-Fourkiller, THPO (Caddo Nation)		
Local						
USCG to Port of Corpus Christi - 001	Notice of Intent to Prepare Environmental Impact Statement for Bluewater SPM Project Deepwater Port License Application	7/8/2019	Roddy C. Bachman (USCG)	Sean Strawbridge, CEO (Port of Corpus Christi)	Letter detailing the proposed Project, NEPA process, and request for comments.	11
USCG to Port of Corpus Christi - 002	Notice of Intent to Prepare Environmental Impact Statement for Bluewater SPM Project Deepwater Port License Application	8/20/2019	Roddy C. Bachman (USCG)	Sean Strawbridge, CEO (Port of Corpus Christi)	Letter detailing the proposed Project, NEPA process, and request for comments.	18

Federal Agency Correspondence

U.S. Department of Homeland Security
United States Coast Guard

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16113/19-014
October 24, 2019

Executive Director
State Historic Preservation Office
Texas Historical Commission
Attn: Mr. Mark Wolfe
P.O. Box 12276
Austin, TX 78711

Subj: NHPA SECTION 106 REVIEW AREA OF POTENTIAL EFFECT FOR THE BLUEWATER DEEPWATER PORT PROJECT (MARAD-2019-0094)

Bluewater Texas Terminals LLC (Bluewater), a subsidiary of Phillips 66, has filed an application for a license to construct, own, and operate the Bluewater Deepwater Port (Bluewater Project) pursuant to the Deepwater Port Act (DWPA) of 1974, as amended, and in accordance with United States Coast Guard (U.S. Coast Guard) implementing regulations. The U.S. Coast Guard and the Maritime Administration (MARAD) are co-lead Federal agencies for environmental impact analysis of the proposed deepwater port (DWP). The purpose of this letter is to initiate consultation with respect to Section 106 of the National Historic Preservation Act (NHPA) and to request concurrence on the Area of Potential Effect (APE) for the onshore and offshore portion of the Bluewater Project.

The Bluewater Project would be located in Federal waters within the Outer Continental Shelf Corpus Christi Area Lease Blocks 698 and 699. The DWP would be located approximately 15.0 nautical miles (17.26 statute miles) off the coast of Aransas County, Texas in water depths of approximately 88-89 feet. The Project would allow for up to two very large crude carriers (VLCC) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the DWP by floating connecting crude oil hoses and floating vapor recovery hoses. If Bluewater is issued a license by MARAD, the license would cover the DWP and associated offshore pipelines seaward of the high watermark per 33 United States Code (U.S.C.) 1502(9). However, the U.S. Coast Guard and MARAD's environmental analysis must cover all components of the project, even those not covered under MARAD's license.

The proposed Project inshore components are those components located between the western Redfish Bay mean high tide (MHT) line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico (GOM). This portion would consist of approximately 7.15 miles of two new collocated 30-inch-diameter crude oil pipelines and an approximately 19-acre booster station located on Harbor Island. This area of the Project would be installed within an approximate 100-foot construction workspace, with additional temporary workspace (ATWS). During construction activities, ATWS would be required beyond the width of the designated construction corridor at certain designated locations to provide the space necessary for safe and efficient installations of the proposed pipelines. The ATWS would be utilized where required for the storage of spoil, pipe, welding, pull strings, horizontal directional drill (HDD) entry and exit locations, and equipment access roads. For purposes of determining the APE, this inshore portion of the project is included in the onshore direct and onshore indirect APE. The Project onshore components include approximately 22.20 miles of two new 30-inch-diameter crude oil pipelines extending from the landward side of the MHT line of Redfish Bay to a planned multi-use terminal facility located south of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines; two of those outbound pipelines are the Project onshore pipeline infrastructure. The onshore pipelines would be installed within an approximate 125-foot construction workspace, with areas of ATWS. Depths of impact for the Project's onshore pipeline are anticipated to range from 4.0 to 7.0 feet along the pipeline centerline, with limited deeper impacts at HDD and bore locations. While the majority of the proposed pipeline will traverse privately-owned and privately-operated properties, approximately 0.45-mile of the proposed pipeline will cross eight discontinuous properties owned by Aransas County Trustee, the City of Aransas Pass, and San Patricio County. These properties, designated herein as the Project Permit Areas, are owned by Aransas County Trustee, the City of Aransas Pass, and San Patricio County, and are considered political subdivisions of the State of Texas. As such, the Project Permit Areas also fall under the jurisdiction of the Antiquities Code of Texas. Parts of the onshore pipeline (approximately 6%) are subject to 404(b)(1) permitting for wetlands and waterbody crossings. The remaining approximate 94% of the onshore pipeline, while not under Federal jurisdiction for permitting, would be an indirect onshore consequence of building the DWP. The U.S. Coast Guard and MARAD are combining the onshore and inshore components of the project as described above, into onshore direct and indirect APE.

The U.S. Coast Guard and MARAD consider the issuance of the DWPA license a Federal "undertaking" as defined in the NHPA and its implementing regulations (36 Code of Federal Regulations [C.F.R.] part 800). An undertaking is defined under 36 C.F.R. § 800.16(y) as "a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval." As a Federal undertaking, issuance of the Bluewater Project DWPA license would require a NHPA Section 106 review. The U.S. Coast Guard and MARAD would like the THC to identify the historic properties within the APE that we have defined that could have their physical and or/or historical environment, or "setting" altered by the Harbor Island Booster Station or onshore and offshore pipeline installation.

Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on such undertakings. The NHPA Section 106 review seeks to accommodate historic preservation concerns with the needs of Federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties. The goal of consultation is to identify historic properties potentially affected by the undertaking, assess these effects and seek ways to avoid, minimize or mitigate any adverse effects on historic properties (36 C.F.R. § 800.1). The NHPA Section 106 review involves four sequential phases:

- Initiation of the Section 106 process;
- Identification of historic properties;
- Assessment of adverse effects to historic properties; and
- Resolution of adverse effects, including development of mitigation strategies.

As part of the second phase (identification of historic properties), the lead Federal agency is required to determine and document the APE for the undertaking in consultation with the appropriate state historic preservation office (SHPO) or tribal historic preservation office (THPO). The APE is defined under 36 C.F.R. 800.16(d) as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

Based on the information provided by the applicant, the U.S. Coast Guard and MARAD recommend the APE for the Project be defined in terms of three separate but interrelated APEs:

- **Offshore Direct APE:** The depth and breadth of the seabed that would be impacted by any bottom-disturbing activities;
- **Onshore Direct APE:** The depth and breadth of terrestrial areas that would be impacted by any ground-disturbing activities; and
- **Onshore Indirect APE:** The viewshed from which onshore, aboveground Project components would be visible.

Based on the current Project design, the recommended offshore direct APE includes the depth and area of the seabed that would be impacted by the construction and/or operation of the following Project components:

- Two SPM buoys that would moor VLCCs or other crude oil carriers for loading;
- Four pipeline end manifolds (PLEMs)--two per each SPM buoy (24-inch diameter sub-marine hoses) that would provide the interconnection between the pipelines and the SPM buoys;
- Two new co-located 30-inch-diameter crude oil pipelines that would connect the Bluewater DWP to the onshore component (approx. 27.13 miles) to be constructed within an approximate 75-foot construction workspace.

The offshore direct APE includes the limits of disturbance for each individual component as well as any areas that may be disturbed during construction, such as construction vessel anchoring areas.

As currently designed, the only offshore Project components that would be visible above the waterline are the SPMs. These Project components would be located 15.0 nautical miles (17.26 statute miles) east off the coast of Aransas County, Texas. Due to the distance from the coast, the U.S. Coast Guard does not believe the construction or operation of these two above water elements would have the potential to indirectly cause alterations in the character or use of historic properties and, as a result, has not recommended an offshore indirect APE.

Based on the current Project design, the recommended onshore direct APE includes the depth and area of terrestrial areas that would be impacted by the construction and/or operation of the following Project components:

- 22.20 miles of two co-located 30-inch diameter crude oil pipeline extending from the landward side of the MHT line of Redfish Bay to the existing multi-use terminal located south of Taft, San Patricio County, Texas
- 7.15 miles of two co-located 30-inch-diameter crude oil pipeline extending from the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico (GOM)
- 19-Acre booster station located on Harbor Island (Harbor Island Booster Station)

The onshore APE includes the limits of disturbance for each individual component as well as any areas disturbed during construction, such as temporary workspace and construction laydown areas. Based on the current Project design, the recommended onshore indirect APE consists of the proposed Harbor Island Booster Station viewshed.

The U.S. Coast Guard and MARAD have reviewed the results of offshore cultural resource investigations performed by Bluewater. The U.S. Coast Guard and MARAD have determined that Bluewater's offshore investigations are sufficient in both scope and extent to identify historic properties within the offshore direct APE. The U.S. Coast Guard and MARAD recommend that Bluewater submit the results of the offshore investigations to the Texas Historical Commission (THC) for review and comment.

Bluewater conducted an intensive archaeological survey by surveying an expanded 300.0-foot-wide Environmental Survey Area (ESA) corridor based on the Project centerline. The archaeological survey recommended that no further archaeological investigations were needed. The U.S. Coast Guard and MARAD have determined that the previous onshore cultural resource investigations are sufficient for identifying historic properties within the onshore direct and indirect APEs. Three cultural resources sites have been previously recorded within 0.5 mile of the proposed onshore project area, with Site 41AS91 Structural Remains, determined as ineligible for listing on the NHRP. Site 41NU289, the Aransas Railroad Causeway, and Site 41NU286, an Open Campsite are "undetermined" for eligibility determination by the State Historic Preservation Office. The U.S. Coast Guard and MARAD seek the THC's determinations for these sites.

The U.S. Coast Guard and MARAD conducted a preliminary viewshed analysis using bare earth digital elevation model data in ArcGIS to identify areas within 3 miles of the proposed Harbor Island Booster Station from which the new terminal will be visible. The U.S. Coast Guard and MARAD recommends these areas within 3 miles of the terminal be considered the indirect onshore APE until detailed viewshed studies can more accurately define this APE. Maps showing the results of these preliminary APE studies can be found in the Enclosure with this letter.

If you have questions about this request or the proposed Bluewater SPM project, please contact Paige Foley, U.S. Coast Guard, (202) 372-1531 (Paige.A.Foley@uscg.mil), Roddy Bachman, U.S. Coast Guard, (202) 372-1451 (Roddy.C.Bachman@uscg.mil) or Yvette Fields, MARAD, (202) 366-0926 (Yvette.Fields@dot.gov). Thank you for your assistance in this matter. We look forward to working with you on the Bluewater Project.

Sincerely,

M. J. Greenway
Commander, U.S. Coast Guard
Chief, Vessel and Facility Operating
Standards Division

Yvette M. Fields
Director, Office of Deepwater
Port Licensing and Port Conveyance
Maritime Administration

Encl: Figure 1 Bluewater Project Harbor Island Booster Station Preliminary Onshore 3-Mile APE Assessment Map

Copy: Paige Foley, U.S. Coast Guard
Roddy Bachman, U.S. Coast Guard
Jake Trahan, Golder Associates
Ashley Thompson, Golder Associates
Amy Borgens, Texas Historical Commission
Jeff Durst, Texas Historical Commission
Docket # MARAD-2019-0094

LEGEND

- SHIPWRECKS
- HISTORICAL MARKERS
- MUSEUMS
- NATIONAL REGISTER (POINTS)
- NATIONAL REGISTER (AREA)
- CEMETERY
- PARKS AND RECREATIONAL FACILITIES
- PREVIOUS SURVEY (LINEAR FACILITY)
- PREVIOUS SURVEY (AREA)
- INSHORE PIPELINE
- OFFSHORE PIPELINE
- HARBOR ISLAND BOOSTER STATION
- HARBOR ISLAND BOOSTER STATION 3 MILE APE

0.8 0.4 0
MILES

0.7 0.35 0
NAUTICAL MILES

1.3 0.65 0
KILOMETERS

BLUEWATER TEXAS TERMINAL LLC
BLUEWATER SPM PROJECT

HARBOR ISLAND BOOSTER STATION
CULTURAL RESOURCES WITHIN 3-MILE APE

PROJECT NO.	CONTROL	SCALE	DATE	FIGURE
19123648	A013	1 in = 4,250 ft	10/16/2019	1

Path: G:\PROJECTS\Phillips_66\Blue_Water_Terminal\99_PROJECTS\19123648\A_EIS\02_PRODUCTION\MXD\19123648_A013_BoosterStationAPE.mxd

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

Commandant (CG-OES-2)
Attn: Vessel and Facility Operating Standards Division.
U.S. Coast Guard STOP 7509
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16113/20-022
April 10, 2020

Ms. Karla Reece
Protected Resources Division
U.S. Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

Subj: REQUEST FOR INFORMAL CONSULTATION AND TECHNICAL ASSISTANCE-BLUEWATER TEXAS TERMINAL SERVICES LLC DEEPWATER PORT (MARAD-2019-0094)

On May 30, 2019 Bluewater Texas Terminal Services LLC, a wholly owned subsidiary of Phillips 66, submitted an application to the U.S. Coast Guard (USCG) and Maritime Administration (MARAD) for a Federal license under the Deepwater Port Act of 1974 (DWPA), for the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port (DWP) that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The Bluewater Texas Terminal (BWTT) DWP Project (Project) would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring (SPM) buoy system.

The BWTT DWP application was noticed in the Federal Register on June 26, 2019 and is available for viewing and downloading from the Federal Docket Management Facility at http://www.regulations.gov, Docket Number MARAD-2019-0094.

The Project is located within San Patricio, Aransas, and Nueces counties, Texas and would consist of three distinct but interrelated components: 1) the onshore component, 2) the inshore component, and 3) the offshore component. The onshore component includes approximately 22.13 miles of two new 30-inch-diameter crude oil pipelines extending from the landward side of the mean high tide (MHT) line of Redfish Bay to a planned multi-use terminal facility located south of Taft in San Patricio County, Texas. In addition to the pipelines, the onshore component includes two high concentration area valve stations located near Aransas Pass, Texas.

The Project inshore components are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. Inshore Project components includes approximately 7.29 miles of two new 30-inch-diameter crude oil pipelines, and an approximate 12-acre facility located on Harbor Island. The Project inshore components serve as the connection point between the onshore and offshore components to allow for the transport of crude oil to the DWP. The Harbor Island Facility consists of pig launcher/receivers, meters and valves, operations building, and communications tower to support the transport of crude oil and operations of the DWP.

The Project offshore components are located seaward of the MHT line located at the interface of San Jose Island and the Gulf of Mexico. The offshore Project components include approximately 26.76 miles of two new 30-inch-diameter pipelines and a DWP. The offshore pipeline infrastructure extends from the Gulf of Mexico MHT to the DWP. The Project DWP is located in Gulf of Mexico waters within approximately 89-feet water depth and consist of two SPM buoy systems (SPM Buoy System 1 and 2). The SPM buoy systems serve as the primary device for the loading vessels berthed at the DWP and would be connected via approximately 1.68 miles of two 30-inch-diameter submerged pipelines.

As stated in MARAD's Notice of Intent to Prepare an Environmental Impact Statement (EIS), dated July 3, 2019, the USCG and MARAD are preparing an EIS for the DWP license application. As part of this environmental review and in accordance with Section 7 of the Endangered Species Act of 1973, as amended, we will fully analyze potential impacts on Federally-listed and proposed threatened and endangered species and designated and proposed critical habitat. USCG and MARAD will complete the analysis of potential impacts on Federally-listed species and critical habitat in a Biological Assessment (BA) that is currently being drafted. USCG and MARAD request your technical assistance regarding the development of the BA and confirmation that the Federally-listed species and critical habitat listed in Attachment A of this letter are complete for the counties affected by the Project. Please note we have made a similar request for technical assistance to the U.S. Fish and Wildlife Service regarding species and habitat under its jurisdiction.

USCG and MARAD appreciate your assistance on this Project. If you have any questions about this request or the preparation of the BWTT EIS and BA, please contact Ms. Paige Foley, U.S. Coast Guard at (202) 372-1531; Paige.A.Foley@uscg.mil. Thank you for your assistance. We look forward to working with you on the BWTT Project.

Sincerely,

M.J. Greenway
Commander, U.S. Coast Guard
Chief, Vessel and Facility Operating
Standards Division

Yvette M. Fields

Yvette Fields
Director, Office of Deepwater Port
Licensing and Port Conveyance
Maritime Administration

Attachment A: BWTT Project - NMFS Federally-listed Species and Designated Critical Habitat

Attachment A:

BWTT Project - NMFS Federally Listed T&E Species and Designated Critical Habitat	
Species	Federal Status
Fish	
Oceanic whitetip shark (*Carcharhinus longimanus*)	T
Giant manta ray (*Manta birostris*)	T
Smalltooth sawfish (*Pristis pectinata*)	E
Mammals	
Bryde's whale (*Balaenoptera edeni*) Gulf of Mexico subspecies	E
Fin whale (*Balaenoptera physalus*)	E
Sei whale (*Balaenoptera borealis*)	E
Sperm whale (*Physeter macrocephalus*)	E
Blue whale (*Balaenoptera musculus*)	E
Humpback whale (*Megaptera novaeangliae*)	E
Reptiles	
Green Sea Turtle* *(Chelonia mydas)*	T
Hawksbill Sea Turtle* (*Eretmochelys imbricate*)	E
Kemp's Ridley Sea Turtle* (*Lepidochelys kempii*)	E
Leatherback Sea Turtle* *(Dermochelys coriacea)*	E
Loggerhead Sea Turtle* *(Caretta caretta)*	T
Invertebrates	
Lobed star coral (*Orbicella annularis*)	T
Mountainous star coral (*Orbicella faveolata*)	T
Boulder star coral (*Orbicella franksi*)	T
Elkhorn coral (*Acropora palmata*)	T
Designated Critical Habitat	

BWTT Project - NMFS Federally Listed T&E Species and Designated Critical Habitat	
Species	Federal Status
Loggerhead Sea Turtle, LOGG-S-02	--

E= endangered
T= threatened
All species information was obtained from NOAA species profiles and habitat listings.
*Sea turtles are under the jurisdiction of the USFWS when nesting on land and NMFS when in the water.

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

Commandant (CG-OES-2)
Attn: Vessel and Facility Operating Standards Division.
U.S. Coast Guard STOP 7509
2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509
Phone: (202) 372-1410
Fax: (202) 372-8382
Email: Myles.J.Greenway@uscg.mil

16113/20-021
April 10, 2020

Ms. Charrish Stevens
Gulf of Mexico Branch, Habitat Conservation Division
U.S. Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

Subj: REQUEST FOR INFORMAL CONSULTATION AND TECHNICAL ASSISTANCE-BLUEWATER TEXAS TERMINAL SERVICES LLC DEEPWATER PORT (MARAD-2019-0094)

On May 30, 2019 Bluewater Texas Terminal Services LLC, a wholly owned subsidiary of Phillips 66, submitted an application to the U.S. Coast Guard (USCG) and Maritime Administration (MARAD) for a Federal license under the Deepwater Port Act of 1974 (DWPA), for the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port (DWP) that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The Bluewater Texas Terminal (BWTT) DWP Project (Project) would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring (SPM) buoy system.

The BWTT DWP application was noticed in the Federal Register on June 26, 2019 and is available for viewing and downloading from the Federal Docket Management Facility at http://www.regulations.gov, Docket Number MARAD-2019-0094.

The Project is located within San Patricio, Aransas, and Nueces counties, Texas and would consist of three distinct but interrelated components: 1) the onshore component, 2) the inshore component, and 3) the offshore component. The onshore component includes approximately 22.13 miles of two new 30-inch-diameter crude oil pipelines extending from the landward side of the mean high tide (MHT) line of Redfish Bay to a planned multi-use terminal facility located south of Taft in San Patricio County, Texas. In addition to the pipelines, the onshore component includes two high concentration area valve stations located near Aransas Pass, Texas.

The Project inshore components are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. Inshore Project components includes approximately 7.29 miles of two new 30-inch-diameter crude oil pipelines, and an approximate 12-acre facility located on Harbor Island. The Project inshore components serve as the connection point between the onshore and offshore components to allow for the transport of crude oil to the DWP. The Harbor Island Facility is situated on Harbor Island and consists of pig launcher/receivers, meters and valves, operations building, and communications tower to support the transport of crude oil and operations of the DWP.

The Project offshore components are located seaward of the MHT line located at the interface of San Jose Island and the Gulf of Mexico. The offshore Project components include approximately 26.76 miles of two new 30-inch-diameter pipelines and a DWP. The offshore pipeline infrastructure extends from the Gulf of Mexico MHT to the DWP. The Project DWP is located in Gulf of Mexico waters within approximately 89-feet water depth and consist of two SPM buoy systems (SPM Buoy System 1 and 2). The SPM buoy systems serve as the primary device for the loading vessels berthed at the DWP and would be connected via approximately 1.68 miles of two 30-inch-diameter submerged pipelines.

As stated in MARAD's Notice of Intent to Prepare an Environmental Impact Statement (EIS), dated July 3, 2019, the USCG and MARAD are preparing an EIS for the DWP license application. As part of this environmental review and in accordance with the Magnuson-Stevens Fishery Conservation and Management Act, we will fully analyze potential impacts on Essential Fish Habitat (EFH). USCG and MARAD will complete the analysis of potential impacts in an EFH Assessment that is currently being drafted. USCG and MARAD request your technical assistance regarding the development of the EFH. Managed species currently reviewed within the EFH Assessment included the following fishery management plans:

- Shrimp Fishery of the Gulf of Mexico, U.S. Waters;
- Red Drum Fishery of the Gulf of Mexico;
- Reef Fish of the Gulf of Mexico;
- Coastal Migratory Pelagic Resources in the Gulf of Mexico and South Atlantic; and
- Atlantic Highly Migratory Species.

USCG and MARAD appreciate your assistance on this Project. If you have any questions about this request or the preparation of the BWTT EIS and EFH Assessment, please contact Ms. Paige Foley, U.S. Coast Guard at (202) 372-1531; Paige.A.Foley@uscg.mil. Thank you for your assistance. We look forward to working with you on the BWTT Project.

Sincerely,

M.J. Greenway
Commander, U.S. Coast Guard
Chief, Vessel and Facility Operating
Standards Division

Yvette M. Fields

Yvette Fields
Director, Office of Deepwater Port
Licensing and Port Conveyance
Maritime Administration

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

Commandant (CG-OES-2)
Attn: Vessel and Facility Operating Standards Division.
U.S. Coast Guard STOP 7509
2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509
Phone: (202) 372-1410
Fax: (202) 372-8382
Email: Myles.J.Greenway@uscg.mil

16113/20-023
April 10, 2020

Ms. Dawn Gardiner
U.S Fish and Wildlife Service
4444 Corona, Suite 215
Corpus Christi, Texas 78411

Subj: REQUEST FOR INFORMAL CONSULTATION AND TECHNICAL ASSISTANCE-BLUEWATER TEXAS TERMINAL SERVICES LLC DEEPWATER PORT (MARAD-2019-0094)

On May 30, 2019 Bluewater Texas Terminal Services LLC, a wholly owned subsidiary of Phillips 66, submitted an application to the U.S. Coast Guard (USCG) and Maritime Administration (MARAD) for a Federal license under the Deepwater Port Act of 1974 (DWPA), for the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port (DWP) that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The Bluewater Texas Terminal (BWTT) DWP Project (Project) would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring (SPM) buoy system.

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The Project offshore components are located seaward of the MHT line located at the interface of San Jose Island and the Gulf of Mexico. The offshore Project components include approximately 26.76 miles of two new 30-inch-diameter pipelines and a DWP. The offshore pipeline infrastructure extends from the Gulf of Mexico MHT to the DWP. The Project DWP is located in Gulf of Mexico waters within approximately 89-feet water depth and consist of two SPM buoy systems (SPM Buoy System 1 and 2). The SPM buoy systems serve as the primary device for the loading vessels berthed at the DWP and would be connected via approximately 1.68 miles of two 30-inch-diameter submerged pipelines.

As stated in MARAD's Notice of Intent to Prepare an Environmental Impact Statement (EIS), dated July 3, 2019, the USCG and MARAD are preparing an EIS for the DWP license application. As part of this environmental review and in accordance with Section 7 of the Endangered Species Act of 1973, as amended, we will fully analyze potential impacts on Federally-listed and proposed threatened and endangered species and designated and proposed critical habitat. USCG and MARAD will complete the analysis of potential impacts on Federally-listed species and critical habitat in a Biological Assessment (BA) that is currently being drafted. USCG and MARAD request your technical assistance regarding the development of the BA and confirmation that the Federally-listed species and critical habitat listed in Attachment A are complete for the counties affected by the Project. Please note, we have made a similar request for technical assistance to the National Marine Fisheries Service regarding species and habitat under its jurisdiction.

USCG and MARAD appreciate your assistance on this Project. If you have any questions about this request or the preparation of the BWTT EIS and BA, please contact Ms. Paige Foley, U.S. Coast Guard at (202) 372-1531; Paige.A.Foley@uscg.mil. Thank you for your assistance. We look forward to working with you on the BWTT Project.

Sincerely,

M.J. Greenway
Commander, U.S. Coast Guard
Chief, Vessel and Facility Operating
Standards Division

Yvette M. Fields

Yvette Fields
Director, Office of Deepwater Port
Licensing and Port Conveyance
Maritime Administration

Attachment A: BWTT Project - USFWS Federally-listed Species and Designated Critical Habitat

Attachment A:

BWTT Project - USFWS Federally Listed T&E Species and Designated Critical Habitat	
Species	Federal Status
Mammals	
Gulf Coast Jaguarundi (*Herpailurus (=Felis) yagouaroundi cacomitli*)	E
Ocelot (*Leopardus (=Felis) pardalis*)	E
West Indian Manatee (*Trichechus manatus*)	T
Birds	
Attwater's Greater Prairie-chicken *(Tympanuchus cupido attwateri*)	E
Least Tern (*Sterna antillarum*)	E
Northern Aplomado Falcon (*Falco femoralis septentrionalis*)	E
Piping Plover (*Charadrius melodus*)	T
Red Knot (*Calidris canutus rufa*)	T
Whooping Crane (*Grus americana*)	E
Reptiles	
Green Sea Turtle* *(Chelonia mydas)*	T
Hawksbill Sea Turtle* (*Eretmochelys imbricata*)	E
Kemp's Ridley Sea Turtle* (*Lepidochelys kempii*)	E
Leatherback Sea Turtle* *(Dermochelys coriacea)*	E
Loggerhead Sea Turtle* *(Caretta caretta)*	T
Clams	
Golden Orb (*Quadrula aurea*)	C
Flowering Plants	
Slender Rush-pea (*Hoffmannseggia tenella*)	E
South Texas Ambrosia (*Ambrosia cheiranthifolia*)	E
Designated Critical Habitat	

BWTT Project - USFWS Federally Listed T&E Species and Designated Critical Habitat	
Species	Federal Status
Piping Plover, TX-16 San Jose Beach	--

E= endangered
T= threatened
C= candidate
All species information was obtained from USFWS ECOS species profiles and five-year review: summary and evaluation.
*Sea turtles are under the jurisdiction of the USFWS when nesting on land and NMFS when in the water.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

June 28, 2019

Mr. David Farris
Bluewater Texas Terminal
2331 CityWest Blvd.
Houston, TX 77042

RE: New Source Review Air Permit Application Completeness Determination for Bluewater Texas Terminal LLC

Dear Mr. Farris:

EPA has reviewed your Prevention of Significant Deterioration (PSD) permit application for the Bluewater Texas Terminal LLC (BWTT) project that was received by the EPA on May 31, 2019 and determined that your application is incomplete at this time. Enclosed with this letter is a list of the information needed from you so we can continue our review. Please notify us if a complete response is not possible by July 31, 2019.

The requested information is necessary for us to develop a Statement of Basis and rationale for the terms and conditions for any proposed permit. As we develop our preliminary determination, it may be necessary for us to request additional clarifying or supporting information. If the supporting information substantially changes the original scope of the permit application, an amendment or new application may be required.

As a cooperating federal review agency, EPA will be working with the U.S. Coast Guard (USCG) and the U.S. Maritime Administration (MARAD) to assist in the BWTT Deepwater Port Act (DPA) License Application review and the development of an Environmental Impact Statement (EIS). EPA will rely on the review and concurrences received in the development of the EIS to fulfill other the regulatory obligations such as Endangered Species Act (ESA) (16 USC § 1536) and National Historic Preservation Act (NHPA) (16 USC § 470f).

If you have any questions concerning the review of your application, please feel free to contact myself or Aimee Wilson of my staff at (214) 665-7596.

Sincerely,

6/28/2019

X Jeffery J. Robinson

Jeffrey Robinson

Signed by: JEFFERY ROBINSON

Jeffery J. Robinson
Branch Chief
Air Permits, Monitoring & Grants Branch

Enclosure

ENCLOSURE

EPA Region 6 PSD Permit Application Completeness Review Comments for BWTT

General:

1) Please provide additional supporting technical documentation to allow for the verification of the basis for the emission calculations. Specifically, the true vapor pressure of the crude oil (psia), molecular weight of vapors (lb/lb-mole), material composition data of the associated emissions (speciated) for the crude oil/condensate proposed for the export operation.
2) The PSD permit application does not mention if there will be any emissions associated from startup, shutdown and maintenance activities. Does BWTT anticipate Maintenance, Startup and Shutdown (MSS) emissions from the marine loading project. EPA needs to ensure that these emissions are permitted, or they are unauthorized. Typically, EPA will permit these emissions by either establishing a separate alternative BACT that applies during MSS, or we many include the emissions into an emission point as part of our BACT determination for that unit with the expectation that the unit will meet BACT at all times. For the permitting record, please provide additional information regarding the facility's MSS emissions and BWTT's preference on how BACT for MSS emissions should be applied in the permit for the marine loading operation. Please be sure to include information for all operational scenarios detailing the startup and shutdown emissions.
3) The PSD permit application does not provide a compliance monitoring strategy for the marine loading operation. EPA requests that BWTT propose a monitoring, recordkeeping and reporting strategy to ensure enforceability of the BACT requirements pursuant to 40 CFR 52.21(n).

BACT Analysis:

4) The 5-Step BACT analysis provided does not differentiate between which control technologies will reduce VOC or GHG emissions or both. Please identify the Best Available Control Technology control options for both pollutants. The application lacks a GHG BACT analysis that evaluates GHG specific control technologies. The GHG BACT analysis should focus on those technologies that are specific to reducing GHG emissions. While some VOC control technologies also control GHG emissions, there are some control technologies focused on reducing GHG emissions that are not normally evaluated when performing a VOC BACT analysis. Please update the application to document the GHG specific control technology or operational practices that were considered.
5) The 5-Step BACT analysis for VOC and GHG emissions does not include Best Management Practices for the SPM buoy system. Starting on page 4-4 of the permit application, a 5-step BACT analysis is provided for the VOC and GHG emissions associated with the proposed facility. The first step of the analysis is to identify all "available" control options for the emission unit, process or activity. A VOC Management Plan is included in the analysis. However, the VOC Management Plan is a ship-specific management plan that is required by the Regulation 15.6 of the International Convention for the Prevention of Pollution from Ships, Annex VI and is carried on-board tankers carrying crude oil. This plan is unique to the tanker and does not cover any Best Management Practices for the operation and maintenance of a SPM buoy system. The Best Management Practices for a SPM buoy system should include an effective plan for ship/shore interface, cargo transfer operations (i.e., minimizing gas formation in cargo tanks), maintenance (i.e., pigging), environmental (i.e., LDAR program), safety and health considerations and emergency preparedness. Please update the application to document the Best Management Practices for the SPM buoy system.
6) The VOC BACT analysis does not appear to include any best management practices to reduce the gas formation in the cargo tanks. The amount and concentration of gas formation depends of several

factors including the True Vapor Pressure (TVP) of the cargo; amount of splashing as the oil enters the tank; time required to load the tank; and, the occurrence of a partial vacuum in the loading line. Please update the application to document the Best Management Practices for controlling VOCs.

7) The PSD permit application does not appear to include a VOC annual emission estimate from fugitives nor does it include a five-step BACT analysis. Please provide an estimate of fugitive emissions and a 5-step BACT analysis for fugitive emissions associated with the pipeline and SPM components located in Federal waters. In this analysis, please include an evaluation of technologies considered to reduce fugitive emissions and a basis for elimination, or information detailing why fugitive emissions will not be emitted from this project. Please also include if the proposed fugitive monitoring program will include monitoring for methane (CH_4). The technologies could include, but are not limited to, the following:
   - Installing leakless technology components to eliminate fugitive emission sources;
   - Implementing an alternative monitoring program using a remote sensing technology such as infrared camera monitoring;
   - Designing and constructing facilities with high quality components and materials of construction compatible with the process known as the Enhanced LDAR standards;
   - Monitoring of flanges for leaks;
   - Using a lower leak detection level for components; and
   - Implementing an audio/visual/olfactory (AVO) monitoring program for compounds.
8) The BACT analysis should include for the proposed monitoring program a compliance strategy (i.e., frequencies of inspections, maintenance repair strategy, recordkeeping, etc.) Please update the application to include a compliance strategy for the proposed monitoring program.
9) The technical infeasibility BACT review discussion in step 2 does not clearly document the technical feasibility difficulties of add on controls based on source-specific design factors and physical, chemical, and engineering principles that preclude the safe and successful use of the control options. Economic, energy, and environmental impacts (step 4 of the BACT analysis) do not influence the removal of a technology during the technical feasibility review in step 2 of the BACT analysis. Please update the application to supplement the technical infeasibility BACT review discussion.

Emission Calculations:

10) The application only provides emissions in tons per year. The emissions are estimated using generic values. The emission calculations utilize data from *VOC Emissions from Oil and Condensate Storage Tanks: Final Report. 2009*. BWTT takes the average values from the data in the report to utilize in the emission calculations. This is done without providing a reasoned justification or scientific basis for using this data. In addition, there no basis is given for the assumptions made in using the average values. BWTT estimated emissions on the VOC species present in the 11 samples in the report instead of using the total hydrocarbons (including methane and ethane). The reasoning given was that the methane, ethane, nitrogen, and carbon dioxide in the crude oil would weather out before it is exported. Does BWTT have any data to support this reasoning? BWTT should also provide documentation or reevaluate the H_2S emissions and ensure that the value given is truly representative of the crude oil to be exported. Please provide an hourly emission estimate and calculate emissions based on known values for the crude oil you intend to export for all pollutants. Please use the entire range of speciated values providing a low end and high end value. In addition, will only crude oil be loaded or will condensate also be loaded? Please utilize available speciation data for emission calculations for the specific products being loaded.
11) Please provide emission calculations for fugitive emissions for the pipeline and SPM components located in Federal waters.

12) If possible, please provide emission calculations for GHG emissions based on source specific data. If using source specific data is not feasible, please provide a detailed reasoning and justification for using the emission factors chosen in the application.

Air Quality Analysis – Please note that EPA is still evaluating the sufficiency of the Air Dispersion Modeling and will contact BWTT air modelers directly with any additional information requests.

13) Table 5-1 in the PSD application identifies the maximum impact to land based receptors to be 1.6 ppb. This value is consistent with the results discussed in Appendix B, Ozone Analysis. However, the paragraph below table 5-1 states, "The project impact at the maximally impacted land-based receptor is 1.8 ppb…". Please verify which is the correct value.
14) Section 3.7 of the Air Dispersion Modeling Report indicates that the receptor grid data was developed based on each of the single point mooring systems being surrounded by a circular "safety zone" and an additional circular "area to be avoided" making a composite circular boundary with radius of 1,350 meters around each of the central buoys. Please provide additional information regarding the difference between these areas, including what if any access the public may have within the areas. This information is necessary to determine if the ambient air has been appropriately represented within the modeling analysis.
15) Section 3.8 of the Air Dispersion Modeling Report states that due to missing dew point temperatures within the buoy data, the relative humidity values used in the meteorological data input file were obtained from the NSRDB website. Please provide additional information regarding the nature of data available from the NSRDB website. This information is necessary to determine if the NSRDB data is appropriate for use in an air dispersion modeling analysis. Also, please indicate why the SPM locations were chosen for data retrieval from the database instead of the location of meteorological stations from which the other meteorological parameters were taken.
16) Please provide additional information to justify the use of 2013 met data from Buoy 42019 instead of from station PTAT2, which was used for 2014-2016 data, when Table 3-4 of the Air Dispersion Modeling Report indicates that the data completeness was the same for both locations. Please also provide information on whether there was consideration to utilize met data from one meteorological station for all 5 years and using data substitution from a nearby meteorological station only for missing data.
17) Section 5.2.3 of the PSD Application and 5.4 of the Air Dispersion Modeling Report indicated that the modeled impacts are acceptable even though the 1-hour ESL values for Crude Oil Vapor (<1% Benzene) are exceeded because the magnitude of exceedance falls within the acceptable range of 10 times the ESL over industrial waters. Please provide additional information regarding where the predicted exceedances occur that demonstrates that all modeled exceedances occur at locations that meet the definition of "industrial waters" as defined in the TCEQ's guidelines references in the PSD application. This information may include, but is not limited to, a plot showing the receptor locations with model predicted exceedances of the ESLs along with information to support a determination that the locations would be considered industrial waters.
18) The current State Health Effects Analysis only evaluates impacts for Crude Oil Vapors (<1% Benzene). Once the speciation data requested in Item 10 (above), has been obtained please update the analysis to address each of the speciated constituents that have corresponding ESL values.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

July 19, 2019

Mr. David Farris
Bluewater Texas Terminal
2331 CityWest Blvd.
Houston, TX 77042

RE: Completeness Review for the Section 112(g) of the Clean Air Act Determination Request for Bluewater Texas Terminal LLC

Dear Mr. Farris:

EPA has reviewed the Bluewater Texas Terminal LLC (BWTT) application for a Case-By-Case Maximum Available Control Technology (MACT) determination submitted in accordance with section 112(g) of the Clean Air Act (CAA) and received by EPA on May 31, 2019. At this time, EPA has determined that your 112(g) application is incomplete and has enclosed a list of the information requests for the BWTT project. Please notify us if a complete response is not possible by August 15, 2019.

The requested information is necessary in order for us to make a decision on our intent to either initially approve or disapprove the case-by-case MACT application and ensures that your request is consistent with the principles of MACT determinations outlined in 40 CFR 63.43(d) and the supporting application requirements in 40 CFR 63.43(e).

If you have any questions concerning the review of your 112(g) application, please feel free to contact myself at (214) 665-6435 or Aimee Wilson of my staff at (214) 665-7596.

Sincerely,

7/19/2019

X Jeffery J Robinson

Jeffery Robinson

Signed by: JEFFERY ROBINSON

Jeffery J. Robinson
Branch Chief
Air Permits, Monitoring & Grants Branch

Enclosure

ENCLOSURE
EPA Region 6 112(g) Application Completeness Review Comments for BWTT

General Application Requirements:

1) 40 CFR 63.43(e) identifies application requirements for case-by-case MACT determinations. The following items are needed.

   a. 63.43(e)(2)(vi) states "The HAP emitted by the constructed or reconstructed major source, and the estimated emission rate for each such HAP, to the extent this information is needed by the permitting authority to determine MACT." (emphasis added) The submittal fails to provide estimated emissions for each HAP and does not identify the HAPs expected for the source. As noted below, additional information on how emissions estimates were calculated will also be needed.
   b. 63.43(e)(2)(vii) states "Any federally enforceable emission limitations applicable to the constructed or reconstructed major source". The submittal only contains a ton per year limit on emissions. There is not enough evidence supporting how this limit was estimated. The submittal does not include any short-term emission limits for the source. The only limitation on emissions is the maximum annual throughput of 384,000,000 Bbl per year.
   c. 63.43(e)(2)(x) states "A recommended emission limitation for the constructed or reconstructed major source consistent with the principles set forth in paragraph (d) of this section". The application fails to evaluate the emissions associated with maintenanceactivities such as pigging or hydrostatic pressure tests. Please consider all emission producing activities and include emission estimates for all activities.
   d. 63.43(e)(2)(xii) states "Supporting documentation including identification of alternative control technologies considered by the applicant to meet the emission limitation, and analysis of cost and non-air quality health environmental impacts or energy requirements for the selected control technology". The application does not include an analysis of the cost of any control technology evaluated by the applicant. It is also missing any evaluation of non-air quality health environmental impacts or energy impacts for the control technologies evaluated.

MACT:

2) Starting on page 5-1 of the 112(g) application, an analysis is provided to demonstrate that regulatory requirements from the National Emission Standards for Marine Tank Vessel Loading Operations, 40 CFR Part 63, Subpart Y is inapplicable based on the the project design not meeting the definitions for "marine tank vessel loading operation", "terminal", "loading berth", and "offshore loading terminal". One of the guiding principles for MACT determinations (40 CFR 63.43(d)(1) is to provide an assurance that a proposed source will meet the emission control level that is achieved in practice by the best controlled *similar source*. (emphasis added) To establish if a source is similar, or not similar to those sources regulated in 40 CFR 63 Subpart Y, please review the definition of similar source as defined in 40 CFR 63.41 and provide us your detailed analysis of why your proposed project is dissimilar to project(s) subject to Subpart Y regulations. In general, a similar source has *comparable emissions*, structurally *similar in design and capacity* and *could be controlled using the same control technology*.

3) Additional information is needed to evaluate the performance of similar sources for the MACT floor analysis. Single Point Mooring (SPM) systems are not considered a new design and have been in use for various marine loading operations for some time. Evaluate any SPMs that utilize a method of Vapor Emissions Control (VEC). Please provide a supporting analysis that would technically illustrate that the control would or would not work for the proposed BWTT operational design based on volumetric loading differences or other operational parameters?

4) Please provide a detailed technical analysis to support a scaled-up design to accommodate BWTT's proposed operating parameters based on the demonstrated VEC operation for the Santa Barbra Ellwood Marine Terminal and the North Sea Shuttle Vessels included on page 5-9 and 6-6 of the application. In accordance with 40 CFR 63.43(d)(2), the analysis should consider the costs and any associated non-air quality health and environmental impacts and energy requirements.

5) Please provide any additional feasibility and cost details related to emission reductions that could be achieved if an additional subsea pipeline is added to route marine loading vapors back on-shore. If vapors can be routed 1-mile back on-shore, could the vapors be routed 18-miles back on-shore? Are there any other regulatory requirements (i.e., U.S. Coast Guard regulations at 33 CFR 154.2015, 33 CFR 154.2107 or 46 CFR 39) that might prevent this alternative scenario? Please remember to include any consideration for the costs and any associated non-air quality health and environmental impacts and energy requirements.

6) BWTT's beyond the floor analysis evaluated a technology transfer -based control. Did BWTT consider evaluating the Phillips 66 Rodeo, CA Marine Terminal, Chevron's Richmond Long Wharf Marine Terminal and the Valdez Marine Terminal (VMT) terminals that were controlling emissions to a level of 95 percent (consistent with the marine tank vessel loading regulations found in the Bay Area Air Quality Management District in California) in the beyond the floor analysis. [1]

7) BWTT should reevaluate their comparison in section 5 of the application regarding the comparison of Outer Continental Shelf (OCS) floating production, storage, and offloading (FPSO) units to the proposed project. It appears BWTT is pulling production sources into the MACT evaluation and not just export facilities. BWTT should make clear that it is a different industry and that the scale of product loaded is not comparable.

8) BWTT needs to perform an analysis to show why a platform is not a viable option for their business plan. The analysis should provide not only economic costs, but also an analysis of the technical feasibility.

<u>Lightering</u>:

9) The 112(g) application does not provide a lightering analysis to give an emission comparison or to provide an analysis of the risks/benefits to lightering in lieu of the proposed SPM facility. BWTT provided an example of onboard vapor recovery technology utilized at Chevron's El Segundo marine terminal on page 6-6. BWTT states the facility is subject to SCAQMD Rule

[1] Memorandum from the Midwest Research Institute (MRI) to Mr. David Markwordt, EPA. (July 14, 1995).

1142 which requires control of loading and lightering activities. BWTT should provide emission calculations data for lightering and to include potential VEC utilization that may be used in the on-shore loading of the ship/barge. In addition, give consideration to emission reductions for vapor balancing between the VLCC and the ship/barge offshore. Also consider the emissions for lightering VLCC that are partially loaded inland and the remaining loaded offshore. Please provide HAP calculations to include any potential VEC opportunities and any secondary emissions that may be incurred, such as hoteling while waiting for port entry, etc. EPA acknowledges that lightering is a current operation for marine loading of crude oil. A recent lightering report completed for the Texas Commission on Environmental Quality (TCEQ) notes, that "there are no state or federal-level regulations that address emission controls associated with lightering operations in the Gulf of Mexico region beyond 12 nautical miles from shore." And, "based on the density of lightering point and zones off the coast of Texas, it is expected that more lightering occurs near the Texas coast than in other regions of the US."[2]

<u>Emission Calculations</u>:

10) Please provide additional supporting technical documentation to allow for the verification of the basis for the emission calculations. Specifically, the true vapor pressure of the crude oil (psia), molecular weight of vapors (lb/lb-mole), material composition data of the associated emissions (speciated) for the crude oil/condensate proposed to be used for the export operation.

11) The application only provides emissions in tons per year. The emissions are estimated using generic values. The emission calculations utilize data from *VOC Emissions from Oil and Condensate Storage Tanks: Final Report. 2009*. BWTT takes the average values from the data in the report to utilize in the emission calculations. This is done without providing a reasoned justification or scientific basis for using this data. In addition, there no basis is given for the assumptions made in using the average values. BWTT estimated emissions on the VOC species present in the 11 samples in the report instead of using the total hydrocarbons (including methane and ethane). The reasoning given was that the methane, ethane, nitrogen, and carbon dioxide in the crude oil would weather out before it is exported. Does BWTT have any data to support this reasoning. BWTT should also reevaluate the H_2S emissions and ensure that the value given is truly representative of the crude oil to be exported. Please provide an hourly emission estimate and calculate emissions based on known values for the crude oil you intend to export for all pollutants. Please use the entire range of speciated values providing a low end and high end value. In addition, will only crude oil be loaded or will condensate also be loaded? Please utilize any available speciation data for emission calculations for the specific crude products being loaded.

12) Please provide emission calculations data for each HAP present utilizing the speciation profile of the crude products that BWTT expects to export.

[2] *See* Sturtz, Timothy; Lindhjem, Chris and Yarwood, Greg, Ramboll Environ. *Final Report Ocean-Going Tanker Vessel Lightering Emissions in the Gulf of Mexico*. https://www.tceq.texas.gov/assets/public/implementation/air/am/contracts/reports/ei/582177209724-20170630-environ-OceanGoingTankerVesselLighteringEmissionsGulfMexico.pdf

Compliance Considerations:

13) The 112(g) application does not appear to include a proposed method for continuous demonstration of compliance for maintenance activities such as pigging or hydrostatic pressure tests. This demonstration may include best management practices and/or schedules for maintenance.

14) The 112(g) application does not provide a compliance monitoring strategy for the marine loading operation or estimated control efficiency of the work practice standard proposed in the application. EPA requests that BWTT propose a monitoring, recordkeeping and reporting strategy to ensure enforceability of the proposed MACT work practice standard and an estimated control efficiency expected to be achieved with this work practice standard in accordance with section 112(h) of the CAA.

15) To provide a continuous compliance demonstration with the fugitive HAP emissions associated with the SPM buoy system, VOC management plans have been used to serve as an indicator of HAP emissions. The 112(g) application relies on a VOC Management Plan this is developed and maintained by the VLCC and not BWTT. A VOC Management Plan is an important consideration and should be considered. However, in addition to the VOC management plan the VLCC will develop, has BWTT considereddeveloping and providing a separate Best Management Plan that it will implement for the SPM buoy system that includes an effective plan for ship/shore interface, cargo transfer operations (i.e., minimizing gas formation in cargo tanks), maintenance (i.e., pigging), environmental (i.e., LDAR program), safety and health considerations and emergency preparedness?

BW★TX

Via E-mail

Mr. Jeff Robinson
Branch Chief, Air Permits, Monitoring & Grants
U.S. EPA Region 6, 6PD
1201 Elm Street, Ste. 500
Dallas, TX 75270

Re: New Source Review Air Permit Application Completeness Determination
Bluewater Texas Terminal LLC ("BWTX")

July 31, 2019

Dear Mr. Robinson:

BWTX is in receipt of your letter dated June 28, 2019, requesting additional information to complete the referenced air permit application.

This letter transmits BWTX's response to the additional information request.

I certify that, based on information and belief formed after reasonable inquiry, that the statements and information contained in these documents are true, accurate and complete.

If you have any additional questions regarding this application, please contact Ms. Chaitali Dave of Phillips 66 Company at chaitali.r.dave@p66.com or 832-765-1069; or Dr. Jesse Lovegren of DiSorbo Consulting, LLC, at jlovegren@disorboconsult.com or 512-961-4471.

Yours,

David Farris
Vice President
BWTT

Enclosure

Responses to Items

1. *Please provide additional supporting technical documentation to allow for the verification of the basis for the emission calculations. Specifically, the true vapor pressure of the crude oil (psia), molecular weight of vapors (lb/lb-mole), material composition data of the associated emissions (speciated) for the crude oil/condensate proposed for the export operation.*

   <u>Response:</u>

   The nature of the requested supporting information is described in detail in Item 10, and a comprehensive response covering Items 1 and 10 is attached.

2. *The PSD permit application does not mention if there will be any emissions associated from startup, shutdown and maintenance activities. Does BWTT anticipate Maintenance, Startup and Shutdown (MSS) emissions from the marine loading project. EPA needs to ensure that these emissions are permitted, or they are unauthorized. Typically, EPA will permit these emissions by either establishing a separate alternative BACT that applies during MSS, or we many include the emissions into an emission point as part of our BACT determination for that unit with the expectation that the unit will meet BACT at all times. For the permitting record, please provide additional information regarding the facility's MSS emissions and BWTT's preference on how BACT for MSS emissions should be applied in the permit for the marine loading operation. Please be sure to include information for all operational scenarios detailing the startup and shutdown emissions.*

   <u>Response:</u>

   BWTX understands EPA's comment to be that excess emissions from MSS activities are unauthorized if not permitted.

   BWTX has not identified any MSS activities at the terminal that would result in emissions in excess of those expected during routine loading operations. Maintenance activities of the types that typically occur at terminals, such as pipeline pigging, meter proving, and pump maintenance, will take place at the onshore Booster station and will not give rise to emissions at the SPM terminal.

   The maintenance activity with the highest potential emission rate that BWTX has identified would be replacement of floating hoses, which would occur no more than once per year per hose string. As noted in the response to Item 7, hoses are flushed with seawater at the end of each loading operation, so hydrocarbons remaining in the hose would consist primarily of oil clinging to the elastomeric lining on the inner carcass. Emissions from draining of hoses during replacement is estimated by assuming that a volume of hydrocarbon liquids is volatilized and emitted to the air. The volume is estimated based on a clingage factor of 0.006×10^{-3} Bbl/ft^2.[1] For a 600 mm I.D. × 1000' hose string, a total wetted area of 6184 ft^2 is calculated, corresponding to a clingage volume of 1.56 gallons,

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[1] AP-42 Chapter 7, Table 7.1-10.

or 11 lb for an assumed liquid density of 7.1 lb/gal. If this activity occurs at each of two hoses per buoy once per year, total annual emissions of 44 lb, or 0.02 tpy are expected.

To the extent that MSS activities occur at the terminal, they will not interfere with BWTX's ability to meet the proposed emission limitations and BACT requirements at all times.

3. *The PSD permit application does not provide a compliance monitoring strategy for the marine loading operation. EPA requests that BWTT propose a monitoring, recordkeeping and reporting strategy to ensure enforceability of the BACT requirements pursuant to 40 CFR 52.21(n).*

Response:

BWTX appreciates the suggestion, and supports the inclusion of monitoring, recordkeeping and reporting requirements in the PSD permit, since doing so will facilitate development of the Part 71 permit (cf. 40 CFR § 71.6(a)(3)(iii)(B)).

BWTX's preference is that the same set of work practice requirements apply in order to satisfy BACT requirements for VOC emissions and MACT requirements for HAP emissions. BWTX's has provided a suggested Notice of MACT Approval (NOMA) determination containing monitoring, recordkeeping and reporting requirements, and BWTX requests that such NOMA requirements be used to establish monitoring, recordkeeping and reporting requirements for applicable requirements of the PSD permit. Please refer to Section 9 of the concurrently filed Case-by-case MACT application.

Given the information contained in this response, BWTX believes that the exact content of the work practice standard is subject to change (cf. response to Item 5), and BWTX also anticipates feedback from EPA on appropriate monitoring and recordkeeping mechanisms. BWTX will be happy to supply suggested monitoring conditions once it receives feedback from EPA on the work practices and monitoring mechanisms discussed elsewhere in this submission.

4. *The 5-Step BACT analysis provided does not differentiate between which control technologies will reduce VOC or GHG emissions or both. Please identify the Best Available Control Technology control options for both pollutants. The application lacks a GHG BACT analysis that evaluates GHG specific control technologies. The GHG BACT analysis should focus on those technologies that are specific to reducing GHG emissions. While some VOC control technologies also control GHG emissions, there are some control technologies focused on reducing GHG emissions that are not normally evaluated when performing a VOC BACT analysis. Please update the application to document the GHG specific control technology or operational practices that were considered.*

Response:

In light of the information supplied in response to Item 12, BWTX believes that GHG BACT requirements no longer apply.

As discussed in the response to Item 12, when estimated CO_2 emissions (produced by the vessel's inert gas generation system) of 17453 tpy CO_2e are considered (cf. application table 3-1), the potential to emit for GHG is less than 75,000 tpy on a CO_2e basis, and GHG BACT requirements no longer apply.

5. *The 5-Step BACT analysis for VOC and GHG emissions does not include Best Management Practices for the SPM buoy system. Starting on page 4-4 of the permit application, a 5-step BACT analysis is provided for the VOC and GHG emissions associated with the proposed facility. The first step of the analysis is to identify all "available" control options for the emission unit, process or activity. A VOC Management Plan is included in the analysis. However, the VOC Management Plan is a ship-specific management plan that is required by the Regulation 15.6 of the International Convention for the Prevention of Pollution from Ships, Annex VI and is carried on-board tankers carrying crude oil. This plan is unique to the tanker and does not cover any Best Management Practices for the operation and maintenance of a SPM buoy system. The Best Management Practices for a SPM buoy system should include an effective plan for ship/shore interface, cargo transfer operations (i.e., minimizing gas formation in cargo tanks), maintenance (i.e., pigging), environmental (i.e., LDAR program), safety and health considerations and emergency preparedness. Please update the application to document the Best Management Practices for the SPM buoy system.*

Response:

BWTX agrees with EPA that a VOC Management Plan is distinct from a terminal operator's Best Management Practices plan. However, unlike most traditional sources of air pollution, loading emissions result from the activities that a vessel engages in which directly serve the purposes of the terminal. Air emissions are ultimately emitted from the tanker vessel's mast risers, and the emission rate is affected by measures implemented by the vessel operator under a VOC Management Plan.

BWTX agrees with EPA that there are practices undertaken by the terminal operator (or by the terminal operator in coordination with the vessel operator) which can serve to reduce the formation of VOC emissions during loading operations. Specifically, BWTX will employ standardized procedures for cargo transfer operations (ship/shore interface and pigging are not particularly relevant to air emissions for the specific installation).

BWTX will develop a deepwater port operations manual, and is required to conduct transfer operations in accordance with the manual pursuant to 33 CFR § 150.425. The operations manual will include the following requirements (cf. 33 CFR § 156.120):

- Each part of the transfer system is aligned to allow the flow of oil;
- Each part of the transfer system not necessary for the transfer operation is securely blanked or shut off;
- The end of each hose not connected for the transfer of oil is blanked off;
- Prior to transfer, a conference is held which ensures that each person in charge understands the sequence of transfer operations, the transfer rate, and critical stages of the transfer operation;

- Transfer does not occur until the terminal operator and person in charge of the receiving vessel agree to begin the transfer operation;
- The transfer rate is reduced at the start of the load to while ensuring proper hose connections, valve line-ups and piping integrity, and at the end of the load to minimize the risk of pressure surges and overfilling.

These aspects of the operations manual serve to reduce the formation of VOC vapors in the transfer lines and vessel cargo tanks.

BWTX appreciates EPA's suggestion about incorporating elements of the terminal's Best Management Practices into the BACT determination, and requests that compliance with the deepwater port operations manual be included as an element of the proposed combined work practice standard.

A draft Best Management Practices plan and a draft Operations Manual may be found in Vol. II, Appendix V, and Vol. III, Appendix A of BWTX's Deepwater Port license application.

6. *The VOC BACT analysis does not appear to include any best management practices to reduce the gas formation in the cargo tanks. The amount and concentration of gas formation depends of several factors including the True Vapor Pressure (TVP) of the cargo; amount of splashing as the oil enters the tank; time required to load the tank; and, the occurrence of a partial vacuum in the loading line. Please update the application to document the Best Management Practices for controlling VOCs.*

Response:

Please see the response to Item 5.

BWTX additionally notes that the majority of the practices identified in this Item are in control of the vessel operator. Consistent with the terminal's operations manual, the vessel operator, in coordination with the onboard mooring master and shoreside operator, dictates the transfer rate during the loading operation.

7. *The PSD permit application does not appear to include a VOC annual emission estimate from fugitives nor does it include a five-step BACT analysis. Please provide an estimate of fugitive emissions and a 5-step BACT analysis for fugitive emissions associated with the pipeline and SPM components located in Federal waters. In this analysis, please include an evaluation of technologies considered to reduce fugitive emissions and a basis for elimination, or information detailing why fugitive emissions will not be emitted from this project. Please also include if the proposed fugitive monitoring program will include monitoring for methane (CH_4). The technologies could include, but are not limited to, the following:*

Installing leakless technology components to eliminate fugitive emission sources;

Implementing an alternative monitoring program using a remote sensing technology such as infrared camera monitoring;

Designing and constructing facilities with high quality components and materials of construction compatible with the process known as the Enhanced LDAR standards;

Monitoring of flanges for leaks;

Using a lower leak detection level for components; and

Implementing an audio/visual/olfactory (AVO) monitoring program for compounds.

Response:

As discussed in the response to Item 11, uncontrolled fugitive emissions would be approximately 0.25 tpy VOC per buoy if SOCMI average emission factors were used.

BWTX appreciates EPA's assistance in identifying candidate control technologies. These are referred to as options 1–6, respectively. An additional work practice, referred to as option 7, is also discussed below. Assumed control efficiencies are as follows:

Technology	Control Efficiency
Leakless Technology	100%
Remote Sensing Technology	Undefined
Enhanced LDAR—high quality component and materials of construction	Undefined
Instrumental Monitoring of flanges, including via optical gas imaging	75–97%
Lower Leak Detection Levels	Undefined
Implementing an audio/visual/olfactory (AVO) monitoring program for compounds	30%
Limit time in VOC service	50%

For the sake of argument, BWTX assumes that all control options are technically feasible. However, the vessel to transport the leak detection personnel would require specific clearance from the port operator before being allowed to operate in the safety zone if classified as a "support vessel," and would otherwise be forbidden from anchoring in the safety zone or mooring to the SPM (33 CFR § 150.380). It is unlikely that such clearance would be granted during a loading operation, however. Monitoring would have to take place during periods when the terminal is idle and when piping components are not in VOC service.

The facility as currently designed employs high quality components which are substantially leakless, and will also employ remote sensing technologies to detect the presence of significant leaks.

Floating hoses are manufactured with leak free elastomeric linings on the inner carcass which prevent leaks of hydrocarbon liquids which might otherwise arise from connections in steel piping. The floating hoses are of double carcass design, such that any leaks forming from the inner carcass are contained.

Flanged connections occur at marine breakaway-dry couplings (MBC's) located at regular intervals along the floating hose. Marine breakaway couplings used in marine offshore oil terminals generally comprise of a unit joined in two halves incorporating a shut off valve(s) which requires no external power or control source to activate i.e. it is a passive device. The valve(s) are mechanically locked in the open position and fail safe to close when activated. The two halves of the unit will part on load/surge and separation initiates the closure of the valve(s). As the unit separates, flow of the liquid being transferred is stopped and contained within each part of the separated hose (where double closure units are fitted).[2]

The two aspects of floating hose design (leak free interior lining and MBC's) described in the previous paragraph provide complementary protection from small leaks that may occur during routine operations and from significant leaks and spills that could occur during incidents. BWTX believes that the SPM and floating hose flanges can be reasonably classified as "leakless" if installed and operated in accordance with the following requirements and guidelines.

- 33 CFR § 150.405, specifying testing and inspection requirements for floating hoses.
- 33 CFR § 149.650, requiring durability under combined wind, wave, and current forces of the most severe storm that can be expected to occur at the port in any 100-year period.
- OCIMF Guide to Purchasing, Manufacturing and Testing of Loading and Discharge Hoses for Offshore Moorings.
- OCIMF SPM Hose Ancillary Equipment Guide.

Remote sensing technology which can detect and locate leaks and other malfunctions will be installed at the deepwater port, as required under 33 CFR § 149.125.

At the end of each loading operation, the floating hoses will be flushed with sea water, with some sea water entering the tanker's slop oil tanks. This work practice serves to limit the amount of time that the floating hose connectors are in VOC service.

The use of leakless components, high quality construction materials, and remote sensing technologies (Options 1–3) is required under USCG regulations, and involves no additional marginal cost. These options have a marginal cost effectiveness of $0/ton.

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[2] Oil Companies International Marine Forum (OCIMF). *Information Paper— Marine Breakaway Couplings*. November 2008.

Additionally, the work practice of inventorying floating hoses with sea water when idle (Option 7) has no marginal cost.

Regular monitoring of flanges for leaks using an FID, PID, or optical gas imaging device (options 4–5); or AVO inspections (option 6) would require chartering of a special-purpose vessel and employing skilled technicians to conduct the monitoring. The annualized cost of chartering and fueling the vessel and hiring the operator would be similar for all such options, regardless of the cost of monitoring instrumentation. BWTX believes that such costs would exceed $20,000 per year. However, as noted above, inspections would not be permitted during loading operations, and could only take place when the terminal is idle (and the floating hoses are inventoried with sea water). The likelihood of successfully detecting a leak would be reduced, such that the generic control efficiencies cited above would not be realized. If a VOC reduction of 0.08–0.24 tons/yr were realized, it would correspond to a cost effectiveness of $80,000–270,000/ton or greater.

When the technologies identified above are ranked by decreasing control effectiveness, the use of leakless technology is the top ranked option. BWTX does not propose to eliminate the top-ranked option based on energy, environmental or economic impacts.

Therefore, the use of leakless technology, combined with the work practice of inventorying hoses with seawater when idle, is proposed as BACT.

8. *The BACT analysis should include for the proposed monitoring program a compliance strategy (i.e., frequencies of inspections, maintenance repair strategy, recordkeeping, etc.) Please update the application to include a compliance strategy for the proposed monitoring program.*

Response:

The option identified as BACT in the response to Item 7 consists primarily of a required equipment design practice. Equipment design practices are not amenable to ongoing periodic monitoring or recordkeeping after initial compliance has been achieved. If EPA deems it appropriate, BWTX would consider compliance with 33 CFR § 150.405 as a reasonable condition for a PSD permit. BWTX also believes that a reasonable additional monitoring requirement could consist of an annotation in the operator's log indicating that the hose was inventoried with seawater at the conclusion of the loading operation.

9. *The technical infeasibility BACT review discussion in step 2 does not clearly document the technical feasibility difficulties of add on controls based on source-specific design factors and physical, chemical, and engineering principles that preclude the safe and successful use of the control options. Economic, energy, and environmental impacts (step 4 of the BACT analysis) do not influence the removal of a technology during the technical feasibility review in step 2 of the BACT analysis. Please update the application to supplement the technical infeasibility BACT review discussion.*

Response:

BWTX agrees that energy, environmental, and economic impacts do not influence the removal of a technology at step 2 of the top-down BACT process. However, BWTX questions whether step 2 of EPA's top-down BACT process is accurately characterized by the phrasing in this Item. BWTX believes that EPA intends to refer to step 2 in a shorthand manner, rather than require an evaluation not contemplated by the top-down BACT guidance.

At step 2, the top-down BACT guidance distinguishes between "availability" and "applicability" as follows:[3]

> *Two key concepts are important in determining whether an undemonstrated technology is feasible: "availability" and "applicability." A technology is considered "available" if it can be obtained by the applicant through commercial channels or is otherwise available within the common sense meaning of the term. An available technology is "applicable" if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible.*

The guidance therefore establishes a two-part test for determining whether an undemonstrated technology is technically feasible (and therefore must be considered at step 3). Conversely, the test implies that if a technology is not "available," it can be rejected without the need to determine whether it is "applicable."

The phrasing in this Item suggests that EPA would like a more detailed analysis as to whether each of the technologies identified in step 1 of the analysis is "applicable." With the preceding distinction in mind, BWTX would like to comment that the information presented in Section 4.3.3 of the application was primarily intended to demonstrate that the rejected technologies are not "available." BWTX assessed whether a control technology solution consisting of a capture system and final control device was available for each candidate technology.

The application (pp. 4-11–4-13) contains a discussion of factors limiting the "applicability" of the technology referred to as "Vapor recovery pipeline / PLEM." In addition to these, BWTX wishes to explicitly note that its specific source design does not include the construction of any offshore platform.

The application (p. 4-13) contains a discussion of the source-specific design and operational characteristics which distinguish the proposed facility from the offshore loading terminal in El Segundo, CA, where a recovery system onboard a workboat has been deployed. Such a system is not currently commercially available for the proposed terminal.

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[3] EPA Office of Air Quality Planning and Standards. March 15, 1990. *DRAFT "Top-Down" Best Available Control Technology Guidance Document* (henceforth "Top-down Guidance"). At 19.

Source-specific technical factors discussed in the application, each of which is essential to the terminal's basic business purpose, include differences in mooring geometry, sea/weather conditions, product volatility, and product pumping rate.

The application (pp. 4-13–4-14) states, with respect to the "recovery system onboard loaded vessel" technology, that the technology is commercially available, but only "*applicable in cases where the terminal can restrict the types of loaded ships to specially-designed vessels under the control of the terminal owner.*" The application demonstrates elsewhere, with detailed supporting information, that such a control system has only deployed in such cases where the types of loaded ships are so restricted. BWTX believes that this source-specific design factor presents a compelling difference for finding that the solution is not "applicable." One additional remark that may be relevant is the distinction between technologies that are "commercially available" and those that are "available" in the context of an applicant's basic business purpose. In the latter sense, the technology is clearly not "available."

> *The permit issuer (here, the Region) should take a "hard look" at the applicant's determination in order to discern which design elements are inherent for the applicant's purpose and which design elements "may be changed to achieve pollutant emissions reductions without disrupting the applicant's basic business purpose for the proposed facility," while keeping in mind that BACT, in most cases, should not be applied to regulate the applicant's purpose or objective for the proposed facility.*[4]

As a final note, BWTX notes that the top-down guidance does not require for undemonstrated / innovative technologies to be listed at step 1.[5] BWTX elected to discuss, in the context of step 1 of its analysis (Sec. 4.3.2), technologies which might have otherwise been disregarded based on their unavailability / innovative nature. Based on the information presented in its application, BWTX feels that EPA could conclude that the control options eliminated at step 2 in the original analysis are more appropriately eliminated at step 1.

10. *The application only provides emissions in tons per year. The emissions are estimated using generic values. The emission calculations utilize data from* VOC Emissions from Oil and Condensate Storage Tanks: Final Report. *2009. BWTT takes the average values from the data in the report to utilize in the emission calculations. This is done without providing a reasoned justification or scientific basis for using this data. In addition, there no basis is given for the assumptions made in using the average values. BWTT estimated emissions on the VOC species present in the 11 samples in the report instead of using the total hydrocarbons (including methane and ethane). The reasoning given was that the methane, ethane, nitrogen, and carbon dioxide in the crude oil would weather out before it is exported. Does BWTT have any data to support this reasoning? BWTT*

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[4] *In Re Desert Rock Energy Company, LLC*. 14 E.A.D. 484, 530. September 24, 2009. Internal citations omitted.
[5] Top-down Guidance at 13–14.

should also provide documentation or reevaluate the H_2S emissions and ensure that the value given is truly representative of the crude oil to be exported. Please provide an hourly emission estimate and calculate emissions based on known values for the crude oil you intend to export for all pollutants. Please use the entire range of speciated values providing a low end and high end value. In addition, will only crude oil be loaded or will condensate also be loaded? Please utilize available speciation data for emission calculations for the specific products being loaded.

Response:

A detailed response is provided at the end of this submission.

11. *Please provide emission calculations for fugitive emissions for the pipeline and SPM components located in Federal waters.*

Response:

Pipeline and SPM components in Federal waters may include valves or flanges at the subsea pipeline, the PLEM, the underbuoy hoses, the SPM, and the floating hose. The PLEM and underbuoy hoses will contain flanged connections and actuated valves. However, BWTX does not believe that air emissions from submerged piping components are quantifiable, to the extent any will occur.

Each floating hose will have approximately 54 flanged connections, and each SPM buoy will have approximately 4 flanges on the exterior where hoses are connected. Typical emission factors used in air permitting were not developed based on sampling data from offshore loading connections. However, if SOCMI average emission factor for flanges in light liquid service is used (0.0005 lb/hr/component),[6] then the uncontrolled emission rate is less than 0.06 lb/hr and 0.25 tpy VOC per buoy.

As noted in the response to Item 7, BWTX will employ leakless technology and a work practice of inventorying hoses with seawater during idle periods to eliminate fugitive emissions.

12. *If possible, please provide emission calculations for GHG emissions based on source specific data. If using source specific data is not feasible, please provide a detailed reasoning and justification for using the emission factors chosen in the application.*

Response:

BWTX appreciates the suggestion, and hereby revises its calculation for GHG emissions based on source specific data.

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[6] *Air Permit Technical Guidance for Chemical Sources. Fugitive Guidance*. TCEQ Publication APDG 6422v2. June 2018. At 18.

The analysis conducted in response to Item 10 contains estimates of methane emissions. Of the five samples evaluated, the LPG speciation analysis yielded detectable amounts of methane in one of the five samples. The LPG fraction of the sample contained 0.1 vol.% methane, corresponding to 0.00004964 wt.% methane in the liquid phase of the whole crude oil sample. When a suitable K-factor is applied and the liquid phase average molecular weight is considered, the vapor phase mass fraction of methane is estimated at 0.04 %. This corresponds to a methane mass emission rate of 7.2 tpy (180 tpy CO_2e) based on the worst-case annual emission rate.

When estimated CO_2 emissions (produced by the vessel's inert gas generation system) of 17453 tpy CO_2e are considered (cf. application table 3-1), the potential to emit for GHG is less than 75,000 tpy on a CO_2e basis, and GHG BACT requirements no longer apply.

BWTX believes that this result is consistent with the original assumption that methane detected in crude oil at a production site would weather out by the time the crude oil reaches an export terminal (cf. Item 10).

13. *Table 5-1 in the PSD application identifies the maximum impact to land based receptors to be 1.6 ppb. This value is consistent with the results discussed in Appendix B, Ozone Analysis. However, the paragraph below table 5-1 states, "The project impact at the maximally impacted land-based receptor is 1.8 ppb…". Please verify which is the correct value.*

Response:

Thank you for drawing attention to this inconsistency. The correct value is 1.6 ppb.

14. *Section 3.7 of the Air Dispersion Modeling Report indicates that the receptor grid data was developed based on each of the single point mooring systems being surrounded by a circular "safety zone" and an additional circular "area to be avoided" making a composite circular boundary with radius of 1,350 meters around each of the central buoys. Please provide additional information regarding the difference between these areas, including what if any access the public may have within the areas. This information is necessary to determine if the ambient air has been appropriately represented within the modeling analysis.*

Response:

An Area to be Avoided (ATBA) is a "*routeing [sic] measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or certain classes of ship*."[7] ATBA's are recommendatory routing measures established via the IMO to promote safety of life and property, marine environmental protection, and navigation safety at deepwater ports and adjacent waters (33 CFR § 150.905). ATBA's are established by USCG regulation around each Deepwater Port and are marked on navigational charts.

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[7] *General Provisions on Ships' Routeing*. IMO Resolution A.572(14). Adopted November 20, 1985.

The activities of vessels are regulated within ATBA's; however, fishing, and the transit of vessels other than tanker or support vessels is not prohibited within an ATBA so long as communication is maintained with the person in charge of vessel operations (33 CFR § 150.380).

BWTX believes that EPA has discretion to exclude ATBA's from the definition of "ambient air" if appropriate conditions are met. Notwithstanding, however, BWTX has also determined that air quality impacts for the present project remain acceptable even if receptors are placed within the ATBA, up to the perimeter of the safety zone. Without prejudicing its position relating to ATBA's, BWTX suggests that EPA only exclude the safety zone from the definition of "ambient air" for the present demonstration, consistent with previous determinations.[8] The revised air dispersion modeling analysis (Cf. Item 18) incorporates receptors within the ATBA.

15. *Section 3.8 of the Air Dispersion Modeling Report states that due to missing dew point temperatures within the buoy data, the relative humidity values used in the meteorological data input file were obtained from the NSRDB website. Please provide additional information regarding the nature of data available from the NSRDB website. This information is necessary to determine if the NSRDB data is appropriate for use in an air dispersion modeling analysis. Also, please indicate why the SPM locations were chosen for data retrieval from the database instead of the location of meteorological stations from which the other meteorological parameters were taken.*

Response:

The National Solar Radiation Database (NSRDB) is a serially complete collection of hourly and half-hourly values of the three most common measurements of solar radiation—global horizontal, direct normal, and diffuse horizontal irradiance—and meteorological data. These data have been collected at a sufficient number of locations and temporal and spatial scales to accurately represent regional solar radiation climates. The data contributors include the National Renewable Energy Laboratory, U.S. Department of Energy, National Oceanic and Atmospheric Administration, National Aeronautics and Space Administration, and several university contributors.

The Physical Solar Model (PSM) was used to transform this data into a gridded format (4 km × 4 km segments) that is used to estimate solar radiation at any location within the United States for any time period after 1998 with as little as a 30-minute temporal resolution. PSM uses cloud properties from the satellite retrievals and then uses those properties to calculate surface radiation. More information is available here https://nsrdb.nrel.gov/current-version#psm.

All components of the selected meteorological data were selected based on their representativeness to meteorological conditions at the SPMs. Because the solar radiation

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[8] E.g., Steven Riva (R2) to Leon Sedefian (NYSDEC). October 9, 2007. *Re: Ambient Air for the Offshore LNG Broadwater Project*.

data was available at the SPM location, this data was selected because it was more representative of on-site conditions than they buoy locations.

16. *Please provide additional information to justify the use of 2013 met data from Buoy 42019 instead of from station PTAT2, which was used for 2014-2016 data, when Table 3-4 of the Air Dispersion Modeling Report indicates that the data completeness was the same for both locations. Please also provide information on whether there was consideration to utilize met data from one meteorological station for all 5 years and using data substitution from a nearby meteorological station only for missing data.*

Response:

Buoy 42019 is closer to the BWTT than PTAT2 and was the preferred source of meteorological data in cases where data capture doesn't favor PTAT2.

Originally, the PTAT2 meteorological data was obtained merely to fill in gaps within the data from Buoy 42019. However, significant amounts of information are missing from the 2014 and 2015 data sets for Buoy 42019. A hybrid data set for these periods may be irregularly disjointed. Such a hybrid data set is less likely to include persistent wind conditions— persistence could lead to higher concentrations for longer term averaging periods. In order to avoid artificially lowering concentrations for longer term averaging periods by using less persistent wind conditions, a single buoy was selected for each calendar year.

The other years of meteorology did not have significant data adequacy issues, but for each year the buoy with better data adequacy was selected for consistency. The exception, as noted, was for 2013. The data capture is identical for both sites for 2013, therefore Buoy 42019 was selected because it is closer to the Terminal.

17. *Section 5.2.3 of the PSD Application and 5.4 of the Air Dispersion Modeling Report indicated that the modeled impacts are acceptable even though the 1-hour ESL values for Crude Oil Vapor (<1% Benzene) are exceeded because the magnitude of exceedance falls within the acceptable range of 10 times the ESL over industrial waters. Please provide additional information regarding where the predicted exceedances occur that demonstrates that all modeled exceedances occur at locations that meet the definition of "industrial waters" as defined in the TCEQ's guidelines references in the PSD application. This information may include, but is not limited to, a plot showing the receptor locations with model predicted exceedances of the ESLs along with information to support a determination that the locations would be considered industrial waters.*

Response:

The TCEQ guidance in question provides in relevant part that:

> *For the purposes of the effects evaluation of marine vessel facilities, a determination will be made on a case-by-case basis whether the adjacent water will be evaluated as industrial or recreational. In some evaluations, waters may not be specifically designated industrial or recreational during the review, but will be evaluated with*

consideration for who is likely to be exposed to emissions from the marine vessel activities.

BWTX notes that the determinations referred to in the TCEQ guidance are made by TCEQ Toxicologists. For the present permitting process, which falls under EPA's jurisdiction, it is uncertain what process EPA would use for making a determination as to whether certain receptors are located in "industrial waters" or "recreational waters" or whether it is more appropriate to avoid making a designation and instead considering the public's likelihood of exposure to emissions from the facility.

However, such a determination is no longer necessary under the revised impacts analysis prepared in response to Item 18. Impacts are acceptable regardless of whether off-property receptors are treated as "industrial waters" or as "recreational waters."

BWTX believes that the information request under this Item should be suspended pending review of the revised dispersion modeling analysis.

18. *The current State Health Effects Analysis only evaluates impacts for Crude Oil Vapors (<1% Benzene). Once the speciation data requested in Item 10 (above), has been obtained please update the analysis to address each of the speciated constituents that have corresponding ESL values.*

Response:

BWTX appreciates the suggestion, and has revised its State Health Effects Analysis accordingly.

AERMOD inputs were revised to extend the receptor grid inward to occupy the ATBA, and a unit emission rate was modeled for each SPM buoy. The worst-case 1-hr average impact corresponds to 4.31884 μg/m^3 per lb/hr and the worst-case annual average impact corresponds to 0.0177 μg/m^3 per tpy. The receptor with the highest impact occurs at the western edge of the safety zone surrounding buoy 1. GLC_{MAX} values for each constituent were determined by multiplying the worst-case hydrocarbon emission rate by the worst-case vapor phase mass fraction for the constituent.

For example, the GLC_{MAX} for Benzene was calculated as follows. The highest lb/hr hydrocarbon emission rate is 8007 lb/hr, and the highest vapor phase benzene mass fraction under the T=95° F condition is 0.35%. The worst-case benzene emission rate is therefore 28.20 lb/hr, corresponding to a worst-case impact of 121 μg/m^3.

As noted in the response to Item 10, speciation data was obtained for five samples of crude oil which represent the range of products that BWTX intends to handle at the terminal. The total number of constituents positively identified in the samples ranged from 82–91. The vapor phase was estimated for each constituent and each sample, and an ESL was identified for each constituent from TCEQ's Toxicity Factor Database (henceforth "ESL list") for each constituent as well. In many cases, however, the ESL list specifies that a particular compound is surrogated to another for purposes of determining a screening factor. Thus, for example, *cis*-2-octene is surrogated to 1-octene and *cis*-1,3-dimethylcyclohexane is surrogated to methylcyclohexane. Therefore, as a conservative measure, BWTX treated all “surrogate groups” consisting of a particular compound as well as all compounds surrogated to that compound as individual air contaminants for estimating emissions and evaluating impacts. The vapor phase mass fractions of all constituents belonging to the same surrogate group were summed for impacts evaluation purposes. A total of 26 surrogate groups were identified. Model results are provided in Appendix B-3 of this submission. The predicted off-property impacts at the worst-impacted off-property receptor are less than the applicable ESL for each constituent and averaging time.

Therefore, BWTX believes that emissions from the project are consistent with the intent of the Texas Clean Air Act.

Supporting documentation and calculations are presented in Appendix B of this response. Electronic modeling files may be found at the following link:

https://disorboconsult.app.box.com/s/nueo3v5v1t3nfi774isfgtvan1ex88ga

Response to PSD Incompleteness Notification, Items 1 and 10

The response to this item is divided into two portions. First, BWTX briefly responds to the specific questions about the emissions calculation methodology presented in the application. Second, BWTX presents a proposed, revised emission calculation methodology.

Methodological Remarks

The data in the referenced publication was selected because BWTX felt that it was methodologically apt: it was the only study identified providing comprehensive, directly measured data on the composition of vapors in the headspace of a crude oil storage tank. As EPA observes, however, several assumptions had to be made in order to use the data to develop emission factors. These assumptions were guided by two customary heuristics in developing emission calculations: first, assumptions should be scientifically-based, and should be conservative to the extent that their accuracy is not known; and second, they should be susceptible to verification in the form of permit monitoring requirements.

The mean was selected for several parameters for which multiple results were reported because these parameters were treated as random variables. A sample mean corresponds to the expected value of a random variable.

The solubility of gases in liquids is usually pressure-dependent, and not well-modeled by Raoult's law.[1] When the pressure of a system is suddenly reduced (e.g., when crude oils are removed from reservoirs), "weathering" or flash volatilization of gaseous compounds such as methane, ethane, carbon dioxide and nitrogen is expected. This intuition is consistent with the speciation data discussed below. Excluding these low-molecular weight compounds from the vapor phase molecular weight estimation was a conservative assumption which tended to increase reported emissions.

Basic assay data were compiled from fourteen crude oil samples representing the range of crude oils BWTX expects to handle. Reported dissolved H_2S values range from 0–2 ppm, consistent with assumed value of 2 ppm used in the application.

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14
H_2S (ppm)	1	1	2	2	2	2	1	1	1	0	–	1	2	1

BWTX understands stabilized lease condensate to be a type of crude oil, when factors such as geologic reservoir and volatility are controlled for, and is unaware of any methodology for identifying a particular sample of unknown provenance as "crude oil" rather than "condensate." This understanding is reflected in the terms of the suggested NOMA. To answer EPA's specific question, BWTX does not currently plan to load condensate at the SPM terminal.

[1] J. H. Hildebrand. "Solubility." J. Am. Chem. Soc. 1916, 38(8) 1452–1473.

Revised Methodology for Determining Speciated Emission Rates

In order to address EPA's request to "calculate emissions based on known values for the crude oil you intend to export for all pollutants," BWTX obtained detailed sampling data for five crude oil samples which are representative of the range of crude oils that BWTX expects to handle.

Data available for each sample included a boiling point distribution (ASTM D7169), a detailed hydrocarbon analysis (ASTM D7169 Appendix 1), relative densities of different cuts (various methods), and an analysis of the LPG cut (initial boiling point–70° F; ASTM D2163). The data provided detailed information on the liquid phase composition of a crude oil sample.

In order to estimate the composition of the vapors in equilibrium with each liquid sample, BWTX computed mole fractions for each constituent. Next, published K-factor nomographs[2] were used to determine equilibrium gas phase mole fractions of methane and ethane, and Raoult's law was used to determine gas phase partial pressures for all other constituents. Raoult's law was not used for methane and ethane because their respective critical temperatures may be exceeded at ambient conditions.

In order to determine the molecular weight of the crude oil sample as a whole, the molecular weight of each cut for which relative densities were reported was determined using the following published correlation,[3] where T_b is the middle boiling point of a petroleum fraction in Kelvins and d is the relative density of the cut.

$$MW = \frac{0.010770 T_b^{1.52869+0.06486 \ln\left(\frac{T_b}{1078-T_b}\right)}}{d} \tag{1}$$

The proportion of the total sample corresponding to a particular cut, as well as the middle boiling point of each cut, was determined from boiling curves. For the LPG cut, the molecular weight was calculated directly from the speciation data mentioned above rather than from Goossens' correlation. The liquid phase average molecular weight is the harmonic mean of the molecular weights of the various cuts, weighted by their mass fractions.

Once mole fractions were calculated for each constituent reported in the detailed hydrocarbon analysis (the number of positively identified constituents ranged from 82–91), partial pressures were calculated for each constituent (excepting methane and ethane) using Raoult's law at two temperatures: 72.1° F (annual average) and 95° F (assumed worst-case hourly average). Pure component vapor pressures were calculated from Antoine equation coefficients downloaded from NIST Webbook. Where published coefficients were not identifiable, a structurally similar isomer was selected as a surrogate for purposes of determining vapor pressures.

Constituent-specific partial pressures and calculated yi values for methane and ethane were used to develop a complete speciation of the vapor phase in equilibrium with the liquid phase of the sample, and thence to calculate the vapor phase molecular weight. Once the average vapor phase molecular weight was estimated, it was possible to determine the vapor phase mass fraction of each constituent. Additionally,

[2]Gas Processors Suppliers Association. 2004. Engineering Data Book (Sec. 25). Tulsa, OK.

[3]Goossens, Adriaan G. Prediction of Molecular Weight of Petroleum Fractions. Ind. Eng. Chem. Res. 1996, 35: 985–988.

partial pressures were summed to obtain a total vapor pressure and a total VOC vapor pressure for each sample and temperature (ten values total). Vapor phase molecular weights (lb/lbmol), VOC vapor pressures (psia), and emission rates (based on product throughputs and pumping rates represented in the application) are reported below for each sample and temperature condition.

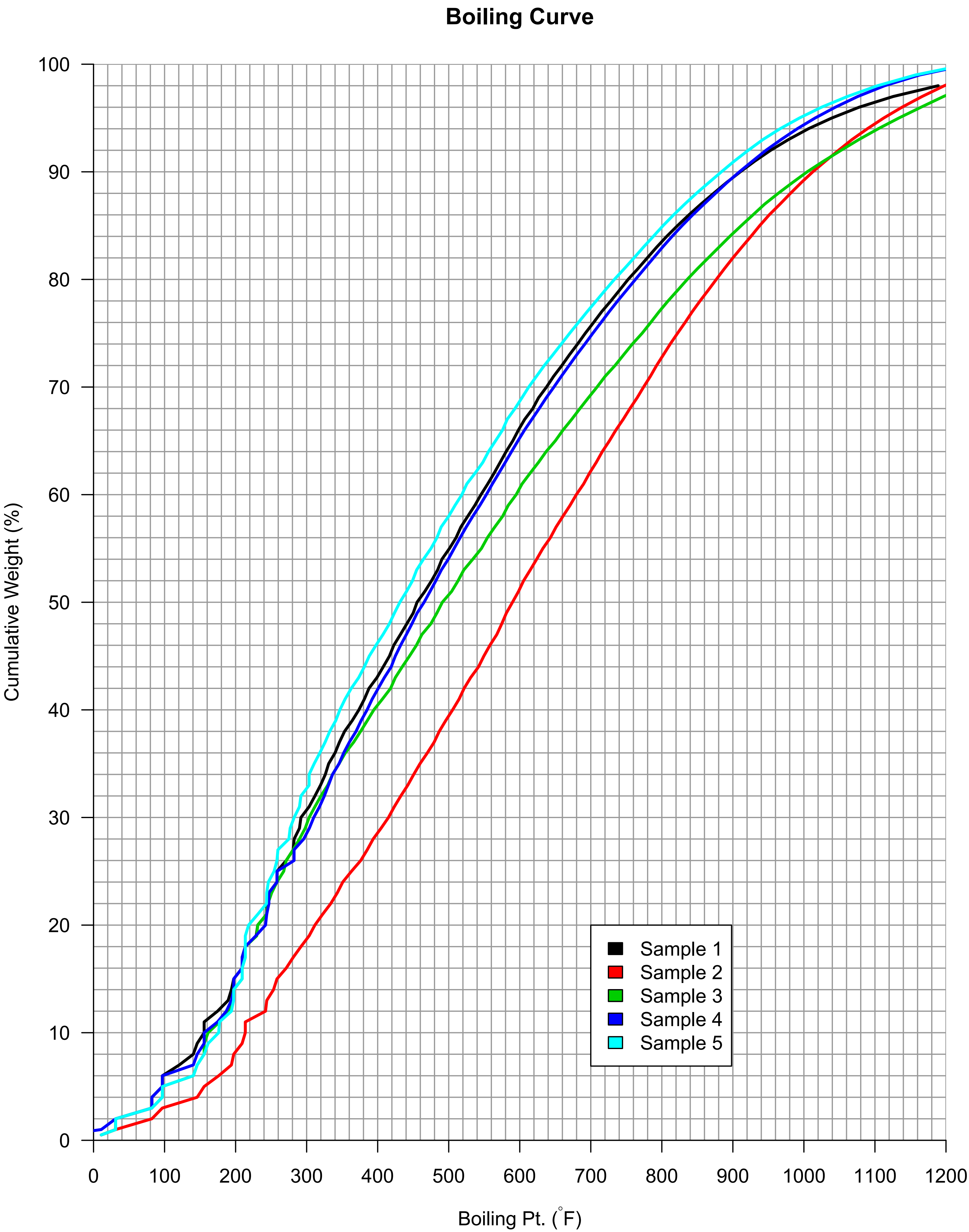
Sample	1	2	3	4	5
MW (72.1° F)	59.37	57.07	56.89	53.04	55.94
MW (95° F)	60.32	58.09	57.75	53.57	56.79
HC VP (72.1° F)	5.24	3.37	4.59	6.44	4.55
HC VP (95° F)	7.74	4.94	6.74	9.32	6.67
VOC VP (72.1° F)	5.24	3.31	4.38	5.86	4.28
VOC VP (95° F)	7.74	4.83	6.36	8.28	6.18
HC ER (lb/hr)	7488	4607	6247	8007	6071
HC ER (tpy)	11767	7276	9859	12904	9611
VOC ER (lb/hr)	7488	4504	5892	7118	5632
VOC ER (tpy)	11767	7144	9407	11749	9051

Vapor phase mass fractions for HAP constituents are summarized below for each sample at the T=95° F condition. Styrene was detected in only one sample. Isooctane, cresols, and naphthalene were not positively identified in any sample.

Sample	1	2	3	4	5
n-Hexane	3.20 %	3.09 %	3.57 %	3.13 %	3.57 %
Benzene	0.34 %	0.058 %	0.35 %	0.20 %	0.34 %
Toluene	0.19 %	0.13 %	0.28 %	0.13 %	0.33 %
m-Xylene	0.097 %	0.046 %	0.048 %	0.037 %	0.074 %
p-Xylene	0.049 %	0.056 %	0.034 %	0.028 %	0.043 %
o-Xylene	0.022 %	0.021 %	0.018 %	0.014 %	0.022 %
Ethylbenzene	0.011 %	0.017 %	0.027 %	0.011 %	0.021 %
Styrene	0.001 %	—	—	—	—

More detailed results, supporting calculations and figures are included as in Appendix A of this submission. While the results of this analysis generally support the assumptions originally made in the permit application, BWTX believes that EPA's preference is to use site-specific data to estimate emission rates, and requests that the source's potential to emit be updated based on the revised emission rates presented herein.

Appendix A-1— Boiling Curves for Five Crude Oil Samples



Boiling Curve
Cumulative Weight (%)
Boiling Pt. (°F)
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
Sample 1
Sample 2
Sample 3
Sample 4
Sample 5

Appendix A-2— Sample Calculation for Liquid Phase Molecular Weight Estimation

$$\text{MW} = g(T_b, d) = \frac{0.010770 T_b^{1.52869 + 0.06486 \ln\left(\frac{T_b}{1078 - T_b}\right)}}{d} \tag{2}$$

$$T/K = f(T/^\circ F) = \frac{T/^\circ F + 459.67}{1.8} \tag{3}$$

$$\text{MW} = g \circ (f \circ T_b, d) \tag{4}$$

Where:

$T_b =$ Middle poiling point of fraction (K) (from boiling curve)
$d =$ Relative density of fraction (dimensionless)

Cuts for which density data are available ($^\circ F$):

IBP – 70
70 – 155
155 – 185
185 – 210
210 – 270
270 – 335
335 – 380
380 – 450
450 – 510
510 – 580
580 – 660
660 – 785
785 – 900
900 – 1050
1050 – FBP

For Sample 1,

$$T_b/^\circ F = \begin{bmatrix} - \\ 105.1 \\ 161.6 \\ 197.1 \\ 243.8 \\ 299.8 \\ 354.9 \\ 415.9 \\ 479.9 \\ 544.8 \\ 618.2 \\ 718.4 \\ 837.1 \\ 962.6 \\ 1166.2 \end{bmatrix} \quad d = \begin{bmatrix} - \\ 0.6494 \\ 0.6974 \\ 0.7172 \\ 0.7402 \\ 0.7614 \\ 0.7676 \\ 0.7780 \\ 0.7956 \\ 0.8095 \\ 0.8227 \\ 0.8418 \\ 0.8516 \\ 0.8649 \\ 0.8820 \end{bmatrix} \quad \text{MW}/\frac{\text{lb}}{\text{lbmol}} = \begin{bmatrix} \text{MW}_{\text{LPG}} = 58.9 \\ 78.0 \\ 88.0 \\ 95.9 \\ 107.2 \\ 122.6 \\ 141.6 \\ 163.9 \\ 188.3 \\ 216.5 \\ 252.8 \\ 309.9 \\ 298.3 \\ 518.4 \\ 832.1 \end{bmatrix} \tag{5}$$

MW_{LPG} is determined directly from the LPG analysis.

$$\text{MW}_{avg} = \left(\frac{\sum_{i=1}^{n} w_i \text{MW}_i^{-1}}{\sum_{i=1}^{n} w_i} \right)^{-1} \tag{6}$$

$$w/\%\text{(from boiling curve)} = \begin{bmatrix} 2.76 \\ 7.17 \\ 2.77 \\ 4.49 \\ 8.72 \\ 9.54 \\ 5.39 \\ 8.16 \\ 6.96 \\ 7.94 \\ 8.16 \\ 10.34 \\ 7.05 \\ 5.82 \\ 4.72 \end{bmatrix} \tag{7}$$

$$\text{MW} = 156.7\ \text{lb/lbmol} \tag{8}$$

Appendix A-3— Speciation Calculations

Sample 1, T=72.1° F

Average Molecular Weight		
Liquid Phase:	156.75	lb/lbmol
Vapor Phase:	59.37	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.00	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-butane	1.90000	0.05124	32.33790	1.65696	0.31595	30.93028
propane	0.32000	0.01137	128.84470	1.46558	0.27946	20.75558
i-butane	0.60000	0.01618	46.68395	0.75538	0.14404	14.10059
i-pentane	1.85000	0.04019	12.06945	0.48509	0.09250	11.24029
n-pentane	2.17000	0.04714	8.94467	0.42168	0.08041	9.77108
n-hexane	2.15000	0.03911	2.59458	0.10146	0.01935	2.80818
2-methylpentane	1.36000	0.02474	3.65310	0.09037	0.01723	2.50103
3-methylpentane	0.86000	0.01564	3.27061	0.05116	0.00976	1.41594
n-heptane	2.04000	0.03191	0.77018	0.02458	0.00469	0.79093
cyclopentane	0.25000	0.00559	5.50431	0.03075	0.00586	0.69273
2-methylhexane	0.94000	0.01470	1.11769	0.01643	0.00313	0.52889
methylcyclohexane	1.30000	0.02075	0.78425	0.01628	0.00310	0.51323
3-methylhexane	0.90000	0.01408	1.04376	0.01469	0.00280	0.47289
methylcyclopentane	0.38000	0.00708	2.35878	0.01669	0.00318	0.45122
cyclohexane	0.52000	0.00968	1.66588	0.01613	0.00308	0.43608
2,2-dimethylbutane	0.10000	0.00182	5.54852	0.01009	0.00192	0.27932
toluene	1.11000	0.01888	0.47674	0.00900	0.00172	0.26639
n-octane	1.76000	0.02415	0.23106	0.00558	0.00106	0.20472
benzene	0.20000	0.00401	1.61828	0.00649	0.00124	0.16293
2-methylheptane	0.84000	0.01153	0.34326	0.00396	0.00075	0.14515
3-methylheptane	0.73000	0.01002	0.34326	0.00344	0.00066	0.12614
2,4-dimethylpentane	0.14000	0.00219	1.68004	0.00368	0.00070	0.11840
2,2-dimethylpropane	0.01000	0.00022	22.76363	0.00495	0.00094	0.11459
2,3-dimethylpentane	0.18000	0.00282	1.17057	0.00330	0.00063	0.10607
1t,3-dimethylcyclopentane	0.14000	0.00223	1.28929	0.00288	0.00055	0.09086
1t,2-dimethylcyclopentane	0.13000	0.00208	1.28929	0.00268	0.00051	0.08437
2,2-dimethylpentane	0.09000	0.00141	1.79972	0.00253	0.00048	0.08154
1,3-dimethylbenzene	1.03000	0.01521	0.13786	0.00210	0.00040	0.07148
2,2,3-trimethylpentane	0.16000	0.00220	0.83572	0.00183	0.00035	0.06731

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1c,3-dimethylcyclopentane	0.08000	0.00128	1.28929	0.00165	0.00031	0.05192
2,2,3-trimethylhexane	0.53000	0.00648	0.18914	0.00123	0.00023	0.05046
4-methylheptane	0.29000	0.00398	0.34223	0.00136	0.00026	0.04996
1c,2t,3-trimethylcyclopentane	0.35000	0.00489	0.26991	0.00132	0.00025	0.04756
n-nonane	1.60000	0.01955	0.05669	0.00111	0.00021	0.04566
1,1-dimethylcyclopentane	0.07000	0.00112	1.28929	0.00144	0.00027	0.04543
2,4-dimethylhexane	0.17000	0.00233	0.50803	0.00119	0.00023	0.04348
1,4-dimethylbenzene	0.49000	0.00723	0.14614	0.00106	0.00020	0.03605
3,3-dimethylpentane	0.05000	0.00078	1.41421	0.00111	0.00021	0.03560
1t,4-dimethylcyclohexane	0.16000	0.00223	0.26991	0.00060	0.00012	0.02174
2,3-dimethylhexane	0.09000	0.00123	0.39143	0.00048	0.00009	0.01773
1,2-dimethylbenzene	0.29000	0.00428	0.10833	0.00046	0.00009	0.01581
1c,2c,3-trimethylcyclopentane	0.11000	0.00154	0.26991	0.00041	0.00008	0.01495
i-propylcyclopentane	0.11000	0.00154	0.26991	0.00041	0.00008	0.01495
1c,2-dimethylcyclohexane	0.12000	0.00168	0.24055	0.00040	0.00008	0.01453
3,3-dimethylhexane	0.06000	0.00082	0.47758	0.00039	0.00007	0.01443
2,2-dimethylhexane	0.05000	0.00069	0.57233	0.00039	0.00007	0.01441
3-methyloctane	0.48000	0.00587	0.05669	0.00033	0.00006	0.01370
2-methyloctane	0.47000	0.00574	0.05669	0.00033	0.00006	0.01341
4-methyloctane	0.35000	0.00428	0.05669	0.00024	0.00005	0.00999
1,1-dimethylcyclohexane	0.07000	0.00098	0.26991	0.00026	0.00005	0.00951
2,5-dimethylheptane	0.32000	0.00391	0.05669	0.00022	0.00004	0.00913
2,2,3-trimethylbutane	0.01000	0.00016	1.75367	0.00027	0.00005	0.00883
ethylbenzene	0.10000	0.00148	0.15620	0.00023	0.00004	0.00786
2-methyl-3-ethylpentane	0.03000	0.00041	0.50948	0.00021	0.00004	0.00769
2,5-dimethylhexane	0.03000	0.00041	0.50948	0.00021	0.00004	0.00769
1c,2t,4-trimethylcyclopentane	0.05000	0.00070	0.26991	0.00019	0.00004	0.00679
3,4-dimethylhexane	0.03000	0.00041	0.36235	0.00015	0.00003	0.00547
1t,2c,3-trimethylcyclopentane	0.04000	0.00056	0.26991	0.00015	0.00003	0.00543
3-methyl-3-ethylpentane	0.02000	0.00027	0.38632	0.00011	0.00002	0.00389
2,3,5-trimethylhexane	0.03000	0.00037	0.18914	0.00007	0.00001	0.00286
4,4-dimethylheptane	0.10000	0.00122	0.05669	0.00007	0.00001	0.00285
2,2,5-trimethylhexane	0.02000	0.00024	0.27648	0.00007	0.00001	0.00278
3,3-diethylpentane	0.07000	0.00086	0.05669	0.00005	0.00001	0.00200
3,3-dimethylheptane	0.07000	0.00086	0.05669	0.00005	0.00001	0.00200
2,3,4-trimethylhexane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00190
c-octene-2	0.01000	0.00014	0.28862	0.00004	0.00001	0.00145
1,1-methylethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
1c,3-dimethylcyclohexane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
2t-ethylmethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
3c-ethylmethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
3t-ethylmethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
1c,2t,4t-trimethylcyclohexane	0.03000	0.00037	0.07721	0.00003	0.00001	0.00117
3,5-dimethylheptane	0.04000	0.00049	0.05669	0.00003	0.00001	0.00114

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
3,4-dimethylheptane	0.03000	0.00037	0.05669	0.00002	0.000004	0.00086
Styrene	0.01000	0.00015	0.10747	0.00002	0.000003	0.00054
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
1c,2t,4c-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
2,2-dimethylheptane	0.01000	0.00012	0.05669	0.00001	0.000001	0.00029
4-ethylheptane	0.01000	0.00012	0.05669	0.00001	0.000001	0.00029

Sample 1, T=95°F

Average Molecular Weight		
Liquid Phase:	156.75	lb/lbmol
Vapor Phase:	60.32	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	0.00	psia

Component	m$_{liq}$ (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m$_{vap}$ (%)
n-butane	1.90000	0.05124	47.45453	2.43152	0.31417	30.27285
propane	0.32000	0.01137	176.65380	2.00940	0.25963	18.97994
i-butane	0.60000	0.01618	67.05331	1.08497	0.14018	13.50808
i-pentane	1.85000	0.04019	18.67352	0.75051	0.09697	11.59899
n-pentane	2.17000	0.04714	14.16178	0.66763	0.08626	10.31810
n-hexane	2.15000	0.03911	4.43665	0.17350	0.02242	3.20270
2-methylpentane	1.36000	0.02474	6.08944	0.15063	0.01946	2.78060
3-methylpentane	0.86000	0.01564	5.48122	0.08574	0.01108	1.58270
n-heptane	2.04000	0.03191	1.42681	0.04553	0.00588	0.97728
cyclopentane	0.25000	0.00559	8.96348	0.05008	0.00647	0.75238
2-methylhexane	0.94000	0.01470	2.01204	0.02959	0.00382	0.63502
methylcyclohexane	1.30000	0.02075	1.42286	0.02953	0.00382	0.62105
3-methylhexane	0.90000	0.01408	1.88579	0.02655	0.00343	0.56985
methylcyclopentane	0.38000	0.00708	4.03151	0.02853	0.00369	0.51437
cyclohexane	0.52000	0.00968	2.90982	0.02818	0.00364	0.50803
toluene	1.11000	0.01888	0.90368	0.01706	0.00220	0.33679
2,2-dimethylbutane	0.10000	0.00182	8.93253	0.01625	0.00210	0.29991
n-octane	1.76000	0.02415	0.46549	0.01124	0.00145	0.27507
benzene	0.20000	0.00401	2.86487	0.01150	0.00149	0.19238
2-methylheptane	0.84000	0.01153	0.66923	0.00771	0.00100	0.18875
3-methylheptane	0.73000	0.01002	0.66923	0.00670	0.00087	0.16403
2,4-dimethylpentane	0.14000	0.00219	2.93417	0.00643	0.00083	0.13792
2,3-dimethylpentane	0.18000	0.00282	2.08700	0.00588	0.00076	0.12613
2,2-dimethylpropane	0.01000	0.00022	33.79926	0.00734	0.00095	0.11348
1t,3-dimethylcyclopentane	0.14000	0.00223	2.27727	0.00509	0.00066	0.10704
1t,2-dimethylcyclopentane	0.13000	0.00208	2.27727	0.00473	0.00061	0.09940
1,3-dimethylbenzene	1.03000	0.01521	0.28049	0.00427	0.00055	0.09700
2,2-dimethylpentane	0.09000	0.00141	3.11782	0.00439	0.00057	0.09421
2,2,3-trimethylpentane	0.16000	0.00220	1.51201	0.00332	0.00043	0.08123
2,2,3-trimethylhexane	0.53000	0.00648	0.37895	0.00245	0.00032	0.06743
4-methylheptane	0.29000	0.00398	0.66709	0.00265	0.00034	0.06495

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-nonane	1.60000	0.01955	0.11691	0.00229	0.00030	0.06281
1c,2t,3-trimethylcyclopentane	0.35000	0.00489	0.52453	0.00256	0.00033	0.06164
1c,3-dimethylcyclopentane	0.08000	0.00128	2.27727	0.00291	0.00038	0.06117
2,4-dimethylhexane	0.17000	0.00233	0.96101	0.00224	0.00029	0.05485
1,1-dimethylcyclopentane	0.07000	0.00112	2.27727	0.00254	0.00033	0.05352
1,4-dimethylbenzene	0.49000	0.00723	0.29779	0.00215	0.00028	0.04899
3,3-dimethylpentane	0.05000	0.00078	2.47165	0.00193	0.00025	0.04149
1t,4-dimethylcyclohexane	0.16000	0.00223	0.52453	0.00117	0.00015	0.02818
2,3-dimethylhexane	0.09000	0.00123	0.75123	0.00093	0.00012	0.02270
1,2-dimethylbenzene	0.29000	0.00428	0.22572	0.00097	0.00012	0.02198
1c,2c,3-trimethylcyclopentane	0.11000	0.00154	0.52453	0.00081	0.00010	0.01937
i-propylcyclopentane	0.11000	0.00154	0.52453	0.00081	0.00010	0.01937
1c,2-dimethylcyclohexane	0.12000	0.00168	0.47036	0.00079	0.00010	0.01895
3-methyloctane	0.48000	0.00587	0.11691	0.00069	0.00009	0.01884
2-methyloctane	0.47000	0.00574	0.11691	0.00067	0.00009	0.01845
3,3-dimethylhexane	0.06000	0.00082	0.90338	0.00074	0.00010	0.01820
2,2-dimethylhexane	0.05000	0.00069	1.06869	0.00073	0.00009	0.01794
4-methyloctane	0.35000	0.00428	0.11691	0.00050	0.00006	0.01374
2,5-dimethylheptane	0.32000	0.00391	0.11691	0.00046	0.00006	0.01256
1,1-dimethylcyclohexane	0.07000	0.00098	0.52453	0.00051	0.00007	0.01233
ethylbenzene	0.10000	0.00148	0.31926	0.00047	0.00006	0.01072
2,2,3-trimethylbutane	0.01000	0.00016	3.01654	0.00047	0.00006	0.01013
2-methyl-3-ethylpentane	0.03000	0.00041	0.96528	0.00040	0.00005	0.00972
2,5-dimethylhexane	0.03000	0.00041	0.96528	0.00040	0.00005	0.00972
1c,2t,4-trimethylcyclopentane	0.05000	0.00070	0.52453	0.00037	0.00005	0.00881
1t,2c,3-trimethylcyclopentane	0.04000	0.00056	0.52453	0.00029	0.00004	0.00704
3,4-dimethylhexane	0.03000	0.00041	0.69690	0.00029	0.00004	0.00702
3-methyl-3-ethylpentane	0.02000	0.00027	0.73113	0.00020	0.00003	0.00491
4,4-dimethylheptane	0.10000	0.00122	0.11691	0.00014	0.00002	0.00393
2,3,5-trimethylhexane	0.03000	0.00037	0.37895	0.00014	0.00002	0.00382
2,2,5-trimethylhexane	0.02000	0.00024	0.54293	0.00013	0.00002	0.00365
3,3-diethylpentane	0.07000	0.00086	0.11691	0.00010	0.00001	0.00275
3,3-dimethylheptane	0.07000	0.00086	0.11691	0.00010	0.00001	0.00275
2,3,4-trimethylhexane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00254
c-octene-2	0.01000	0.00014	0.57018	0.00008	0.00001	0.00191
1,1-methylethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
1c,3-dimethylcyclohexane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
2t-ethylmethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
3c-ethylmethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
3t-ethylmethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
1c,2t,4t-trimethylcyclohexane	0.03000	0.00037	0.16373	0.00006	0.00001	0.00165
3,5-dimethylheptane	0.04000	0.00049	0.11691	0.00006	0.00001	0.00157
3,4-dimethylheptane	0.03000	0.00037	0.11691	0.00004	0.00001	0.00118
Styrene	0.01000	0.00015	0.22287	0.00003	0.000004	0.00075

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000003	0.00055
1c,2t,4c-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000003	0.00055
2,2-dimethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00039
4-ethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00039

Sample 2, T=72.1° F

Average Molecular Weight		
Liquid Phase:	189.92	lb/lbmol
Vapor Phase:	57.07	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00004964	%
Methane y_i	982.09	ppm
Methane Mass% Vap	0.02760403	%
Ethane K:	28.63	
Ethane p_i:	0.06	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.25000	0.01077	128.84470	1.38734	0.41877	32.35932
n-butane	0.74000	0.02418	32.33790	0.78194	0.23603	24.04011
i-butane	0.25000	0.00817	46.68395	0.38136	0.11511	11.72466
i-pentane	0.81000	0.02132	12.06945	0.25735	0.07768	9.82121
n-pentane	0.98000	0.02580	8.94467	0.23075	0.06965	8.80609
n-hexane	1.03000	0.02270	2.59458	0.05890	0.01778	2.68471
2-methylpentane	0.60000	0.01322	3.65310	0.04831	0.01458	2.20194
methylcyclopentane	0.70000	0.01580	2.35878	0.03726	0.01125	1.65874
3-methylpentane	0.38000	0.00837	3.27061	0.02739	0.00827	1.24855
methylcyclohexane	1.54000	0.02979	0.78425	0.02336	0.00705	1.21329
cyclohexane	0.64000	0.01444	1.66588	0.02406	0.00726	1.07107
cyclopentane	0.18000	0.00487	5.50431	0.02683	0.00810	0.99533
ethane	0.01000	0.00063		0.06101	0.01808	0.95284
n-heptane	1.04000	0.01971	0.77018	0.01518	0.00458	0.80467
3-methylhexane	0.43000	0.00815	1.04376	0.00851	0.00257	0.45088
2-methylhexane	0.36000	0.00682	1.11769	0.00763	0.00230	0.40422
1t,2-dimethylcyclopentane	0.31000	0.00600	1.28929	0.00773	0.00233	0.40152
1t,3-dimethylcyclopentane	0.22000	0.00426	1.28929	0.00549	0.00166	0.28495
1c,3-dimethylcyclopentane	0.19000	0.00368	1.28929	0.00474	0.00143	0.24609
n-octane	0.99000	0.01646	0.23106	0.00380	0.00115	0.22981
2,3-dimethylpentane	0.15000	0.00284	1.17057	0.00333	0.00100	0.17639
2-methylheptane	0.44000	0.00732	0.34326	0.00251	0.00076	0.15173
1,1-dimethylcyclopentane	0.10000	0.00193	1.28929	0.00249	0.00075	0.12952
1c,2t,3-trimethylcyclopentane	0.42000	0.00711	0.26991	0.00192	0.00058	0.11388
2,2,3-trimethylhexane	0.57000	0.00844	0.18914	0.00160	0.00048	0.10831
toluene	0.22000	0.00453	0.47674	0.00216	0.00065	0.10536
3-methylheptane	0.26000	0.00432	0.34326	0.00148	0.00045	0.08966
2,4-dimethylpentane	0.05000	0.00095	1.68004	0.00159	0.00048	0.08439
2,2-dimethylhexane	0.14000	0.00233	0.57233	0.00133	0.00040	0.08049
1c,2c,3-trimethylcyclopentane	0.25000	0.00423	0.26991	0.00114	0.00034	0.06779
2,2-dimethylbutane	0.01000	0.00022	5.54852	0.00122	0.00037	0.05574

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-nonane	0.94000	0.01392	0.05669	0.00079	0.00024	0.05354
1t,4-dimethylcyclohexane	0.19000	0.00322	0.26991	0.00087	0.00026	0.05152
benzene	0.03000	0.00073	1.61828	0.00118	0.00036	0.04877
n-propylcyclopentane	0.17000	0.00288	0.26991	0.00078	0.00023	0.04610
4-methylheptane	0.13000	0.00216	0.34223	0.00074	0.00022	0.04469
2,2,3-trimethylpentane	0.05000	0.00083	0.83572	0.00069	0.00021	0.04198
1,4-dimethylbenzene	0.28000	0.00501	0.14614	0.00073	0.00022	0.04111
2,5-dimethylhexane	0.08000	0.00133	0.50948	0.00068	0.00020	0.04095
2,4-dimethylhexane	0.08000	0.00133	0.50803	0.00068	0.00020	0.04083
2,2-dimethylpentane	0.02000	0.00038	1.79972	0.00068	0.00021	0.03616
1,3-dimethylbenzene	0.24000	0.00429	0.13786	0.00059	0.00018	0.03324
1c,2t,4-trimethylcyclopentane	0.12000	0.00203	0.26991	0.00055	0.00017	0.03254
1t,2c,3-trimethylcyclopentane	0.12000	0.00203	0.26991	0.00055	0.00017	0.03254
2-methyl-3-ethylpentane	0.06000	0.00100	0.50948	0.00051	0.00015	0.03071
2,3-dimethylhexane	0.06000	0.00100	0.39143	0.00039	0.00012	0.02359
2t-ethylmethylcyclopentane	0.08000	0.00135	0.26991	0.00037	0.00011	0.02169
i-propylcyclopentane	0.08000	0.00135	0.26991	0.00037	0.00011	0.02169
2,2,3-trimethylbutane	0.01000	0.00019	1.75367	0.00033	0.00010	0.01762
1c,2-dimethylcyclohexane	0.07000	0.00118	0.24055	0.00028	0.00009	0.01692
1,1-dimethylcyclohexane	0.06000	0.00102	0.26991	0.00027	0.00008	0.01627
1,2-dimethylbenzene	0.14000	0.00250	0.10833	0.00027	0.00008	0.01524
2,3,5-trimethylhexane	0.08000	0.00118	0.18914	0.00022	0.00007	0.01520
3,3-dimethylpentane	0.01000	0.00019	1.41421	0.00027	0.00008	0.01421
ethylbenzene	0.08000	0.00143	0.15620	0.00022	0.00007	0.01255
3-methyloctane	0.21000	0.00311	0.05669	0.00018	0.00005	0.01196
1c,2-dimethylcyclopentane	0.04000	0.00077	0.26991	0.00021	0.00006	0.01085
3-ethylhexane	0.03000	0.00050	0.33317	0.00017	0.00005	0.01004
2-methyloctane	0.17000	0.00252	0.05669	0.00014	0.00004	0.00968
3,3-dimethylhexane	0.02000	0.00033	0.47758	0.00016	0.00005	0.00960
4-methyloctane	0.15000	0.00222	0.05669	0.00013	0.00004	0.00854
3c-ethylmethylcyclopentane	0.03000	0.00051	0.26991	0.00014	0.00004	0.00813
3t-ethylmethylcyclopentane	0.03000	0.00051	0.26991	0.00014	0.00004	0.00813
3-methyl-3-ethylpentane	0.02000	0.00033	0.38632	0.00013	0.00004	0.00776
3,4-dimethylhexane	0.02000	0.00033	0.36235	0.00012	0.00004	0.00728
1,1-methylethylcyclopentane	0.02000	0.00034	0.26991	0.00009	0.00003	0.00542
2,5-dimethylheptane	0.09000	0.00133	0.05669	0.00008	0.00002	0.00513
2,6-dimethylheptane	0.02000	0.00030	0.18914	0.00006	0.00002	0.00380
c-octene-2	0.01000	0.00017	0.28862	0.00005	0.00001	0.00290
3,3-dimethylheptane	0.05000	0.00074	0.05669	0.00004	0.00001	0.00285
4-ethylheptane	0.05000	0.00074	0.05669	0.00004	0.00001	0.00285
2,2,5-trimethylhexane	0.01000	0.00015	0.27648	0.00004	0.00001	0.00278
1c,3-dimethylcyclohexane	0.01000	0.00017	0.26991	0.00005	0.00001	0.00271
1,1,4-trimethylcyclohexane	0.03000	0.00045	0.07721	0.00003	0.00001	0.00233
2,4,4-trimethylhexane	0.01000	0.00015	0.22259	0.00003	0.00001	0.00224

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.01000	0.00015	0.18914	0.00003	0.00001	0.00190
2,4-dimethylheptane	0.01000	0.00015	0.18914	0.00003	0.00001	0.00190
3,3-diethylpentane	0.03000	0.00044	0.05669	0.00003	0.00001	0.00171
1,1,3-trimethylcyclohexane	0.02000	0.00030	0.07721	0.00002	0.00001	0.00155
3,4-dimethylheptane	0.02000	0.00030	0.05669	0.00002	0.00001	0.00114
2,4-dimethylheptene-1	0.01000	0.00015	0.08699	0.00001	0.000004	0.00087
nonene-1	0.01000	0.00015	0.08699	0.00001	0.000004	0.00087
1,1,2-trimethylcyclohexane	0.01000	0.00015	0.07721	0.00001	0.000004	0.00078
1c,2t,4c-trimethylcyclohexane	0.01000	0.00015	0.07721	0.00001	0.000004	0.00078
3,5-dimethylheptane	0.01000	0.00015	0.05669	0.00001	0.000003	0.00057

Sample 2, T=95° F

Average Molecular Weight		
Liquid Phase:	189.92	lb/lbmol
Vapor Phase:	58.09	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00004964	%
Methane y_i	1116.67	ppm
Methane Mass% Vap	0.03083285	%
Ethane K:	35.50	
Ethane p_i:	0.11	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.25000	0.01077	176.65380	1.90213	0.39354	29.87280
n-butane	0.74000	0.02418	47.45453	1.14747	0.23740	23.75321
i-butane	0.25000	0.00817	67.05331	0.54776	0.11333	11.33896
i-pentane	0.81000	0.02132	18.67352	0.39816	0.08238	10.23114
n-pentane	0.98000	0.02580	14.16178	0.36533	0.07559	9.38765
n-hexane	1.03000	0.02270	4.43665	0.10071	0.02084	3.09105
2-methylpentane	0.60000	0.01322	6.08944	0.08052	0.01666	2.47139
methylcyclopentane	0.70000	0.01580	4.03151	0.06368	0.01318	1.90888
methylcyclohexane	1.54000	0.02979	1.42286	0.04238	0.00877	1.48216
3-methylpentane	0.38000	0.00837	5.48122	0.04590	0.00950	1.40888
cyclohexane	0.64000	0.01444	2.90982	0.04203	0.00869	1.25968
ethane	0.01000	0.00063		0.11086	0.02242	1.16063
cyclopentane	0.18000	0.00487	8.96348	0.04369	0.00904	1.09135
n-heptane	1.04000	0.01971	1.42681	0.02813	0.00582	1.00372
3-methylhexane	0.43000	0.00815	1.88579	0.01537	0.00318	0.54850
2-methylhexane	0.36000	0.00682	2.01204	0.01373	0.00284	0.48995
1t,2-dimethylcyclopentane	0.31000	0.00600	2.27727	0.01366	0.00283	0.47752
1t,3-dimethylcyclopentane	0.22000	0.00426	2.27727	0.00969	0.00200	0.33888
n-octane	0.99000	0.01646	0.46549	0.00766	0.00159	0.31172
1c,3-dimethylcyclopentane	0.19000	0.00368	2.27727	0.00837	0.00173	0.29267
2,3-dimethylpentane	0.15000	0.00284	2.08700	0.00593	0.00123	0.21175
2-methylheptane	0.44000	0.00732	0.66923	0.00490	0.00101	0.19918
1,1-dimethylcyclopentane	0.10000	0.00193	2.27727	0.00440	0.00091	0.15404
1c,2t,3-trimethylcyclopentane	0.42000	0.00711	0.52453	0.00373	0.00077	0.14902
2,2,3-trimethylhexane	0.57000	0.00844	0.37895	0.00320	0.00066	0.14611
toluene	0.22000	0.00453	0.90368	0.00410	0.00085	0.13448
3-methylheptane	0.26000	0.00432	0.66923	0.00289	0.00060	0.11770
2,2-dimethylhexane	0.14000	0.00233	1.06869	0.00249	0.00051	0.10120
2,4-dimethylpentane	0.05000	0.00095	2.93417	0.00278	0.00058	0.09924
1c,2c,3-trimethylcyclopentane	0.25000	0.00423	0.52453	0.00222	0.00046	0.08870
n-nonane	0.94000	0.01392	0.11691	0.00163	0.00034	0.07434

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1t,4-dimethylcyclohexane	0.19000	0.00322	0.52453	0.00169	0.00035	0.06741
2,2-dimethylbutane	0.01000	0.00022	8.93253	0.00197	0.00041	0.06042
n-propylcyclopentane	0.17000	0.00288	0.52453	0.00151	0.00031	0.06032
4-methylheptane	0.13000	0.00216	0.66709	0.00144	0.00030	0.05866
benzene	0.03000	0.00073	2.86487	0.00209	0.00043	0.05814
1,4-dimethylbenzene	0.28000	0.00501	0.29779	0.00149	0.00031	0.05640
2,5-dimethylhexane	0.08000	0.00133	0.96528	0.00128	0.00027	0.05223
2,4-dimethylhexane	0.08000	0.00133	0.96101	0.00128	0.00026	0.05200
2,2,3-trimethylpentane	0.05000	0.00083	1.51201	0.00126	0.00026	0.05114
1,3-dimethylbenzene	0.24000	0.00429	0.28049	0.00120	0.00025	0.04553
1c,2t,4-trimethylcyclopentane	0.12000	0.00203	0.52453	0.00107	0.00022	0.04258
1t,2c,3-trimethylcyclopentane	0.12000	0.00203	0.52453	0.00107	0.00022	0.04258
2,2-dimethylpentane	0.02000	0.00038	3.11782	0.00118	0.00024	0.04218
2-methyl-3-ethylpentane	0.06000	0.00100	0.96528	0.00096	0.00020	0.03918
2,3-dimethylhexane	0.06000	0.00100	0.75123	0.00075	0.00016	0.03049
2t-ethylmethylcyclopentane	0.08000	0.00135	0.52453	0.00071	0.00015	0.02838
i-propylcyclopentane	0.08000	0.00135	0.52453	0.00071	0.00015	0.02838
1c,2-dimethylcyclohexane	0.07000	0.00118	0.47036	0.00056	0.00012	0.02227
1,2-dimethylbenzene	0.14000	0.00250	0.22572	0.00057	0.00012	0.02137
1,1-dimethylcyclohexane	0.06000	0.00102	0.52453	0.00053	0.00011	0.02129
2,3,5-trimethylhexane	0.08000	0.00118	0.37895	0.00045	0.00009	0.02051
2,2,3-trimethylbutane	0.01000	0.00019	3.01654	0.00057	0.00012	0.02040
ethylbenzene	0.08000	0.00143	0.31926	0.00046	0.00009	0.01728
3,3-dimethylpentane	0.01000	0.00019	2.47165	0.00047	0.00010	0.01672
3-methyloctane	0.21000	0.00311	0.11691	0.00036	0.00008	0.01661
1c,2-dimethylcyclopentane	0.04000	0.00077	0.52453	0.00041	0.00008	0.01419
2-methyloctane	0.17000	0.00252	0.11691	0.00029	0.00006	0.01344
3-ethylhexane	0.03000	0.00050	0.65042	0.00032	0.00007	0.01320
3,3-dimethylhexane	0.02000	0.00033	0.90338	0.00030	0.00006	0.01222
4-methyloctane	0.15000	0.00222	0.11691	0.00026	0.00005	0.01186
3c-ethylmethylcyclopentane	0.03000	0.00051	0.52453	0.00027	0.00006	0.01064
3t-ethylmethylcyclopentane	0.03000	0.00051	0.52453	0.00027	0.00006	0.01064
3-methyl-3-ethylpentane	0.02000	0.00033	0.73113	0.00024	0.00005	0.00989
3,4-dimethylhexane	0.02000	0.00033	0.69690	0.00023	0.00005	0.00943
2,5-dimethylheptane	0.09000	0.00133	0.11691	0.00016	0.00003	0.00712
1,1-methylethylcyclopentane	0.02000	0.00034	0.52453	0.00018	0.00004	0.00710
2,6-dimethylheptane	0.02000	0.00030	0.37895	0.00011	0.00002	0.00513
3,3-dimethylheptane	0.05000	0.00074	0.11691	0.00009	0.00002	0.00395
4-ethylheptane	0.05000	0.00074	0.11691	0.00009	0.00002	0.00395
c-octene-2	0.01000	0.00017	0.57018	0.00010	0.00002	0.00386
2,2,5-trimethylhexane	0.01000	0.00015	0.54293	0.00008	0.00002	0.00367
1c,3-dimethylcyclohexane	0.01000	0.00017	0.52453	0.00009	0.00002	0.00355
1,1,4-trimethylcyclohexane	0.03000	0.00045	0.16373	0.00007	0.00002	0.00332
2,4,4-trimethylhexane	0.01000	0.00015	0.43934	0.00007	0.00001	0.00297

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.01000	0.00015	0.37895	0.00006	0.00001	0.00256
2,4-dimethylheptane	0.01000	0.00015	0.37895	0.00006	0.00001	0.00256
3,3-diethylpentane	0.03000	0.00044	0.11691	0.00005	0.00001	0.00237
1,1,3-trimethylcyclohexane	0.02000	0.00030	0.16373	0.00005	0.00001	0.00221
3,4-dimethylheptane	0.02000	0.00030	0.11691	0.00003	0.00001	0.00158
2,4-dimethylheptene-1	0.01000	0.00015	0.18738	0.00003	0.00001	0.00127
nonene-1	0.01000	0.00015	0.18738	0.00003	0.00001	0.00127
1,1,2-trimethylcyclohexane	0.01000	0.00015	0.16373	0.00002	0.00001	0.00111
1c,2t,4c-trimethylcyclohexane	0.01000	0.00015	0.16373	0.00002	0.00001	0.00111
3,5-dimethylheptane	0.01000	0.00015	0.11691	0.00002	0.000004	0.00079

Sample 3, T=72.1° F

Average Molecular Weight		
Liquid Phase:	160.51	lb/lbmol
Vapor Phase:	56.89	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.21	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.39000	0.01420	128.84470	1.82911	0.41802	32.40233
n-butane	1.31000	0.03618	32.33790	1.16989	0.26737	27.31670
n-pentane	1.96000	0.04360	8.94467	0.39003	0.08914	11.30487
i-pentane	1.32000	0.02937	12.06945	0.35443	0.08100	10.27321
i-butane	0.28000	0.00773	46.68395	0.36098	0.08250	8.42890
n-hexane	1.84000	0.03427	2.59458	0.08892	0.02032	3.07844
2-methylpentane	1.04000	0.01937	3.65310	0.07076	0.01617	2.44985
ethane	0.03000	0.00160		0.21026	0.04585	2.42341
methylcyclopentane	1.05000	0.02003	2.35878	0.04724	0.01080	1.59706
3-methylpentane	0.75000	0.01397	3.27061	0.04569	0.01044	1.58174
cyclohexane	1.20000	0.02289	1.66588	0.03813	0.00871	1.28905
methylcyclohexane	2.13000	0.03482	0.78425	0.02731	0.00624	1.07715
cyclopentane	0.29000	0.00664	5.50431	0.03653	0.00835	1.02931
n-heptane	1.65000	0.02643	0.77018	0.02036	0.00465	0.81944
3-methylhexane	0.68000	0.01089	1.04376	0.01137	0.00260	0.45767
1t,2-dimethylcyclopentane	0.53000	0.00866	1.28929	0.01117	0.00255	0.44063
2-methylhexane	0.54000	0.00865	1.11769	0.00967	0.00221	0.38919
1t,3-dimethylcyclopentane	0.36000	0.00589	1.28929	0.00759	0.00173	0.29929
benzene	0.28000	0.00575	1.61828	0.00931	0.00213	0.29218
1c,3-dimethylcyclopentane	0.32000	0.00523	1.28929	0.00674	0.00154	0.26604
toluene	0.73000	0.01272	0.47674	0.00606	0.00139	0.22441
n-octane	1.33000	0.01869	0.23106	0.00432	0.00099	0.19817
2,3-dimethylpentane	0.20000	0.00320	1.17057	0.00375	0.00086	0.15096
2,2-dimethylbutane	0.04000	0.00075	5.54852	0.00413	0.00094	0.14311
2-methylheptane	0.64000	0.00899	0.34326	0.00309	0.00071	0.14166
1,1-dimethylcyclopentane	0.16000	0.00262	1.28929	0.00337	0.00077	0.13302
1c,2t,3-trimethylcyclopentane	0.58000	0.00830	0.26991	0.00224	0.00051	0.10095
2,2,3-trimethylhexane	0.71000	0.00889	0.18914	0.00168	0.00038	0.08659
3-methylheptane	0.36000	0.00506	0.34326	0.00174	0.00040	0.07968
2,2-dimethylhexane	0.21000	0.00295	0.57233	0.00169	0.00039	0.07750
1c,2c,3-trimethylcyclopentane	0.29000	0.00415	0.26991	0.00112	0.00026	0.05047

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-methylheptane	0.21000	0.00295	0.34223	0.00101	0.00023	0.04634
n-propylcyclopentane	0.26000	0.00372	0.26991	0.00100	0.00023	0.04525
2,2,3-trimethylpentane	0.08000	0.00112	0.83572	0.00094	0.00021	0.04311
1t,2c,3-trimethylcyclopentane	0.24000	0.00343	0.26991	0.00093	0.00021	0.04177
2,5-dimethylhexane	0.12000	0.00169	0.50948	0.00086	0.00020	0.03942
1t,4-dimethylcyclohexane	0.22000	0.00315	0.26991	0.00085	0.00019	0.03829
n-nonane	0.97000	0.01214	0.05669	0.00069	0.00016	0.03546
2,2-dimethylpentane	0.03000	0.00048	1.79972	0.00086	0.00020	0.03482
1c,2t,4-trimethylcyclopentane	0.20000	0.00286	0.26991	0.00077	0.00018	0.03481
1,3-dimethylbenzene	0.39000	0.00590	0.13786	0.00081	0.00019	0.03467
2-methyl-3-ethylpentane	0.10000	0.00141	0.50948	0.00072	0.00016	0.03285
2,4-dimethylhexane	0.10000	0.00141	0.50803	0.00071	0.00016	0.03276
1,4-dimethylbenzene	0.26000	0.00393	0.14614	0.00057	0.00013	0.02450
2t-ethylmethylcyclopentane	0.13000	0.00186	0.26991	0.00050	0.00011	0.02263
2,4-dimethylpentane	0.02000	0.00032	1.68004	0.00054	0.00012	0.02167
ethylbenzene	0.19000	0.00287	0.15620	0.00045	0.00010	0.01914
3,3-dimethylpentane	0.02000	0.00032	1.41421	0.00045	0.00010	0.01824
2,3-dimethylhexane	0.07000	0.00098	0.39143	0.00039	0.00009	0.01767
i-propylcyclopentane	0.09000	0.00129	0.26991	0.00035	0.00008	0.01566
3-ethylhexane	0.07000	0.00098	0.33317	0.00033	0.00007	0.01504
1,1-dimethylcyclohexane	0.08000	0.00114	0.26991	0.00031	0.00007	0.01392
1,2-dimethylbenzene	0.18000	0.00272	0.10833	0.00029	0.00007	0.01257
2,3,5-trimethylhexane	0.10000	0.00125	0.18914	0.00024	0.00005	0.01220
2,2,3-trimethylbutane	0.01000	0.00016	1.75367	0.00028	0.00006	0.01131
1c,2-dimethylcyclopentane	0.06000	0.00098	0.26991	0.00026	0.00006	0.01044
3c-ethylmethylcyclopentane	0.06000	0.00086	0.26991	0.00023	0.00005	0.01044
3-methyloctane	0.28000	0.00350	0.05669	0.00020	0.00005	0.01024
3,4-dimethylhexane	0.04000	0.00056	0.36235	0.00020	0.00005	0.00935
3,3-dimethylhexane	0.03000	0.00042	0.47758	0.00020	0.00005	0.00924
3t-ethylmethylcyclopentane	0.05000	0.00072	0.26991	0.00019	0.00004	0.00870
1c,2-dimethylcyclohexane	0.05000	0.00072	0.24055	0.00017	0.00004	0.00776
2-methyloctane	0.21000	0.00263	0.05669	0.00015	0.00003	0.00768
3-methyl-3-ethylpentane	0.03000	0.00042	0.38632	0.00016	0.00004	0.00747
4-methyloctane	0.17000	0.00213	0.05669	0.00012	0.00003	0.00621
2,4,4-trimethylhexane	0.03000	0.00038	0.22259	0.00008	0.00002	0.00431
2,5-dimethylheptane	0.11000	0.00138	0.05669	0.00008	0.00002	0.00402
1,1-methylethylcyclopentane	0.02000	0.00029	0.26991	0.00008	0.00002	0.00348
1,1,4-trimethylcyclohexane	0.06000	0.00076	0.07721	0.00006	0.00001	0.00299
2,3,4-trimethylhexane	0.02000	0.00025	0.18914	0.00005	0.00001	0.00244
2,4-dimethylheptane	0.02000	0.00025	0.18914	0.00005	0.00001	0.00244
2,6-dimethylheptane	0.02000	0.00025	0.18914	0.00005	0.00001	0.00244
3,3-dimethylheptane	0.06000	0.00075	0.05669	0.00004	0.00001	0.00219
1,1,3-trimethylcyclohexane	0.04000	0.00051	0.07721	0.00004	0.00001	0.00199
3,3-diethylpentane	0.05000	0.00063	0.05669	0.00004	0.00001	0.00183

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-ethylheptane	0.05000	0.00063	0.05669	0.00004	0.00001	0.00183
1c,3-dimethylcyclohexane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00174
nonene-1	0.02000	0.00025	0.08699	0.00002	0.00001	0.00112
1c,2t,4c-trimethylcyclohexane	0.02000	0.00025	0.07721	0.00002	0.000004	0.00100
3,4-dimethylheptane	0.02000	0.00025	0.05669	0.00001	0.000003	0.00073
1,1,2-trimethylcyclohexane	0.01000	0.00013	0.07721	0.00001	0.000002	0.00050
3,5-dimethylheptane	0.01000	0.00013	0.05669	0.00001	0.000002	0.00037

Sample 3, T=95° F

Average Molecular Weight		
Liquid Phase:	160.51	lb/lbmol
Vapor Phase:	57.75	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	0.38	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.39000	0.01420	176.65380	2.50781	0.39423	30.10500
n-butane	1.31000	0.03618	47.45453	1.71676	0.26988	27.16440
n-pentane	1.96000	0.04360	14.16178	0.61752	0.09707	12.12900
i-pentane	1.32000	0.02937	18.67352	0.54837	0.08620	10.77088
i-butane	0.28000	0.00773	67.05331	0.51849	0.08151	8.20407
n-hexane	1.84000	0.03427	4.43665	0.15205	0.02390	3.56717
ethane	0.03000	0.00160		0.38344	0.05685	2.96035
2-methylpentane	1.04000	0.01937	6.08944	0.11796	0.01854	2.76733
methylcyclopentane	1.05000	0.02003	4.03151	0.08073	0.01269	1.84973
3-methylpentane	0.75000	0.01397	5.48122	0.07657	0.01204	1.79635
cyclohexane	1.20000	0.02289	2.90982	0.06660	0.01047	1.52580
methylcyclohexane	2.13000	0.03482	1.42286	0.04954	0.00779	1.32432
cyclopentane	0.29000	0.00664	8.96348	0.05949	0.00935	1.13586
n-heptane	1.65000	0.02643	1.42681	0.03771	0.00593	1.02873
3-methylhexane	0.68000	0.01089	1.88579	0.02054	0.00323	0.56034
1t,2-dimethylcyclopentane	0.53000	0.00866	2.27727	0.01973	0.00310	0.52740
2-methylhexane	0.54000	0.00865	2.01204	0.01740	0.00274	0.47477
1t,3-dimethylcyclopentane	0.36000	0.00589	2.27727	0.01340	0.00211	0.35824
benzene	0.28000	0.00575	2.86487	0.01648	0.00259	0.35052
1c,3-dimethylcyclopentane	0.32000	0.00523	2.27727	0.01191	0.00187	0.31843
toluene	0.73000	0.01272	0.90368	0.01149	0.00181	0.28826
n-octane	1.33000	0.01869	0.46549	0.00870	0.00137	0.27053
2-methylheptane	0.64000	0.00899	0.66923	0.00602	0.00095	0.18716
2,3-dimethylpentane	0.20000	0.00320	2.08700	0.00669	0.00105	0.18239
1,1-dimethylcyclopentane	0.16000	0.00262	2.27727	0.00596	0.00094	0.15922
2,2-dimethylbutane	0.04000	0.00075	8.93253	0.00666	0.00105	0.15613
1c,2t,3-trimethylcyclopentane	0.58000	0.00830	0.52453	0.00435	0.00068	0.13294
2,2,3-trimethylhexane	0.71000	0.00889	0.37895	0.00337	0.00053	0.11757
3-methylheptane	0.36000	0.00506	0.66923	0.00339	0.00053	0.10528
2,2-dimethylhexane	0.21000	0.00295	1.06869	0.00315	0.00050	0.09807
1c,2c,3-trimethylcyclopentane	0.29000	0.00415	0.52453	0.00218	0.00034	0.06647

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-methylheptane	0.21000	0.00295	0.66709	0.00197	0.00031	0.06121
n-propylcyclopentane	0.26000	0.00372	0.52453	0.00195	0.00031	0.05959
1t,2c,3-trimethylcyclopentane	0.24000	0.00343	0.52453	0.00180	0.00028	0.05501
2,2,3-trimethylpentane	0.08000	0.00112	1.51201	0.00170	0.00027	0.05286
2,5-dimethylhexane	0.12000	0.00169	0.96528	0.00163	0.00026	0.05062
1t,4-dimethylcyclohexane	0.22000	0.00315	0.52453	0.00165	0.00026	0.05042
n-nonane	0.97000	0.01214	0.11691	0.00142	0.00022	0.04955
1,3-dimethylbenzene	0.39000	0.00590	0.28049	0.00165	0.00026	0.04780
1c,2t,4-trimethylcyclopentane	0.20000	0.00286	0.52453	0.00150	0.00024	0.04584
2-methyl-3-ethylpentane	0.10000	0.00141	0.96528	0.00136	0.00021	0.04218
2,4-dimethylhexane	0.10000	0.00141	0.96101	0.00135	0.00021	0.04199
2,2-dimethylpentane	0.03000	0.00048	3.11782	0.00150	0.00024	0.04087
1,4-dimethylbenzene	0.26000	0.00393	0.29779	0.00117	0.00018	0.03383
2t-ethylmethylcyclopentane	0.13000	0.00186	0.52453	0.00098	0.00015	0.02980
ethylbenzene	0.19000	0.00287	0.31926	0.00092	0.00014	0.02651
2,4-dimethylpentane	0.02000	0.00032	2.93417	0.00094	0.00015	0.02564
2,3-dimethylhexane	0.07000	0.00098	0.75123	0.00074	0.00012	0.02298
3,3-dimethylpentane	0.02000	0.00032	2.47165	0.00079	0.00012	0.02160
i-propylcyclopentane	0.09000	0.00129	0.52453	0.00068	0.00011	0.02063
3-ethylhexane	0.07000	0.00098	0.65042	0.00064	0.00010	0.01989
1,1-dimethylcyclohexane	0.08000	0.00114	0.52453	0.00060	0.00009	0.01834
1,2-dimethylbenzene	0.18000	0.00272	0.22572	0.00061	0.00010	0.01775
2,3,5-trimethylhexane	0.10000	0.00125	0.37895	0.00047	0.00007	0.01656
3-methyloctane	0.28000	0.00350	0.11691	0.00041	0.00006	0.01430
1c,2-dimethylcyclopentane	0.06000	0.00098	0.52453	0.00051	0.00008	0.01375
3c-ethylmethylcyclopentane	0.06000	0.00086	0.52453	0.00045	0.00007	0.01375
2,2,3-trimethylbutane	0.01000	0.00016	3.01654	0.00048	0.00008	0.01318
3,4-dimethylhexane	0.04000	0.00056	0.69690	0.00039	0.00006	0.01218
3,3-dimethylhexane	0.03000	0.00042	0.90338	0.00038	0.00006	0.01184
3t-ethylmethylcyclopentane	0.05000	0.00072	0.52453	0.00038	0.00006	0.01146
2-methyloctane	0.21000	0.00263	0.11691	0.00031	0.00005	0.01073
1c,2-dimethylcyclohexane	0.05000	0.00072	0.47036	0.00034	0.00005	0.01028
3-methyl-3-ethylpentane	0.03000	0.00042	0.73113	0.00031	0.00005	0.00958
4-methyloctane	0.17000	0.00213	0.11691	0.00025	0.00004	0.00868
2,4,4-trimethylhexane	0.03000	0.00038	0.43934	0.00016	0.00003	0.00576
2,5-dimethylheptane	0.11000	0.00138	0.11691	0.00016	0.00003	0.00562
1,1-methylethylcyclopentane	0.02000	0.00029	0.52453	0.00015	0.00002	0.00458
1,1,4-trimethylcyclohexane	0.06000	0.00076	0.16373	0.00012	0.00002	0.00429
2,3,4-trimethylhexane	0.02000	0.00025	0.37895	0.00009	0.00001	0.00331
2,4-dimethylheptane	0.02000	0.00025	0.37895	0.00009	0.00001	0.00331
2,6-dimethylheptane	0.02000	0.00025	0.37895	0.00009	0.00001	0.00331
3,3-dimethylheptane	0.06000	0.00075	0.11691	0.00009	0.00001	0.00307
1,1,3-trimethylcyclohexane	0.04000	0.00051	0.16373	0.00008	0.00001	0.00286
3,3-diethylpentane	0.05000	0.00063	0.11691	0.00007	0.00001	0.00255

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-ethylheptane	0.05000	0.00063	0.11691	0.00007	0.00001	0.00255
1c,3-dimethylcyclohexane	0.01000	0.00014	0.52453	0.00008	0.00001	0.00229
nonene-1	0.02000	0.00025	0.18738	0.00005	0.00001	0.00164
1c,2t,4c-trimethylcyclohexane	0.02000	0.00025	0.16373	0.00004	0.00001	0.00143
3,4-dimethylheptane	0.02000	0.00025	0.11691	0.00003	0.000005	0.00102
1,1,2-trimethylcyclohexane	0.01000	0.00013	0.16373	0.00002	0.000003	0.00072
3,5-dimethylheptane	0.01000	0.00013	0.11691	0.00001	0.000002	0.00051

Sample 4, T=72.1° F

Average Molecular Weight		
Liquid Phase:	156.73	lb/lbmol
Vapor Phase:	53.04	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.58	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.70000	0.02488	128.84470	3.20556	0.54688	45.46606
n-butane	1.85000	0.04988	32.33790	1.61316	0.27521	30.15826
n-pentane	2.20000	0.04779	8.94467	0.42746	0.07293	9.91995
i-butane	0.36000	0.00971	46.68395	0.45317	0.07731	8.47213
i-pentane	1.11000	0.02411	12.06945	0.29102	0.04965	6.75356
ethane	0.06000	0.00313		0.57642	0.08953	5.07587
n-hexane	2.0000	0.03637	2.59458	0.09437	0.01610	2.61589
2-methylpentane	1.06000	0.01928	3.65310	0.07042	0.01201	1.95205
methylcyclopentane	1.0000	0.01862	2.35878	0.04393	0.00749	1.18908
3-methylpentane	0.72000	0.01309	3.27061	0.04283	0.00731	1.18709
n-heptane	1.82000	0.02847	0.77018	0.02192	0.00374	0.70662
cyclopentane	0.25000	0.00559	5.50431	0.03075	0.00525	0.69369
methylcyclohexane	1.33000	0.02123	0.78425	0.01665	0.00284	0.52581
cyclohexane	0.55000	0.01024	1.66588	0.01706	0.00291	0.46188
1t,2-dimethylcyclopentane	0.70000	0.01117	1.28929	0.01441	0.00246	0.45496
3-methylhexane	0.81000	0.01267	1.04376	0.01322	0.00226	0.42619
2-methylhexane	0.58000	0.00907	1.11769	0.01014	0.00173	0.32679
1t,3-dimethylcyclopentane	0.44000	0.00702	1.28929	0.00905	0.00154	0.28597
1c,3-dimethylcyclopentane	0.38000	0.00607	1.28929	0.00782	0.00133	0.24698
benzene	0.20000	0.00401	1.61828	0.00649	0.00111	0.16316
n-octane	1.29000	0.01770	0.23106	0.00409	0.00070	0.15026
2,3-dimethylpentane	0.23000	0.00360	1.17057	0.00421	0.00072	0.13572
2-methylheptane	0.73000	0.01002	0.34326	0.00344	0.00059	0.12632
1,1-dimethylcyclopentane	0.16000	0.00255	1.28929	0.00329	0.00056	0.10399
toluene	0.40000	0.00680	0.47674	0.00324	0.00055	0.09613
3-methylheptane	0.46000	0.00631	0.34326	0.00217	0.00037	0.07960
1c,2t,3-trimethylcyclopentane	0.58000	0.00810	0.26991	0.00219	0.00037	0.07892
2,2-dimethylhexane	0.27000	0.00370	0.57233	0.00212	0.00036	0.07790
2,2,3-trimethylhexane	0.64000	0.00782	0.18914	0.00148	0.00025	0.06102
2,2-dimethylbutane	0.02000	0.00036	5.54852	0.00202	0.00034	0.05594
4-methylheptane	0.27000	0.00370	0.34223	0.00127	0.00022	0.04658

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1t,2c,3-trimethylcyclopentane	0.33000	0.00461	0.26991	0.00124	0.00021	0.04490
1c,2t,4-trimethylcyclopentane	0.32000	0.00447	0.26991	0.00121	0.00021	0.04354
1c,2c,3-trimethylcyclopentane	0.28000	0.00391	0.26991	0.00106	0.00018	0.03810
n-propylcyclopentane	0.27000	0.00377	0.26991	0.00102	0.00017	0.03674
2-methyl-3-ethylpentane	0.12000	0.00165	0.50948	0.00084	0.00014	0.03082
2,5-dimethylhexane	0.12000	0.00165	0.50948	0.00084	0.00014	0.03082
2,4-dimethylhexane	0.12000	0.00165	0.50803	0.00084	0.00014	0.03073
n-nonane	1.04000	0.01271	0.05669	0.00072	0.00012	0.02972
2,2,3-trimethylpentane	0.07000	0.00096	0.83572	0.00080	0.00014	0.02949
1t,4-dimethylcyclohexane	0.21000	0.00293	0.26991	0.00079	0.00014	0.02857
1,3-dimethylbenzene	0.37000	0.00546	0.13786	0.00075	0.00013	0.02571
i-propylcyclopentane	0.17000	0.00237	0.26991	0.00064	0.00011	0.02313
2t-ethylmethylcyclopentane	0.16000	0.00223	0.26991	0.00060	0.00010	0.02177
2,3-dimethylhexane	0.11000	0.00151	0.39143	0.00059	0.00010	0.02171
1,4-dimethylbenzene	0.27000	0.00399	0.14614	0.00058	0.00010	0.01989
2,2-dimethylpentane	0.02000	0.00031	1.79972	0.00056	0.00010	0.01814
2,4-dimethylpentane	0.02000	0.00031	1.68004	0.00053	0.00009	0.01694
3-ethylhexane	0.09000	0.00123	0.33317	0.00041	0.00007	0.01512
3,3-dimethylpentane	0.02000	0.00031	1.41421	0.00044	0.00008	0.01426
3-methyloctane	0.39000	0.00477	0.05669	0.00027	0.00005	0.01115
3,4-dimethylhexane	0.06000	0.00082	0.36235	0.00030	0.00005	0.01096
1c,2-dimethylcyclopentane	0.08000	0.00128	0.26991	0.00034	0.00006	0.01089
2,3,5-trimethylhexane	0.11000	0.00134	0.18914	0.00025	0.00004	0.01049
1,2-dimethylbenzene	0.18000	0.00266	0.10833	0.00029	0.00005	0.00983
3-methyl-3-ethylpentane	0.05000	0.00069	0.38632	0.00027	0.00005	0.00974
1c,2-dimethylcyclohexane	0.08000	0.00112	0.24055	0.00027	0.00005	0.00970
1,1-dimethylcyclohexane	0.07000	0.00098	0.26991	0.00026	0.00005	0.00952
3c-ethylmethylcyclopentane	0.07000	0.00098	0.26991	0.00026	0.00005	0.00952
3t-ethylmethylcyclopentane	0.06000	0.00084	0.26991	0.00023	0.00004	0.00816
ethylbenzene	0.10000	0.00148	0.15620	0.00023	0.00004	0.00787
2-methyloctane	0.26000	0.00318	0.05669	0.00018	0.00003	0.00743
3,3-dimethylhexane	0.03000	0.00041	0.47758	0.00020	0.00003	0.00722
4-methyloctane	0.24000	0.00293	0.05669	0.00017	0.00003	0.00686
2,4,4-trimethylhexane	0.05000	0.00061	0.22259	0.00014	0.00002	0.00561
3,3-dimethylheptene-1	0.12000	0.00149	0.08699	0.00013	0.00002	0.00526
2,6-dimethylheptane	0.04000	0.00049	0.18914	0.00009	0.00002	0.00381
2,5-dimethylheptane	0.12000	0.00147	0.05669	0.00008	0.00001	0.00343
2,4-dimethylheptane	0.03000	0.00037	0.18914	0.00007	0.00001	0.00286
1,1-methylethylcyclopentane	0.02000	0.00028	0.26991	0.00008	0.00001	0.00272
1c,3-dimethylcyclohexane	0.02000	0.00028	0.26991	0.00008	0.00001	0.00272
1,1,4-trimethylcyclohexane	0.06000	0.00074	0.07721	0.00006	0.00001	0.00234
3,3-diethylpentane	0.08000	0.00098	0.05669	0.00006	0.00001	0.00229
3,3-dimethylheptane	0.07000	0.00086	0.05669	0.00005	0.00001	0.00200
1,1,3-trimethylcyclohexane	0.05000	0.00062	0.07721	0.00005	0.00001	0.00195

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00191
4-ethylheptane	0.05000	0.00061	0.05669	0.00003	0.00001	0.00143
1c,2t,4c-trimethylcyclohexane	0.03000	0.00037	0.07721	0.00003	0.000005	0.00117
3,4-dimethylheptane	0.04000	0.00049	0.05669	0.00003	0.000005	0.00114
2,4-dimethylheptene-1	0.02000	0.00025	0.08699	0.00002	0.000004	0.00088
nonene-1	0.02000	0.00025	0.08699	0.00002	0.000004	0.00088
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
3,5-dimethylheptane	0.01000	0.00012	0.05669	0.00001	0.000001	0.00029

Sample 4, T=95° F

Average Molecular Weight		
Liquid Phase:	156.73	lb/lbmol
Vapor Phase:	53.57	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	1.03	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.70000	0.02488	176.65380	4.39501	0.53058	43.67220
n-butane	1.85000	0.04988	47.45453	2.36724	0.28578	31.00513
n-pentane	2.20000	0.04779	14.16178	0.67678	0.08170	11.00335
i-butane	0.36000	0.00971	67.05331	0.65090	0.07858	8.52525
i-pentane	1.11000	0.02411	18.67352	0.45025	0.05436	7.32038
ethane	0.06000	0.00313		1.03445	0.11102	6.23121
n-hexane	2.0000	0.03637	4.43665	0.16138	0.01948	3.13379
2-methylpentane	1.06000	0.01928	6.08944	0.11739	0.01417	2.27965
methylcyclopentane	1.0000	0.01862	4.03151	0.07508	0.00906	1.42381
3-methylpentane	0.72000	0.01309	5.48122	0.07177	0.00866	1.39378
n-heptane	1.82000	0.02847	1.42681	0.04062	0.00490	0.91711
cyclopentane	0.25000	0.00559	8.96348	0.05008	0.00605	0.79141
methylcyclohexane	1.33000	0.02123	1.42286	0.03021	0.00365	0.66834
cyclohexane	0.55000	0.01024	2.90982	0.02980	0.00360	0.56521
1t,2-dimethylcyclopentane	0.70000	0.01117	2.27727	0.02544	0.00307	0.56299
3-methylhexane	0.81000	0.01267	1.88579	0.02389	0.00288	0.53946
2-methylhexane	0.58000	0.00907	2.01204	0.01825	0.00220	0.41214
1t,3-dimethylcyclopentane	0.44000	0.00702	2.27727	0.01599	0.00193	0.35388
1c,3-dimethylcyclopentane	0.38000	0.00607	2.27727	0.01381	0.00167	0.30562
n-octane	1.29000	0.01770	0.46549	0.00824	0.00099	0.21207
benzene	0.20000	0.00401	2.86487	0.01150	0.00139	0.20236
2-methylheptane	0.73000	0.01002	0.66923	0.00670	0.00081	0.17254
2,3-dimethylpentane	0.23000	0.00360	2.08700	0.00751	0.00091	0.16953
1,1-dimethylcyclopentane	0.16000	0.00255	2.27727	0.00582	0.00070	0.12868
toluene	0.40000	0.00680	0.90368	0.00615	0.00074	0.12766
3-methylheptane	0.46000	0.00631	0.66923	0.00422	0.00051	0.10872
1c,2t,3-trimethylcyclopentane	0.58000	0.00810	0.52453	0.00425	0.00051	0.10744
2,2-dimethylhexane	0.27000	0.00370	1.06869	0.00396	0.00048	0.10191
2,2,3-trimethylhexane	0.64000	0.00782	0.37895	0.00296	0.00036	0.08565
4-methylheptane	0.27000	0.00370	0.66709	0.00247	0.00030	0.06361
2,2-dimethylbutane	0.02000	0.00036	8.93253	0.00325	0.00039	0.06309

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1t,2c,3-trimethylcyclopentane	0.33000	0.00461	0.52453	0.00242	0.00029	0.06113
1c,2t,4-trimethylcyclopentane	0.32000	0.00447	0.52453	0.00234	0.00028	0.05928
1c,2c,3-trimethylcyclopentane	0.28000	0.00391	0.52453	0.00205	0.00025	0.05187
n-propylcyclopentane	0.27000	0.00377	0.52453	0.00198	0.00024	0.05002
n-nonane	1.04000	0.01271	0.11691	0.00149	0.00018	0.04294
2-methyl-3-ethylpentane	0.12000	0.00165	0.96528	0.00159	0.00019	0.04091
2,5-dimethylhexane	0.12000	0.00165	0.96528	0.00159	0.00019	0.04091
2,4-dimethylhexane	0.12000	0.00165	0.96101	0.00158	0.00019	0.04073
1t,4-dimethylcyclohexane	0.21000	0.00293	0.52453	0.00154	0.00019	0.03890
2,2,3-trimethylpentane	0.07000	0.00096	1.51201	0.00145	0.00018	0.03738
1,3-dimethylbenzene	0.37000	0.00546	0.28049	0.00153	0.00018	0.03665
i-propylcyclopentane	0.17000	0.00237	0.52453	0.00125	0.00015	0.03149
2t-ethylmethylcyclopentane	0.16000	0.00223	0.52453	0.00117	0.00014	0.02964
2,3-dimethylhexane	0.11000	0.00151	0.75123	0.00113	0.00014	0.02918
1,4-dimethylbenzene	0.27000	0.00399	0.29779	0.00119	0.00014	0.02840
2,2-dimethylpentane	0.02000	0.00031	3.11782	0.00098	0.00012	0.02202
2,4-dimethylpentane	0.02000	0.00031	2.93417	0.00092	0.00011	0.02073
3-ethylhexane	0.09000	0.00123	0.65042	0.00080	0.00010	0.02067
3,3-dimethylpentane	0.02000	0.00031	2.47165	0.00077	0.00009	0.01746
3-methyloctane	0.39000	0.00477	0.11691	0.00056	0.00007	0.01610
1c,2-dimethylcyclopentane	0.08000	0.00128	0.52453	0.00067	0.00008	0.01482
3,4-dimethylhexane	0.06000	0.00082	0.69690	0.00057	0.00007	0.01477
2,3,5-trimethylhexane	0.11000	0.00134	0.37895	0.00051	0.00006	0.01472
1,2-dimethylbenzene	0.18000	0.00266	0.22572	0.00060	0.00007	0.01435
1c,2-dimethylcyclohexane	0.08000	0.00112	0.47036	0.00053	0.00006	0.01329
1,1-dimethylcyclohexane	0.07000	0.00098	0.52453	0.00051	0.00006	0.01297
3c-ethylmethylcyclopentane	0.07000	0.00098	0.52453	0.00051	0.00006	0.01297
3-methyl-3-ethylpentane	0.05000	0.00069	0.73113	0.00050	0.00006	0.01291
ethylbenzene	0.10000	0.00148	0.31926	0.00047	0.00006	0.01128
3t-ethylmethylcyclopentane	0.06000	0.00084	0.52453	0.00044	0.00005	0.01111
2-methyloctane	0.26000	0.00318	0.11691	0.00037	0.00004	0.01074
4-methyloctane	0.24000	0.00293	0.11691	0.00034	0.00004	0.00991
3,3-dimethylhexane	0.03000	0.00041	0.90338	0.00037	0.00004	0.00957
3,3-dimethylheptene-1	0.12000	0.00149	0.18738	0.00028	0.00003	0.00794
2,4,4-trimethylhexane	0.05000	0.00061	0.43934	0.00027	0.00003	0.00776
2,6-dimethylheptane	0.04000	0.00049	0.37895	0.00019	0.00002	0.00535
2,5-dimethylheptane	0.12000	0.00147	0.11691	0.00017	0.00002	0.00495
2,4-dimethylheptane	0.03000	0.00037	0.37895	0.00014	0.00002	0.00402
1,1-methylethylcyclopentane	0.02000	0.00028	0.52453	0.00015	0.00002	0.00370
1c,3-dimethylcyclohexane	0.02000	0.00028	0.52453	0.00015	0.00002	0.00370
1,1,4-trimethylcyclohexane	0.06000	0.00074	0.16373	0.00012	0.00001	0.00347
3,3-diethylpentane	0.08000	0.00098	0.11691	0.00011	0.00001	0.00330
1,1,3-trimethylcyclohexane	0.05000	0.00062	0.16373	0.00010	0.00001	0.00289
3,3-dimethylheptane	0.07000	0.00086	0.11691	0.00010	0.00001	0.00289

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00268
4-ethylheptane	0.05000	0.00061	0.11691	0.00007	0.00001	0.00206
1c,2t,4c-trimethylcyclohexane	0.03000	0.00037	0.16373	0.00006	0.00001	0.00173
3,4-dimethylheptane	0.04000	0.00049	0.11691	0.00006	0.00001	0.00165
2,4-dimethylheptene-1	0.02000	0.00025	0.18738	0.00005	0.00001	0.00132
nonene-1	0.02000	0.00025	0.18738	0.00005	0.00001	0.00132
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000002	0.00058
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000002	0.00058
3,5-dimethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00041

Sample 5, T=72.1° F

Average Molecular Weight		
Liquid Phase:	152.85	lb/lbmol
Vapor Phase:	55.94	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.26	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.44000	0.01525	128.84470	1.96514	0.45897	36.17973
n-butane	1.30000	0.03419	32.33790	1.10556	0.25821	26.82880
n-pentane	1.82000	0.03856	8.94467	0.34489	0.08055	10.38919
i-butane	0.30000	0.00789	46.68395	0.36831	0.08602	8.93789
i-pentane	1.13000	0.02394	12.06945	0.28894	0.06748	8.70386
ethane	0.04000	0.00203		0.26466	0.05821	3.12922
n-hexane	1.85000	0.03281	2.59458	0.08514	0.01988	3.06327
2-methylpentane	1.02000	0.01809	3.65310	0.06609	0.01544	2.37798
cyclohexane	1.62000	0.02942	1.66588	0.04901	0.01145	1.72229
methylcyclohexane	2.94000	0.04577	0.78425	0.03589	0.00838	1.47145
methylcyclopentane	0.94000	0.01707	2.35878	0.04027	0.00941	1.41501
3-methylpentane	0.63000	0.01117	3.27061	0.03655	0.00854	1.31497
n-heptane	1.90000	0.02898	0.77018	0.02232	0.00521	0.93388
cyclopentane	0.17000	0.00371	5.50431	0.02039	0.00476	0.59717
3-methylhexane	0.71000	0.01083	1.04376	0.01130	0.00264	0.47294
1t,2-dimethylcyclopentane	0.52000	0.00810	1.28929	0.01044	0.00244	0.42786
2-methylhexane	0.57000	0.00869	1.11769	0.00972	0.00227	0.40658
2,3-dimethylbutane	0.11000	0.00195	4.06734	0.00794	0.00185	0.28553
benzene	0.27000	0.00528	1.61828	0.00855	0.00200	0.27885
1c,3-dimethylcyclopentane	0.33000	0.00514	1.28929	0.00662	0.00155	0.27152
1t,3-dimethylcyclopentane	0.31000	0.00483	1.28929	0.00622	0.00145	0.25507
toluene	0.83000	0.01377	0.47674	0.00656	0.00153	0.25252
n-octane	1.53000	0.02047	0.23106	0.00473	0.00110	0.22562
1,1-dimethylcyclopentane	0.23000	0.00358	1.28929	0.00462	0.00108	0.18924
2-methylheptane	0.81000	0.01084	0.34326	0.00372	0.00087	0.17744
1c,2t,3-trimethylcyclopentane	0.88000	0.01199	0.26991	0.00324	0.00076	0.15158
2,3-dimethylpentane	0.18000	0.00275	1.17057	0.00321	0.00075	0.13447
2,2-dimethylbutane	0.03000	0.00053	5.54852	0.00295	0.00069	0.10623
2,2-dimethylhexane	0.27000	0.00361	0.57233	0.00207	0.00048	0.09862
3-methylheptane	0.41000	0.00549	0.34326	0.00188	0.00044	0.08982
2,4-dimethylpentane	0.07000	0.00107	1.68004	0.00179	0.00042	0.07505

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-propylcyclopentane	0.35000	0.00477	0.26991	0.00129	0.00030	0.06029
1t,2-dimethylcyclohexane	0.37000	0.00504	0.24055	0.00121	0.00028	0.05680
1t,4-dimethylcyclohexane	0.32000	0.00436	0.26991	0.00118	0.00027	0.05512
1,3-dimethylbenzene	0.61000	0.00878	0.13786	0.00121	0.00028	0.05367
4-methylheptane	0.23000	0.00308	0.34223	0.00105	0.00025	0.05023
n-nonane	1.31000	0.01561	0.05669	0.00089	0.00021	0.04740
ethylcyclopentane	0.11000	0.00171	0.67389	0.00115	0.00027	0.04731
2,3-dimethylhexane	0.18000	0.00241	0.39143	0.00094	0.00022	0.04496
i-propylcyclopentane	0.25000	0.00341	0.26991	0.00092	0.00021	0.04306
1c,2t,4-trimethylcyclopentane	0.24000	0.00327	0.26991	0.00088	0.00021	0.04134
1t,2c,3-trimethylcyclopentane	0.22000	0.00300	0.26991	0.00081	0.00019	0.03790
3-ethylpentane	0.06000	0.00092	0.98304	0.00090	0.00021	0.03764
2,2,3-trimethylhexane	0.29000	0.00346	0.18914	0.00065	0.00015	0.03500
1,1,4-trimethylcyclohexane	0.70000	0.00848	0.07721	0.00065	0.00015	0.03449
2,2-dimethylpentane	0.03000	0.00046	1.79972	0.00082	0.00019	0.03446
2,4-dimethylhexane	0.10000	0.00134	0.50803	0.00068	0.00016	0.03242
1,4-dimethylbenzene	0.33000	0.00475	0.14614	0.00069	0.00016	0.03078
2,5-dimethylhexane	0.08000	0.00107	0.50948	0.00055	0.00013	0.02601
1,1-dimethylcyclohexane	0.13000	0.00177	0.26991	0.00048	0.00011	0.02239
3,3-dimethylpentane	0.02000	0.00031	1.41421	0.00043	0.00010	0.01805
2t-ethylmethylcyclopentane	0.10000	0.00136	0.26991	0.00037	0.00009	0.01723
1,2-dimethylbenzene	0.22000	0.00317	0.10833	0.00034	0.00008	0.01521
ethylbenzene	0.15000	0.00216	0.15620	0.00034	0.00008	0.01495
3-ethylhexane	0.07000	0.00094	0.33317	0.00031	0.00007	0.01488
1c,2-dimethylcyclopentane	0.08000	0.00125	0.26991	0.00034	0.00008	0.01378
3-methyloctane	0.35000	0.00417	0.05669	0.00024	0.00006	0.01266
3,3-dimethylhexane	0.04000	0.00054	0.47758	0.00026	0.00006	0.01219
2,2,3-trimethylbutane	0.01000	0.00015	1.75367	0.00027	0.00006	0.01119
2-methyl-3-ethylpentane	0.03000	0.00040	0.50948	0.00020	0.00005	0.00975
3,4-dimethylhexane	0.04000	0.00054	0.36235	0.00019	0.00005	0.00925
2-methyloctane	0.25000	0.00298	0.05669	0.00017	0.00004	0.00904
3c-ethylmethylcyclopentane	0.05000	0.00068	0.26991	0.00018	0.00004	0.00861
3t-ethylmethylcyclopentane	0.05000	0.00068	0.26991	0.00018	0.00004	0.00861
4-methyloctane	0.21000	0.00250	0.05669	0.00014	0.00003	0.00760
3-methyl-3-ethylpentane	0.03000	0.00040	0.38632	0.00016	0.00004	0.00740
1,1-methylethylcyclopentane	0.03000	0.00041	0.26991	0.00011	0.00003	0.00517
2,6-dimethylheptane	0.04000	0.00048	0.18914	0.00009	0.00002	0.00483
2,5-dimethylheptane	0.13000	0.00155	0.05669	0.00009	0.00002	0.00470
1c,2-dimethylcyclohexane	0.03000	0.00041	0.24055	0.00010	0.00002	0.00461
2,4,4-trimethylhexane	0.03000	0.00036	0.22259	0.00008	0.00002	0.00426
$\ast$1c,3c,5-trimethylcyclohexane	0.07000	0.00085	0.07721	0.00007	0.00002	0.00345
1c,3-dimethylcyclohexane	0.02000	0.00027	0.26991	0.00007	0.00002	0.00345
4-ethylheptane	0.08000	0.00095	0.05669	0.00005	0.00001	0.00289
2,3,4-trimethylpentane	0.01000	0.00013	0.44990	0.00006	0.00001	0.00287

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,2,3,4-tetramethylpentane	0.02000	0.00024	0.20988	0.00005	0.00001	0.00268
2,3,4-trimethylhexane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00241
2,4-dimethylheptane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00241
3,3-diethylpentane	0.06000	0.00072	0.05669	0.00004	0.00001	0.00217
c-octene-2	0.01000	0.00014	0.28862	0.00004	0.00001	0.00184
2,4-dimethylheptene-1	0.03000	0.00036	0.08699	0.00003	0.00001	0.00167
1c,2t,4c-trimethylcyclohexane	0.03000	0.00036	0.07721	0.00003	0.00001	0.00148
2,3,5-trimethylhexane	0.01000	0.00012	0.18914	0.00002	0.00001	0.00121
3,5-dimethylheptane	0.03000	0.00036	0.05669	0.00002	0.000005	0.00109
1,1,3-trimethylcyclohexane	0.02000	0.00024	0.07721	0.00002	0.000004	0.00099
i-butylcyclopentane	0.02000	0.00024	0.07721	0.00002	0.000004	0.00099
3,3-dimethylheptane	0.02000	0.00024	0.05669	0.00001	0.000003	0.00072
3,4-dimethylheptane	0.02000	0.00024	0.05669	0.00001	0.000003	0.00072
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00049
2,2-dimethylheptane	0.01000	0.00012	0.05669	0.00001	0.000002	0.00036

Sample 5, T=95° F

Average Molecular Weight		
Liquid Phase:	152.85	lb/lbmol
Vapor Phase:	56.79	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	0.48	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.44000	0.01525	176.65380	2.69433	0.43569	33.83301
n-butane	1.30000	0.03419	47.45453	1.62237	0.26235	26.85258
n-pentane	1.82000	0.03856	14.16178	0.54605	0.08830	11.21901
i-pentane	1.13000	0.02394	18.67352	0.44704	0.07229	9.18480
i-butane	0.30000	0.00789	67.05331	0.52902	0.08555	8.75602
ethane	0.04000	0.00203		0.48112	0.07218	3.82230
n-hexane	1.85000	0.03281	4.43665	0.14558	0.02354	3.57266
2-methylpentane	1.02000	0.01809	6.08944	0.11017	0.01782	2.70360
cyclohexane	1.62000	0.02942	2.90982	0.08561	0.01384	2.05185
methylcyclohexane	2.94000	0.04577	1.42286	0.06512	0.01053	1.82085
methylcyclopentane	0.94000	0.01707	4.03151	0.06883	0.01113	1.64953
3-methylpentane	0.63000	0.01117	5.48122	0.06125	0.00990	1.50308
n-heptane	1.90000	0.02898	1.42681	0.04135	0.00669	1.18000
cyclopentane	0.17000	0.00371	8.96348	0.03321	0.00537	0.66327
3-methylhexane	0.71000	0.01083	1.88579	0.02042	0.00330	0.58280
1t,2-dimethylcyclopentane	0.52000	0.00810	2.27727	0.01843	0.00298	0.51545
2-methylhexane	0.57000	0.00869	2.01204	0.01749	0.00283	0.49920
benzene	0.27000	0.00528	2.86487	0.01514	0.00245	0.33669
1c,3-dimethylcyclopentane	0.33000	0.00514	2.27727	0.01170	0.00189	0.32711
toluene	0.83000	0.01377	0.90368	0.01244	0.00201	0.32648
2,3-dimethylbutane	0.11000	0.00195	6.69218	0.01306	0.00211	0.32042
n-octane	1.53000	0.02047	0.46549	0.00953	0.00154	0.31000
1t,3-dimethylcyclopentane	0.31000	0.00483	2.27727	0.01099	0.00178	0.30729
2-methylheptane	0.81000	0.01084	0.66923	0.00725	0.00117	0.23595
1,1-dimethylcyclopentane	0.23000	0.00358	2.27727	0.00815	0.00132	0.22799
1c,2t,3-trimethylcyclopentane	0.88000	0.01199	0.52453	0.00629	0.00102	0.20092
2,3-dimethylpentane	0.18000	0.00275	2.08700	0.00573	0.00093	0.16352
2,2-dimethylhexane	0.27000	0.00361	1.06869	0.00386	0.00062	0.12560
3-methylheptane	0.41000	0.00549	0.66923	0.00367	0.00059	0.11943
2,2-dimethylbutane	0.03000	0.00053	8.93253	0.00475	0.00077	0.11664
2,4-dimethylpentane	0.07000	0.00107	2.93417	0.00313	0.00051	0.08940

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-propylcyclopentane	0.35000	0.00477	0.52453	0.00250	0.00040	0.07991
1t,2-dimethylcyclohexane	0.37000	0.00504	0.47036	0.00237	0.00038	0.07575
1,3-dimethylbenzene	0.61000	0.00878	0.28049	0.00246	0.00040	0.07448
1t,4-dimethylcyclohexane	0.32000	0.00436	0.52453	0.00229	0.00037	0.07306
4-methylheptane	0.23000	0.00308	0.66709	0.00205	0.00033	0.06678
n-nonane	1.31000	0.01561	0.11691	0.00183	0.00030	0.06666
ethylcyclopentane	0.11000	0.00171	1.24259	0.00213	0.00034	0.05950
2,3-dimethylhexane	0.18000	0.00241	0.75123	0.00181	0.00029	0.05886
i-propylcyclopentane	0.25000	0.00341	0.52453	0.00179	0.00029	0.05708
1c,2t,4-trimethylcyclopentane	0.24000	0.00327	0.52453	0.00171	0.00028	0.05480
1t,2c,3-trimethylcyclopentane	0.22000	0.00300	0.52453	0.00157	0.00025	0.05023
1,1,4-trimethylcyclohexane	0.70000	0.00848	0.16373	0.00139	0.00022	0.04989
2,2,3-trimethylhexane	0.29000	0.00346	0.37895	0.00131	0.00021	0.04784
3-ethylpentane	0.06000	0.00092	1.78043	0.00163	0.00026	0.04650
1,4-dimethylbenzene	0.33000	0.00475	0.29779	0.00141	0.00023	0.04277
2,4-dimethylhexane	0.10000	0.00134	0.96101	0.00129	0.00021	0.04183
2,2-dimethylpentane	0.03000	0.00046	3.11782	0.00143	0.00023	0.04071
2,5-dimethylhexane	0.08000	0.00107	0.96528	0.00103	0.00017	0.03361
1,1-dimethylcyclohexane	0.13000	0.00177	0.52453	0.00093	0.00015	0.02968
2t-ethylmethylcyclopentane	0.10000	0.00136	0.52453	0.00071	0.00012	0.02283
1,2-dimethylbenzene	0.22000	0.00317	0.22572	0.00071	0.00012	0.02161
3,3-dimethylpentane	0.02000	0.00031	2.47165	0.00075	0.00012	0.02152
ethylbenzene	0.15000	0.00216	0.31926	0.00069	0.00011	0.02084
3-ethylhexane	0.07000	0.00094	0.65042	0.00061	0.00010	0.01982
1c,2-dimethylcyclopentane	0.08000	0.00125	0.52453	0.00065	0.00011	0.01827
3-methyloctane	0.35000	0.00417	0.11691	0.00049	0.00008	0.01781
3,3-dimethylhexane	0.04000	0.00054	0.90338	0.00048	0.00008	0.01573
2,2,3-trimethylbutane	0.01000	0.00015	3.01654	0.00046	0.00007	0.01313
2-methyloctane	0.25000	0.00298	0.11691	0.00035	0.00006	0.01272
2-methyl-3-ethylpentane	0.03000	0.00040	0.96528	0.00039	0.00006	0.01260
3,4-dimethylhexane	0.04000	0.00054	0.69690	0.00037	0.00006	0.01213
3c-ethylmethylcyclopentane	0.05000	0.00068	0.52453	0.00036	0.00006	0.01142
3t-ethylmethylcyclopentane	0.05000	0.00068	0.52453	0.00036	0.00006	0.01142
4-methyloctane	0.21000	0.00250	0.11691	0.00029	0.00005	0.01069
3-methyl-3-ethylpentane	0.03000	0.00040	0.73113	0.00029	0.00005	0.00955
1,1-methylethylcyclopentane	0.03000	0.00041	0.52453	0.00021	0.00003	0.00685
2,5-dimethylheptane	0.13000	0.00155	0.11691	0.00018	0.00003	0.00662
2,6-dimethylheptane	0.04000	0.00048	0.37895	0.00018	0.00003	0.00660
1c,2-dimethylcyclohexane	0.03000	0.00041	0.47036	0.00019	0.00003	0.00614
2,4,4-trimethylhexane	0.03000	0.00036	0.43934	0.00016	0.00003	0.00574
$\ast$1c,3c,5-trimethylcyclohexane	0.07000	0.00085	0.16373	0.00014	0.00002	0.00499
1c,3-dimethylcyclohexane	0.02000	0.00027	0.52453	0.00014	0.00002	0.00457
4-ethylheptane	0.08000	0.00095	0.11691	0.00011	0.00002	0.00407
2,3,4-trimethylpentane	0.01000	0.00013	0.84444	0.00011	0.00002	0.00368

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,2,3,4-tetramethylpentane	0.02000	0.00024	0.41398	0.00010	0.00002	0.00360
2,3,4-trimethylhexane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00330
2,4-dimethylheptane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00330
3,3-diethylpentane	0.06000	0.00072	0.11691	0.00008	0.00001	0.00305
c-octene-2	0.01000	0.00014	0.57018	0.00008	0.00001	0.00248
2,4-dimethylheptene-1	0.03000	0.00036	0.18738	0.00007	0.00001	0.00245
1c,2t,4c-trimethylcyclohexane	0.03000	0.00036	0.16373	0.00006	0.00001	0.00214
2,3,5-trimethylhexane	0.01000	0.00012	0.37895	0.00005	0.00001	0.00165
3,5-dimethylheptane	0.03000	0.00036	0.11691	0.00004	0.00001	0.00153
1,1,3-trimethylcyclohexane	0.02000	0.00024	0.16373	0.00004	0.00001	0.00143
i-butylcyclopentane	0.02000	0.00024	0.16373	0.00004	0.00001	0.00143
3,3-dimethylheptane	0.02000	0.00024	0.11691	0.00003	0.000005	0.00102
3,4-dimethylheptane	0.02000	0.00024	0.11691	0.00003	0.000005	0.00102
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000003	0.00071
2,2-dimethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00051

Appendix A-4— Antoine Coefficients and Molecular Weights

$$\log_{10}(P/\mathrm{bar}) = A - \frac{B}{T/\mathrm{K} + C} \tag{9}$$

Compound	Formula	Mol. Wt.	VPsurrogate	A	B	C
*1c,3c,5-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1-nonene	—	—	—	4.079	1,435.359	−67.615
1-octene	—	—	—	4.058	1,353.486	−60.386
1,1-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1,1-dimethylcyclopentane	C_7H_{14}	98.188	—	3.955	1,226.557	−50.393
1,1-methylethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1,1,2-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1,1,3-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1,1,4-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1,2-dimethylbenzene	C_8H_{10}	106.167	—	4.938	1,901.373	−26.268
1,3-dimethylbenzene	C_8H_{10}	106.167	—	5.092	1,996.545	−14.772
1,4-dimethylbenzene	C_8H_{10}	106.167	—	4.146	1,474.403	−55.377
1c,2-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	3.967	1,369.525	−57.110
1c,2-dimethylcyclopentane	C_7H_{14}	98.188	i-propylcyclopentane	—	—	—
1c,2c,3-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,2t,3-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,2t,3c-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1c,2t,4-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,2t,4c-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1c,2t,4t-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1c,3-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,3-dimethylcyclopentane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	—	—	—
1c,3c,5c-trimethylcyclohexane	C_9H_{18}	126.242	—	—	—	—
1t,2-dimethylcyclohexane	C_8H_{16}	112.215	1c,2-dimethylcyclohexane	—	—	—
1t,2-dimethylcyclopentane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	—	—	—
1t,2c,3-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1t,3-dimethylcyclopentane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	—	—	—
1t,4-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
2-methyl-3-ethylpentane	C_8H_{18}	114.231	2,5-dimethylhexane	—	—	—
2-methylheptane	C_8H_{18}	114.231	—	4.042	1,337.468	−59.457
2-methylhexane	C_7H_{16}	100.204	—	4.007	1,240.869	−53.047
2-methyloctane	C_9H_{20}	128.258	n-nonane	—	—	—
2-methylpentane	C_6H_{14}	86.177	—	3.964	1,135.410	−46.578
2,2-dimethylbutane	C_6H_{14}	86.177	—	3.880	1,081.176	−43.807
2,2-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
2,2-dimethylhexane	C_8H_{18}	114.231	—	4.133	1,367.457	−48.436
2,2-dimethylpentane	C_7H_{16}	100.204	—	3.940	1,190.298	−49.807
2,2-dimethylpropane	C_5H_{12}	72.150	—	3.864	950.318	−36.329
2,2,3-trimethylbutane	C_7H_{16}	100.204	—	3.922	1,203.362	−46.776

Compound	Formula	Mol. Wt.	VPsurrogate	A	B	C
2,2,3-trimethylhexane	C_9H_{20}	128.258	—	4.414	1,592.354	−42.627
2,2,3-trimethylpentane	C_8H_{18}	114.231	2,2,4-trimethylpentane	—	—	—
2,2,3,4-tetramethylpentane	C_9H_{20}	128.258	—	3.960	1,376.496	−58.063
2,2,4-trimethylpentane	—	—	—	3.937	1,257.840	−52.415
2,2,5-trimethylhexane	C_9H_{20}	128.258	—	4.252	1,471.761	−48.948
2,3-dimethylbutane	C_6H_{14}	86.177	—	3.935	1,127.187	−44.200
2,3-dimethylhexane	C_8H_{18}	114.231	—	4.059	1,351.645	−55.257
2,3-dimethylpentane	C_7H_{16}	100.204	—	3.987	1,242.609	−50.806
2,3,4-trimethylhexane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2,3,4-trimethylpentane	C_8H_{18}	114.231	—	4.156	1,420.710	−44.618
2,3,5-trimethylhexane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2,4-dimethylheptane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2,4-dimethylheptene-1	C_9H_{18}	126.242	1-nonene	—	—	—
2,4-dimethylhexane	C_8H_{18}	114.231	—	3.989	1,292.707	−57.970
2,4-dimethylpentane	C_7H_{16}	100.204	—	3.961	1,197.608	−50.877
2,4,4-trimethylhexane	C_9H_{20}	128.258	—	3.991	1,378.043	−58.046
2,5-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
2,5-dimethylhexane	C_8H_{18}	114.231	—	3.980	1,284.664	−59.032
2,6-dimethylheptane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2t-ethylmethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
3-ethylheptane	C_9H_{20}	128.258	—	—	—	—
3-ethylhexane	C_8H_{18}	114.231	—	4.040	1,339.865	−59.479
3-ethylpentane	C_7H_{16}	100.204	—	4.005	1,254.119	−53.004
3-methyl-3-ethylpentane	C_8H_{18}	114.231	—	4.048	1,380.130	−49.963
3-methylheptane	C_8H_{18}	114.231	2-methylheptane	—	—	—
3-methylhexane	C_7H_{16}	100.204	—	3.999	1,243.759	−53.524
3-methyloctane	C_9H_{20}	128.258	n-nonane	—	—	—
3-methylpentane	C_6H_{14}	86.177	—	3.974	1,152.368	−46.021
3,3-diethylpentane	C_9H_{20}	128.258	n-nonane	—	—	—
3,3-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
3,3-dimethylheptene-1	C_9H_{18}	126.242	1-nonene	—	—	—
3,3-dimethylhexane	C_8H_{18}	114.231	—	3.859	1,243.387	−62.655
3,3-dimethylpentane	C_7H_{16}	100.204	—	3.956	1,230.986	−47.568
3,4-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
3,4-dimethylhexane	C_8H_{18}	114.231	—	4.098	1,382.877	−52.831
3,5-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
3c-ethylmethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
3t-ethylmethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
4-ethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
4-methylheptane	C_8H_{18}	114.231	—	4.060	1,347.236	−58.539
4-methyloctane	C_9H_{20}	128.258	n-nonane	—	—	—
4,4-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
benzene	C_6H_6	78.114	—	4.018	1,203.835	−53.226
c-nonene-3	C_9H_{18}	126.242	1-nonene	—	—	—

Compound	Formula	Mol. Wt.	VPsurrogate	A	B	C
c-octene-2	C_8H_{16}	112.215	1-octene	—	—	—
cyclohexane	C_6H_{12}	84.161	—	3.970	1,203.526	−50.287
cyclopentane	C_5H_{10}	70.134	—	4.003	1,119.208	−42.412
ethane	C_2H_6	30.070	—	—	—	—
ethylbenzene	C_8H_{10}	106.167	—	4.075	1,419.315	−60.539
ethylcyclopentane	C_7H_{14}	98.188	—	4.023	1,305.001	−51.755
i-butane	C_4H_{10}	58.123	—	4.328	1,132.108	0.918
i-butylcyclopentane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
i-pentane	C_5H_{12}	72.150	—	3.915	1,020.012	−40.053
i-propylcyclohexane	—	—	—	3.997	1,452.816	−63.759
i-propylcyclopentane	C_8H_{16}	112.215	—	4.017	1,383.340	−54.742
methylcyclohexane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	3.952	1,272.865	−51.520
methylcyclopentane	C_6H_{12}	84.161	—	3.988	1,186.059	−47.108
n-butane	C_4H_{10}	58.123	—	4.356	1,175.581	−2.071
n-heptane	C_7H_{16}	100.204	—	4.028	1,268.636	−56.199
n-hexane	C_6H_{14}	86.177	—	4.003	1,171.530	−48.784
n-nonane	C_9H_{20}	128.258	—	3.825	1,492.928	−55.895
n-octane	C_8H_{18}	114.231	—	4.049	1,355.126	−63.633
n-pentane	C_5H_{12}	72.150	—	3.989	1,070.617	−40.454
n-propylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
nonene-1	C_9H_{18}	126.242	—	4.079	1,435.359	−67.615
propane	C_3H_8	44.097	—	4.537	1,149.360	24.906
Styrene	C_8H_8	104.152	—	4.059	1,459.909	−59.551
t-7-methyloctene-3	C_9H_{18}	126.242	1-nonene	—	—	—
toluene	C_7H_8	92.141	—	4.142	1,377.578	−50.507

Appendix B-1— Constituent CAS Numbers, ESL's, and ESL Surrogates

∞ ="Simple asphyxiant"

Component	CAS	1-hr ESL (µg/m^3)	Ann. ESL (µg/m^3)	Surrogate
ethylbenzene	100-41-4	26,000	570	—
Styrene	100-42-5	110	140	—
1,4-dimethylbenzene	106-42-3	2,200	180	xylene
n-butane	106-97-8	66,000	7,100	—
3-methyl-3-ethylpentane	1067-08-9	5,600	540	n-octane
3,3-diethylpentane	1067-20-5	4,800	450	n-nonane
4,4-dimethylheptane	1068-19-5	4,800	450	n-nonane
2,3,5-trimethylhexane	1069-53-0	4,800	450	n-nonane
2-methylpentane	107-83-5	5,600	200	n-hexane
2,2,3,4-tetramethylpentane	1070-87-7	4,800	450	n-nonane
2,2-dimethylheptane	1071-26-7	4,800	450	n-nonane
2,4-dimethylheptane	1071-26-7	4,800	450	n-nonane
2,4-dimethylpentane	108-08-7	10,000	2,700	n-heptane
1,3-dimethylbenzene	108-38-3	2,200	180	xylene
methylcyclohexane	108-87-2	16,100	1,610	—
toluene	108-88-3	4,500	1,200	—
n-pentane	109-66-0	59,000	7,100	—
n-hexane	110-54-3	5,600	200	—
cyclohexane	110-82-7	3,400	340	—
n-octane	111-65-9	5,600	540	—
n-nonane	111-84-2	4,800	450	—
nonene-1	124-11-8	5,700	570	alkenes, generic, not otherwise specified
n-heptane	142-82-5	10,000	2,700	—
ethylcyclopentane	1640-89-7	16,300	1,630	—
2,2,3-trimethylhexane	16747-25-4	4,800	450	n-nonane
1t,3-dimethylcyclopentane	1759-58-6	3,500	350	—
$\star$1c,3c,5-trimethylcyclohexane	1839-63-0	3,400	340	cyclohexane
1c,2t,4t-trimethylcyclohexane	1839-63-0	3,400	340	cyclohexane
1c,2t,4c-trimethylcyclohexane	1839-63-0	3,400	340	cyclohexane
1,1,4-trimethylcyclohexane	1839-63-0	3,400	340	cyclohexane
1c,2t,3c-trimethylcyclohexane	1839-63-0	3,400	340	cyclohexane
1,1,3-trimethylcyclohexane	1839-63-0	3,400	340	cyclohexane
3,3-dimethylheptene-1	19549-87-2	5,700	570	alkenes, generic, not otherwise specified
2,4-dimethylheptene-1	19549-87-2	5,700	570	alkenes, generic, not otherwise specified
i-butylcyclopentane	2040-95-1	3,500	350	—

Component	CAS	1-hr ESL (μg/m^3)	Ann. ESL (μg/m^3)	Surrogate
n-propylcyclopentane	2040-96-2	3,500	350	—
i-propylcyclopentane	2040-96-2	3,500	350	—
1c,2-dimethylcyclohexane	2207-01-4	3,400	340	cyclohexane
2,5-dimethylheptane	2216-30-0	4,800	450	n-nonane
2,6-dimethylheptane	2216-30-0	4,800	450	n-nonane
4-ethylheptane	2216-32-2	4,800	450	n-nonane
3-methyloctane	2216-33-3	4,800	450	n-nonane
4-methyloctane	2216-34-4	4,800	450	n-nonane
1c,3-dimethylcyclopentane	2532-58-3	3,500	350	—
c-octene-2	25377-83-7	3,400	340	1-octene
3t-ethylmethylcyclopentane	2613-65-2	3,500	350	—
cyclopentane	287-92-3	17,000	1,700	—
2-methyloctane	3221-61-2	4,800	450	n-nonane
2,2,5-trimethylhexane	3522-94-9	4,800	450	n-nonane
1,1-methylethylcyclopentane	3875-51-2	3,500	350	—
3c-ethylmethylcyclopentane	3875-51-2	3,500	350	—
3,3-dimethylheptane	4032-86-4	4,800	450	n-nonane
2,2-dimethylpropane	463-82-1	59,000	7,100	n-pentane
2,2,3-trimethylbutane	464-06-2	10,000	2,700	n-heptane
1c,2t,3-trimethylcyclopentane	4850-28-6	3,500	350	dimethylcyclopentane, all isomers
1,1-dimethylcyclopentane	4850-28-6	3,500	350	dimethylcyclopentane, all isomers
1c,2t,4-trimethylcyclopentane	4850-28-6	3,500	350	dimethylcyclopentane, all isomers
1t,2c,3-trimethylcyclopentane	4850-28-6	3,500	350	dimethylcyclopentane, all isomers
1c,2c,3-trimethylcyclopentane	4850-28-6	3,500	350	dimethylcyclopentane, all isomers
1c,2-dimethylcyclopentane	4850-28-6	3,500	350	dimethylcyclopentane, all isomers
3,3-dimethylpentane	562-49-2	10,000	2,700	n-heptane
3,3-dimethylhexane	563-16-6	5,600	540	n-octane
2,2,3-trimethylpentane	564-02-3	5,600	540	n-octane
2,3,4-trimethylpentane	564-02-3	5,600	540	n-octane
2,3-dimethylpentane	565-59-3	10,000	2,700	n-heptane
3,4-dimethylhexane	583-48-2	5,600	540	n-octane
2,3-dimethylhexane	584-94-1	5,600	540	n-octane
3-methylhexane	589-34-4	10,000	2,700	n-heptane
2,4-dimethylhexane	589-43-5	5,600	540	n-octane
4-methylheptane	589-53-7	5,600	540	n-octane
3-methylheptane	589-81-1	5,600	540	n-octane
2,2-dimethylpentane	590-35-2	10,000	2,700	n-heptane
1,1-dimethylcyclohexane	590-66-9	16,100	1,610	methylcyclohexane

Component	CAS	1-hr ESL (µg/m^3)	Ann. ESL (µg/m^3)	Surrogate
2,2-dimethylhexane	590-73-8	$5,600$	540	n-octane
2-methylhexane	591-76-4	$10,000$	$2,700$	n-heptane
2,5-dimethylhexane	592-13-2	$5,600$	540	n-octane
2-methylheptane	592-27-8	$5,600$	540	n-octane
2-methyl-3-ethylpentane	609-26-7	$5,600$	540	n-octane
3-ethylpentane	617-78-7	$10,000$	$2,700$	n-heptane
3-ethylhexane	619-99-8	$5,600$	540	n-octane
1t,4-dimethylcyclohexane	624-29-3	$16,100$	$1,610$	methylcyclohexane
1t,2-dimethylcyclohexane	624-29-3	$16,100$	$1,610$	methylcyclohexane
1c,3-dimethylcyclohexane	638-04-0	$16,100$	$1,610$	methylcyclohexane
1,1,2-trimethylcyclohexane	7094-26-0	$3,400$	340	cyclohexane
benzene	71-43-2	170	4.500	—
ethane	74-84-0	∞	∞	—
propane	74-98-6	∞	∞	—
i-butane	75-28-5	$23,000$	$7,100$	—
2,2-dimethylbutane	75-83-2	$5,600$	200	n-hexane
i-pentane	78-78-4	$59,000$	$7,100$	n-pentane
2,3-dimethylbutane	79-29-8	$5,600$	200	n-hexane
1t,2-dimethylcyclopentane	822-50-4	$3,500$	350	propylcyclopentane
2,3,4-trimethylhexane	921-47-1	$4,800$	450	n-nonane
2,4,4-trimethylhexane	921-47-1	$4,800$	450	n-nonane
3,4-dimethylheptane	922-28-1	$4,800$	450	n-nonane
3,5-dimethylheptane	926-82-9	$4,800$	450	n-nonane
2t-ethylmethylcyclopentane	930-90-5	$3,500$	350	dimethylcyclopentane, all isomers
1,2-dimethylbenzene	95-47-6	$2,200$	180	xylene
3-methylpentane	96-14-0	$5,600$	200	n-hexane
methylcyclopentane	96-37-7	$2,600$	260	—

Appendix B-2— Vapor Phase Weight Percentages Summed by Surrogate Group

T=72.1°F (annual modeling)

Surrogate Group	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	MIN	MAX
propane	20.76	32.36	32.40	45.47	36.18	20.76	45.47
n-butane	30.93	24.04	27.32	30.16	26.83	24.04	30.93
n-pentane	21.13	18.63	21.58	16.67	19.09	16.67	21.58
i-butane	14.10	11.72	8.43	8.47	8.94	8.43	14.10
n-hexane	7.00	6.19	7.25	5.81	7.15	5.81	7.25
ethane	0	0.95	2.42	5.08	3.13	0	5.08
n-heptane	2.14	1.99	1.90	1.64	2.12	1.64	2.14
cyclohexane	0.45	1.09	1.30	0.48	1.77	0.45	1.77
methylcyclohexane	0.55	1.28	1.13	0.57	1.61	0.55	1.61
methylcyclopentane	0.45	1.66	1.60	1.19	1.42	0.45	1.66
n-octane	0.71	0.81	0.75	0.67	0.80	0.67	0.81
cyclopentane	0.69	1.00	1.03	0.69	0.60	0.60	1.03
dimethylcyclopentane, all isomers	0.12	0.41	0.39	0.34	0.45	0.12	0.45
propylcyclopentane	0.08	0.40	0.44	0.45	0.43	0.08	0.45
benzene	0.16	0.05	0.29	0.16	0.28	0.05	0.29
1c,3-dimethylcyclopentane	0.05	0.25	0.27	0.25	0.27	0.05	0.27
1t,3-dimethylcyclopentane	0.09	0.28	0.30	0.29	0.26	0.09	0.30
toluene	0.27	0.11	0.22	0.10	0.25	0.10	0.27
n-nonane	0.16	0.23	0.18	0.15	0.14	0.14	0.23
xylene	0.12	0.09	0.07	0.06	0.10	0.06	0.12
n-propylcyclopentane	0	0.05	0.05	0.04	0.06	0	0.06
ethylcyclopentane	0	0	0	0	0.05	0	0.05
i-propylcyclopentane	0.01	0.02	0.02	0.02	0.04	0.01	0.04
ethylbenzene	0.01	0.01	0.02	0.01	0.01	0.01	0.02
3c-ethylmethylcyclopentane	0.001	0.01	0.01	0.01	0.01	0.001	0.01
3t-ethylmethylcyclopentane	0.001	0.01	0.01	0.01	0.01	0.001	0.01
1,1-methylethylcyclopentane	0.001	0.01	0.003	0.003	0.01	0.001	0.01
1-octene	0.001	0.003	0	0	0.002	0	0.003
alkenes, generic, not otherwise specified	0	0.002	0.001	0.01	0.002	0	0.01
i-butylcyclopentane	0	0	0	0	0.001	0	0.001
Styrene	0.001	0	0	0	0	0	0.001

T=95°F (1-hr modeling)

Surrogate Group	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	MIN	MAX
propane	18.98	29.87	30.10	43.67	33.83	18.98	43.67
n-butane	30.27	23.75	27.16	31.01	26.85	23.75	31.01
n-pentane	22.03	19.62	22.90	18.32	20.40	18.32	22.90
i-butane	13.51	11.34	8.20	8.53	8.76	8.20	13.51
n-hexane	7.87	7.03	8.29	6.87	8.22	6.87	8.29
ethane	0	1.16	2.96	6.23	3.82	0	6.23
n-heptane	2.59	2.43	2.35	2.10	2.64	2.10	2.64
cyclohexane	0.53	1.29	1.55	0.59	2.12	0.53	2.12
methylcyclohexane	0.66	1.57	1.40	0.72	2.00	0.66	2.00
methylcyclopentane	0.51	1.91	1.85	1.42	1.65	0.51	1.91
n-octane	0.92	1.06	0.99	0.91	1.07	0.91	1.07
cyclopentane	0.75	1.09	1.14	0.79	0.66	0.66	1.14
dimethylcyclopentane, all isomers	0.15	0.52	0.50	0.45	0.58	0.15	0.58
propylcyclopentane	0.10	0.48	0.53	0.56	0.52	0.10	0.56
benzene	0.19	0.06	0.35	0.20	0.34	0.06	0.35
1c,3-dimethylcyclopentane	0.06	0.29	0.32	0.31	0.33	0.06	0.33
toluene	0.34	0.13	0.29	0.13	0.33	0.13	0.34
1t,3-dimethylcyclopentane	0.11	0.34	0.36	0.35	0.31	0.11	0.36
n-nonane	0.22	0.32	0.25	0.22	0.20	0.20	0.32
xylene	0.17	0.12	0.10	0.08	0.14	0.08	0.17
n-propylcyclopentane	0	0.06	0.06	0.05	0.08	0	0.08
ethylcyclopentane	0	0	0	0	0.06	0	0.06
i-propylcyclopentane	0.02	0.03	0.02	0.03	0.06	0.02	0.06
ethylbenzene	0.01	0.02	0.03	0.01	0.02	0.01	0.03
3c-ethylmethylcyclopentane	0.002	0.01	0.01	0.01	0.01	0.002	0.01
3t-ethylmethylcyclopentane	0.002	0.01	0.01	0.01	0.01	0.002	0.01
1,1-methylethylcyclopentane	0.002	0.01	0.005	0.004	0.01	0.002	0.01
1-octene	0.002	0.004	0	0	0.002	0	0.004
alkenes, generic, not otherwise specified	0	0.003	0.002	0.01	0.002	0	0.01
i-butylcyclopentane	0	0	0	0	0.001	0	0.001
Styrene	0.001	0	0	0	0	0	0.001

Appendix B-3— Model Results

Surrogate Group	1-hr GLC_{max} (µg/m^3)	1-hr ESL (µg/m^3)	GLC_{max}/ESL (%)	Ann. GLC_{max} (µg/m^3)	Ann. ESL (µg/m^3)	GLC_{max}/ESL (%)
benzene	121.21	170	71.30	0.67	4.50	14.83
n-hexane	2,865.57	5,600	51.17	16.57	200	8.28
methylcyclopentane	660.08	2,600	25.39	3.79	260	1.46
cyclohexane	732.09	3,400	21.53	4.04	340	1.19
i-butane	4,670.99	23,000	20.31	32.21	7,100	0.45
n-butane	10,721.33	66,000	16.24	70.65	7,100	1.00
n-pentane	7,918.60	59,000	13.42	49.29	7,100	0.69
n-heptane	911.78	10,000	9.12	4.90	2,700	0.18
n-octane	368.47	5,600	6.58	1.85	540	0.34
dimethylcyclopentane, all isomers	198.84	3,500	5.68	1.03	350	0.29
propylcyclopentane	194.68	3,500	5.56	1.04	350	0.30
methylcyclohexane	692.94	16,100	4.30	3.68	1,610	0.23
1t,3-dimethylcyclopentane	123.88	3,500	3.54	0.68	350	0.20
1c,3-dimethylcyclopentane	113.11	3,500	3.23	0.62	350	0.18
xylene	58.08	2,200	2.64	0.28	180	0.16
toluene	116.46	4,500	2.59	0.61	1,200	0.05
cyclopentane	392.77	17,000	2.31	2.35	1,700	0.14
n-nonane	110.49	4,800	2.30	0.53	450	0.12
n-propylcyclopentane	27.63	3,500	0.79	0.14	350	0.04
ethylcyclopentane	20.57	16,300	0.13	0.11	1,630	0.01
i-propylcyclopentane	19.74	3,500	0.56	0.10	350	0.03
Styrene	0.26	110	0.24	0.001	140	0.001
3c-ethylmethylcyclopentane	4.76	3,500	0.14	0.02	350	0.01
3t-ethylmethylcyclopentane	3.96	3,500	0.11	0.02	350	0.01
1,1-methylethylcyclopentane	2.45	3,500	0.07	0.01	350	0.004
alkenes, generic, not otherwise specified	3.66	5,700	0.06	0.02	570	0.003
ethylbenzene	9.17	26,000	0.04	0.04	570	0.01
1-octene	1.33	3,400	0.04	0.01	340	0.002
i-butylcyclopentane	0.49	3,500	0.01	0.002	350	0.001
propane	15,101.51	∞	0	103.85	∞	0
ethane	2,154.70	∞	0	11.59	∞	0

Appendix B-4— Updated Receptor Grid Maps

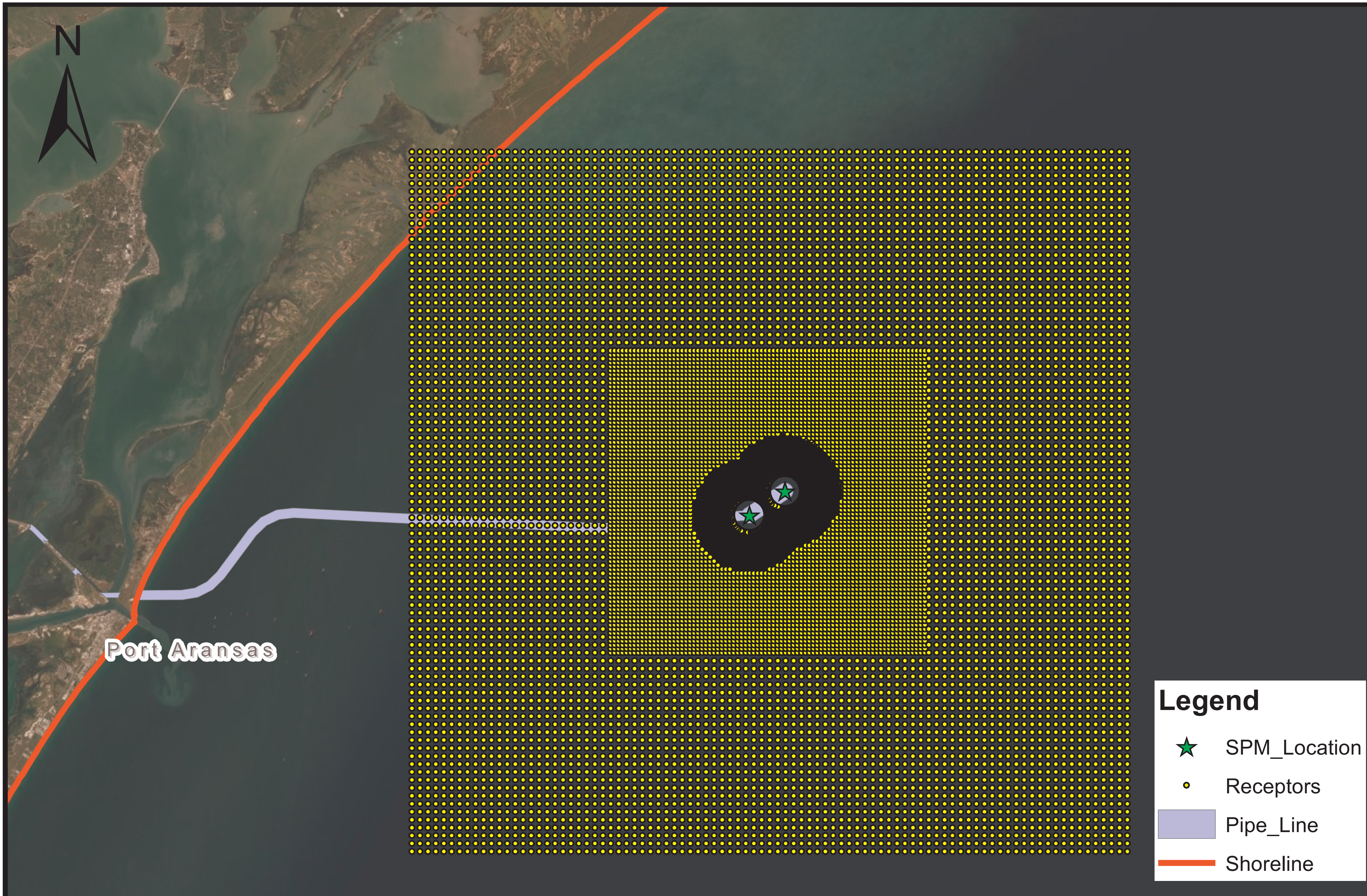


Figure 3-2 Modeled Receptors

DiSorbo
Environmental Consulting Firm

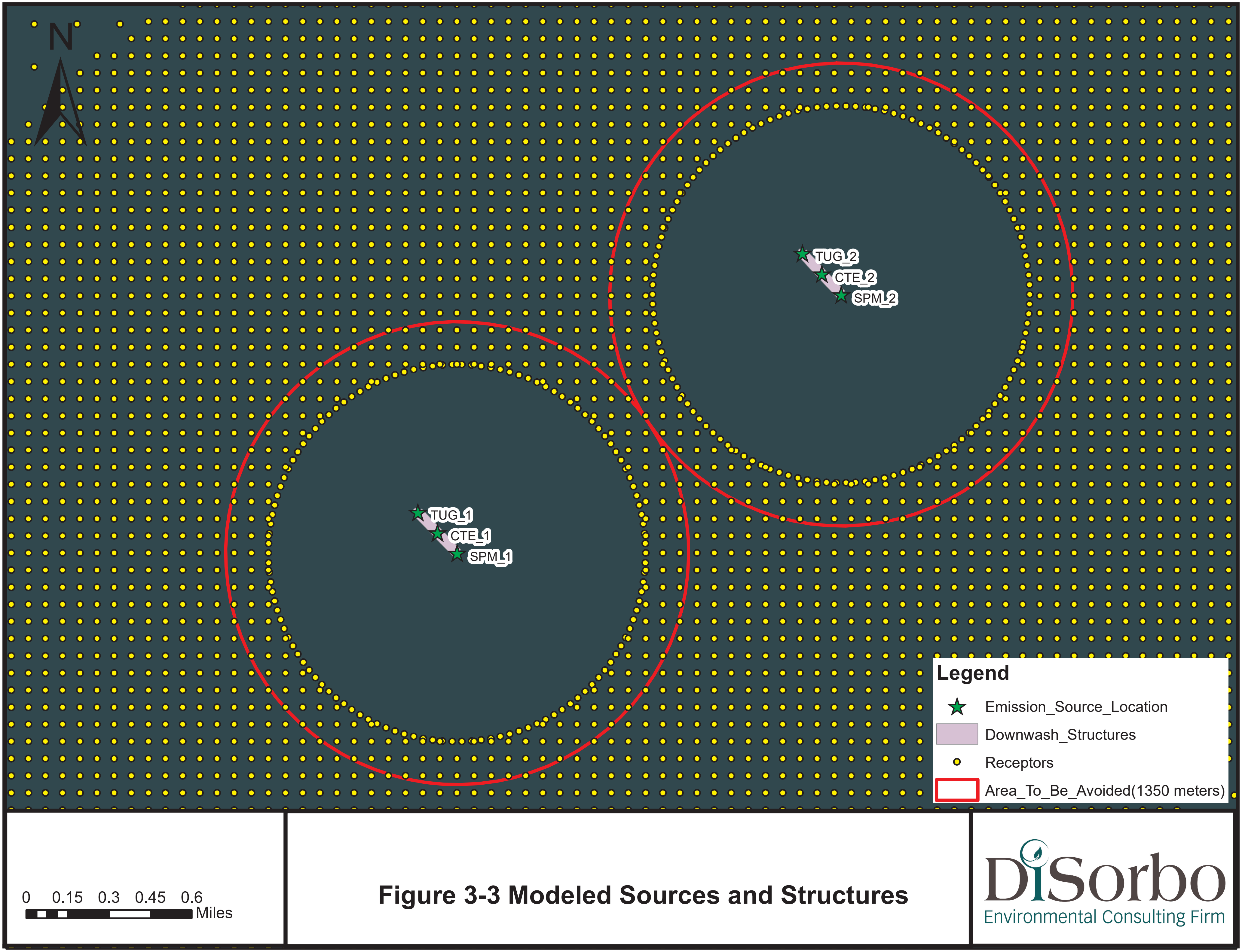


Figure 3-3 Modeled Sources and Structures

DiSorbo
Environmental Consulting Firm

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

July 31, 2019

Mr. David Farris
Bluewater Texas Terminal
2331 CityWest Blvd.
Houston, TX 77042

RE: Title V Application Incompleteness Determination for the Bluewater Texas Terminal LLC

Dear Mr. Farris:

The United States Environmental Protection Agency (EPA) has completed a review of your title V operating permit application for the Bluewater Texas Terminal (BWTT) received on May 31, 2019. We have determined that your application is incomplete as submitted. We have enclosed review comments that will need to be addressed in order for EPA to continue to process your title V permit application. Please notify us if your response/supplemental submittal is not possible by September 1, 2019.

Upon receipt of your supplemental information, we will continue our completeness review and will issue a completeness determination based upon our evaluation of all information provided for your permit application at that time. The information specified in our Enclosure is necessary for EPA to develop a Statement of Basis and provide a rationale for the terms and conditions for a draft title V operating permit. As we continue our review, it may be necessary for EPA to request further clarifying or supporting information. If any supplemental information substantially changes the original scope of the permit application, an amendment or new application may be required.

If you have any questions concerning our questions or the information we are requesting, please feel free to contact myself at (214) 665-6435 or Aimee Wilson of my staff at (214) 665-7596.

Sincerely,

7/31/2019

X Jeff Robinson

Jeff Robinson
Branch Chief Air Permits, Monitoring & Gra...
Signed by: JEFFERY ROBINSON

Enclosure

ENCLOSURE

EPA Region 6 Title V Application Completeness Review Comments
Bluewater Texas Terminal LLC (BWTT)

The information in the application appears to mirror the Bluewater Texas Terminal LLC (BWTT) Prevention of Significant Deterioration (PSD) application. Of special note, as the PSD application has been determined to be incomplete, much of the same information requested to make the PSD application complete will also be needed in order for the title V application to be considered complete.

1. Please provide information on fugitive emissions as they should be included in the permit application in accordance with 40 CFR § 71.3(d).

2. For the permitting record, please provide additional information to clarify how BWTT intends to verify that the noncompany owned, foreign flagship marine tank vessels loaded at BWTT are tested annually for a vapor tightness test in accordance with 40 CFR § 63.565(c).

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270-2102

August 1, 2019

Mr. Myles J. Greenway
Commander, U.S. Coast Guard
Chief, Vessel and Facilities Operating
Standard Division by Direction
2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509

Dear Mr. Greenway:

The Region 6 Office of the U.S. Environmental Protection Agency (EPA) has reviewed the July 3, 2019, Department of Transportation, Maritime Administration (MARAD), Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) for the proposed Bluewater Texas Terminal located in San Patricio County, Texas [Docket No. MARAD-2019-0094]. The U.S. Coast Guard (USCG), in coordination with the MARAD, is now requesting comments on the scope of the DEIS for the construction and operation of facilities by Bluewater Texas Terminal, LLC. USCG and MARAD will use this DEIS in its decision-making process to assess the associated impacts on natural resources and the human environment and to determine whether this project is in the public's best interest.

To assist in the scoping process for this project, we enclosed detailed scoping comments for your consideration. Our scoping comments are provided pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and Section 309 of the Clean Air Act. EPA is most interested about the following issues: mitigation, alternative development, impacts to water and biological resources, wetlands, endangered species, invasive species management, habitat protection, air quality, cumulative impacts, cultural/ historic resource impacts and environmental justice.

Because the Deepwater Port Act designates the proposed type of facility a "new source" for Clean Water Act and Clean Air Act purposes, EPA intends to rely on this EIS and incorporated consultations for its NPDES permitting actions and the consultations for air permitting actions. Of particular interest will be the conclusion of consultations with the National Marine Fisheries Service and/or U.S. Fish and Wildlife Service for compliance with the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act and the consultations with the Advisory Council on Historic Preservation and the Texas Historical Commission for compliance with the National Historic Preservation Act. We request that particular consideration be given to EPA's actions in these consultations.

EPA looks forward to continued involvement and cooperation in the EIS development for this project. Please send one hard copy of the DEIS and a web link to this office when completed and submitted for public comment. You may now electronically file your EIS using our *e-NEPA Electronic Filing* by linking to EPA's web site at http://www.epa.gov/compliance/nepa/submiteis/index.html. If you have any questions, please contact Robert Houston of my staff at (214) 665-8565; or by e-mail at houston.robert@epa.gov.

Sincerely,

Arturo J. Blanco
Director
Office of Communities, Tribes and
Environmental Assessment

cc (email): Ms. Yvette Fields, Maritime Administration, Yvette.Fields@dot.gov
Mr. Patrick Clark, U.S. Coast Guard, Patrick.W.Clark@uscg.mil
Mr. Linden Houston, Maritime Administration, Linden.Houston@dot.gov
Mr. Timothy O'Brien, U.S. Coast Guard, Timothy.P.O'Brien@uscg.mil
Mr. Roddy Bachman, U.S. Coast Guard, Roddy.C.Bachman@uscg.mil
Mr. Brad McKitrick, U.S. Coast Guard, Bradley.K.McKitirick@uscg.mil

Enclosure

DETAILED SCOPING COMMENTS
FOR THE US COAST GUARD (USCG)
AND MARITIME ADMINISTRATION (MARAD)
NOTICE OF INTENT (NOI)
TO PREPARE AN
ENVIRONMENTAL IMPACT STATEMENT (EIS)
FOR THE PROPOSED
BLUEWATER TEXAS TERMINAL, LLC
SAN PATRICIO COUNTY, TEXAS

BACKGROUND

The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an Environmental Impact Statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) Deepwater Port License Application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

DETAILED COMMENTS

Statement of Purpose and Need

The DEIS should clearly identify the underlying purpose and need to which the USCG is responding in proposing the alternatives (40 CFR 1502.13). The purpose of the proposed action is typically the specific objectives of the activity, while the need for the proposed action may be to eliminate a broader underlying problem or take advantage of an opportunity. The purpose and need should be a clear, objective statement of the rationale for the proposed project.

Alternatives Analysis

The National Environmental Policy Act (NEPA) requires evaluation of reasonable alternatives, including those that may not be within the jurisdiction of the lead agency (40 CFR Section 1502.14(c)). A robust range of alternatives will include options for avoiding significant environmental impacts. The DEIS should provide a clear discussion of the reasons for the elimination of alternatives which are not evaluated in detail.

The environmental impacts of the proposal and alternatives should be presented in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public (40 CFR 1502.14). The potential environmental impacts of each alternative should be quantified to the greatest extent possible (e.g., acres of bay bottom impacted, tons per year of emissions produced).

Stormwater Considerations

The DEIS should describe the original (natural) drainage patterns in the project locale, as well as the drainage patterns of the area during project operations. Also, the DEIS should identify whether any components of the proposed project are within a 50 or 100-year floodplain. The DEIS should note that, under the Federal Clean Water Act (CWA), any construction project disturbing a land area of one or more acres requires a construction stormwater discharge permit.

Waters of the United States and Compliance with Section 404 CWA

The impacts from the construction, operation and maintenance of the proposed Bluewater Texas Offshore Terminal Deepwater Port and its associated facilities will result in impacts to wetlands that require permit authorization under Section 404 of the Clean Water Act (CWA 404) for the placement of dredged or fill material. As such, the DEIS should include a thorough evaluation that demonstrates planning efforts to avoid, minimize, and compensate for wetland losses associated with the construction, operation and maintenance of the proposed project. This evaluation is necessary to demonstrate the project's compliance with the Federal Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR 230), promulgated pursuant to Section 404(b)(1) of the CWA. Impacts to aquatic resources and wetlands should include direct, indirect and cumulative effects reasonably associated with the proposed project. Along with the CWA 404 (b)(1) analysis, all unavoidable direct and indirect impacts would need to be compensated. We recommend that an aquatic resource and wetland mitigation plan, consistent with the 2008 Final Rule for Compensatory Mitigation for Losses of Aquatic Resources, be included within DEIS.

Specific to the existing documentation, please ensure wetland impacts are consistently identified and quantified throughout the project documentation. If portions of the current evaluation of wetland impacts is based upon a desktop analysis, the EPA recommends a field-based assessment of the project impacts to be included as soon as possible and be available with the DEIS. For the evaluation of alternatives, providing a clear comparative analysis of project alternatives with all associated wetland impacts (preferably in a tabular form with supporting map of alternatives) would be beneficial. The alternatives evaluation should include a thorough discussion of avoidance and minimization measures considered such as use of horizontal directional drilling throughout the project footprint and not limited to where conventional construction practices are not feasible.

The mitigation plan should include all components as required by the 2008 Mitigation Rule and compensate for unavoidable impacts to aquatic resources, including of the conversion wetland resources along with any temporal losses that may result from project construction. The mitigation plan should incorporate an analysis of lost wetland functions along with the wetland functions to be enhanced, restored or created. The proposed mitigation should be in the same watershed as the proposed impacts and should be of the same type to ensure adequate compensation is provided for the types and quantities of aquatic resources impacted by the project. Please provide the revised draft mitigation plan with the DEIS as providing this material for public review allows for the optimum analysis of the entire range of significant potential environmental impacts by the Corps, the EPA and other interested stakeholders.

Biological Resources, Habitat and Wildlife

The DEIS should identify all petitioned and listed threatened and endangered species and critical habitat that might occur within the project area, including any areas. The DEIS should identify which species or critical habitat might be directly, indirectly, or cumulatively affected by each alternative and describe possible mitigation for each of the species. EPA recommends that the USGS consult with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act. We also recommend that the USCG coordinate across field offices and with USFWS, NMFS, and the Texas Parks and Wildlife Department (TPWD) to ensure that current and consistent surveying, monitoring, and reporting protocols are applied in protection and mitigation efforts.

Invasive Species

Human actions are the primary means of invasive species introductions. Pipeline construction causes disturbance of ROW soils and vegetation through the movement of people and vehicles along the ROW, access roads, and lay down areas. These activities can contribute to the spread of invasive species.

Executive Order 13112, *Invasive Species* (February 3, 1999), mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. Executive Order 13112 also calls for the restoration of native plants and tree species. If the proposed project will entail new landscaping, the DEIS should describe how the project will meet the requirements of Executive Order 13112.

In addition, we encourage alternative management practices that limit herbicide use (as a last resort), focusing instead on other methods to limit invasive species vegetation and decrease fire risk. Possible alternatives include mowing and weed control fabric, which may need a layer of soil to prevent degradation due to ultraviolet light.

Air Quality

The DEIS should discuss the existing, or baseline, ambient air conditions in the vicinity of the project. This includes identification of applicable National Ambient Air Quality Standards (NAAQS), non-NAAQS pollutants, and criteria pollutant nonattainment areas. The project must be evaluated for cumulative and indirect air quality impacts, with potential impacts from temporary, long-term, or cumulative degradation of air quality addressed. This evaluation should estimate and quantify project-related criteria and hazardous air pollutant (air toxics) emissions, identify specific emissions sources, and consider any expected air quality/visibility impacts to any Class I Federal Areas identified in 40 CFR Part 81, Subpart D. Such discussions should describe and estimate air emissions from potential construction and maintenance activities, and proposed mitigation measures as part of a construction emissions mitigation plan to limit these emissions.

Hazardous Materials/Hazardous Waste/Solid Waste

The DEIS should address potential direct, indirect and cumulative impacts of hazardous waste from construction and operation of the proposed transmission line and other facilities. The document should identify projected hazardous waste types and volumes, and expected storage, disposal, and management plans. It should address the applicability of state and federal hazardous waste requirements. Appropriate mitigation should be evaluated, including measures to minimize the generation of hazardous waste (i.e., hazardous waste minimization). Alternate industrial processes using less toxic materials should be evaluated as mitigation since such processes could reduce the volume or toxicity of hazardous materials requiring management and disposal as hazardous waste.

Indirect Impacts

Per CEQ regulations at CFR 1508.8(b), the indirect effects analysis "may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." We recommend the DEIS consider available information about the extent to which drilling activity might be stimulated by the construction of an offshore crude oil export facility on the Gulf coast, and any potential environmental effects associated with that export terminal expansion.

Cumulative and Indirect Impacts

The cumulative impacts analysis should identify how resources, ecosystems, and communities in the vicinity of the project have already been, or will be, affected by past, present, or future activities in the project area. These resources should be characterized in terms of their response to change and capacity to withstand stresses. Trends data should be used to establish a baseline for the affected resources, to evaluate the significance of historical degradation, and to predict the environmental effects of the project components.

For the cumulative impacts assessment, we recommend the DEIS focus on resources of concern or resources that are "at risk" and/or are significantly impacted by the proposed project, before mitigation. For this project, the USCG should conduct a thorough assessment of the cumulative impacts, especially in the context of the other developments occurring and proposed in the area, including pending and proposed projects.

Coordination with Tribal Governments

Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments* (November 6, 2000), was issued in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and to strengthen the United States government-to-government relationships with Indian tribes. If applicable, the DEIS should describe the process and outcome of government-to-government consultation between the USGS and with each of the tribal governments within the project area, issues that were raised (if any), and how those issues were addressed in the selection of the proposed alternative.

National Historic Preservation Act and Executive Order 13007(NRHA)

Consultation for tribal cultural resources is required under Section 106 of the National Historic Preservation Act. Historic properties under the NHPA are properties that are included in the National Register of Historic Places or that meet the criteria for the National Register. Section 106 of the NHPA requires a federal agency, upon determining that activities under its control could affect historic properties, consult with the appropriate State Historic Preservation Officer (SHPO)/Tribal Historic Preservation Officer (THPO), Indian tribes, or any other interested party. Under NEPA, any impacts to tribal, cultural, or other treaty resources must be discussed and mitigated. Section 106 of the NHPA requires that Federal agencies consider the effects of their actions on cultural resources, following regulation in 36 CFR 800. The DEIS should address the existence of cultural and historic resources, including Indian sacred sites, in the project areas, and address compliance with Section 106 of the NHPA. The DEIS should provide a summary of all coordination with Tribes, the SHPO/THPO, or any other party; and identify all NRHP listed or eligible sites, and the development of a Cultural Resource Management Plan.

Environmental Justice and Impacted Communities

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994) and the Interagency Memorandum of Understanding on Environmental Justice (August 4, 2011) direct federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations, allowing those populations a meaningful opportunity to participate in the decision-making process. Guidance[1] by CEQ clarifies the terms low-income and minority population (which includes Native Americans) and describes the factors to consider when evaluating disproportionately high and adverse human health effects. The DEIS should also describe outreach conducted to all other communities that could be affected by the project, since rural communities may be among the most vulnerable to health risks associated with the project.

The USGS should evaluate environmental justice populations within at least one-mile radius of the proposed project boundaries and use of available tools (i.e., EJ Screen, U.S. Census Bureau, area knowledge) to identify and screen environmental justice populations. EPA recommends using the Promising Practice Report to supplement the applicable requirements for considering and analyzing Environmental Justice population, which can be found at the following link: https://www.epa.gov/sites/production/files/2016-08/documents/nepa_promising_practices_document_2016.pdf.

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[1] Environmental Justice Guidance under the National Environmental Policy Act, Appendix A (Guidance for Federal Agencies on Key Terms in Executive Order 12898), CEQ, December 10, 1997.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TX 75270

August 6, 2019

Mr. Roddy Bachman
U.S. Coast Guard (CG-OES-2)
Vessel and Facilities Operating
2703 Martin Luther King, Jr. Avenue S.E.
Washington, DC 20593-7509

Subject: EPA Authority Over Construction and Operation
Phillips 66 Bluewater Texas Deepwater Port Act Project

Dear Mr. Bachman:

The EPA Region 6 received a copy of the Deepwater Port Act (DPA) license application package for the Phillips 66 Bluewater Texas Terminal (Bluewater), a crude oil export terminal, on July 2, 2019. We provide these comments to assist the United States Coast Guard/Maritime Administration (USCG/MARAD) and their contractors as the agencies initiate scoping for the Environmental Impact Statement (EIS) under the DPA and the National Environmental Policy Act (NEPA), evaluate the application for a DPA license, as well as conducting consultations with the National Marine Fisheries Service and/or U.S. Fish and Wildlife Service for compliance with the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act and with Advisory Council on Historic Preservation and the Texas Historical Commission for compliance with the National Historic Preservation Act.

The proposed project involves the design, engineering, and construction of a deepwater port, 56.48 miles of pipeline infrastructure, and a booster station. The overall project will consist of three distinct, but interrelated components: 1) the “onshore” component, 2) the “inshore” component, and 3) the “offshore” component.

Onshore components associated with the proposed project include the construction and operation of approximately 22.20 miles of two (2) new paralleling 30-inch diameter pipelines located within San Patricio and Aransas counties, Texas. The proposed onshore pipelines extend from the planned multi-use terminal located south of the City of Taft in San Patricio County, Texas to the western Redfish Bay mean high tide (MHT) line. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines are the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station. We note that there is no explanation why the “multi-use” terminal is not considered as part of the overall Bluewater facility.

Inshore components associated with the proposed project include the construction and operation of approximately 7.15 miles of two (2) new 30-inch-diameter pipelines and the Harbor Island Booster Station. The proposed inshore components serve to connect the onshore components to offshore components for the transport of crude oil and operation of the proposed deepwater port. The approximate 7.15 miles of the proposed inshore pipeline infrastructure extends from the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. The proposed inshore pipeline infrastructure crosses three navigable waterways including the Gulf Intracoastal Waterway (GIWW), the Aransas Pass Channel, and the Lydia Ann Channel. The inshore pipelines would intersect portions of Texas state submerged lease tract 306 near the Lydia Ann Channel. The alignment of the inshore pipeline generally parallels Highway 361 from Aransas Pass to Harbor Island. The proposed Harbor Island Booster Station would occupy approximately 19 acres on Harbor Island in Nueces County, Texas. The proposed Harbor Island Booster Station would consist of the necessary operating and pumping infrastructure to support the transport of crude oil and operations of the deepwater port.

Offshore components associated with the proposed project include approximately 27.13 miles of two (2) new paralleling 30-inch diameter offshore pipelines and the deepwater port. The proposed deepwater port consists of two (2) Single Point Mooring (SPM) buoy systems (SPM Buoy System 1 and 2). The proposed SPM buoy systems would be connected via approximately 1.68 miles of two (2) 30-inch diameter submerged pipelines. The proposed SPM buoy systems would serve as the primary device for the loading vessels berthed at the deepwater port. The SPM buoy systems would each consist of a pipeline end manifold (PLEM), catenary anchor leg mooring (CALM) system, mooring hawsers, sub-marine hoses, and floating hoses for the transfer of crude oil from each of the SPM buoy systems to moored vessels.

The EPA Region 6 appreciates this opportunity to provide the following information to the Coast Guard and Maritime Administration as part of the coordinated licensing effort for this facility.

We reviewed the Bluewater documents and have determined that the applications for EPA Clean Air Act Prevention of Significant Deterioration permit, the Title V operating permit, and the Case-by-Case Maximum Available Control Technology determination action are administratively incomplete in that all of the required information for the EPA forms and certifications were not included. Please see enclosed letters from Jeff Robinson to David Farris dated June 28, July 19, and July 31 of 2019 for detailed deficiencies. Also, there are issues with the Clean Water Act permit applications. In addition to the comments below, we reserve the right to request additional information as we more fully examine the permit applications and begin to develop Agency decisions regarding permits for the proposed facility. The NEPA and cross-cutting statutes and regulatory consultation documents need to be sufficient for our use in our regulatory permit actions. The EPA would appreciate the opportunity to participate in the consultations as an action agency.

CLEAN WATER ACT. Due to the nature of the delegation of the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) permit authority in Texas, the EPA Region 6 is the NPDES permitting authority for the project, including onshore, inshore, and offshore discharges.

The Bluewater Texas Terminal, LLC (Bluewater), a subsidiary of Phillips 66 Pipeline LLC, Deepwater Port Act (DPA) license application received by the EPA Region 6 included a copy of the NPDES permit application forms. In accordance with the applicable Environmental Permit Regulations, (40 CFR 124.3(c), 54 FR 18785, May 2, 1989), this information was reviewed and determined to be administratively incomplete. During the technical analysis of the application, other deficiencies may be determined and a request for additional or clarifying information will be made to the applicant.

1) Bluewater stated in the NPDES application that it is investigating the use of biocides, corrosion inhibitors, and environmentally friendly oxygen scavengers for the hydrostatic testing of offshore pipeline infrastructure. The application should clearly state whether these chemicals are used in the process. The EPA notes that the use of these chemicals may trigger biomonitoring requirements.

2) The EPA finalized revisions to the application requirements at 40 CFR 122.21 in the final NPDES Applications and Program Updates Rule. The final rule became effective on June 12, 2019. The permittee should resubmit the application on the revised forms that may be downloaded at https://www.epa.gov/npdes/npdes-applications-and-forms

Because the Deepwater Port Act (DPA) designates the proposed type of facility a "new source" for CWA purposes, the EPA will consider the information in the MARAD/Coast Guard's EIS and consultation documents in its NPDES permit action in accordance with CWA § 511(c)(1) and DPA § 5(f). Of interest will be the conclusion of consultations with the National Marine Fisheries Service and/or U.S. Fish and Wildlife Service for compliance with the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act; including effects on fish, shellfish, and threatened and endangered species, in all life stages, caused by the construction and operation of the facility. The EPA is also intending to rely on the National Historic Preservation Act consultations with Advisory Council on Historic Preservation and the Texas Historical Commission for compliance with the National Historic Preservation Act.

CLEAN AIR ACT. The EPA does not normally administer the Clean Air Act (CAA) in the western Gulf of Mexico because under CAA Section 328, the Department of Interior's Bureau of Ocean Energy Management is responsible for regulating outer continental shelf (OCS) sources, as defined in the Outer Continental Shelf Lands Act, in that area. As presented in the application, the proposed source is not an OCS source, so Section 328 does not apply. Instead, the EPA is the CAA permitting authority for non OCS facilities in federal waters. The EPA regards a provision of the DPA, 33 U.S.C. § 1501, et seq, as the primary source of its authority to apply the CAA to activities associated with deepwater ports. The DPA applies federal law and applicable State law to deepwater ports, and further designates deepwater ports as "new sources" for CAA purposes. Accordingly, for the source's pre-construction and operating permits, the EPA will rely on the provisions of Title 1 and Title V of the CAA, supporting applicable regulations and on the state law to the extent applicable and not inconsistent with federal law. Since the applicant asserted that the nearest adjacent coastal state to the operation is Texas, based on the location of the terminal, the EPA concludes that, in accordance with Section 19 of the DPA, the applicable state laws and regulations governing air quality at Bluewater are those of Texas.

The EPA will also consider the information in the MARAD/Coast Guard's EIS and consultation documents in its CAA permit actions, and in particular will rely on the MARAD / Coast Guard's consultations with the National Marine Fisheries Service and/or U.S. Fish and Wildlife Service for compliance with the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act as well as consultations with the Advisory Council on Historic Preservation and the Texas Historical Commission for compliance with the National Historic Preservation Act.

Based on our recent discussions with Phillips 66 Bluewater Texas Terminal representatives, and a review of the applications from Bluewater for the required Prevention of Significant Deterioration (PSD) permit, Case-by-Case Maximum Available Control Technology determination, and Title V operating permit, we have declared the applications to be administratively incomplete. We issued letters of administrative incompleteness to Bluewater on June 28, July 19, and July 31 of 2019 outlining the deficiencies, and have enclosed copies for the record. Until the deficiencies have been resolved, we reserve the right to request more information from the applicant to complete and substantiate their air permit applications, Appendices Z, ZAA, and ZBB of the DWP License application package, pursuant to each set of CAA implementing regulations the applicant seeks coverage.

MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT. Under Section 101 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), 33 U.S.C. § 1401, no person may transport material from the United States or on an American flagged vessel for the purpose of dumping it in ocean waters in the absence of a permit issued by the EPA pursuant to MPRSA § 102. A MPRSA §102 permit is also required for any person transporting material from anywhere for the purpose of dumping it in the territorial seas or to the contiguous zone where it might affect the territorial seas.

Based on our current understanding, it does not appear that this proposal includes transporting materials for the purpose of dumping it in connection with the construction or operation of the Bluewater facility. Moreover, "dumping" does not include "construction of any fixed structure or artificial island nor the intentional placement of any device in ocean waters, or on or in the submerged land beneath such waters, for a purpose other than disposal, when such construction or such placement is otherwise regulated by Federal or state law . . ." MPRSA § 3(f). The construction of this deepwater port appears to fall within this statutory exclusion. However, if this understanding is not correct or if dredged materials associated with the construction/placement of the offshore platform, SPM facilities and pipelines require disposal, MRPSA Sections 101 and 103 may apply, as well as provisions of the Clean Water Act.

Also, if you should need further information about the Region 6 program for Ocean Disposal, please feel free to visit our website at: https://www.epa.gov/ocean-dumping/managing-ocean-dumping-epa-region-6 or an overview of the entire program nationally at: https://www.epa.gov/ocean-dumping

COASTAL AND WETLAND RESOURCES. As described, these project components, taken individually and considered cumulatively, could have significant impacts to vital coastal and wetland resources. Therefore, all necessary measures should be taken to avoid such impacts to the degree possible and to mitigate or compensate for those that cannot be avoided. Beyond compliance with the National Environmental Policy Act and the Clean Water Act, there is also a need to ensure that the proposed project is consistent with federal and State efforts to restore coastal resources. Accordingly, all practicable efforts should be taken to ensure that the proposed project does not conflict with reasonably foreseeable future restoration efforts in the proposed project area. Special attention should be given to alternative plans currently being analyzed as part of the Texas Coastal Restoration and Protection Feasibility Study (U.S. Army Corps of Engineers), the Texas Coastal Resiliency Master Plan (Texas General Land Office), and any proposed projects under the Deepwater Horizon Natural Resource Damage Assessment and RESTORE Act programs.

The impacts from the construction, operation and maintenance of the deepwater port and its ancillary facilities, including dredging and any projected impacts to wetlands and special aquatic sites (including seagrass beds), are of particular interest to us and should be analyzed in the draft Environmental Impact Statement (EIS). A thorough evaluation should be presented in the draft EIS that demonstrates planning efforts to avoid, minimize, and compensate for wetland and special aquatic site losses associated with the construction, operation, and maintenance of the proposed project. Impacts to aquatic resources and wetlands should include direct, indirect and cumulative effects reasonably associated with the proposed project. Along with the Clean Water Act Section 404 (b)(1) analysis, all unavoidable direct and indirect impacts would need to be compensated. We recommend that an aquatic resource and wetland mitigation plan, consistent with the 2008 Final Rule for Compensatory Mitigation for Losses of Aquatic Resources, be included within the draft EIS. Please note that providing this material after public review of the draft EIS does not allow optimum analysis of the entire range of significant potential environmental impacts.

In addition, the draft EIS should address any other projected marine and coastal natural resource impacts such as losses of habitat important to resident and migratory shorebirds and sea turtles, the introduction of invasive species, bottom scour and benthic community impacts from the mooring system, and marine pollution issues.

NATIONAL ENVIRONMENTAL POLICY ACT. The EPA Region 6 desires to be a cooperating agency in the development of the EIS by MARAD and USCG. A formal invitation for cooperating agency status should be addressed to the Region 6 NEPA program to the attention of Robert Houston. Additionally, Section 309 of the Clean Air Act requires the EPA to review EISs prepared by other agencies. This review will be coordinated by the Region 6 NEPA office.

I have enclosed a copy of the Region 6 scoping comment letter, issued on August 1, 2019.

MARAD/USCG should submit the EIS to EPA through the e-NEPA electronic filing system. Filing instructions are available on the EPA's NEPA website at https://www.epa.gov/nepa/environmental-impact-statement-filing-guidance

Please provide an additional copy of both draft and final EISs to the EPA Region 6 for consideration in its NPDES permit action.

POINT OF CONTACT. I will be the primary EPA point of contact for communications on the Bluewater project. Correspondence should be directed to me as follows:

Robert D. Lawrence
Senior Policy Advisor – Energy Issues
EPA Region 6
1201 Elm Street (6AR)
Dallas, TX 75270
(214) 665-6580

Once again, the EPA Region 6 looks forward to working with the Coast Guard and Maritime Administration on this project.

Sincerely yours,

Rod Lawrence

Robert D. Lawrence
Senior Policy Advisor - Energy Issues

Enclosures:

June 28, 2019 letter to David Farris (PSD permit)
July 19, 2019 letter to David Farris (112G determination)
July 31, 2019 letter to David Farris (Title V permit)
August 1, 2019 letter to Myles Greenway (scoping comments)

cc: Ms. Kimberly Baggette
US Army Corps of Engineers, Galveston, TX

Ms. Terri Thomas
Bureau of Ocean Energy Management, New Orleans LA

Dr. Roy E. Crabtree
NOAA National Marine Fisheries Service, St. Petersburg, FL

Mr. Chuck Ardizzone, Project Leader
U.S. Fish & Wildlife Service, Houston, TX

Ms. Yvette Fields
Maritime Administration, Washington, DC

Ms. Chaitali Dave
Bluewater Texas Terminal LLC., Houston, TX

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VIA E-MAIL

August 8, 2019

Ms. Ashley Mohr
Environmental Scientist
Air Permits Section (ARPE)
U.S. Environmental Protection Agency, Region 6
1201 Elm St
Dallas, TX 75270

Re: Request Use of Alternative Model AERCOARE for the Bluewater Texas Terminal LLC ("BWTX") Deepwater Port Project

Dear Ms. Mohr:

On May 9, 2019, a letter was sent to your attention requesting approval for the use of the AERCOARE meteorological preprocessing module.

On May 31, 2019, BWTX formally filed a Deepwater Port License application, and the application has been made available for public inspection by the U.S. Department of Transportation Maritime Administration (MARAD).[1] Therefore, we wish to resubmit the request in a manner which reflects the recent public filing of the Deepwater Port License application.

Additionally, we wish to make revisions to our request based on information shared in a July 10, 2019, conference call between BWTX, EPA Region 6, EPA OAQPS and EPA Model Clearinghouse. These revisions incorporate recently-published information about AERCOARE and also reflect amendments made to Appendix W in 2017.

Overview

As part of its Deepwater Port License Application, BWTX has conducted air dispersion modeling in support of the development of an Environmental Impact Statement (EIS) and also to demonstrate that air emissions from the deepwater port will not contravene the intent of the Texas Clean Air Act.

As stated in Sections 3.0.b and 3.2.2.a of Appendix W to 40 CFR Part 51 ("Appendix W"), approval of an alternative model or technique is the responsibility of EPA Region 6, in consultation with EPA's Model Clearinghouse. BWTX seeks approval to use AERCOARE as an alternative model. Since Appendix W does not appear to specify a preferred model corresponding to the required use case, BWTX believes that Region 6's approval is necessary before the applicable air quality analyses can be approved.

This request summarizes the proposed project and associated air dispersion modeling requirements, discusses two potentially applicable dispersion models (OCD and AERMOD-AERCOARE) which could be used in the absence of a preferred model, and explains why the AERMOD-AERCOARE should be approved as an alternative model.

[1] 84 Fed. Reg. 32005. Jul. 3, 2019.

Description of Project and Modeling Requirements

BWTX proposes to construct a deepwater port for export of crude oil via two Single Point Mooring (SPM) systems. The SPM's will be located at 27° 53 21.70" N, 96° 39'4.16" W and at 27° 54' 9.28" N, 96° 37' 41.23" W, approximately 18 statute miles from Matagorda Island at its nearest point and 26 statute miles from the entrance to Port Aransas. Aside from the SPM systems, no other fixed or floating structures will be constructed. Each SPM system consists of a pipeline end manifold (PLEM), a catenary anchor leg mooring (CALM) buoy, and hose strings used to transfer oil. VOC emissions generated during crude oil loading operations will be limited through a combination of work practices. These emissions are vented to the atmosphere through the tankers' mast risers.

The proposed project is subject to the Deepwater Port Act ("DWPA", 33 USC § 1501 et seq.) and must obtain a license from MARAD before construction on the terminal may begin. MARAD regulations also require that an applicant prepare and submit applications to EPA for all permits required under the Clean Air Act (33 CFR § 148.700). Copies of the required applications have been previously provided to EPA Region 6, and additional information about the project can be supplied on request.

In order to facilitate compilation of an Environmental Impact Statement (EIS) by MARAD, BWTX has performed dispersion modeling showing that emissions from offshore mobile and stationary sources will not cause or contribute to any NAAQS violation. BWTX has additionally performed modeling, showing that emissions from loading operations will not cause adverse impacts to public health or property, as determined by comparison to Effects Screening Levels (ESL) and ambient air quality standards of the Texas Commission on Environmental Quality (TCEQ).

BWTX understands from conversations with Region 6 staff that EPA interprets the DWPA provision federalizing the law of the nearest adjacent coastal State (33 USC § 1518(b)) to require that modeling analyses be conducted pursuant to applicable TCEQ guidance. This guidance includes requirements that permit applicants generally use AERMOD as a refined model,[2] that ESL modeling incorporate a "frequency of impacts" analysis,[3] and that impacts over water be evaluated according to specified guidelines.[4]

About OCD

According to Appendix W, OCD is the recommended model when "*the modeling application involves determining the impact of offshore emissions from point, area, or line sources on the air quality of coastal regions*" and "*for situations that involve platform building downwash*" (§ 4.2.2.3).

OCD is a straight-line Gaussian model developed to determine the impact of offshore emissions from point, area or line sources on the air quality of coastal regions. OCD incorporates overwater plume transport and dispersion, considering fundamental differences in the factors determining atmospheric turbulence characteristics over water and over land, as well as changes that occur as the plume crosses the shoreline. Some key features of OCD include platform building downwash, partial plume dispersion, interaction with the overland internal boundary layer, and continuous shoreline fumigation (Appendix W § A.3). The performance of OCD in predicting onshore pollutant concentrations from offshore sources was originally assessed using tracer studies at sites in

[2] TCEQ Publication APDG 6232v4. *Air Quality Modeling Guidelines*. September 2018. At 66.
[3] TCEQ Publication APDG 5874v5. *Modeling and Effects Review Applicability (MERA)*. March 2018. At 19.
[4] Alan Thomas (TCEQ Toxicology and Risk Assessment) to Interested Parties. *Effects Evaluation Procedure: Marine Vessels (Draft)*. August 2001.

Ventura, CA, Pismo Beach, CA, and Cameron, LA, and the model was found to be a clear improvement over the previously approved models, CRSTER and PTMTP.[5]

OCD allows up to 180 receptors to be specified (e.g., when using polar coordinates, there is a limit of five rings of 36 receptors per ring). While the default output is a summary table of the five highest concentrations at each receptor for each averaging period, a postprocessor (“`ANALYSIS`”) is available for more refined output analysis, including a tabulation of all concentrations exceeding a given threshold (Appendix W § A.3(c)).

Bureau of Ocean Energy Management (BOEM) regulations implement portions of the Outer Continental Shelf Lands Act (“OCSLA”, 43 USC § 1331 et seq.), which requires compliance with the NAAQS to the extent that OCS activities significantly affect the air quality of any State. Current BOEM regulations require a dispersion modeling analysis following Appendix W in case emission rates of criteria pollutants exceed specified *de minimis* thresholds (30 CFR §§ 550.218(e), 550.249(e)). If predicted onshore ambient concentrations of pollutants exceed specified significance levels, then additional requirements, including BACT, apply (30 CFR § 550.303(f)).

As explained by the USGS (predecessor to MMS), air quality modeling under OCSLA responds to a different statutory mandate than air quality modeling under the Clean Air Act:

> *The Clean Air Act gives EPA the authority to regulate air pollution sources onshore. The [OCSLA], on the other hand, authorizes the Department to regulate OCS activities only if the emissions from the activities have significant effects on onshore air quality. Also, all OCS sources are external to the areas whose air quality they may affect, a situation not commonly encountered in EPA's regulatory program*.[6]

Therefore, when MMS published notice of its approval of OCD, it did so for purposes of “*the air quality regulatory program outlined in 30 CFR 250.57*.”[7] This is a program intended to ensure that oil and gas exploration, development and production activities conducted on the OCS do not significantly impact the air quality of onshore areas of an adjacent state.

Following passage of the Clean Air Act Amendments of 1990, jurisdiction over OCSLA sources (with respect to their air emissions) was partially delegated to EPA. New Source Review (NSR) permitting as implemented by EPA requires the determination of pollutant concentrations at any location corresponding to the definition of “ambient air” (40 CFR § 50.1(e)), which may include locations over water. Therefore, OCSLA sources using OCD to comply with EPA air permitting requirements would use the model to predict over-water pollutant concentrations instead of (or in addition to) shoreline pollutant concentrations.

Although OCD is a potentially candidate for the required air dispersion modeling analyses, it does not fall under the required scope of regulatory use specified in Appendix W (§ A.3a), as detailed in the associated *Federal Register* notice: the proposed facility is not an oil and gas operation subject to OCSLA, but instead a marine terminal subject to DWPA. Additionally, OCD does not directly support the tiered screening approach for NO_2 required under § 4.2.3.4(b) of Appendix W. Finally, consideration of TCEQ guidance pursuant to Appendix W § 6.1(b) indicates that AERMOD is generally required. Therefore, BWTX does not believe that OCD is a

[5] Hanna, S.R., Schulman, L.L., Paine, R.J., Pleim, J.E., and Baer, M. 1985. “Development and Evaluation of the Offshore and Coastal Dispersion Model.” *JAPCA* 35:1039–1047.
[6] 45 Fed. Reg. 15128. Mar. 7, 1980.
[7] 50 Fed. Reg. 12249. Mar. 28, 1985. The regulation referred to corresponds to the regulation currently codified as 30 CFR § 550.303.

recommended model under Appendix W for the specific dispersion modeling requirements applying to this project.

About AERMOD-AERCOARE

AERMOD is a steady-state plume dispersion model for assessment of pollutant concentrations from a variety of sources. AERMOD simulates transport and dispersion from multiple point, area, or volume sources based on an up-to-date characterization of the atmospheric boundary layer. Sources may be located in rural or urban areas, and receptors may be located in simple or complex terrain. AERMOD accounts for building wake effects (i.e., plume downwash) based on the PRIME building downwash algorithms. The model employs hourly sequential preprocessed meteorological data to estimate concentrations for averaging times from 1-hour to 1-year (also multiple years). AERMOD is designed to operate in concert with two pre-processor codes: AERMET processes meteorological data for input to AERMOD, and AERMAP processes terrain elevation data and generates receptor and hill height information for input to AERMOD.[8]

As noted above, AERMOD is the recommended regulatory model for a wide variety of applications, and BWTX believes that AERMOD is the recommended model for the required modeling analysis, based on the guidelines in Appendix W, §§ 6.1(b), A.1(a). However, Appendix W requirements corresponding to the proper use of AERMET (§ A.1(b)(2)) cannot be fulfilled because it is not possible to specify a combination of inputs that is "*adequately representative of the modeling domain*." AERMET should not be regarded as a recommended model for applications in over water modeling domains for the following reasons:[9]

- The surface roughness over the ocean varies with wind speed and wave conditions, and the surface roughness variability with wind speed is also different than for temperature and specific humidity. AERMET, however, assumes a constant surface roughness over water.
- AERMET divides the diurnal cycle into daytime and nighttime boundary layer regimes, with the distinction being driven solely by the solar angle. However, overwater stability is influenced by air modification with key variables being wind speed, air-sea temperature difference, and overwater relative humidity. Stable conditions occur as warmer air is advected over cold water, and unstable conditions result when cold air is transported over warm water.
- AERMET uses the Bowen ratio to calculate the sensible heat during daytime hours, but does not explicitly include the effects of moisture and latent heat in the Monin-Obukhov length stability parameter. However, atmospheric stability is more strongly affected by latent heat release over the ocean than over land.
- AERMET applies a constant Bowen ratio method for partitioning the latent and sensible heat fluxes depending on the land use. However, air modification in coastal areas can result in very large changes in the Bowen ratio caused by a shift in the wind direction.

As noted above, OCD includes an algorithm which attempts to accurately characterize the marine boundary layer, and does not have these shortcomings. However, OCD has not been updated in several years and is not able to take advantage of a variety of recently-developed routines that make AERMOD a preferred model for NSR modeling requirements.

[8] Appendix W § A.1.
[9] Wong, H., Elleman, R., Wolvovsky, E., Richmond, K., and Paumier, J. 2016. "AERCOARE: An overwater meteorological preprocessor for AERMOD." *JAWMA* 66(11): 1121–1140.

Beginning in June 2010, EPA Region 10 began coordinating efforts with Shell to develop a refined air quality dispersion model for some applications in the Arctic marine environment.[10] AERMOD was selected as the foundation for the model due to the modular nature of its design: it contains a dispersion program and two data preprocessing programs which can be modified or replaced independently of each other. The Coupled Ocean-Atmosphere Response Experiment (COARE) bulk flux algorithm, which is one of the most frequently used algorithms in the air-sea interaction community,[11] was selected as a means of generating profile and surface files in lieu of AERMET. The method developed, which involved generating inputs using published COARE algorithms and translating them for use in AERMOD via a set of spreadsheet calculations, was approved as an alternative model with the concurrence of EPA's Model Clearinghouse.[12]

Approval of AERMOD-COARE in Shell's case was based on a detailed statistical evaluation of the proposed AERMOD-COARE approach using available tracer study data, as well as an evaluation of OCD against the same data set. OCD was used as a benchmark since it had been previously approved as a recommended model based on comparison with data from two of the tracer studies. In proposing approval, EPA Region 10 recommended that additional tracer studies be evaluated to determine whether approval should be extended to mid-latitude and tropical marine environments in the future.[13]

Subsequent to its collaboration with Shell, EPA Region 10 initiated two studies in late 2011 to further develop the potential of COARE for AERMOD modeling applications. One such study involved the development of a meteorological data preprocessor program called AERCOARE, and testing of AERCOARE against data available from four tracer studies (the three mentioned above used to test OCD's performance, as well as a study conducted in Carpinteria, CA, which was used in Shell's demonstration).[14] The development of AERCOARE is especially significant because it reduces the level of scientific expertise required to implement COARE algorithms in an AERMOD modeling demonstration.

Results of the study were subsequently described in a 2016 peer-reviewed journal publication which recommended broader use of AERCOARE, concluding as follows:[15]

> *The model performance for the combined AERCOARE-AERMOD modeling approach was found to be comparable to OCD and CALPUFF for the same tracer studies…AERCOARE-AERMOD could be applied as an alternative to the current EPA model OCD for many regulatory applications using the same basic overwater meteorological data. This approach would allow AERMOD methods for plume impingement on elevated terrain, building downwash, nitrogen oxides to nitrogen dioxide (NO_2) conversion, design concentration calculations, area sources, volume sources, buoyant line sources, hourly variable emissions, and many other features to be used for offshore sources. Shoreline fumigation and platform downwash modules are not included in AERMOD, and there may be instances where OCD and/or CALPUFF are more appropriate when such issues are thought to be important to the application*.

[10] Herman Wong (EPA R10) to Tyler Fox (EPA Air Quality Modeling Group). COARE Bulk Flux Algorithm to Generate Hourly Meteorological Data for Use with the AERMOD Dispersion Program; Section 3.2.2.e Alternative Refined Model Demonstration. April 1, 2011.
[11] Fairall, C. W., Bradley, E. F., Hare, J. E., Grachev, A. A., & Edson, J. B. 2003. Bulk parameterization of air–sea fluxes: Updates and verification for the COARE algorithm. *Journal of climate*, 16(4): 571–591.
[12] George Bridgers (EPA Model Clearinghouse) to Herman Wong (EPA R10). Model Clearinghouse Review of AERMOD-COARE as an Alternative Model for Application in an Arctic Marine Ice Free Environment. May 6, 2011.
[13] Wong, op. cit. at 12.
[14] *Evaluation of the Combined AERCOARE/AERMOD Modeling Approach for Offshore Sources*. EPA Publication 910-R-12-007. October 2012.
[15] Wong et al. op. cit. at 1138.

Recommended Approval of AERCOARE for BWTX's Project

As explained above, based on the dispersion modeling requirements that BWTX is subject to under the DWPA as well as the conditions under which OCD and AERMET are recommended for regulatory use, BWTX does not believe that Appendix W specifies any complete modeling system as a recommended model (§ 3.2.2.b(3)). BWTX believes that AERMOD is recommended, and in any case AERMOD is a necessary tool based on its ability to model NO_X-NO_2 conversion and its postprocessing options, such as comparison against probabilistic NAAQS standards and the ability to conduct a "frequency of impacts" analysis required by TCEQ guidance. However, AERMOD requires a meteorological preprocessing module, and the default module (AERMET) cannot be used as recommended.

When there is no preferred model, approval of an alternative model is governed by five elements (§ 3.2.2.e):

1. The model or technique has received a scientific peer review;
2. The model or technique can be demonstrated to be applicable to the problem on a theoretical basis;
3. The databases which are necessary to perform the analysis are available and adequate;
4. Appropriate performance evaluations of the model or technique have shown that the model or technique is not inappropriately biased for regulatory application; and
5. A protocol on methods and procedures to be followed has been established.

BWTX recognizes the significant level of effort invested by Shell, EPA, and members of the scientific community since 2010, and believes that it is appropriate to make use of the earlier work discussed above in supporting its request. In other words, BWTX believes that recent publications supply the necessary support for approving the use of AERCOARE for a variety of offshore modeling scenarios and geographic locations, and that such support is published in the format normally considered by EPA when evaluating alternative models.

We hasten to emphasize that the brevity of the justification supplied below is intended to avoid duplicative efforts. BWTX is prepared to supply additional data and analysis, as deemed appropriate by your office or by the Model Clearinghouse.

First, a study of AERMOD-AERCOARE has been recently published in a peer-reviewed journal.[16]

Second, the same study discusses the theoretical basis for applying AERMOD-AERCOARE to a variety of offshore scenarios, with the exception of those involving shoreline fumigation and platform downwash. These two limitations do not apply to BWTX's use case: BWTX's modeling demonstrations are concerned with the prediction of pollutant concentrations in over water locations near the loading terminal; and no platform will be constructed (the only downwash structures will be vessels).

Third, detailed data sets used to evaluate AERCOARE have been published by EPA.[17] These include meteorological data and concentration predictions associated with four tracer studies.

Fourth, the study mentioned above has demonstrated comparable performance between AERMOD-AERCOARE and OCD for four tracer studies. When certain AERMOD input variables are constrained (requiring

[16] Wong et al. op. cit.
[17] EPA Publication 910-R-12-007.

the mixing height layer to be greater than 25 m and not allowing the Monin-Obukhov length to be less than 5 m), AERMOD-AERCOARE performs better than OCD in some conditions.[18]

Fifth, BWTX has previously submitted a modeling protocol, and attaches a copy for reference. Based on ongoing discussions with your office, we understand that certain elements of the protocol are likely to be revised, and the attached version may not be reflective of the modeling approach which ultimately receives approval.

If you have any further questions, please contact me at 512-961-4471 (jlovegren@disorboconsult.com) or Leslie Fifita at 512-961-7508 (lfifita@disorboconsult.com). Please copy Ms. Chaitali Dave of Phillips 66 Company on correspondence related to this matter (chaitali.r.dave@p66.com).

Yours,

Jesse Lovegren, Ph.D., P.E.
Senior Engineer

Attachment: Modeling Protocol

[18] Wong et al. op. cit. at 1121.

DiSorbo Environmental Consulting Firm

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713-955-1230 (p) | 713-955-1201(f) | www.disorboconsult.com

Attachment

Modeling Protocol

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<u>Modeling Procedures for Minor NSR NAAQS, Texas State Property Line, and Texas Effects Review</u>
Supporting the NEPA application for Submittal to MARAD

Project Identification
Project Name: Bluewater Texas Terminal LLC (“BWTT”) SPM Project
Applicant: BWTT
New or existing: New
Location: in Gulf of Mexico approximately 18 statue miles off Port Aransas

Project Description
BWTT plans to build a new offshore oil terminal comprised of two single point mooring systems. Oil will be loaded on to Very Large Crude Carriers (VLCCs) that are moored to one or both of the systems. Crude oil vapor and hydrogen sulfide will be emitted from during loading of the VLCCs. Emissions due to fuel combustion will be generated by the VLCC engines, tug boats, and workboats used to support operations at the terminal.

Pollutants Evaluated
A NAAQS evaluation will be performed for emissions of NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2.
A Texas State Property Line evaluation will be performed for emissions of H_2S. A Health Effects Review evalualtion will be conducted for Crude Oil Vapor. A table of applicable standards is provided below:

Pollutant	Averaging Period	Standard (ug/m3)	Analysis
NO_2	1-hr	188	NAAQS
	Annual	100	NAAQS
CO	1-hr	40000	NAAQS
	8-hr	10000	NAAQS
PM_{10}	24-hr	150	NAAQS
$PM_{2.5}$	24-hr	35	NAAQS
	Annual	12	NAAQS
SO_2	1-hr	196	NAAQS
	3-hr	1300	NAAQS
	24-hr	365	NAAQS
	Annual	80	NAAQS
H_2S	30-Minute	108 (Residential) / 162 (Non-Residential)	State Property Line
Crude Oil Vapor (<1% Benzene)	1-hr	3500	Texas Health Effects Review (ESL)
	Annual	350	Texas Health Effects Review (ESL)

Emission Rates
Emission rates are in the process of being finalized and will be included in the MARAD license application.

Model Selection
Refined alternative model AERCOARE (Version D13108) will be used for the evaluation. AERCOARE will be use in conjunction with meteorological data from nearby buoys to produce an AERMOD-ready meteorological data set. Meteorological parameters that are not available from buoy data will be filled in from National Solar Radiation Database (https://nsrdb.nrel.gov). AERCOARE will not be supplemented by additional prognostic data and will not use outputs from MMIF.

EPA Preferred model AERMOD (Version 18081) will be uses to estimate concentrations near the proposed terminal.

Release Parameters
Release parameters are in the process of being finalized and will be included in the MARAD license application.

NOx to NO2 Conversion
At this time BWTT plans to use the Tier II ozone limiting option Ambient Ratio Method 2 (ARM2) to refine estimates of NO_2 concentrations that result from emissions of NO_X using default ratio bounds of 0.5 – 0.9. If a Tier III method such as the Plume to Volume Molar Ratio Method (PVMRM) is ultimately selected to estimate ozone limiting, additional justification will be provided.

Building Wake Effects
The Building Input Processor Program with PRIME (BPIP-PRIME) will be used to estimate building downwash parameters for all modeled point sources. The buoy itself is not substantial enough to be considered a downwash structure, but the VLCCs and tugboats will be included as downwash structures.

Receptor Grid
Each of the single point mooring systems will be surrounded by a circular “safety zone” and an additional circular “area to be avoided” making a composite circular boundary with a total radius of 1,350 meters around each of the central buoys. The area inside these circles is considered facility property (for the purposes of modeling) and anything outside the circles will be considered ambient air. Receptors will be placed along the circular boundaries at a spacing of 100 meters. The 100-meter spaced receptors will continue in a cartesian grid from the circular boundary to a distance of 2,500 meters beyond the property. A second grid of receptors spaced 250 meters apart will be placed from 2,500 meters to 7,500 meters from the circular boundaries. The last grid of receptors spaced 500 meters apart will be placed from 7,500 meters to 20,000 meters from the circular boundaries.

BW★TX

Via E-mail

Mr. Jeff Robinson
Branch Chief, Air Permits, Monitoring & Grants
U.S. EPA Region 6, 6PD
1201 Elm Street, Ste. 500
Dallas, TX 75270

Re: Title V Application Incompleteness Determination
Bluewater Texas Terminal LLC ("BWTX")

August 15, 2019

Dear Mr. Robinson:

BWTX is in receipt of your letter dated September 1, 2019, requesting additional information to complete the referenced air permit application.

This letter transmits BWTX's response to the additional information request.

I certify that, based on information and belief formed after reasonable inquiry, that the statements and information contained in these documents are true, accurate and complete.

If you have any additional questions regarding this application, please contact Ms. Chaitali Dave of Phillips 66 Company at chaitali.r.dave@p66.com or 832-765-1069; or Dr. Jesse Lovegren of DiSorbo Consulting, LLC, at jlovegren@disorboconsult.com or 512-961-4471.

Yours,

Davis

David Farris
Vice President
BWTT

Enclosure

Responses to Information Request

The information in the application appears to mirror the Bluewater Texas Terminal LLC (BWTT) Prevention of Significant Deterioration (PSD) application. Of special note, as the PSD application has been determined to be incomplete, much of the same information requested to make the PSD application complete will also be needed for the title V application to be considered complete.

Response:

Additional information was supplied on July 31, 2019, in response to the referenced completeness determination. A copy is enclosed.

1. *Please provide information on fugitive emissions as they should be included in the permit application in accordance with 40 CFR § 71.3(d).*

Response:

The requested information is contained in Items 7 and 11 of the enclosed PSD application additional information submission.

2. *For the permitting record, please provide additional information to clarify how BWTT intends to verify that the noncompany owned, foreign flagship marine tank vessels loaded at BWTT are tested annually for a vapor tightness test in accordance with 40 CFR § 63.565(c).*

Response:

BWTX does not believe that 40 CFR § 63.565(c) is an applicable requirement. Notwithstanding, vapor tightness will be documented as a matter of course, as indicated below.

All marine tank vessels considered for loading at BWTX will be screened by the P66 Vetting and Audit department against standardized vetting criteria, including the Oil Companies International Marine Forum (OCIMF) Ship Inspection Report (SIRE) Program. This vetting screening includes checks of the validity of all vessel Trading certificates, and specifically a verification of vapor tightness test and record of such, in accordance with 40 CFR § 63.565(c).

Additionally, BWTX will verify vessel compliance with 40 CFR § 63.565(c) by requesting the vessel's Master to warrant that the vessel has been tested for vapor tightness. This will be accomplished by:

1. Requiring from the vessel a completed pre-arrival information questionnaire, including a copy of the vapor tightness certification.

2. A verification of the vapor tightness certification upon arrival as part of the Declaration of Inspection (DoI) ship / terminal interface, conforming to 46 CFR § 35.35-30.

The Vapor recovery system is approved by the flag State, is considered part of the Inert Gas system, and is required to be tested every time the IGS system is tested but at least annually.

BW★TX

Via E-mail

Mr. Jeff Robinson
Branch Chief, Air Permits, Monitoring & Grants
U.S. EPA Region 6, 6PD
1201 Elm Street, Ste. 500
Dallas, TX 75270

Re: Completeness Review for Clean Air Act § 112(g) Determination Request
Bluewater Texas Terminal LLC ("BWTX")

August 15, 2019

Dear Mr. Robinson:

BWTX is in receipt of your letter dated July 19, 2019, requesting additional information to complete the referenced air permit application.

This letter transmits BWTX's response to the additional information request.

I certify that, based on information and belief formed after reasonable inquiry, that the statements and information contained in these documents are true, accurate and complete.

If you have any additional questions regarding this application, please contact Ms. Chaitali Dave of Phillips 66 Company at chaitali.r.dave@p66.com or 832-765-1069; or Dr. Jesse Lovegren of DiSorbo Consulting, LLC, at jlovegren@disorboconsult.com or 512-961-4471.

Yours,

D Farris

David Farris
Vice President
BWTT

Enclosure

Introductory Remarks

At the outset of this submission, BWTX prefaces its response to EPA's July 19, 2019 112(g) Completeness Review by making several observations about the required procedures for case-by-case MACT determinations under Section 112(g) of the Clean Air Act. This is done for two reasons: first, BWTX has benefitted from recent discussions with EPA staff about the nature of the required procedures, and wishes to make explicit areas where it has reevaluated the approach originally outlined in Section 2 of its application; and second, BWTX hopes to employ a consistent approach in addressing the items of additional information requested by EPA, and make clear its motivations for doing so.

These introductory remarks are divided between three topics. First, procedures for 112(g) determinations are examined in somewhat more detail than in the original application. Second, key differences between the 112(g) determination process and the 112(d) standard setting process are discussed. Finally, certain relevant issues raised by EPA's information request are commented on.

EPA's individual data requests and BWTX's response to those requests then follow.

Process for 112(g) Determinations

Special Status of 112(g) "Guidance"

Section 112(g)(1)(B) of the Clean Air Act required EPA to publish guidance addressing the implementation of the 112(g) program, guidance which, according to EPA is "*intended to be binding*."[1] Since EPA has represented the *Federal Register* preamble associated with the final 112(g) rule (henceforth the "112(g) preamble")[2] as "guidance,"[3] BWTX believes it appropriate to rely on the 112(g) preamble in interpreting several of the provisions under 40 CFR Part 63, Subpart B. This section discusses the development of certain relevant aspects of the 112(g) rule.

Proposal Stage and Changes made in Final Rule

The proposed version of the 112(g) rule[4] was accompanied by a publication entitled "*Guidelines for MACT Determinations under Section 112(g)—PROPOSAL*."[5] This document (henceforth the "Proposed Guidelines") specifies a three-tier process for making case-by-case MACT determinations which is essentially identical to that discussed in Section 2.4 of the application.[6] The process involved the following three steps:

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[1] 60 Fed. Reg. 8334. Feb. 14, 1995.
[2] 61 Fed. Reg. 68383. Dec. 27, 1996.
[3] Id. at 68391 ("*The guidance in this preamble is designed to help the permitting authority determine*…" etc.)
[4] 59 Fed. Reg. 15504. Apr. 1, 1994.
[5] EPA Publication 450/3-92/007(b). March 1994.
[6] The application referenced a similar "Guidelines" document for the 112(j) program which made use of the same three-tier framework.

- First, the applicant attempts to make a MACT floor finding, considering the level of emissions reduction achieved by sources in the same category or subcategory;

- Second, if no MACT floor finding can be made, transfer technologies must be identified and evaluated, with consideration given to their technical feasibility and overall reasonability. Technically feasible transfer technologies must be evaluated based on their costs, non-air quality health and environmental impacts, and energy requirements; and

- Finally, MACT-level controls are selected.

The three-tier process was mirrored in the text of the proposed regulation, relevant portions of which are reproduced below:[7]

§ 63.43(d)(2) *When a relevant emission standard has not yet been promulgated pursuant to section 112(d) or section 112(h) of the Act, the owner or operator shall:*

(i) *Review all available information to determine whether the MACT floor can be determined for the MACT-affected unit being constructed, reconstructed or modified. The MACT floor finding shall be conducted based upon a method approved by the Administrator. Examples of approved methods can be found in "Guidelines for MACT Determinations Under Section 112(g)," EPA-450/3-92-007b…*

(ii) *When a MACT floor can be determined, based upon the available information, the owner or operator shall include in the MACT application a recommended MACT emission limitation and shall select a control technology that would achieve a level of emission control that is greater than or equal to the MACT floor and achieves the maximum degree of emission reduction of hazardous air pollutants with consideration of costs, [etc.]*

(iii) *When a MACT floor cannot be determined, based upon the available information, the owner or operator shall include in the MACT application a recommended MACT emission limitation and shall select a control technology that achieves the maximum degree of emission reduction of hazardous air pollutants with consideration to costs, [etc.], after evaluating control technologies that can be identified from available information and that have been successfully demonstrated in practice for similar sources;*

When the wording of the proposed rule is compared to the currently effective rule text, and when certain sections of the 112(g) preamble are compared to homologous discussions in the Proposed Guidelines, it becomes apparent how EPA changed its approach to the rulemaking between the proposal and adoption stages. The changes can be understood

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[7] The text of the proposed rule was not published in the Federal Register and is no longer accessible through EPA's website. It can be obtained through an archived version of EPA's website: **https://web.archive.org/web/20020923064714/http://www.epa.gov/ttn/oarpg/t3/fr_notices/sec112g.zip**

as collapsing what was originally proposed as a three-step process into a single, comprehensive analysis. Key differences are as follows:

- In the proposed version, transfer technologies from "similar sources" (Tier II) only had to be considered if it was not possible to make a MACT floor finding from within the relevant category or subcategory. The final rule and 112(g) guidance dispense entirely with a category-based MACT floor process. Instead, a "similar source" analysis is required up-front and used to set the minimum level of control.

- In the proposed version, potentially transferable technologies cannot be eliminated based on cost when determining whether they correspond to a "similar source."[8] The final 112(g) preamble specifically admits cost as a consideration in determining whether a source is similar.[9]

- The Proposed Guidelines include discussion on when and how to consider what are traditionally called "beyond the floor" controls.[10] There is no corresponding discussion in the 112(g) preamble. The significance of this point is elaborated on further below.

A careful review of the development of the 112(g) rule thus indicates that significant changes were made to the "Principles of MACT Determinations" section of the rule:[11] EPA ultimately abandoned proposed rule text specifically referring to the Proposed Guidelines, departed from the three-tier process described in the proposed rule text in favor of a one-step approach, and did not update the Proposed Guidelines at the final promulgation stage. BWTX infers from these changes that the 112(g) preamble is clearly the more authoritative resource in justifying its proposed MACT finding, and no longer believes that it is appropriate to rely on the "Guidelines" publications (whether 112(j) or 112(g)).

Role of costs, non-air quality health and environmental impacts, and energy requirements

Section 112(g)(2)(B) of the Clean Air Act requires that new and reconstructed major sources of HAP meet the "*maximum achievable control technology emission limitation…for new sources.*" In the 112(g) preamble, EPA included statements interpreting this phrasing to refer to the so-called "MACT floor" provision of the Clean Air Act for new sources, rather than to subsection 112(d) as a whole:

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[8] Proposed Guidelines at 35. ("*A technology is generally considered technically infeasible if there are structural, design, physical or operational constraints that prevent the application of the control technology to the emission unit. Cost to install and maintain the control technology is not considered a factor in determining technical feasibility.*")
[9] 112(g) preamble at 68395. (*"Therefore, whenever costs are quantified, such costs should include the purchase price of controls plus the costs associated with installation and operation of those controls for the source in question."*)
[10] E.g., Proposed Guidelines at 87ff.
[11] 40 CFR § 63.43.

> *…the owner or operator must demonstrate to the permitting authority that emissions will be controlled to a level consistent with the "**new source MACT" definition in section 112(d)(3) of the Act**.*[12]
>
> *…*
>
> *As required by section 112(g)(2)(B), this rule requires a case-by-case determination by the permitting authority that the technology selected by the owner or operator is consistent with what would have been required under section 112(d) of the Act. For constructed and reconstructed major sources, the minimum requirement for a case-by-case MACT determination, consistent with section 112(d), is the level of control that is achieved in practice by the best controlled similar source.*[13]

Consistent with this interpretation,[14] the 112(g) preamble contains an extended discussion on procedures for determining whether a particular source should be treated as a "similar source," but no discussion or guidance on making a "beyond the floor" determination. The "similar source" determination therefore fulfills the 112(g)(2)(B) directive that a case-by-case determination for the source be consistent with the 112(d)(3) provisions applicable to new sources. The elements of 112(d)(2) of the Act that are applicable to new sources are addressed by the rule's requirements that the source owner submit an analysis of cost, non-air quality environmental and health impacts, and energy requirements "*for the selected control technology*."[15]. In this way, both the preamble and the text of 40 CFR § 63.43 show how a 112(g) determination fulfills all of the 112(d) requirements that apply to new, case-by-case sources.

<u>Differences between 112(d) Standards and 112(g) Determinations</u>

The process for case-by-case MACT determinations under Section 112(g)(2) of the Act described above departs from the process that is normally used by EPA in setting category-wide emission standards under Section 112(d). There are two main reasons why this should be the case. First, the 112(g) program was intended to be implemented primarily by State permitting authorities, which would not have the resources to conduct nationwide assessments of the type that EPA performs during category-specific standards setting. And second, source categories were not specified in detail when EPA developed its list of source categories.[16]

During category-specific standards setting, EPA establishes definitions that create sharp boundaries for a specific category. While permitting authorities are instructed to determine

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[12] 112(g) preamble at 68385.
[13] Id. at 68394 (emphasis added).
[14] As a threshold manner, it should be noted that differing implementations of a MACT determination process under two separate statutory programs would be expected, following *Environmental Defense v. Duke Energy Corp*. 549 U.S. 561, 573 (2007) ("A given term in the same statute may take on distinct characters from association with distinct statutory objects calling for different implementation strategies.")
[15] 40 CFR § 63.43(e)(2)(xii).
[16] Cf. discussion in 112(g) preamble at 68395. ("*When the notice of initial list of categories of sources…was published…the EPA listed broad categories of major and area sources rather than narrowly defined categories…During the standard-setting process, EPA may find it appropriate to further subcategorize to distinguish among classes, types and sizes of sources.*")

which sources may be similar to the case-by-case application, they do not have to perform the comprehensive classification exercise that is implied by EPA's category-wide standard setting process. EPA's decision to abandon the category-specific MACT floor process during 112(g) determinations is wholly consistent with these considerations.

Source Categories and "Similar Sources"

In the 112(g) preamble, EPA advances the following interpretation of the term "similar source," as used in Section 112(d)(3) of the Clean Air Act, for purposes of implementing the 112(g) program:

> *The EPA believes that because the Act specifically indicates that existing source MACT should be determined from within the source category and does not make this distinction for new source MACT, that Congress intends for transfer technologies to be considered when establishing the minimum criteria for new sources. EPA believes that the use of the word "similar" provides support for this interpretation.*[17]

This differs markedly from the interpretation that the same phrase takes on when EPA sets category-wide MACT standards under Section 112(d). For example, in one case the D.C. Court of Appeals has referred to Section 112(d)(3) as "*requiring EPA to set NESHAP standards based on emissions reductions achieved by similar sources within the same NESHAP category.*"[18]

In that case, when EPA discovered that certain of the sources considered in setting the MACT floor for cement kilns would not actually belong to the regulated source category (they would instead be classified as Commercial and Industrial Solid Waste Incineration [CISWI] units), it did not recalculate the MACT floor, a decision that was held to be arbitrary and capricious.[19]

Similarly, in a related case, one version of the Boiler MACT rule was vacated in its entirety due to a deficiency that the Court found in EPA's CISWI definition: since revising the definition would change "*the populations of units subject to EPA's boilers and CISWI rules*,"[20] the MACT floor would necessarily have to be recalculated before the rule could take effect.

Thus, in the context of 112(d) standard setting, there is clear precedent supporting the conclusion that "similar source" must be interpreted as referring to a source in the same category or subcategory as the proposed source. In 112(g) determinations, as noted above, the opposite is true.

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[17] 112(g) preamble at 68395.
[18] *Portland Cement Ass'n. v. EPA*. 665 F.3d 177, 186 (D.C. Cir. 2011).
[19] "*[I]n none of EPA's proposals, final rules, or brief in this Court has EPA attempted to defend the principle that, in the face of a final and promulgated CISWI definition, data from CISWI kilns could now be considered in setting NESHAP standards.*" Id.
[20] *NRDC v. EPA*. 489 F.3d 1250, 1261 (D.C. Cir. 2007).

Cost and the MACT Floor Analysis

The differing interpretations of the phrase "similar source" give rise to a more fundamental distinction between 112(d) standards and 112(g) determinations, a distinction which affects how cost and other factors are considered in setting MACT. As caselaw and prior rulemakings make clear, when EPA sets 112(d) standards, cost is not considered during the MACT floor determination:

> *EPA implements [112(d)] requirements through a two-step process. The agency begins by setting the minimum stringency standards required by section 7412(d)(3) for new and existing sources…Once the Agency sets statutory floors, it then determines, considering cost and other factors listed in section 7412(d)(2), whether stricter standards are "achievable." 42 U.S.C. § 7412(d)(2). The Agency calls such stricter requirements "beyond the floor" standards.*[21]

In contrast, however, under the 112(g) program EPA effectively eliminated a MACT floor process of the type used in setting 112(d) standards. In the "similar source" analysis which replaced the proposed MACT floor analysis, EPA chose to include cost considerations, among other factors:

> *The EPA believes that the practical use and effectiveness of any transfer technology should be generally comparable across emission units. While the particular pollutants emitted need not be the same, the following factors may be considered: the volume and concentration of emissions, the type of emissions, the similarity of emission points, and the cost and effectiveness of controls for one source category relative to the cost and effectiveness of those controls for the other source category, as well as other operating conditions.*[22]

Therefore, under the 112(g) program, not only is cost considered in setting the minimum level of control, but it is considered in a different way than under 112(d) standard setting. In setting 112(d) standards, EPA considers cost by determining the cost-effectiveness of particular controls under consideration during the beyond the floor analysis, an approach that has been upheld in litigation.[23] But EPA's guidance for assessing cost in making a "similar source" determination instead involves consideration of the *relative* cost of controls for two types of stationary source. EPA has taken the position that the Clean Air Act does not require it to use a particular form of cost analysis,[24] and it therefore seems reasonable to conclude that the "relative cost" methodology contemplated by the 112(g) preamble fulfills the same function that cost-effectiveness calculations do in 112(d) standard setting.

Common Themes in EPA's Information Request

Several of the questions in EPA's information request appear to presume familiarity with the interpretation in the 112(g) preamble that a "similar source" need not belong to the

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[21] *National Lime Ass'n v. EPA*. 233 F.3d 625, 629 (D.C. Cir. 2000).
[22] 112(g) preamble at 68395.
[23] E.g., *NRDC v. EPA*. 749 F.3d 1055, 1060–1061 (D.C. Cir. 2004).
[24] Id. at 1060.

same source category as the proposed source. Item 2, for example, observes that BWTX should provide a more specific analysis of why the sources corresponding to the MACT Y "offshore loading terminal" subcategory are not "similar" to the proposed terminal. Item 3, in the same vein, asks whether there exist any SPM systems that conduct loading operations using "Vapor Emissions Control" (VEC). BWTX believes that the thrust of Item 3 is that if such sources existed, then they should be evaluated as potentially "similar" sources.

Certain of the items (viz., items 4, 5, and 8) appear to imply the existence of a technical feasibility analysis of the type described in Tier II of the Proposed Guidelines. While the Proposed Guidelines envision the elimination of potential "similar sources" based on technical feasibility alone, the final 112(g) preamble enumerates several factors, including cost (but not technical feasibility specifically), that should be used in assessing similarity. For example, Item 3 specifically requests for BWTX to "*technically illustrate that [VEC] would or would not work.*" BWTX interprets such requests as referring to the specific guidelines on "similar source" determinations in the 112(g) preamble.

Some of the items (viz. Items 4, 5, and 8) specifically request evaluation of cost, non-air quality health and environmental impacts, and energy requirements. BWTX believes that such remarks are based on EPA's assumption that such factors should be evaluated during a case-by-case MACT determination in the same manner as they are in a 112(d) rulemaking. Alternately, they may be based on a reading of the obsolete Proposed Guidelines publication (at Tier II, candidate technologies that cannot be eliminated based on technical feasibility should be compared for cost effectiveness).[25]

As discussed above there are important reasons why 112(d) standards and 112(g) determinations cannot use the same procedures; and there is also a sound basis for not relying on the obsolete, Proposed Guidelines when making 112(g) determinations. BWTX's approach to addressing these items is to first address the request within the "similar source" framework discussed above, and then provide any additional information that is readily available (most typically information previously submitted to MARAD), whether or not BWTX believes that its submission is required under 40 CFR § 63.43(e)(2).

Responses to Information Request

1. *40 CFR 63.43(e) identifies application requirements for case-by-case MACT determinations. The following items are needed.*

   a. *63.43(e)(2)(vi) states "The HAP emitted by the constructed or reconstructed major source, and the estimated emission rate for each such HAP, to the extent this information is needed by the permitting authority to determine MACT." (emphasis added) The submittal fails to provide estimated emissions for each HAP and does not identify the HAPs expected for the source. As noted below, additional information on how emissions estimates were calculated will also be needed.*

   b. *63.43(e)(2)(vii) states "Any federally enforceable emission limitations applicable to the constructed or reconstructed major source". The submittal only contains a ton per year limit*

[25] E.g., Proposed Guidelines at 26.

on emissions. There is not enough evidence supporting how this limit was estimated. The submittal does not include any short-term emission limits for the source. The only limitation on emissions is the maximum annual throughput of 384,000,000 Bbl per year.

c. *63.43(e)(2)(x) states "A recommended emission limitation for the constructed or reconstructed major source consistent with the principles set forth in paragraph (d) of this section". The application fails to evaluate the emissions associated with maintenance activities such as pigging or hydrostatic pressure tests. Please consider all emission producing activities and include emission estimates for all activities.*

d. *63.43(e)(2)(xii) states "Supporting documentation including identification of alternative control technologies considered by the applicant to meet the emission limitation, and analysis of cost and non-air quality health environmental impacts or energy requirements for the selected control technology". The application does not include an analysis of the cost of any control technology evaluated by the applicant. It is also missing any evaluation of non-air quality health environmental impacts or energy impacts for the control technologies evaluated.*

Response:

Item 1.a

As EPA notes, emission rate information is required "*to the extent this information is needed by the permitting authority to determine MACT*."[26] The HAP emitted by the source are all susceptible to control in the same manner, and BWTX believes that the application contains sufficiently detailed information on emission rates to enable EPA to make a control determination. Section 9 of the application listed each of the HAP species that BWTX believed would be emitted, and BWTX's proposal is to control Crude Oil Vapors as a surrogate for each individual HAP that may be contained therein.[27]

Data on speciated emission rates have been recently supplied in response to a completeness determination for the PSD application. The relevant portion of the response is excerpted and included as an attachment to this submittal.

Item 1.b

EPA asserts that the application fails to comply with 40 CFR 63.43(e)(2)(vii) because it does not contain any proposed emission limitations other than an annual throughput limit,

[26] The relevant portion of the 112(g) preamble reads as follows:

> *The EPA wishes to clarify that the requirement in § 63.43(e)(2)(vi) to list emission rates is intended as background information to enable the permitting authority to identify the pollutants requiring MACT controls. The EPA recognizes that there is often a significant effort required to obtain precise estimates of HAP emission rates and speciations. The EPA does not intend in this paragraph to require a greater level of detail than is necessary for evaluating applicability and emission control issues.*

61 Fed. Reg. 68393 (Dec. 27, 1996).

[27] Ibid.

which is not specifically justified. The regulatory requirement in question refers to emission limitations that a new or reconstructed source is otherwise subject to, not to prospective emission limitations of the NOMA.

The referenced throughput limitation was proposed as part of the basis for calculating the terminal's potential to emit. However, BWTX has taken the opportunity to revisit its proposed emission limitations and no longer believes that it is appropriate to establish an enforceable potential to emit as a requirement of the NOMA. The suggested NOMA has been revised (see Attachment 3) to remove the throughput limitation and to incorporate other control requirements developed in response to other items.

Item 1.c

EPA asserts that the application fails to evaluate emissions from maintenance activities. Emissions from maintenance activities are negligible, as discussed in more detail in the response to Item 13, and can be held to negligible levels by adhering to the work practice of inventorying the floating hose with seawater at the end of each loading operation. A requirement to this effect is contained in the revised proposed NOMA.

Item 1.d

40 CFR 63.43(e)(2)(xii) states that an applicant must supply the analysis presently requested by EPA for the "*selected control technology*." This information is provided below.

As discussed in its introductory remarks, BWTX feels that cost should be considered to the extent necessary to determine whether a specific stationary source is "similar" to the proposed source, but does not believe that cost information must be systematically analyzed for each control technology discussed in the application.

The proposed "combined work practice," as revised, includes three elements: restriction to ships adhering to bottom fill design, restriction to ships adhering to MARPOL Annex VI requirements to maintain a VOC management plan, and adherence to an operations manual consistent with USCG requirements.

Restricting use of the terminal to ships employing bottom fill has no marginal cost, as the standard (46 CFR § 153.282) is generally adhered to in shipbuilding. Use of bottom fill rather than splash loading would not increase the amount of head required of the onshore cargo transfer pumps, so energy impacts are negligible. Although crude oil is not especially susceptible to static electricity hazards, bottom fill minimizes the formation of static charges (and thus the likelihood of a fire) and would have a positive secondary environmental impact.

Restricting use of the terminal to ships complying with MARPOL Annex VI has no marginal cost since compliance is required under EPA regulations implementing the Act to Prevent Pollution from Ships (33 USC §§ 1905–1915).[28] Proper operation of an inert gas

[28] 75 Fed. Reg. 22896 Apr. 30, 2010.

generation system, as required under the terms of a VOC management plan, would reduce energy costs for the vessel operator, and would therefore reduce combustion emissions from onboard generators.

Development of an operations manual is associated with an initial cost on the order of $100,000, and complying with the manual involves annual labor and other operational costs on the order of $37,500,000. These expenditures are necessary to ensure compliance with USCG regulations. Adherence to the operations manual reduces the risk of casualty (oil spills, fire, etc.) and therefore has a positive secondary environmental impact. Energy impacts are negligible.

As discussed in the PSD application (p. 4-10), EPA has identified the reduction efficiency of the submerged fill work practice as 60%.[29] Therefore, BWTX estimates that if these measures were not adhered to, potential emission rates could be 150% higher. Based on a potential HAP emission rate of 845 tons per year, the combined work practice will result in an emissions reduction of approximately 1270 tons per year. BWTX judges the combined work practice to be a cost-effective means of reducing HAP emissions.

2. *Starting on page 5-1 of the 112(g) application, an analysis is provided to demonstrate that regulatory requirements from the National Emission Standards for Marine Tank Vessel Loading Operations, 40 CFR Part 63, Subpart Y is inapplicable based on the project design not meeting the definitions for "marine tank vessel loading operation", "terminal", "loading berth", and "offshore loading terminal". One of the guiding principles for MACT determinations (40 CFR 63.43(d)(1) is to provide an assurance that a proposed source will meet the emission control level that is achieved in practice by the best controlled similar source. (emphasis added) To establish if a source is similar, or not similar to those sources regulated in 40 CFR 63 Subpart Y, please review the definition of similar source as defined in 40 CFR 63.41 and provide us your detailed analysis of why your proposed project is dissimilar to project(s) subject to Subpart Y regulations. In general, a similar source has comparable emissions, structurally similar in design and capacity and could be controlled using the same control technology.*

Response:

The concept of a "similar source" is not relevant in determining whether a particular NESHAP standard applies to a source. Therefore, BWTX interprets the question to relate to the case-by-case MACT determination rather than to the MACT Y applicability determination.

As discussed in its introductory remarks, BWTX agrees that there is a distinction between sources which are "similar" in the context of a case-by-case MACT determination, and sources belonging to the same source category or subcategory for purposes of standards development. In this response, BWTX summarizes the information contained in the application and also reframes its analysis using the framework set forth in EPA's 112(g) preamble, which BWTX understands to be binding.

[29] 75 Fed. Reg. 65115. Oct. 21, 2010.

The application indicates that the Louisiana Offshore Oil Port (LOOP) is the only "similar source," and is therefore the best-performing similar source.[30] LOOP, and vessels calling at LOOP, are subject to the applicable EPA and USCG regulations which form the basis of BWTX's proposed combined work practice standard. BWTX believes that the proposed combined work practice standard will result in an emissions reduction equivalent to that achieved by LOOP. The application also discusses four types of control strategies which represent emissions reductions beyond those achieved by LOOP. For purposes of addressing EPA's question, the selected MACT-level controls and other controls evaluated can be reframed as referring to types of existing facilities which are potentially "similar":

- Facilities employing subsea lines which route vapor back to an onshore control device ("SUBSEA LINES").
- Facilities employing a combined work practice consisting of submerged fill, use of MARPOL Annex VI-compliant vessels, and best management practices ("WORK PRACTICE").
- Facilities employing a workboat which captures and recovers vapors displaced from a loaded vessel ("WORKBOAT").
- Facilities which restrict loading operations to specially-designed vessels under the terminal operator's control, which are equipped with onboard control devices ("ONBOARD CONTROLS").
- Facilities where tankers berth at the end of a pier or causeway, or at a fixed platform, and a control system is located on the dock or platform ("DOCKSIDE CONTROLS").

EPA regulations require that the minimum approvable MACT controls correspond to "*the emission control which is achieved in practice by the best controlled similar source.*"[31] Therefore, BWTX first determined whether sources employing a particular control strategy existed. The results of this evaluation are summarized below.

Category	Existing Facilities Identified
SUBSEA LINES	None exist. GIMT was constructed with this configuration but ceased operations after

[30] The application proposes using distance from shore (i.e., whether a facility is located in state jurisdictional waters) as a test for determining similarity between sources. If this condition is relaxed, then two additional sources, located in Barber's Point Hawai'i and St. Croix, US Virgin Islands, would potentially be treated as "similar," though the final control determination would not change since neither employ controls.
[31] 40 CFR § 63.43(d)(1).

Category	Existing Facilities Identified
	six months. Unable to determine whether controls were employed effectively.
WORK PRACTICE	LOOP.
WORKBOAT	Three workboats are believed to operate in SCAQMD waters and call at the El Segundo Terminal during bunker fuel loading operations.
ONBOARD CONTROLS	Handymax-sized tankers calling at El Segundo. EMT ceased operation in 2012. North Sea operations not relevant to MACT floor determination.[32]
DOCKSIDE CONTROLS	Richmond Long Wharf. Numerous others exist when no minimum distance from shore is assumed.

The categories for which controlled sources currently exist are the WORK PRACTICE, WORKBOAT, ONBOARD CONTROLS, and DOCKSIDE CONTROLS categories. Although the SUBSEA LINES technique need not be considered further, information about GIMT is provided below for completeness.

In assessing whether a particular source is a "similar source," The 112(g) preamble specifies five factors that should be considered by permitting authorities: volume and concentration of emissions, type of emissions, similarity of emission points, cost and effectiveness of controls, and other operating conditions.[33] Each of these factors was assessed for the five types of sources, and results of the analysis are summarized in the table below. Table cells corresponding to a particular factor are shaded green if the source in question is similar to the proposed facility with respect to that factor, and are shaded red in the case of a significant dissimilarity. Unshaded cells correspond to dissimilarities that are not judged to be decisive in determining whether the two sources are similar.

[32] 61 Fed. Reg. 68394 (Dec. 27, 1996) ("*The definition of MACT for new source MACT in this rule does not require consideration of sources outside the U.S*.").
[33] 112(g) preamble at 68395.

Category	Volume and concentration	Type of emissions	Similarity of emission points	Cost and effectiveness of Controls	Comparable operating conditions	Similar Source?
SUBSEA LINES	Similar concentration (crude oil vapors). Volume is lower and intermittent.	Same (crude oil vapors)	Smaller tanker vessel.	Cost of capture system proportional to length of subsea lines (i.e., ~25 times higher for 25 mi. pipeline). Effectiveness not established.	Ocean conditions and mooring geometry differ. Loaded vessel does not weathervane.	No
WORK PRACTICE	Similar concentration (crude oil vapors).	Same (crude oil vapors)	Same (VLCC).	Similar cost and effectiveness.	No other relevant differences.	Yes
WORKBOAT	Significantly lower concentration (gasoil vapors). Significantly lower volume.	Similar (gasoil vapors).	Smaller tanker vessel.	Significantly lower cost and significantly lower demonstrated effectiveness: vapor processing capacity much lower.	Ocean conditions and mooring geometry differ. Loaded vessel does not weathervane.	No

Category	Volume and concentration	Type of emissions	Similarity of emission points	Cost and effectiveness of Controls	Comparable operating conditions	Similar Source?
ONBOARD CONTROLS	Similar concentration (crude oil vapors).	Same (crude oil vapors).	Smaller tanker vessel.	Installed cost is proportional to number of ships in fleet (i.e., 30–60 times higher for high throughput export terminal).	Ocean conditions and mooring geometry differ.	No
DOCKSIDE CONTROLS	Similar in concentration and volume.	Similar (refined product vapors).	Loading arm, fixed vapor return line and dockside vapor skid are employed.	Cost-effective capture system and controls can be located on or near the dock.	Fixed dock or platform available for construction of capture and control equipment, installation of utilities, etc.	No

The presentation in section 5 of the application includes additional details about specific facilities. Based on this information and the factors summarized in the above table, BWTX determines that LOOP is the existing facility that can be reasonably classified as a “similar source” in the context of a MACT floor determination.[34]

- As detailed in Section 5 of the application, no loading facilities in the United States employ vapor controls based on subsea lines. In any event, BWTX has made a diligent effort to review all available information about this particular control technology and does not believe there are sufficient grounds to determine that such a control technique is effective in practice. The subsea line-based control systems specifically discussed in the MACT Y rulemaking docket were conceptual designs, and none were actually built.

  Assuming, for the sake of argument, that these systems could be effective, it should be noted that a significant portion of their capital cost is in the laying of a subsea pipeline. For example, during MACT Y rulemaking EPA considered an analysis for a hypothetical control system based on subsea vapor pipelines for a facility located 1.5 miles offshore. The cost of piping and subsea lines was 64% of the total capital cost (Cf. Attachment 2).

  The laying of dual 16” vapor return pipelines[35] has an estimated cost of approximately $2.9 MM/mi. Therefore, the cost of laying the 25 miles of pipeline would exceed the cost of laying the one mile of pipeline contemplated by sources in the MACT Y rulemaking docket by approximately $70 million. Thus, even if such a system was in use on an existing source, and its control effectiveness were known, the cost of control would not be comparable. Consequently, if any nearshore sources using subsea lines existed, they would not reasonably be considered similar sources.

- As discussed in Section 6.3.3 of the application, workboats known to operate in the United States are restricted to the processing of bunker fuels having a maximum vapor pressure of 0.75 psia and a maximum loading rate of 8,000–12,000 Bbl/hr. This corresponds to approximately one hundredth of the hydrocarbon flow rate that is estimated from the proposed project. Due to differences in flow rate, any workboat adapted for control of emissions from the present project could not be directly transferred from those in operation in California, since control could not be achieved without significantly reducing the throughput of the proposed facility and hindering its ability to operate continuously during a loading operation.

  Direct technology transfer is also discouraged by differences in mooring geometry: during multi-buoy mooring transfer operations, the loaded tanker is held in a fixed position. For loading at an SPM buoy, the workboat would have to be dynamically positioned near the stern of the loaded vessel, a design factor not relevant for the

[34] Cf. also remarks in the response to Item 3 (below), concerning two other SPM-based loading terminals in United States waters which employ a combined work practice.
[35] Dual pipelines would be necessary to enable round-trip pigging of the pipeline.

workboats operating in California. Consequently, sources using workboats are not reasonably considered similar sources.

- As discussed in Sections 5 and 6.3.1, there exist two handymax-sized Jones Act oil tankers which conduct controlled loading operations at the Chevron El Segundo terminal in California. These, however, differ in cargo capacity by a factor of approximately six, when compared to VLCCs. While the terminal employs multi-buoy moorings rather than an SPM buoy, this design difference is not expected to significantly affect the effectiveness of the onboard controls. The cost of controls, however, is not comparable.

  The transfer operations completed at the Chevron El Segundo terminal take place on two tankers operated by Chevron affiliates. Based on the throughput levels reported in the application and the estimated round-trip voyage time between Offshore Galveston and Ningbo, PRC (a representative export destination), BWTX believes that a total 60 VLCCs (loading and underway to/from export destination) would be required to sustain operations at the proposed terminal. Purchase of a VLCC would cost approximately $93 million per unit based on current market rates, and the cost of retrofitting the vessel with control equipment would increase the capital cost to approximately $100 million. Operating expenses of approximately $14,000/day would be required for crews, stores, spare equipment, insurance, maintenance, and shipyard costs, corresponding to a cost of $570 MM/yr on an annualized basis.[36]

  Based on the cost of controls, the control solution in place at El Segundo for oil tankering operations cannot be considered a similar source.

- As discussed in Section 3 of the application, the distinction between causeway-, jetty-, and platform-type loading facilities; and terminals where loading takes place via mooring buoys is a fundamental one: the former contain fixed structures attached to the sea floor via pilings which can accommodate a control device and capture system when factored into the initial design. Control costs are significantly lower and have a high and established effectiveness. EPA has previously included in the MACT Y rulemaking docket an analysis comparing the cost of controls at the Richmond Long Wharf (causeway-type) to a hypothetical project for installing controls at the El Segundo marine terminal (multi-buoy type), and concluded that the costs for the offshore location were approximately doubled on a $/ton HAP basis.[37] EPA's analysis was used to justify subcategorization during the MACT Y rulemaking, and BWTX believes that it continues to provide support for concluding that causeway-type terminals are not similar to true offshore terminals located in open water locations.

[36] Capital recovery factor based on depreciation over 20 years at 7% interest per annum.
[37] Mike Steinbrecher (Chevron Corporation) to David Markwordt (EPA OAQPS). March 13, 1995. *Proposed Rule: Marine Tank Vessel Loading Operations*. Docket item A-90-44-IV-D-136.

Sources employing dockside controls are not reasonably considered similar sources.

3. *Additional information is needed to evaluate the performance of similar sources for the MACT floor analysis. Single Point Mooring (SPM) systems are not considered a new design and have been in use for various marine loading operations for some time. Evaluate any SPMs that utilize a method of Vapor Emissions Control (VEC). Please provide a supporting analysis that would technically illustrate that the control would or would not work for the proposed BWTT operational design based on volumetric loading differences or other operational parameters?*

Response:

To BWTX's knowledge, and based on extensive efforts to identify similar sources, there exist no single-point mooring buoys used for crude oil loading operations in the United States which utilize VEC. The definition of MACT for new sources does not require consideration of sources outside the U.S.[38] In order to confirm this assessment, BWTX contacted the three major manufacturers of CALM-type buoys as well as the leading certifying entity for VEC systems, the American Bureau of Shipping. BWTX included select correspondence from this investigation in its application.

There exist two terminals in the United States which conduct liquid loading operations via an SPM: LOOP, and the terminal at Barber's Point, HI. BWTX also understands that an SPM loading buoy has recently been commissioned at the Limetree Bay Terminals facility in St. Croix. All of these sources are discussed in the application, and none employ VEC. However, each is presumed to use a similar combined work practice. A recently-released report (copy enclosed in Attachment 6) does not identify any SPM buoys used for loading crude oil other than those mentioned.

Loading terminals which currently employ VECs do not conduct loading operations via SPM. This is discussed at length in Section 5 of the application. Of special relevance is Table 5-2 of the application, which specifies the type of mooring system in use at each of the offshore terminals considered in the MACT Y rulemaking. The application also includes appendices with supporting documentation related to this point, including correspondence with at least one SPM manufacturer.

Since no potentially similar sources exist, BWTX does not feel that it is necessary to proceed further in the analysis indicated by EPA. Finally, BWTX is unable to conclude that VEC on an SPM "*would not work*": this would be equivalent to drawing conclusions about potential, as-yet unrealized advances in engineering design and control technology. BWTX doubts that EPA intended the remark in its literal sense.

4. *Please provide a detailed technical analysis to support a scaled-up design to accommodate BWTT's proposed operating parameters based on the demonstrated VEC operation for the Santa Barbra Ellwood Marine Terminal and the North Sea Shuttle Vessels included on page 5-9 and 6- 6*

[38] 61 Fed. Reg. 68394 (Dec. 27, 1996).

of the application. In accordance with 40 CFR 63.43(d)(2), the analysis should consider the costs and any associated non-air quality health and environmental impacts and energy requirements.

Response:

In Item 7, EPA has indicated a dispreference for consideration of production sources. Both EMT and the North Sea Shuttle vessels are used for tankering of crude oil produced offshore. BWTX believes that the information provided in the application and elsewhere in this submission constitutes the requisite analysis referred to in 40 CFR § 63.43(d)(2).

Shuttle tankers operating in the North Sea have been modified to control VOC emissions using techniques such as refrigeration, adsorption, liquid-liquid absorption, and operation of cargo tanks at elevated pressures. As discussed in the responses to Items 2 and 7, the use of onboard controls requires that the terminal owner limit loaded vessels to a fleet under the owner's control. This may be a reasonable control strategy for terminals offloading oil produced offshore, but cannot be applied to an export terminal.

Cost information relating to the "onboard controls" control strategy is presented in the response to Item 2. The required analysis considering the cost, non-air quality health and environmental impacts and energy requirements of the selected control technology is presented in the response to Item 1.

5. *Please provide any additional feasibility and cost details related to emission reductions that could be achieved if an additional subsea pipeline is added to route marine loading vapors back on-shore. If vapors can be routed 1-mile back on-shore, could the vapors be routed 18-miles back on-shore? Are there any other regulatory requirements (i.e., U.S. Coast Guard regulations at 33 CFR 154.2015, 33 CFR 154.2107 or 46 CFR 39) that might prevent this alternative scenario? Please remember to include any consideration for the costs and any associated non-air quality health and environmental impacts and energy requirements.*

Response:

EPA's phrasing (*"…if vapors can be routed…"*) implies that EPA is unable to conclude that a control technology based on routing vapors 1-mile back to shore should be considered in making a MACT determination. BWTX has demonstrated elsewhere in this response that this control technique is not achieved in practice by any source in the United States, and need not be considered further in determining MACT.

However, portions of the question are relevant from the standpoint of 40 CFR § 63.43(d)(3), which specifies situations where a work practice may be prescribed in lieu of an emission limitation, and BWTX interprets the question as relating primarily to this issue. This provision requires that a determination be made following the provisions in Section 112(h)(2) of the Clean Air Act, which provides two conditions under which a work practice may be prescribed in lieu of an emission limitation:

> *(A) a hazardous air pollutant or pollutants cannot be emitted through a conveyance designed and constructed to emit or capture such pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State or local law, or*
>
> *(B) the application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations.*

Each of these considerations are addressed in turn.

US Coast Guard regulations (33 CFR Part 154, Subpar P) require that facility vapor control systems eliminate sources of ignition to the maximum practicable extent, and eliminate potential overpressure and vacuum hazards (33 CFR § 154.2100). Before being placed into operation, vapor control systems must be certified as compliant with USCG regulations by an approved certifying entity. Certain specific safety objectives lack proven solutions in the context of a subsea vapor return pipeline. USCG-approved certifying entities which issue guidelines for SPM-based loading facilities do not provide guidelines for vapor control at such installations, and BWTT questions whether an SPM-based vapor control system could be certified in a reasonable amount of time, or at all, for reasons detailed below.

VLCC's calling at the terminal would be subject to IMO requirements pertaining to inert gas systems. For terminals handling only inerted cargo vapors, USCG regulations specify two options for eliminating ignition sources: either have a detonation arrester within 18 m of the facility vapor connection, or have an inerting system (33 CFR § 154.2105(b)): the inerting system must be at most 22 meters from the facility vapor connection, and cannot operate at a vacuum if it is possible for air to leak in downstream of the injection point (33 CFR § 154.2107).

A vapor recovery system of the type referred to in this item would be unable to meet these requirements because a detonation system or inerting system could not be located within the prescribed distance from the facility vapor connection. Such a design would require a regulatory exemption (33 CFR § 154.108). This issue is discussed in a January 16, 1992, letter available in the MACT Y rulemaking docket, included as Attachment 2.[39]

Therefore, while there are potential compatibility issues with USCG Regulations issued pursuant to Section 183(f) of the Clean Air Act, BWTX cannot conclude that they preclude the construction of a conveyance for capturing loading. Additional considerations bearing on the possibility and the technical difficulties of constructing such a conveyance are given below.

- As noted in the response to Item 2, the overall length of pipeline laid would be a significant factor in determining the overall cost of such a system, and the length of the pipeline would therefore be an important factor.

- The length of pipeline would also be relevant from an operability standpoint. Crude oil loading vapors include inert gas contained in a ship's cargo hold, which contains a substantial portion of water vapors. Such vapors would condense in the vapor pipeline, and would have to be frequently removed by pigging. Ship cargo tanks operate within narrow pressure ranges, outside of which loading operations must be immediately halted. A solution for managing the back pressure in the vapor pipeline, with concomitant impacts on energy would have to be devised, and would likely include one or more offshore booster pump stations and frequent pigging. The minimum pigging frequency could be at least one or more times during each

[39] Docket item A-90-44-II-D-49.

single loading operation , and the loading operation would have to be suspended since the pig is a potential ignition source. The suspension of loading operations would prevent the facility from operating continuously as intended.

- Finally, a person implementing such a solution would have to make provisions to minimize impacts to the aquatic environment when installing the pipeline. Such impacts would include, *inter alia*, impacts to marine mammals in the form of acoustic disturbances and impacts to benthic organisms occasioned by disturbances to subsea soils.

In sum, there are impediments to constructing a conveyance for capturing loading emissions such that EPA may conclude that a work practice standard can be prescribed under Section 112(h)(2)(A).

However, approval of a work practice standard under Section 112(h)(2)(B) is more straightforward. EPA previously adopted the submerged fill work practice standard for existing "offshore loading terminal" which would otherwise subject to MACT Y,[40] which entails that the appropriate finding under Section 112(h) was made. Such a finding would have been expected since it is not practicable to measure emissions that are released from a marine vessel during a loading operation not subject to vapor recovery. Since the same considerations apply to BWTX's proposed facility (or to any similarly classified facility), BWTX believes that a work practice standard is appropriate under the criteria at 40 CFR § 63.43(d)(3).

6. *BWTT's beyond the floor analysis evaluated a technology transfer -based control. Did BWTT consider evaluating the Phillips 66 Rodeo, CA Marine Terminal, Chevron's Richmond Long Wharf Marine Terminal and the Valdez Marine Terminal (VMT) terminals that were controlling emissions to a level of 95 percent (consistent with the marine tank vessel loading regulations found in the Bay Area Air Quality Management District in California) in the beyond the floor analysis.*

Response:

In preparing its application, BWTT considered the memorandum of July 14, 1995, concerning recalculation of the MACT floor for VMT and for offshore loading terminals. The memo is discussed in the application on pp. 5-11–5-12. The facilities referred to were not judged to be reasonable candidates for technology transfer.

VMT is not discussed in detail in the memo, but the reasons favoring subcategorization are discussed at 60 FR 48393 (September 19, 1995). VMT is not an offshore terminal.

The Richmond Long Wharf is a causeway-type terminal that was included in the MACT Y "Offshore Loading Terminal" subcategory, and is not otherwise relevant (but see discussion under the response to Item 2).

The Phillips 66 Rodeo, CA, terminal is not mentioned in the memo, nor is it specifically referred to elsewhere in the MACT Y rulemaking docket. It does not have any loading

[40] 76 Fed. Reg. 22576. Apr. 21, 2011.

berths more than 0.5 miles from shore. If EPA intends to suggest that the Rodeo terminal was one of the two “offshore” terminals (the other being the Richmond Long Wharf) under BAAQMD jurisdiction as of July 1995, BWTT believes that the intended reference is to a platform-type terminal previously operated by Hercules Refining. This source is discussed on pp. 5-9–5-12 of the application.

As discussed in the response to Item 2, none of these facilities are “similar sources” and they do not have potential for technology transfer.

7. *BWTT should reevaluate their comparison in section 5 of the application regarding the comparison of Outer Continental Shelf (OCS) floating production, storage, and offloading (FPSO) units to the proposed project. It appears BWTT is pulling production sources into the MACT evaluation and not just export facilities. BWTT should make clear that it is a different industry and that the scale of product loaded is not comparable.*

Response:

BWTX made efforts to identify all sources with potentially transferable control technologies in its MACT evaluation, as required by EPA’s regulations.

However, BWTX is willing to defer to EPA’s judgment that it is not appropriate to “*pull production sources into the MACT evaluation and not just export facilities.*” Table 5-2 of the application classifies terminals by their business function, and clearly indicates those which are production sources rather than export facilities. As a point of further clarification, the North Sea shuttle tankers, EMT, GIMT, discussed in the application are all facilities used for off-take of crude oil produced offshore.

Indeed, loading operations associated with offshore production involve intermittent offtake operations at significantly lower throughputs than an export terminal. The discussion in 6.3.1 of the application captures this distinction in detail: if a terminal operates with a small, dedicated fleet of tankers, then it necessarily has low and variable throughputs when compared with an export facility. When operating at its intended throughputs, BWTX’s proposed SPM terminal is expected to provide enough crude oil for at least sixty VLCCs operating simultaneously (whether loading or underway to/from their destinations).

Production-related terminals, based on BWTX’s review, tend to require a smaller number of vessels, perhaps one or two. BWTX has found this distinction is compelling when concluding that production-related terminals are not “similar sources” and that onboard control systems are not reasonable candidates for technology transfer.

8. *BWTT needs to perform an analysis to show why a platform is not a viable option for their business plan. The analysis should provide not only economic costs, but also an analysis of the technical feasibility.*

Response:

BWTX interprets this question as a request for clarification on whether BWTX has any plans to construct or otherwise make use of an offshore platform. EPA has communicated to USCG in a April 5, 2019 letter that it wishes to be apprised of such information.[41] Such information is perhaps relevant in conducting the required "similar source" analysis, though BWTX cannot be certain of EPA's exact intent in posing the question.

BWTX can confirm that its business plan is viable without a platform. As explained in the application, offshore loading operations can take place via tandem loading (i.e., transfer from an F(P)SO directly to a tanker) or through a mooring buoy. Oil tankers are not moored alongside an offshore platform. The purpose of a platform for an offshore export facility would be to support scheduling and incident response and to allow for support staff to be stationed in proximity to the terminal. Transfer pumps and metering equipment could also potentially be located on a platform. BWTX is able to achieve these functions through the use of onshore stations, service vessels, and radio communications.

The remainder of the response to this item summarizes additional information which is incidentally available, based on the MARAD regulation requiring that a Deepwater Port License application supply information about refurbished Outer Continental Shelf facilities and co-located fixed offshore components (33 CFR § 148.105(s)).

BWTX's Deepwater Port License application contains the following statement:

> *No refurbished Outer Continental Shelf (OCS) facilities and/or co-located fixed offshore components are proposed to be utilized as part of the proposed Project. The Applicant investigated the feasibility of utilizing existing OCS infrastructure. Based on this review, it was determined that there is currently no existing infrastructure located within the area meeting the necessary criteria to fulfill the Project purpose and need. As such, the utilization and/or refurbishing of existing OCS infrastructure was not determined feasible for the proposed Project.*[42]

The costs of constructing an offshore platform vary based on numerous factors. To give a general idea of the order of magnitude of the cost, BWTX believes that for a fixed platform located in the general vicinity of the proposed project, construction of a new platform structure, a main deck, and a cellar deck would have a total cost of approximately $265 million.

The application also contains a detailed analysis as to the technical feasibility of utilizing existing offshore infrastructure to fulfill the project purpose and need. This analysis is contained in Volume II, Section 2 of the application,[43] and relevant portions are summarized in the remainder of this response.

The installation and operation of fixed platforms creates adverse impacts to marine life, water qualify, and subsea soils. Fixed platforms also have negative energy impacts associated with staffing and providing power to a remote location. Among secondary environmental impacts may be included the inherent high safety risk of transporting supplies and personnel to and from the platform via service vessel or helicopter. Offshore

[41] Rob Lawrence (EPA R6) to Curtis Borland and Yvette Fields (USCG). April 5, 2019. Marine Vessel Loading emissions. Regulations.gov document ID MARAD-2019-0012-0017.
[42] Vol. I, Page 20-1 of application.
[43] Regulations.gov docket item MARAD-2019-0094-0004.

platforms have limited space and often store flammable materials such as diesel fuel and propane. Ignition sources such as gas turbines, diesel engines, and flares pose a hazard which must be accounted for during offshore engineering projects. Platforms associated with oil production sites and pipeline facilities may have to handle and dispose of contaminated wastewater in the form of produced water or liquid slugs created during pipeline pigging.

Non-air quality environmental and health impacts associated with construction of a fixed platform were evaluated in the Deepwater Port License application, and the impacts considered are given below.

Environmental Impact	Bluewater SPM Project	Fixed Platform
Minimizes the potential for interference with natural processes	✓ Bluewater SPM project design allows for moored vessels to accommodate for existing natural processes	X Fixed platform design consists of rigid fixed structures incapable of accommodating for various offshore processes once installed. The inability of a ship to weather vane around the platform adds the risk of running into the platform in rough seas.
Minimizes Personnel Occupancy Required	✓ Un-manned system (excluding the assist tugs during berthing and de-berthing)	X Requires personnel to be onsite the fixed platform during operations. Potential for ship colliding with the platform can also harm the personnel. Potential risk of transportation of personnel to and from offshore. Potential risk to personnel accident due to highly hazardous environment on the platform from storage of diesel and propane. Incidents such as vapor cloud release, vapor cloud from oil spills, collision from vessels, etc. risks now exist.
Minimizes exposure of workforce to secure facilities in preparation of a severe storm event	✓ Un-manned system which can be remotely secured in preparation of severe storm event	X Requires personnel to be onsite to prepare fixed platform for sever storm event
Length of Construction Schedule	✓ 1-month timeframe of disturbance of the marine environment	X 3-month or more timeframe and disturbance of the marine environment
Maintenance Requirements	✓ Shorter timeframe of required maintenance	X Longer timeframe of required maintenance
Minimizes potential for overwater spills	✓ Project design limits required maintenance and no fuel refilling operations	X Project design requires increased maintenance and multiple facilities requiring fuel thereby resulting in an

Environmental Impact	Bluewater SPM Project	Fixed Platform
		increased potential for overwater spills
Minimizes Above Water Footprint	✓ Smaller footprint above the water	X Larger footprint above the water especially for locations in proximity to shipping lanes
Minimizes Seabed Water Footprint	✓ Smaller seabed footprint	X Larger seabed footprint therefore larger eco disturbances during construction
Minimizes damage to vessel due to Accidental Collision	✓ SPM chains allow for impact absorption and would cause less damage to vessel	X Rigid dolphins and platform of a fixed dock structure will cause greater damage to vessel
Accidental Collision Damage to Personnel	✓ Proposed project does not include a manned fixed structure.	X High safety concerns with vessel collision with an occupied fixed platform, consisting of multiple pressurized vapor lines and fuel storage
Minimizes operational noise impacts	✓ Proposed project design limits the required noise generating structures and noise impacts	X Project design including platform requires multiple diesel generators and facilities resulting in increased ambient noise impacts
Minimizes operational lighting impacts	✓ Proposed project SPM design minimizes required above water surface infrastructure requiring lighting	X Proposed fixed platform design requires multiple light fixtures for operations.
Minimizes operational impacts to water quality	✓ Proposed project SPM design does include any water uptake/discharges	X Proposed fixed platform design requires multiple water uptake/discharges thereby resulting in water quality impacts
Minimizes TSS and benthic impacts for construction activities	✓ Proposed project design minimizes the required installation of infrastructure resulting in increased TSS and benthic habitat impacts	X Proposed project design requires installation of increased infrastructure resulting in increased total suspended solids (TSS) and benthic habitat impacts
Minimizes operational impacts to plankton	✓ Proposed project SPM design does include any water uptake/discharges thereby avoiding impacts to plankton within the water column	X Proposed fixed platform design requires multiple water uptake/discharges thereby resulting in uptake of plankton
Minimizes construction and operational impacts to fisheries	✓ Proposed project design minimizes water column and seabed impacts	X Fixed platform design requires installation of numerous large

Environmental Impact	Bluewater SPM Project	Fixed Platform
		diameter piles and multiple subsea lines

9. *The 112(g) application does not provide a lightering analysis to give an emission comparison or to provide an analysis of the risks/benefits to lightering in lieu of the proposed SPM facility. BWTT provided an example of onboard vapor recovery technology utilized at Chevron's El Segundo marine terminal on page 6-6. BWTT states the facility is subject to SCAQMD Rule 1142 which requires control of loading and lightering activities. BWTT should provide emission calculations data for lightering and to include potential VEC utilization that may be used in the on-shore loading of the ship/barge. In addition, give consideration to emission reductions for vapor balancing between the VLCC and the ship/barge offshore. Also consider the emissions for lightering VLCC that are partially loaded inland and the remaining loaded offshore. Please provide HAP calculations to include any potential VEC opportunities and any secondary emissions that may be incurred, such as hoteling while waiting for port entry, etc. EPA acknowledges that lightering is a current operation for marine loading of crude oil. A recent lightering report completed for the Texas Commission on Environmental Quality (TCEQ) notes, that "there are no state or federal-level regulations that address emission controls associated with lightering operations in the Gulf of Mexico region beyond 12 nautical miles from shore." And, "based on the density of lightering point and zones off the coast of Texas, it is expected that more lightering occurs near the Texas coast than in other regions of the US."*

Response:

An analysis similar to that requested is contained in Volume I, Section 13 of the Deepwater Port License application, and is referred to as the "no project" scenario. A copy is enclosed as Attachment 4.

10. *Please provide additional supporting technical documentation to allow for the verification of the basis for the emission calculations. Specifically, the true vapor pressure of the crude oil (psia), molecular weight of vapors (lb/lb-mole), material composition data of the associated emissions (speciated) for the crude oil/condensate proposed to be used for the export operation.*

Response:

Data on speciated emission rates have been recently supplied in response to a completeness determination for the PSD application. The relevant portion of the response is excerpted and included as an attachment (Attachment 5) to this submittal.

11. *The application only provides emissions in tons per year. The emissions are estimated using generic values. The emission calculations utilize data from VOC Emissions from Oil and Condensate Storage Tanks: Final Report. 2009. BWTT takes the average values from the data in the report to utilize in the emission calculations. This is done without providing a reasoned justification or scientific basis for using this data. In addition, there no basis is given for the assumptions made in using the average values. BWTT estimated emissions on the VOC species present in the 11 samples in the report instead of using the total hydrocarbons (including methane and ethane). The reasoning given was that the methane, ethane, nitrogen, and carbon dioxide in the crude oil would weather out before it is exported. Does BWTT have any data to support this reasoning. BWTT should also reevaluate the H_2S emissions and ensure that the value given is truly*

representative of the crude oil to be exported. Please provide an hourly emission estimate and calculate emissions based on known values for the crude oil you intend to export for all pollutants. Please use the entire range of speciated values providing a low end and high end value. In addition, will only crude oil be loaded or will condensate also be loaded? Please utilize any available speciation data for emission calculations for the specific crude products being loaded.

Response:

Data on speciated emission rates have been recently supplied in response to a completeness determination for the PSD application. The relevant portion of the response is excerpted and included as an attachment (Attachment 5) to this submittal.

12. *Please provide emission calculations data for each HAP present utilizing the speciation profile of the crude products that BWTT expects to export.*

Response:

Data on speciated emission rates have been recently supplied in response to a completeness determination for the PSD application. The relevant portion of the response is excerpted and included as an attachment (Attachment 5) to this submittal.

13. *The 112(g) application does not appear to include a proposed method for continuous demonstration of compliance for maintenance activities such as pigging or hydrostatic pressure tests. This demonstration may include best management practices and/or schedules for maintenance.*

Response:

BWTX has not identified any MSS activities at the terminal that would result in emissions in excess of those expected during routine loading operations. Maintenance activities of the types that typically occur at terminals, such as pipeline pigging, meter proving, and pump maintenance, will take place at the onshore Booster station and will not give rise to emissions at the SPM terminal.

At the end of each loading operation, the floating hoses will be flushed with sea water, with some sea water entering the tanker's slop oil tanks. This work practice serves to reduce emissions from hose replacements to negligible levels. An emission calculation has been provided in response to EPA's completeness determination for the pending PSD application, and is reproduced below as follows.

The maintenance activity with the highest potential emission rate that BWTX has identified would be replacement of floating hoses, which would occur no more than once per year per hose string. As noted in the response to Item 7, hoses are flushed with seawater at the end of each loading operation, so hydrocarbons remaining in the hose would consist primarily of oil clinging to the elastomeric lining on the inner carcass. Emissions from draining of hoses during replacement is estimated by assuming that a volume of hydrocarbon liquids is volatilized and emitted to the air. The volume is estimated based on a clingage factor of 0.006 × 10^{-3} Bbl/ft^2.[44] For a 600 mm I.D. × 1000' hose string, a total wetted area of 6184 ft^2 is calculated, corresponding to a clingage volume of 1.56 gallons, or 11 lb for an assumed liquid density of 7.1 lb/gal. If this activity occurs at each of two hoses per buoy once per year, total annual emissions of 44 lb, or 0.02 tpy are expected.

14. *The 112(g) application does not provide a compliance monitoring strategy for the marine loading operation or estimated control efficiency of the work practice standard proposed in the application. EPA requests that BWTT propose a monitoring, recordkeeping and reporting strategy to ensure enforceability of the proposed MACT work practice standard and an estimated control efficiency expected to be achieved with this work practice standard in accordance with section 112(h) of the CAA.*

Response:

Section 9 of the application contains suggested terms of a NOMA. A revised version is attached (Attachment 3) to this response.

15. *To provide a continuous compliance demonstration with the fugitive HAP emissions associated with the SPM buoy system, VOC management plans have been used to serve as an indicator of HAP emissions. The 112(g) application relies on a VOC Management Plan this is developed and maintained by the VLCC and not BWTT. A VOC Management Plan is an important consideration and should be considered. However, in addition to the VOC management plan the VLCC will develop, has BWTT considered developing and providing a separate Best Management Plan that it will implement for the SPM buoy system that includes an effective plan for ship/shore interface, cargo transfer operations (i.e., minimizing gas formation in cargo tanks), maintenance (i.e., pigging), environmental (i.e., LDAR program), safety and health considerations and emergency preparedness?*

Response:

BWTX agrees with EPA that there are practices undertaken by the terminal operator (or by the terminal operator in coordination with the vessel operator) which can serve to reduce the formation of crude oil vapors during loading operations. Specifically, BWTX will employ standardized procedures for cargo transfer operations (ship/shore interface and pigging are not particularly relevant to air emissions for the specific installation).

BWTX will develop a deepwater port operations manual, and is required to conduct transfer operations in accordance with the manual pursuant to 33 CFR § 150.425. The operations manual will include the following requirements (cf. 33 CFR § 156.120):

- Each part of the transfer system is aligned to allow the flow of oil;
- Each part of the transfer system not necessary for the transfer operation is securely blanked or shut off;

[44] AP-42 Chapter 7, Table 7.1-10.

- The end of each hose not connected for the transfer of oil is blanked off;

- Prior to transfer, a conference is held which ensures that each person in charge understands the sequence of transfer operations, the transfer rate, and critical stages of the transfer operation;

- Transfer does not occur until the terminal operator and person in charge of the receiving vessel agree to begin the transfer operation;

- The transfer rate is reduced at the start of the load to while ensuring proper hose connections, valve line-ups and piping integrity, and at the end of the load to minimize the risk of pressure surges and overfilling.

These aspects of the operations manual serve to reduce the formation of crude oil vapors in the transfer lines and vessel cargo tanks.

BWTX appreciates EPA's suggestion about incorporating elements of the terminal's Best Management Practices into the MACT determination, and requests that compliance with the deepwater port operations manual be included as an element of the proposed combined work practice standard.

A draft Best Management Practices plan and a draft Operations Manual may be found in Vol. II, Appendix V, and Vol. III, Appendix A of BWTX's Deepwater Port license application.

Attachments:

1. MACT Y Rulemaking docket—Cost analysis submitted by Chevron

2. MACT Y Rulemaking docket—Correspondence between USCG and Chevron

3. Suggested NOMA provisions (revised)

4. Deepwater Port License Application—Vol. II, Section 13

5. HAP Emissions Speciation and Calculations

6. "REPORT: Single Point Mooring Safety and Performance"

Attachment 2

COMPARISON OF ONSHORE vs. OFFSHORE MARINE VAPOR RECOVERY SYSTEM COSTS

ITEM	ITEM	ONSHORE	OFFSHORE
A	CAPITAL COSTS		
	COMBUSTOR	593,000	593,000
	OTHER MAJOR EQUIPMENT	2,260,000	2,260,000
	PIPING & SUBSEA LINES	4,711,000	14,711,000
	ELECTRICAL & TELEMETRY	1,000,000	1,419,000
	FOUNDATIONS	1,120,000	1,120,000
	BUILDINGS	367,000	367,000
	SITE IMPROVEMENTS	297,000	297,000
	INSULATION/PLANT	196,000	196,000
B	ENGINEERING SERVICES	1,000,000	1,000,000
	TOTAL ON AND OFF SHORE COSTS	11,544,000	22,963,000
C	ANNUAL COSTS ($/YR)		
	LABOR	100,000	100,000
	MAINTENANCE (3%)	358,000	688,000
	NATURAL GAS	60,000	60,000
	ELECTRICAL	80,000	80,000
	TAXES	131,000	252,000
	TOTAL ANNUAL OPERATING COSTS ($/YR)	729,000	1,180,000
D	CAPITAL RECOVERY $/YR (0.16) (FOR ON/OFF SHORE)	1,847,000	3,674,000
E	HAP EMISSIONS REDUCED, TONS/YR	10	10
F	COSTS EFFECTIVENESS $/TON HAP REMOVED	257,000	485,000

BASIS:

- MODIFIED RICHMOND MVR SCOPE 12-1-93 DKB
- SUBSEA LINES COSTS - EL SEGUNDO BASIS
- ONSHORE MVR FACILITIES COMBUSTOR LOCATED 2 MILES FROM WHARF
- OFFSHORE MVR FACILITY HAS 1.5 MILE LONG VAPOR SUBSEA LINE LOOP
- TELEMETRY COSTS FROM GAVIOTA

DKB 12/1/93

A-90-44 II D 049

U.S. Department of Transportation

United States Coast Guard

Commandant
U.S. Coast Guard

2100 Second Street S.W
Washington, DC 20593-0001
Staff Symbol: (G-MTH-1)
Phone: (202) 267-1217

16703/33-154

JAN 16 1992

Mr. Darsh K. Bhutra
Chevron Research and Technology Company
100 Chevron Way
P.O. Box 1627
Richmond, CA 94802-0627

COPY

Dear Mr. Bhutra:

We appreciate the concerns you expressed in your letter of December 9, 1991 and in our discussion at the API conference with the problems associated with implementing the Vapor Control System regulations at your El Segundo offshore loading terminal. These problems include placement of the detonation arrester and gas injection point 2,000 to 3,000 feet from the vessel and eliminating the excessive vapor condensate that could be easily formed in the underwater vapor line.

The Vapor Control Regulations, found in Title 33 Code of Federal Regulations (CFR) Part 154, apply to offshore terminals such as your El Segundo terminal. Although I agree that problems need to be overcome to reach the level of safety envisioned by the regulations, we are not in a position at this time to say these problems are unsolvable and offshore facility vapor collection is impossible to accomplish safely. Modifications to the Vapor Control Regulations, such as increasing the permitted distances from the facility vapor connection for the detonation arrester and gas injection point, can easily be accomplished, if necessary, through the regulation exemption process. Other options, including locating the facility vapor control system offshore, should also be explored.

Again, we understand the problems you face collecting flammable or combustible vapors from an offshore terminal. I don't believe the difficulty is with the regulations but rather with the engineering problems that must be overcome to comply with the regulations as written. I assure you that we will work with you to try to overcome the inherent problems of an offshore terminal vapor collection.

Sincerely,

K. J. ELDRIDGE
Commander, U.S. Coast Guard
Chief, Hazardous Materials Branch
Marine Technical and Hazardous
Materials Division
By Direction of the Commandant

Copy: Mr. D. Markwordt, EPA

Notice of MACT Approval

40 CFR Part 63, Subpart C

Maximum Achievable Control Technology Emission Limitation for Constructed and Reconstructed Sources under Section 112(g)

This notice establishes practicable, enforceable maximum achievable control technology emission limitations, work practice standards and other requirements for Blue Water Texas Terminal LLC ("BWTX") for the MACT-affected emission units located at the BWTX Deepwater Port. The work practice standards and requirements set forth in this document are enforceable on **[effective date of notice]**.

A. Major Source Information

1. Mailing address of owner or operator:

   2331 CityWest Blvd, Houston, Texas 77042

2. Location of major source:

   Gulf of Mexico: 27° 53′ 21.70″ N, 96°39′ 4.16″ W ("SPM 1"); and 27° 54′ 9.28″ N, 96° 37′ 41.23″ W ("SPM 2")

3. Source category or subcategory for major source:

   Deepwater port crude oil export terminal

4. Type of construction or reconstruction:

   Construction of new affected facility

5. Project description:

   BWTX proposes to construct a deepwater port for export of crude oil via two Single Point Mooring (SPM) systems. The SPM's will be located at 27° 53′ 21.70″ N, 96°39′ 4.16″ W and at 27° 54′ 9.28″ N, 96° 37′ 41.23″ W, in BOEM lease block TX4, subdivisions 698 and 699 (see Appendix A). The facility will be approximately 18 statute miles from Matagorda Island at its nearest point and 26 statute miles from the entrance to Port Aransas. At the location of the deepwater port, the water depth is approximately 89 feet, which provides sufficient under keel clearance for a fully laden oil tanker in the Very Large Crude Carrier (VLCC) size range.

Loading of vessels is accomplished through two single point mooring (SPM) systems, each consisting of a pipeline end manifold (PLEM), a catenary anchor leg mooring (CALM) buoy, and hose strings. During loading operations, crude oil is pumped from the onshore valve and pipeline infrastructure to the deepwater port through two 30" offshore pipelines. The pipelines run along the seabed and terminate at a PLEM which is also affixed to the seabed. Each CALM mooring buoy is anchored by several catenary chains extending radially outward and down to the seabed. The buoy moves up and down with the tide and waves, and floats above the PLEM. The CALM buoy is partially submerged and its upper part is able to freely rotate about its base. One or more under-buoy hoses connect to the submerged portion of the CALM buoy and transfer crude oil from the PLEM to the CALM buoy. A floating hose string connects the CALM buoy to a tanker vessel in order to deliver crude oil.

6. Equipment List

The following devices are subject to this notice:

(a) Catenary Anchor Leg Mooring buoy located at 27° 53′ 21.70″ N, 96°39′ 4.16″ W, including associated PLEM, mooring hawser, floating hose, and under buoy hoses (Emission Point Number SPM1).

(b) Catenary Anchor Leg Mooring buoy located at 27° 54′ 9.28″ N, 96° 37′ 41.23″ W, including associated PLEM, mooring hawser, floating hose, and under buoy hoses (Emission Point Number SPM2).

7. Anticipated commencement date for construction or reconstruction:

March 1, 2020

8. Anticipated start-up date of construction or reconstruction:

July 1, 2021

9. List of the hazardous air pollutants emitted by MACT-affected emission units:

Crude oil vapors (which may contain Benzene, Ethyl benzene, Hexane, Naphthalene, Toluene, 2,2,4-Trimethylpentane, o-Xylene, m-Xylene, and p-Xylene, and Styrene).

B. MACT Emission Limitation

1. Liquids loaded into the cargo tanks of transport vessels shall be limited to crude oil, pipeline interface (transmix), and water. For purposes of this notice, “crude oil” shall include lease condensate.
2. The above stated owner or operator shall not permit any vessel to be loaded unless it complies with the equipment design specifications of 46 CFR § 153.282.
3. The above stated owner or operator shall not permit any vessel to be loaded unless it possesses and implements a VOC management plan consistent with the requirements specified in 40 CFR § 1043.100(b)(1), Regulation 15.6.
4. The above stated owner or operator shall conduct transfer operations in accordance with an operations manual pursuant to 33 CFR § 150.425.
5. During the initial stages of loading into each individual tank the flow rate in its branch line should not exceed a linear velocity of 1 metre/second. When the bottom structure is covered and after all splashing and surface turbulence has ceased, the rate can be increased to the lesser of the ship or shore pipeline and pumping system maximum flow rates, consistent with proper control of the system. Prior to the start of each transfer operations, the above stated owner or operator shall perform a calculation to determine the maximum cargo pumping rate which ensures compliance with this provision.
6. Each terminal manifold flange shall be equipped with a removable blank flange. The end of each hose not connected for the transfer of oil shall be blanked off. Each part of the transfer system not necessary for the transfer operation shall be securely blanked or shut off. Prior to the removal of blanks from tanker and terminal pipelines or hoses, the section between the last valve and blank shall not contain oil under pressure. Precautions to prevent spillage, including inventorying hoses with sea water at the conclusion of each loading operation, shall be implemented.

C. Monitoring Requirements

1. During each loading operation, the above stated owner or operator shall continuously monitor the transfer rate.
2. Prior to receiving a vessel at the terminal, the above stated owner or operator shall conduct vetting of the vessel using a standardized vetting policy. The vetting policy shall include provisions to ensure compliance with Provisions B.2 and B.3 of this authorization.

3. The above stated owner or operator shall determine concentration of each species of HAP contained in the hydrocarbon vapors in equilibrium with the liquid phase of each grade of crude oil loaded using one of the following methods:

   (c) EPA Test Method 18 (40 CFR Part 60, Appendix A-6); or

   (d) Detailed Hydrocarbon Analysis (ASTM D7169) and vapor-liquid equillibrium calculation.

   Crude oil samples shall be taken from the final storage location prior to delivery to the loading facility. Sampling shall be conducted on an annual basis. For purposes of this provision, two samples of crude oil correspond to different grades if they are produced from distinct regions identified in the U.S. Energy Information Administration Drilling Productivity Report.

4. The above stated owner or operator shall, on a monthly basis, calculate the estimated HAP emissions from crude oil loading operations during the preceding 12-month period. Emissions estimates and emission factors shall be based on test data, or if test data is not available, shall be based on measurement or estimating techniques generally accepted in industry practice for operating conditions at the source.

D. Reporting and Recordkeeping Requirements

1. The above stated owner or operator shall notify EPA Region 6 in writing or by electronic mail of the following activities. Such notifications shall be delivered or postmarked within 30 calendar days after the date the activity takes place:

   (a) the actual date construction is commenced;

   (b) the actual date construction is completed; and

   (c) the actual date of startup of the source.

2. Records containing the information and data sufficient to demonstrate compliance with the provisions of this approval shall be maintained at an office having day-to-day operational control of the site. Such records shall be maintained for at least five years following the date the information or data is obtained.

3. The above stated owner or operator shall maintain the following records:

   (a) A copy of the operational manual required under Provision B.4.

   (b) A copy of the vetting policy required under Provision C.2.

4. The above stated owner or operator shall maintain a file which specifies, for each crude oil loading operation, the following information:

(a) The volume of crude oil loaded;

(b) The true vapor pressure of the crude oil loaded;

(c) The date and time of commencement and completion of the loading operation;

(d) The date and time at which submerged fill is established; and the calculated maximum allowable pumping rate and actual cargo transfer during the time period specified in Provision B.5.

(e) The results of the vetting of the vessel, to the extent necessary to establish compliance with Provision C.2.

(f) The estimated quantity of HAP emissions resulting from the loading operation;

(g) The identifier of the mooring buoy at which loading takes place (i.e., SPM1 or SPM2);

(h) The IMO registry number corresponding to the loaded vessel;

E. Other Requirements

1. The above stated owner or operator shall comply with the startup, shutdown and malfunction (SSM) plan requirements specified at 40 CFR § 63.6(e).
2. At all times, including periods of startup, shutdown, and maintenance, the above stated owner or operator shall, to the extent practicable, maintain and operate the facility including any associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the EPA, which may include, but is not limited to, monitoring results, review of operating maintenance procedures and inspection of the facility.
3. The requirements of this notice shall be administratively incorporated into the facility's Title V operating permit (40 CFR Part 71) upon issuance of such operating permit.
4. Approval to construct shall become invalid if construction is not commenced within 18 months after receipt of such approval, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The Administrator may extend the 18-month period upon a satisfactory showing that an extension is justified.
5. EPA authorized representatives, upon the presentation of credentials, shall be permitted to undertake the following actions:

(a) Enter the premises where the facility is located or where any records are required to be kept under the terms and conditions of this notice;

(b) During normal business hours, have access to and make copies of any records required to be kept under the terms and conditions of this notice;

(c) Inspect any equipment, operation, or method subject to requirements in this notice; and

(d) Sample materials and emissions from the sources.

6. In the event of any changes in control or ownership of the facilities to be constructed, this notice shall be binding on all subsequent owners and operators. The above stated owner or operator shall notify the succeeding owner and operator of the existence of this notice and its conditions by letter; and a copy of the letter shall be forwarded to EPA Region 6 within thirty days of its signature.
7. The provisions of this notice are severable, and, if any provision of this notice is held invalid, the remainder of this notice shall not be affected.

F. Compliance Certifications

1. The above stated owner or operator shall certify compliance with the terms and conditions of this notice according to the provisions specified at 40 CFR § 63.9(h). All compliance and enforcement correspondence required by this notice shall be delivered to the following address:

Compliance and Enforcement Division
EPA Region 6
1201 Elm St (6EN)
Dallas, TX 75270

DEEPWATER PORT LICENSE APPLICATION FOR THE BLUEWATER SPM PROJECT

VOLUME II – ENVIRONMENTAL EVALUATION

Section 13 – Meteorology, Air Quality, and Noise

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LIST OF FIGURES

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LIST OF ACRONYMS

AIS	Automatic Identification System
AQCR's	Air quality control regions
µPa	Micro Pascals
BACT	Best available control technology
BWTT	Bluewater Texas Terminal LLC
CFR	Code of Federal Regulations
CWA	Clean Water Act of 1977
CZMA	Coastal Zone Management Act of 1972
dB	decibels
dBA	decibels on the A-weighted scale
DWPA	Deepwater Port Act
DWPL	Deepwater Port License
ECA	Emission Control Area
EEZ	Exclusive Economic Zone
E.O.	Executive Order
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FIP	Federal implementation plan
FR	Federal Register
ft	feet
GHG	Greenhouse gas
GOLA	Galveston Offshore Lightering Area
GOM	Gulf of Mexico
HAP	Hazardoes air pollutant
HDD	horizontal directional drill
HUD	U.S. Department of Housing and Urban Development
Hz	hertz
km	kilometer
L_{dn}	day-night sound level
LEDPA	Least Environmentally Damaging Practicable Alternative
MACT	Maximum achievable control technology
MARAD	Maritime Administration
m	meter
m/s	meters per second
MHT	mean high tide
mi	mile
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NES	National Emission Standards
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen oxides
NSA	noise sensitive area

NSPS	New Source Performance Standards
NSR	New source review
^{o}F	degrees Fahrenheit
OSHA	Occupational Safety and Health Administration
PBR	Permit By Rule
P.L.	Public Law
PLEM	pipeline end manifold
PM	Particulate Mater
PPA	Pollution Prevention Act of 1990
PSD	Prevention of significatn deterioration
Project	Bluewater SPM Project
RHA	U.S. Rivers and Harbors Act of 1899
SIL	Significant impact levels
SIP	State Implementation Plan
SPM	single point mooring
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
U.S.	United States
U.S.C.	United States Code
U.S.C.G.	United States Coast Guard
USEPA	U.S. Environmental Protection Agency
VLCC	very large crude carrier
VOC	Volatile Organic Carbon

13 Meteorology, Air Quality, and Noise

This section discusses the existing meteorology, air quality, and noise conditions within the vicinity of the Proposed Project and the Alternative Project, and the anticipated environmental impacts associated with the construction, operation, and decommissioning of the Proposed Project and the Alternative Project. The detailed description of the Proposed and Alternative Project and the framework for the evaluation of environmental impacts is provided in Section 3: Project Description and Framework for Environmental Evaluation.

13.1 Applicable Laws and Regulations

Bluewater Texas Terminal, LLC (BWTT) has reviewed the following laws and statutes that relate to air quality and noise impacts and provided a list of applicable regulations required to comply with the Deepwater Port Act (DWPA) during construction and operation of the Proposed Project. Applicable laws and regulations are described below.

13.1.1 State and Local

13.1.1.1 Noise

The Onshore and Inshore Pipelines are largely in unincorporated areas of San Patricio and Aransas counties; however some portions lie within the boundaries of the City of Port Aransas, Texas and the City of Aransas Pass, Texas. The City of Port Aransas does not have numerical criteria for sound levels; however, sound from construction equipment which “disturb the comfort and repose of a person of ordinary sensibilities produced from tools and equipment in commercial construction, demolition, drilling, or reasonably similar activities” is considered a nuisance except between the hours of 6:00 a.m. to 7:00 p.m., Monday through Saturday, and 8:00 a.m. to 5:00 p.m. on Sunday.

The City of Aransas Pass has a general noise ordinance to protect from domestic disturbances of the peace; however, it does not contain specific provisions for construction or facility noise and is not applicable to the Project. No other applicable state and/or local noise ordinances are applicable to the Project.

The Alternative Onshore and Inshore Pipelines will not be within the boundaries of the Cities of Port Aransas and Aransas Pass; however, the Alternative Onshore Pipelines will be within the boundaries of the City of Ingleside and the Alternative Inshore Pipelines will be within the City of Corpus Christi on Mustang Island.

Ingleside has established a noise ordinance limiting noise that extends beyond the property on which it is produced (Ingleside code of Ordinances, Chapter 30, Article IV – Noise). Noise limits, by land use type, are:

- On residential land, 70 decibels (dB) between 6:00 a.m. and 6:00 p.m., 65 dB between 6:00 p.m. and 10:00 p.m., and 60 dB between 10:00 p.m. and 6:00 a.m.
- On other land use types, including industrial land, 85 dB between 6:00 a.m. and 10:00 p.m., and 80 dB between 10:00 p.m. and 6:00 a.m.

However, construction noise occurring between the hours of 6:00 a.m. and 10:00 p.m. is exempted from the above ordinance.

Similarly, Corpus Christi has established a noise ordinance limiting noise that extends beyond the property on which it is produced (Corpus Christi Code of Ordinances, Chapter 31 – Noise). Noise limits are:

- 70 decibels on the A-weighted scale (dBA) between the hours of 8:01 a.m. and 11:00 p.m. Sunday through Thursday and between the hours of 7:01 a.m. and 12:00 midnight on Friday and Saturday; and
- 60 dBA between the hours of 11:01 p.m. and 8:00 a.m. Sunday through Thursday and between the hours of 12:01 a.m. and 7:00 a.m. on Friday and Saturday and between the hours of 12:01 a.m. and 8:00 a.m. on Sunday.

However, construction noise occurring between the hours of 7:00 a.m. and 8:00 p.m. is exempted from the above ordinance.

13.1.2 Federal and International

13.1.2.1 National Environmental Policy Act of 1969 (NEPA)

In compliance with 33 U.S.C. 1504(f) and 33 Code of Federal Regulations (CFR) 148.710(b), the BWTT Deepwater Port License (DWPL) will be processed in accordance with the NEPA (44 U.S.C. 4332). 33 U.S.C. 1504(f) states that "such compliance shall fulfill the requirement of all Federal agencies in carrying out their responsibilities under the National Environmental Policy Act of 1969 pursuant to [the Deepwater Port Act of 1974]." The process by which the licensing will comply with NEPA is further set in 33 U.S.C. 1504(f) and 33 CFR Part 148.

13.1.2.2 Noise Laws and Regulations

Noise Pollution and Abatement Act of 1972 is a statute of the United States (U.S.) initiating a federal program of regulating noise pollution with the intent of protecting human health and minimizing annoyance of noise to the general public. However, this program lost funding in 1981. Currently, there are no federal regulations that limit overall environmental noise levels. However, in 1974 the U.S. Environmental Protection Agency (USEPA) published its Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, which provides a resource for state and local governments to use in developing noise standards. The USEPA determined that a day-night sound level (L_{dn}) of 55 decibels dBA (which is equivalent to a continuous sound level of 48.6 dBA) protects the public from indoor and outdoor activity noise interference (USEPA 1974). In addition, the U.S. Department of Housing and Urban Development (HUD) has developed a noise abatement and control policy applicable to HUD programs codified in 24 CFR Part 51. Consistent with USEPA's guidance, it is a HUD goal that exterior noise levels not exceed 55 dBA L_{dn}. However, according to HUD policy, noise at or below 65 dBA is acceptable, noise between 65 and 75 dBA is generally acceptable, and noise exceeding 75 dBA is unacceptable at a given site.

In addition to public health and welfare, airborne noise from operation of the Project can affect the operational workforce. The Occupational Safety and Health Administration (OSHA) has established a requirement that sound levels should be controlled to a time-weighted sound level of 85 dBA; if that is not met, a worker hearing conservation program must be implemented (29 CFR 1910.95).

13.1.2.3 Clean Air Act

The Clean Air Act (42 USC § 7401 et seq.) is a comprehensive law whose purpose is to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population. The Clean Air Act requires USEPA to set uniform National Ambient Air Quality Standards (NAAQS) for air pollutants which cause or contribute to air pollution reasonably anticipated to endanger public health or welfare, and which are emitted from numerous and diverse mobile or stationary sources (42 USC § 7408).

USEPA establishes air quality control regions (AQCR's) and classifies them according to whether they have attained the NAAQS for each listed pollutant ("criteria pollutants"). Attainment and maintenance of the NAAQS in each AQCR is primarily the responsibility of the states, and each state is required to submit a state implementation plan (SIP) for approval by EPA. For areas not belonging to a state or for which a state has failed to submit an adequate SIP, EPA promulgates a federal implementation plan (FIP).

SIP's and FIP's include control measures for individual stationary sources and specific classes of stationary sources, and also include preconstruction permitting programs which allow for USEPA and state pollution control agencies to supervise the construction of new sources of air pollutant emissions. Stationary source preconstruction permitting programs include two nationwide programs: Prevention of Significant Deterioration (PSD), which applies for pollutants for which an AQCR has attained the NAAQS; and Nonattainment New Source Review (NNSR), which applies for pollutants for which an AQCR has not attained the NAAQS. Additionally, a "minor NSR" preconstruction permitting program is included as part of each SIP or FIP, whose provisions can vary in different parts of the country. While enforcement of SIP requirements is the primary responsibility of the states, USEPA has authority under the Clean Air Act to enforce specific requirements of a SIP against a source owner.

In additional to SIP and FIP requirements (including preconstruction permitting), the Clean Air Act requires USEPA to establish uniform nationwide emissions standards for stationary sources under two different programs: New Source Performance Standards (NSPS) apply to specific categories of new and modified sources of air pollutant emissions; and National Emissions Standards for Hazardous Air Pollutants (NESHAP) apply to new and existing sources of named hazardous air pollutants (HAP). Major stationary sources are also required to obtain a Clean Air Act operating permit ("Title V permit") which identifies all applicable requirements under the Clean Air Act, including emissions sources from mobile sources (e.g., automobiles, locomotives, construction equipment, and marine vessels) which are also subject to emission standards established by USEPA under Title II of the Clean Air Act. These standards generally apply to the manufacturers and importers of vehicle engines. States, with the exception of California, are not permitted to establish mobile source emission standards (42 USC § 7543). In addition to authority granted under the Clean Air Act, USEPA has authority under the Act to Prevent Pollution from Ships (APPS; 33 USC §§ 1905–1915) to regulate air emissions from marine vessels, consistent with the requirements of Annex VI to the International Convention for the Prevention of Pollution from Ships ("MARPOL Annex VI").

MARAD regulations implementing the DWP Act require an analysis showing that the deepwater port will comply with all applicable Federal, tribal, and State requirements for the protection of the environment (33 CFR § 148.105(z)), and also require that an applicant prepare and submit applications to USEPA for all permits required under the Clean Air Act (33 CFR § 148.700). EPA is a cooperating agency under the DWP licensing program (33 CFR § 148.3(d)).

Clean Air Act requirements potentially applicable to the Project are summarized in further detail below. Air emissions from subsea pipelines are not expected, and the discussion relating to Air Quality in this Section relates primarily to the SPM buoys, and to a lesser extent to the Harbor Island Booster Station.

13.1.2.3.1 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

NAAQS have been established for six criteria pollutants (40 CFR §§ 50.4–50.19). Primary NAAQS are summarized in Table 13-1, along with the corresponding Significant Impact Levels (SIL) for each pollutant (40 CFR § 51.165 (b)(2)). SIL's for the 1-hr NO_2 and SO_2 standards and for Ozone have been issued on an interim basis, no SIL has been issued for Lead.. Secondary NAAQS, which are of equal or lesser stringency than the primary NAAQS, are not presented here. USEPA has established SIL's for criteria pollutant as screening tools for determining whether the impact of a particular stationary source could reasonably cause or contribute to any NAAQS violation.

Table 13-1: Primary NAAQS and USEPA SIL's

Pollutant	Averaging Period	SIL	NAAQS
Carbon Monoxide (CO)	1-hr	2 mg/m^3	35 ppm
	8-hr	0.5 mg/m^3	9 ppm
Lead	3-month	—	0.15 µg/m^3
Nitrogen Dioxide (NO_2)	1-hr	4 ppb	100 ppb
	1-yr	1.0 µg/m^3	53 ppb

Pollutant	Averaging Period	SIL	NAAQS
Ozone	8-hr	1.0 ppb	70 ppb
Particulate Matter	24-hr (PM_{10})	5 µg/m^3	150 µg/m^3
	24-hr ($PM_{2.5}$)	1.2 µg/m^3	35 µg/m^3
	1-yr ($PM_{2.5}$)	0.2 µg/m^3	12 µg/m^3
Sulfur Dioxide (SO_2)	1-hr	3 ppb	75 ppb

Activities associated with the SPM buoys (crude oil loading) will emit Volatile Organic Compounds, which are a precursor to Ozone. Mobile sources associated with the SPM buoys (crude oil tankers, tugboats and workboats) will emit products of combustion, which include CO, oxides of nitrogen (NO_X),[1] particulate matter[2] and SO_2. Criteria pollutants other than lead will be emitted from stationary sources at the Harbor Island Booster Station (storage tanks, wastewater treatment, and stationary engines).

13.1.2.3.2 NEW SOURCE PERFORMANCE STANDARDS (NSPS)

NSPS are established by EPA for categories of stationary sources that cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare (42 USC § 7411(b)). Currently promulgated NSPS are codified at 40 CFR Part 60. NSPS apply to new and modified sources, and are set based on the best system of emission reduction for reducing air emissions from the source category, based on technology that has been adequately demonstrated.

No currently promulgated NSPS applies to the SPM buoys.

NSPS associated with the Harbor Island Booster Station apply to Organic Liquid Storage Vessels (40 CFR Part 60, Subpart K) and Stationary Compression Ignition Internal Combustion Engines (i.e., diesel engines; 40 CFR Part 60, Subpart IIII).

13.1.2.3.3 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP)

NESHAP apply to sources emitting a limited set of specifically named pollutants (e.g., vinyl chloride, mercury, benzene), and apply more generally to “major” stationary sources of HAP emissions. A stationary source is “major” if it has the potential to emit at least 10 tons per year of any individual HAP, or 25 tons per year of any combination of HAP. NESHAP for specific source categories are codified at 40 CFR Part 63.

Neither the SPM buoys nor the Harbor Island Booster Station correspond to any listed source subject to a NESHAP standard. Notwithstanding, however, new and reconstructed major sources of HAP which are not subject to a promulgated NESHAP must obtain a case-by-case Maximum Achievable Control Technology (MACT) determination prior to beginning actual construction on the source (40 CFR § 63.42(c)). The SPM buoys will constitute a major source of HAP and are required to obtain case-by-case approval. Accordingly, BWTT has filed with EPA a request for

[1] Ambient NO_2 levels result from direct emissions of NO_2 as well as NO_2 formed through secondary reaction of other oxides of nitrogen in the atmosphere. NO_2 impacts caused by a source are therefore customarily assessed in terms of the source’s total NO_X emissions. NO_X is also a precursor to ozone formation.

[2] NAAQS for particulate matter may refer either to particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}; “inhalable particulate”), or to particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$; “fine particulate”).

a case-by-case MACT determination (Volume I). BWTT has proposed as MACT a requirement to limit use of the terminal to vessels compliant with USCG submerged fill standards and with MARPOL Annex VI VOC Management Plan requirements.

13.1.2.3.4 PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

PSD permitting applies to the construction of new "major" stationary sources. A stationary source is "major" for PSD purposes if it has the potential to emit 250 tons per year of any regulated pollutant.[3] A PSD permit must be obtained by a source owner prior to beginning actual construction. In order to be issued a PSD permit, a source owner must apply the Best Available Control Technology (BACT) to the new or modified source. The source owner must additionally perform an analysis on the air quality impacts of the proposed source which shows that the source will not cause a violation of any NAAQS standard or any PSD increment. PSD increments (40 CFR § 52.21(c)) are air quality standards similar to the NAAQS which are intended to prevent the degradation of air quality in areas which are in attainment for a NAAQS pollutant. The required BACT and air quality analysis requirements apply to each pollutant that a new or modified major source would emit in significant amounts. In the case of Greenhouse Gases (GHG), however, the scope of PSD review is limited to BACT (EPA 2014).

The SPM buoys would constitute a new major stationary source for PSD purposes, and will emit VOC and Greenhouse Gases (GHG) in significant amounts. BWTT has filed a PSD permit application to EPA (Volume I) which includes an air quality analysis and a control technology review establishing a proposed BACT consistent with the proposed MACT standard.

13.1.2.3.5 NONATTAINMENT NEW SOURCE REVIEW (NNSR)

NNSR applies to construction and modification of stationary sources which have the potential to emit "major" amounts of a pollutant for which an area is classified as nonattainment. Since the portion of the Outer Continental Shelf where the SPM buoys will locate has not been designated as an AQCR, and emissions from the project will not impact any nonattainment area, NNSR does not apply.

13.1.2.3.6 STATE IMPLEMENTATION PLAN (SIP)

The SPM buoys will be located outside the jurisdictional waters of the State of Texas, and will therefore not be directly subject to any SIP requirements. Notwithstanding, the Deepwater Port Act specifies that the law of the nearest adjacent coastal state applies to a deepwater port, to the extent applicable and not inconsistent with any applicable Federal law or regulation (33 USC § 1518(b)).

The relevant state law in this context is the Texas Clean Air Act (TEXAS HEALTH AND SAFETY CODE, Chapter 382), which requires in relevant part that a preconstruction permit be obtained prior to beginning work on the construction of a new "facility."[4] In order to obtain a preconstruction permit, the Texas Commission on Environmental Quality (TCEQ) must find that the proposed facility will use at least the best available control technology (BACT), and also must find no indication that emissions from the facility will contravene the intent of the Texas Clean Air Act (i.e., "*to safeguard the state's air resources from pollution by controlling or abating air pollution and emissions of air contaminants, consistent with the protection of public health, general welfare, and physical property, including the esthetic enjoyment of air resources by the public and the maintenance of adequate visibility*") (TEXAS HEALTH AND SAFETY CODE §§ 382.002, 382.0518(b)). The BACT demonstration that would be required by TCEQ, if the project were under its jurisdiction, is similar to the required PSD control technology review discussed above. The showing of acceptable impacts to public health, welfare and property required by the Texas Clean Air Act is included in the modeling reports whose results are summarized below.

[3] A lower threshold of 100 tpy applies to specifically listed source categories (40 CFR § 52.21(b)(1)).

[4] "Facility" in Texas Clean Air Act permitting generally corresponds to the EPA term "emissions unit" (40 CFR § 52.21(b)(7)).

The Harbor Island Booster Station is subject to certain elements of the Texas SIP (40 CFR § 52.2270).

The Texas SIP requires that all new and modified stationary sources obtain an authorization prior to beginning actual constructions (30 TAC § 116.110). In the case of sources that do not significantly contribute air contaminants to the atmosphere, such as the Harbor Island Booster Station, a Permit by Rule (PBR) may be obtained pursuant to applicable requirements of 30 TAC Chapter 106. A PBR is a streamlined form of air permitting authorization which contains generic control requirements and emission rate limits, and does not require case-by-case evaluation. BWTT will register a claim for a PBR for air emissions from the Harbor Island Booster Station (Volume I).

Storage tanks and wastewater treatment equipment are subject to control requirements at 30 TAC Chapter 115, Subchapter B. These requirements are generally consistent with otherwise applicable requirements of the PBR that must be obtained.

13.1.2.3.7 TITLE V OPERATING PERMIT

For areas of the country where the applicable SIP does not contain an approved operating permit program, the owner of a stationary source subject to Title V of the Clean Air Act must obtain a federal operating permit from EPA (40 CFR § 71.1(b)). Title V permits are generally required for stationary sources which are "major" for the purposes of the NESHAP, PSD, and/or NNSR programs. An operating permit must specify all applicable requirements of the Clean Air Act (including SIP requirements) that apply to the source, as well as monitoring, reporting and recordkeeping requirements adequate to demonstrate compliance with each applicable requirement.

Since the SPM buoys will constitute a major stationary source for purposes of NESHAP and PSD, an operating permit must be required. The SPM buoys will be located beyond the jurisdictional waters of Texas. Accordingly, BWTT has filed an application for a federal operating permit (Volume I).

The Harbor Island Booster Station will not be a major source and will not otherwise be subject to Title V permitting requirements.

13.1.2.3.8 MOBILE SOURCE EMISSIONS STANDARDS

The APPS requires engine manufacturers, owners and operators of vessels, and other persons to comply with MARPOL Annex VI. APPS applies to all U.S.-flagged ships anywhere in the world and to all foreign-flagged vessels operating in navigable waters of the United States or while at port under U.S. jurisdiction. Regulations promulgated by EPA[5] are generally consistent with MARPOL Annex VI requirements discussed elsewhere in this section.

MARPOL Annex VI requirements will apply to ships operating in the area of the SPM buoys, including oil tankers and support vessels. These requirements generally apply to manufacturers, sellers, and importers of marine vessels and marine engines, as well as to the owners and operators of marine vessels.

13.1.2.3.9 MANDATORY GREENHOUSE GAS REPORTING RULE

Under the Consolidated Appropriations Act of 2008 (P.L. 110–161), EPA authorized funding to develop a rule requiring mandatory reporting of greenhouse gas (GHG) emissions above appropriate thresholds. EPA has authority under sections 114 and 208 of the Clean Air Act (42 USC §§ 7414, 7542) to collect information about sources of air pollution,[6] and has issued implementing regulations at 40 CFR Part 98.

Mandatory Greenhouse Gas Reporting requirements do not apply to the SPM Buoys or to the Harbor Island Booster Station because they do not belong to any of the categories of source required to report GHG emissions.

[5] Cf. 75 FR 22896; April 30, 2010.

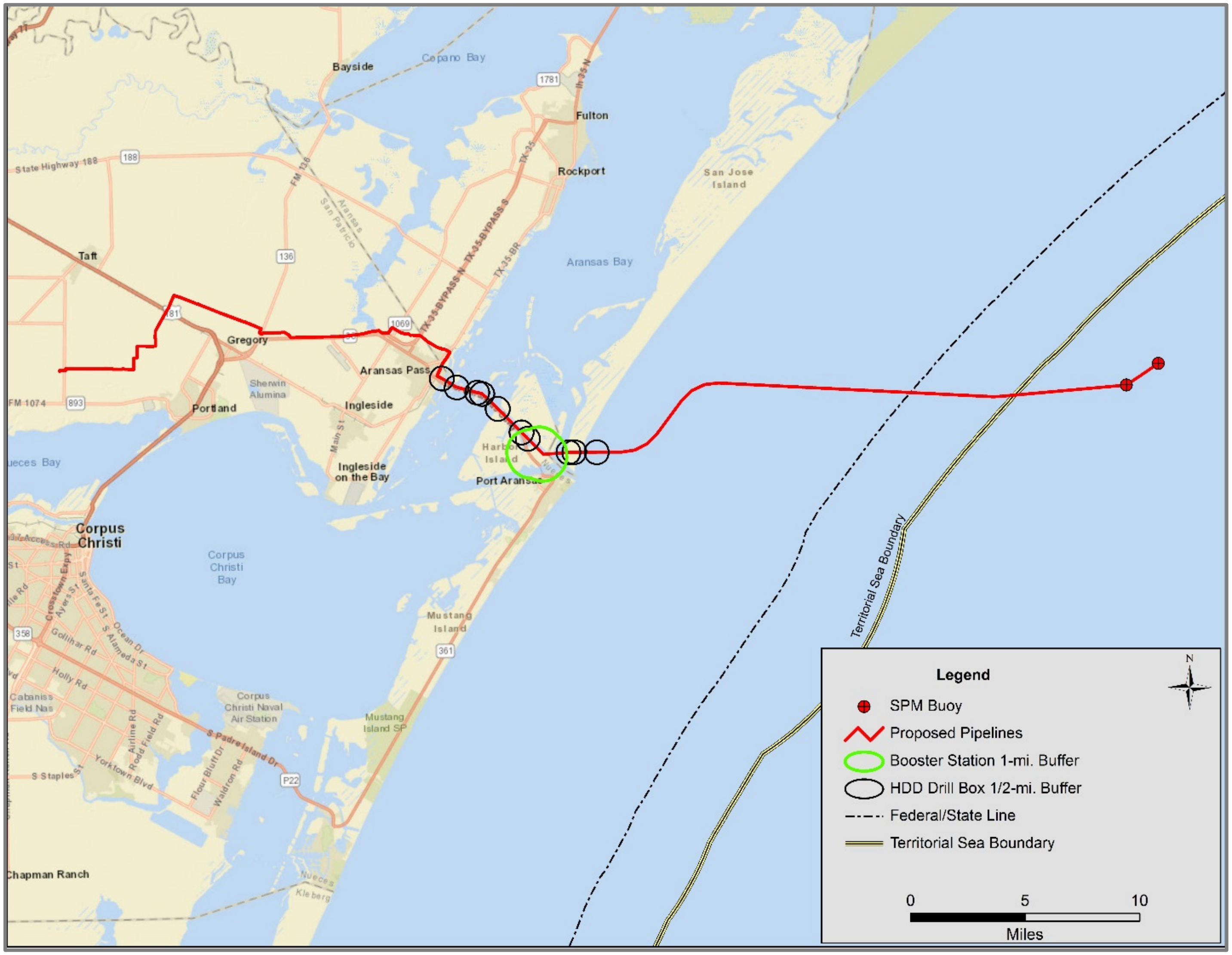
[6] 74 FR 56264; October 30, 2009.

13.2 Proposed Project

13.2.1 Proposed Project Area

The Proposed Project area considered for ambient sound and noise impacts includes noise sensitive areas (NSA) within 0.5 mile (mi) of planned horizontal directional drill (HDD) construction and within 1 mi of the Harbor Island Booster Station, as well as other potential noise receptors in the immediate vicinity of the Onshore Pipelines, Inshore Pipelines, Offshore Pipelines, and both SPM buoys (which make up the SPM buoy systems). The Proposed Project area is depicted in Figure 13-1. Underwater sound is addressed in Section 8: Wildlife and Protected Resources.

Figure 13-1: Proposed Project Area, Noise Analysis



Source: BOEM 2019

The Proposed Project area analyzed for impacts to air quality includes the onshore vicinity of the Proposed Project components as well as the surrounding western Gulf of Mexico including existing oil and gas operations. Texas counties in the vicinity of the Proposed Project include Kenedy, Kleberg, Nueces, San Patricio, Aransas and Refugio. The Proposed Project Area for air emissions that occur from current, prevailing means of conducting crude oil export activities, which rely on the use of shuttle tankers for long-haul voyages includes the greater Gulf of Mexico region where these vessels currently transit. Existing Air Quality conditions are characterized in two ways. First, data from onshore, regulatory air quality monitors are presented, showing compliance with the NAAQS. Second, emission rates of VOC and NO_X associated with existing offshore crude oil loading operations are estimated.

13.2.2 Proposed Project Area Existing Conditions

13.2.2.1 Climatology/Meteorology

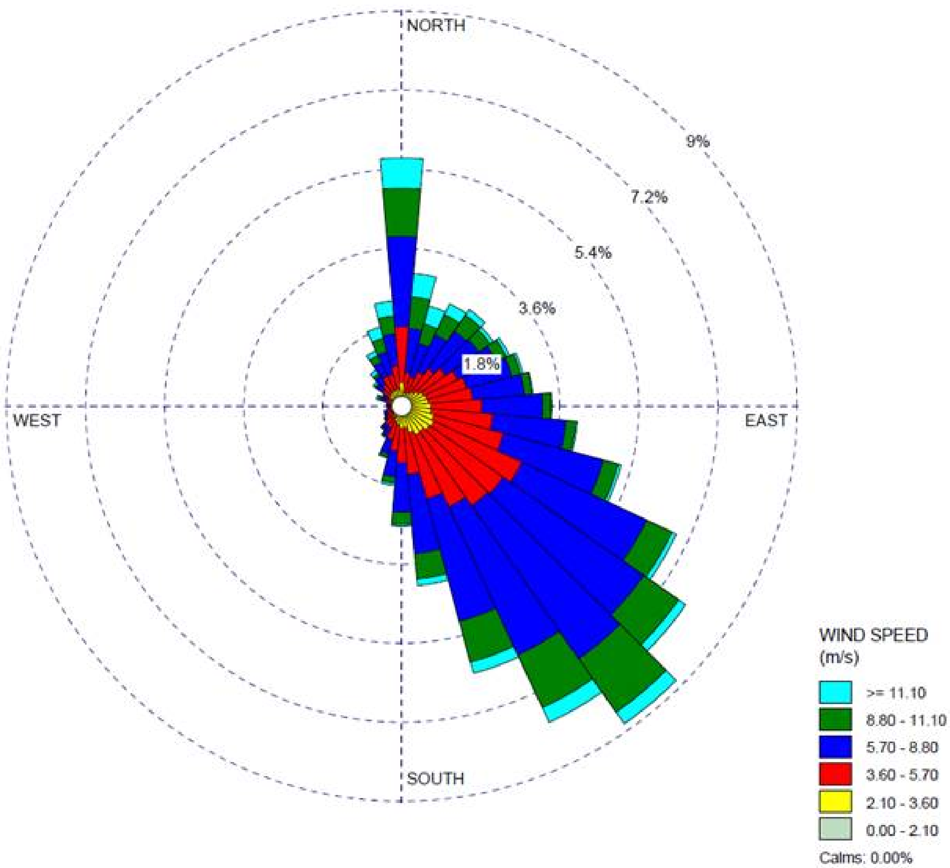
The Proposed Project area in southeastern Texas has a humid, subtropical climate, where summers are long and hot, and winters are short and mild. Along the southeastern Texas coast and offshore, climate is influenced by the GOM, which moderates seasonal temperatures along the coast and provides the state's major source of precipitation (Texas Water Development Board [TWDB] 2012). As shown in Table 13-2, the average annual temperature for the Onshore Project area is about 73 degrees Fahrenheit (°F). January is the coldest month of the year with an average temperature of 57°F. August is the hottest month of the year with an average temperature of about 85°F. September is typically the wettest month. The precipitation of southeastern Texas occurs primarily in spring and fall (see Table 13-2). The area's total average rainfall amount is about 35 inches a year. (National Oceanic and Atmospheric Administration [NOAA] 2019).

Table 13-2: Baseline Climate Data (1981 to 2010) for Port Aransas, TX

Month	Precipitation (Inches)	Minimum Temperature (°F)	Average Temperature (°F)	Maximum Temperature (°F)
January	2.21	50.6	56.6	62.6
February	2.53	53.5	59.3	65.1
March	2.39	59.4	65.0	70.7
April	2.03	66.6	71.8	77.0
May	3.55	73.7	78.4	83.2
June	2.76	78.4	83.1	87.8
July	2.63	79.5	84.3	89.2
August	2.14	80.0	85.1	90.1
September	5.70	76.8	82.2	87.6
October	4.29	70.7	76.3	82.0
November	2.86	61.6	67.7	73.7
December	1.66	52.6	59.0	65.5
Source: NOAA 2019.				

The prevailing wind direction within the vicinity of the Project is from the southeast (Figure 13-2). During the summer, thunderstorms are common along breezes from the GOM or resulting from tropical and subtropical disturbances (TWDB 2012). The southeastern coastal region of Texas can be affected by tropical cyclones, including hurricanes that originate in or move through the GOM. Recent major tropical cyclones that have hit the Project area include Hurricane Harvey (2017), Hurricane Ike (2008), and Hurricane Bret (1999) (National Weather Service 2019). On average, along any 50-mi-long segment of the Texas coast, one hurricane occurs every 6 years (Roth 2010).

Figure 13-2: Project Location Wind Rose



13.2.2.2 Noise

13.2.2.2.1 SOUND FUNDAMENTALS

Sound is a physical disturbance in a medium, such as air or water, which can be detected by a human or animal ear. Sound pressure levels (intensity) are measured in units of dB with respect to a reference pressure value on a logarithmic scale; the pitch of sound is its frequency, which is measured in hertz (Hz). Because the human ear is more sensitive to mid-frequency sounds, relative to low and high frequency sounds, airborne sound is measured on a frequency-adjusted scale that gives greater weighting to mid-frequency sounds (dBA). The threshold for the human ear to detect a change in perceptible sound is 3 dBA; a 5-dBA sound level change is clearly noticeable; and a 10-dBA change is perceived as a doubling (or halving) of sound levels (Federal Highway Administration [FHWA] 1995). The relative sound levels of some common environmental sounds, as well as human impressions of those sounds, are provided in Table 13-3.

Table 13-3: Sound Levels and Relative Loudness

Noise Source or Activity	Sound Level (dBA)	Subjective Impression
Jet aircraft takeoff from carrier at 50 feet (ft; 15 meters [m])	140	Deafening (130 dBA is the threshold of pain)
Loud rock concert near stage	120	
Loud car horn 10 ft (3 m) away	100	Very loud
School cafeteria with untreated surfaces	80	Loud
Near freeway auto traffic	60	Moderate
Normal conversation	60	
Average office	50	
Average residence without stereo playing	30	Quiet
Quiet library, soft whisper	20	Very quiet
	0	Threshold of hearing

Source: HUD 1985; USEPA 1971.

Noise is defined as unwanted or objectionable sound, which may include sound that interferes with communication, disturbs sleep, or is intense enough to damage hearing. Ambient sound levels and human sensitivity to sound vary over time; for example, a nuisance sound (noise) generated during the night may be perceived as a greater disturbance than the same sound generated during the day. Evaluation of ambient noise levels and impacts is therefore based on measurements of sound exposure over time. Two measures of time-varying sound exposure are the 24-hour equivalent sound level (L_{eq}) and the weighted sound level (L_{dn}). The L_{eq} is the level of steady sound with the same total (equivalent) energy as the time-varying sound, averaged over a 24-hour period. The L_{dn} is the L_{eq}, weighted to account for people's greater sensitivity to nighttime sound by adding 10 dBA between the hours of 10:00 p.m. and 7:00 a.m.

Airborne sound is measured in dB relative to a reference pressure of 20 micro Pascals (µPa) at 1 meter (m), which is derived from the average human hearing threshold; however, the reference pressure in water is 1 µPa at 1 m. Therefore, a given sound will produce a higher sound pressure level in water than in air, and it is difficult to make direct comparisons between sound levels in air and water. In addition, sound travels much faster through water than through air (about 1,500 m per second [m/s] in water and about 330 m/s in air) (OSPAR Commission 2009). Underwater sound is addressed in Section 8: Wildlife and Protected Resources.

13.2.2.2.2 AMBIENT NOISE

The ambient sound level comprises the total sound generated within a specific environment, including natural and anthropogenic sounds. The magnitude and frequency of ambient sound at any specific location is variable in time, and that variation may be due to changing weather conditions, seasonal changes in vegetative cover, and, in developed areas, daily traffic or use patterns. Existing sources of sound in the Onshore Project area may include local road traffic, high altitude aircraft overflights, vessels in nearby open water areas, and natural sounds such as wildlife vocalizations and vegetation. Land uses and their associated human activities have different ambient sound levels.

Where the Project facilities will be located in inshore waters (including Redfish Bay) and the GOM, natural sources of ambient airborne sound include bird calls, water movement, and wind. Anthropogenic sources of ambient sound include commercial and recreational vessels, and helicopters transporting workers and supplies to offshore platforms and other facilities. Vessels in the Project area may include commercial vessels in the GOM travelling along shipping fairways or calling at nearby ports, including Port Aransas and Corpus Christi; commercial vessels travelling in the Intracoastal Waterway and other shipping/transit channels across the inshore waters; and smaller, recreational boats in both inshore waters and the GOM. Vessel traffic is discussed in detail in Section 14: Navigation and Navigation Safety. The occurrence of noise from vessel traffic is highly variable, and vessel-generated sound is transient and limited to the time when the vessel is passing through the sound receptor. Long periods of low anthropogenic sound levels may occur when vessels are not present at a specific location. Similarly, sound from helicopter overflights is transient and intermittent.

A noise-sensitive area (NSA) is a location which, because of its use by people, may be more susceptible to noise impacts. Examples of NSAs include residences, churches, and schools. NSAs in the Project area were identified based on a review of available aerial imagery. Surveys were conducted to document the ambient sound levels at the NSAs within 1 mi of the Harbor Island Booster Station and within 0.5 mi of each HDD entry and exit location; the results are presented in Table 13-4 and Appendix S. In addition, designated critical habitat for the piping plover on San Jose Island was assessed as an NSA for HDD construction and sound levels at that location were estimated based on available ambient data from similar environments; because sea turtles have also been documented nesting on San Jose Island, the NSA is also representative of suitable sea turtle nesting habitat in the Project vicinity. Appendix S also includes figures depicting each NSA assessed. As described in Table 13-4, the nearest NSA to HDD construction sites or aboveground facilities are residences located within about 150 feet (ft; 46 m) from HDDs 5 and 6.

Where the Harbor Island Booster Station will be installed in Port Aransas, Texas, the nearest NSA is 0.8 mi (1.3 kilometers [km]) away. The facility site is on undeveloped, open land (see Section 12: Coastal Zone Uses, Recreation, and Aesthetics). Similarly, where onshore construction activities are planned on San Jose Island and other inshore islands, the Inshore Pipelines will cross primarily undeveloped land, but adjacent to existing disturbance (e.g., roadways, powerlines). The Onshore Pipelines will cross predominantly developed areas in Aransas Pass and Port Aransas; the nearest NSAs to HDD construction will be 150 ft (46 m) away. Outside of incorporated areas, the Onshore Pipelines cross predominantly open and agricultural land, as well as some areas of wetlands.

Table 13-4: Noise Sensitive Areas within 0.5 mi of HDDs and 1 mi of the Harbor Island Booster Station

Facility/HDD Number	HDD Entry/Exit Location	NSA Description[a]	Distance and Direction to Construction Workspace (ft/m)	Ambient Sound Level (L_{dn} dBA)
Harbor Island Booster Station				
Booster Station		Park	4,400 ft (1,341 m; S)	51.2
		Residences	5,000 ft (1,524 m; SSW)	44.9
Onshore Pipelines				
2	Entry	Residence	1,700 ft (518 m; W)	54.4
	Exit	Residence	1,650 ft (503 m; NW)	
4	Entry	Residences	150 ft (46 m; W)	56.7
	Exit	Residence	450 ft (137 m; SW)	53.5
Inshore Pipelines				
5	Entry	Residences	2,200 ft (671 m; W)	60.5
	Exit	Residence	150 ft (46 m; S)	57.5
6	Entry	Residences (RV Park)	700 ft (213 m; S)	61.3
	Exit	Residences (RV Park)	1,100 ft (335 m; SE)	
7	Entry	Residences (RV Park)	700 ft (213 m; S)	61.3
	Exit	Residence	900 ft (274 m; SE)	65.7
9	Entry	Piping plover critical habitat	2,450 ft (747 m; E)	59 0
10	Entry		1,300 ft (396 m; E)	

a No NSAs were identified within 0.5 mi of HDDs 1, 3, and 8.

13.2.2.4 Air Quality

Existing Air Quality conditions are characterized in two ways. First, data from onshore, regulatory air quality monitors are presented, showing compliance with the NAAQS. Second, emission rates of VOC and NO_X associated with existing offshore crude oil loading operations are estimated.

13.2.2.4.1 CURRENT ONSHORE AIR QUALITY

Texas counties in the vicinity of the Project (Kenedy, Kleberg, Nueces, San Patricio, Aransas and Refugio) are currently classified as "attainment/unclassifiable" for each NAAQS pollutant (40 CFR § 81.344).

Background air quality in the area surrounding a proposed action is typically obtained from nearby air monitoring stations. No air monitoring stations are presently located offshore, so the closest onshore monitors have been selected to represent existing air quality conditions for the project area.

Table 13-5: Summary of Representative Monitored Concentrations for Project NAAQS Pollutants

Pollutant	Averaging Period	Monitor Location	AIRS ID[7]	Period	Design Value[8]
NO_2	1-hr	Galveston, TX	48-167-1034	2016–2018	28.3 ppb
	Annual			2018	2 ppb
Ozone	8-hr	Corpus Christi, TX	48-355-0025	2015–2017	62 ppb
PM_{10}	24-hr	Corpus Christi, TX	48-355-0034	2016–2018	79.0 µg/m^3
$PM_{2.5}$	24-hr	Corpus Christi, TX	48-355-0034	2016–2018	25.7 µg/m^3
	Annual				8.7 µg/m^3
SO_2	1-hr	Corpus Christi, TX	48-355-0025	2016–2018	4 ppb
CO	1-hr	Deer Park, TX	48-201-1039	2018	1.3 ppb
	8-hr			2018	1 ppb

13.2.2.4.2 AIR QUALITY IMPACTS FROM EXISTING CRUDE OIL LOADING OPERATIONS IN PROJECT AREA

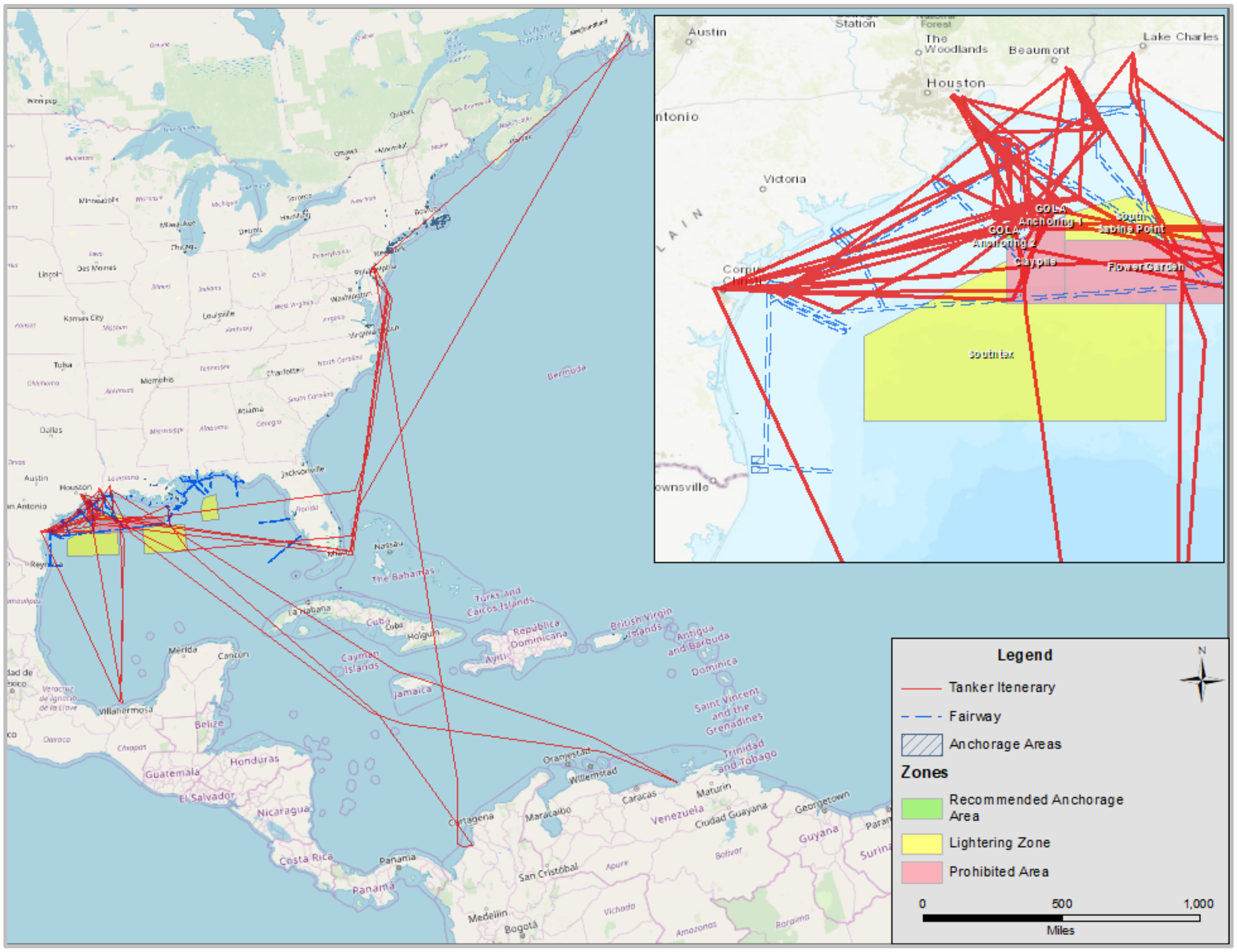
In addition to data from onshore air quality monitors, a second source of information about existing conditions is an estimate of air emissions that occur from current, prevailing means of conducting crude oil export activities, which rely on the use of shuttle tankers for long-haul voyages. Because NO_X and VOC are the only pollutants for which significant Project impacts are anticipated, the following discussion is confined to these two pollutants only.

The activities of shuttle tankers are illustrated in Figure 13-3, which shows daily automatic identification system (AIS) positions signaled by the *Eagle Kinarut*, a foreign-flagged shuttle tanker in the Aframax size class, over the course of a one-year period.

[7] Monitor ID's correspond to identifiers used in EPA's AirData website (https://www.epa.gov/outdoor-air-quality-data).

[8] Design values correspond to the form used to determine attainment of a standard, as described in 40 CFR § 50.4–50.13. For example, an area's classification with respect to the 8-hr CO standard is based on the second-highest monitored concentration during a given year (40 CFR § 50.8(a)(1)).

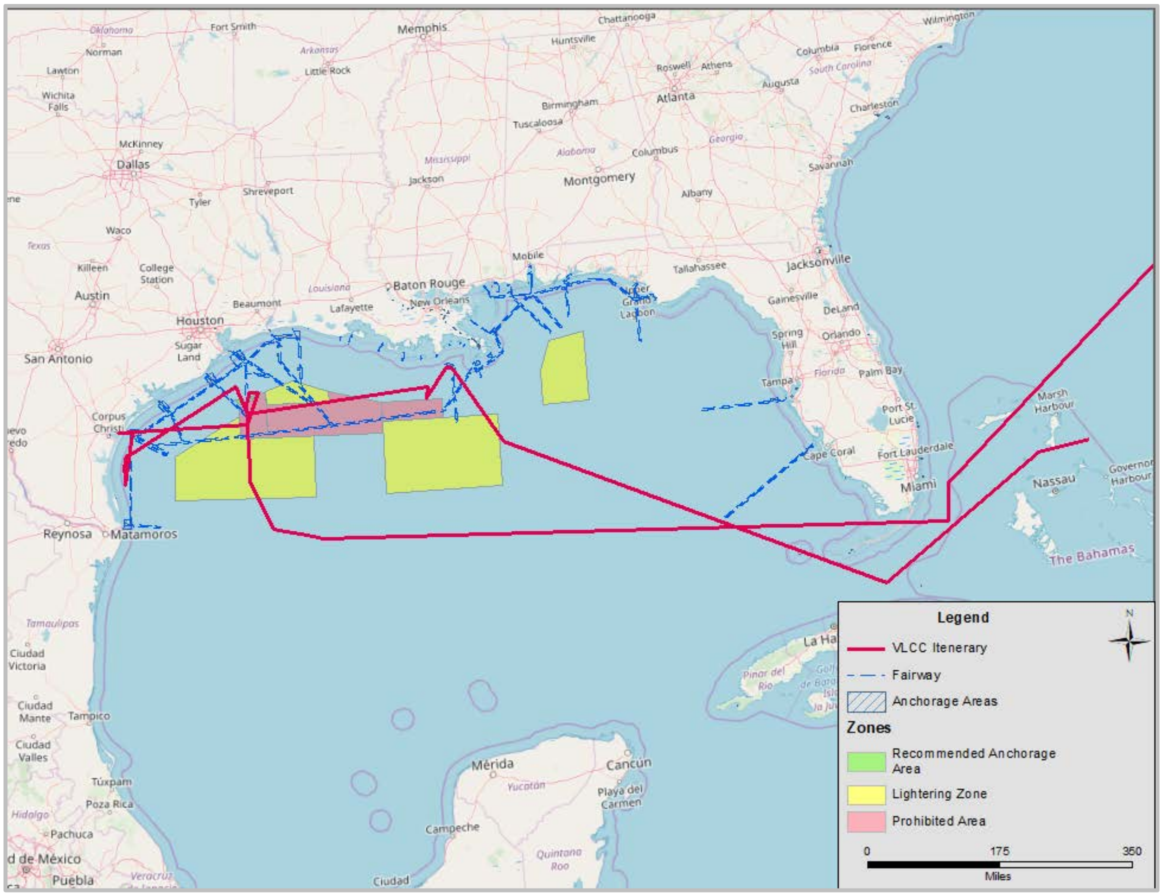
Figure 13-3: Tanker itinerary: North America (left) and Offshore Gulf of Mexico (right).



The tanker frequents crude oil export terminals at various locations along the Texas Gulf Coast (including Corpus Christi, Houston, and Beaumont) and also occasionally calls at crude oil export terminals in Mexico, Colombia and Venezuela. It calls at refinery terminals along the Texas and Louisiana Gulf Coasts, as well as in Paulsboro, NJ, Delaware City, DE, and Come by Chance, Newfoundland. However, the tanker also makes numerous stops in an area known as the Galveston Offshore Lightering Area (GOLA). In GOLA, the tanker is involved in ship-to-ship transfers, either loading export cargoes onto larger tankers, typically VLCCs, or unloading cargoes from larger tankers for delivery to refineries. Since it is not a Jones Act vessel, it cannot carry crude oil between U.S. ports. Such a tanker is referred to as a shuttle tanker because it moves cargoes a short distance between a terminal and a larger vessel. The practice of loading VLCCs by means of shuttle tanker is referred to as "reverse lightering." Aframax sized vessels are most frequently used in reverse lightering practices due to their ability to enter most coastal ports with restricted draft depths.

VLCCs are the preferred means of exporting crude oil on long-haul voyages, and the majority of VLCC loading in the Gulf of Mexico takes place via reverse lightering. For, example, 65% of *all* crude oil export volumes were loaded via reverse lightering during the week ending January 8, 2019 (RBN 2019). Reverse lightering is required due to the lack of deep draft ports in the Gulf of Mexico. For illustration, the trajectory of the VLCC *Maran Ares* is shown in Figure 13-4 over a five-week period. The tanker enters the Gulf, proceeds to the Louisiana Offshore Oil Port (LOOP), presumably taking on a partial load; it then proceeds to the Moda Midstream crude oil terminal in Ingleside, TX (one of two onshore terminals currently capable of partial VLCC loadings), presumably taking on additional cargo; finally, it travels to GOLA, signaling “restricted maneuverability” during a presumed reverse lightering operation. This itinerary illustrates the three current means available for loading of VLCCs. As a whole, VLCCs receive the majority of their cargo offshore via reverse lightering.

Figure 13-4: VLCC Itinerary



The prevalent use of shuttle tankers for Gulf of Mexico oil exports illustrates an important aspect of the U.S. crude oil export market. The market includes crude oil destined for export that is generally loaded twice. Crude oil is first loaded onto a shuttle tanker at a shoreside terminal along the Gulf Coast, with emission controls, and then onto a VLCC, in an offshore lightering area, without emission controls.

Of the three means of loading a VLCC illustrated in Figure 13-4 (partial loading onshore, deepwater port, or reverse lightering), reverse lightering is the least efficient means of exporting crude oil from an economic standpoint, since the exporter must charter and fuel one or more shuttle tankers in addition to the VLCC. Therefore, the expected impact of the Project on the crude oil export logistics market will be to displace reverse lightering operations that would otherwise occur. Although the Project will be a source of VOC emissions, it will displace VOC emissions that would otherwise result from reverse lightering. It will also reduce diesel combustion emissions by reducing port traffic (tug and shuttle tanker) and offshore shuttle tanker traffic that would otherwise occur during lightering activities.

Emissions associated with reverse lightering are quantified below, and can be understood as arising from five distinct operations: uncontrolled loading of the VLCC during the reverse lightering operation; controlled loading of each shuttle tanker at a shoreside terminal; emissions from ship engines during transit of a shuttle tanker between the shoreside terminal and the offshore lightering area; emissions from ship engines from both the shuttle tanker and the VLCC during the lightering operation itself; and finally, emissions from tractor tugs used to assist with shoreside mooring of the shuttle tanker within shoreside harbors.

13.2.2.4.3 EMISSION FACTORS FOR LOADING OPERATIONS

VOC emission factors associated with loading during reverse lightering operations are assumed to be equal to those that would result from loading at the deepwater port, i.e., 120.3 lb VOC/MBbl crude oil loaded (methodology shown below).

VOC emission factors for controlled loading are based on a capture efficiency of 99% for the shoreside closed vent system, and a destruction efficiency of 99% for the shoreside control device (TCEQ 2016; TCEQ 2011). The emission factor for controlled loading is therefore 1.99% of the corresponding uncontrolled emission factor, or 2.39 lb VOC/MBbl.

Emissions of NO_X from the shoreside control device are estimated based on a net heating value of 20,000 Btu/lb for crude oil vapors, and a NO_X emission factor of 0.1 lb/MMBtu for the control device, or 0.24 lb NO_X/MBbl.

13.2.2.4.4 EMISSION FACTORS FOR SHIP ENGINES

MARPOL Annex VI specifies tiered NO_X emission limits (figure 13-4, below) for marine diesel engines which vary based on the engine's year of construction, its rated speed, and whether it operates in a designated Emission Control Area (ECA). To estimate emissions from reverse lightering operations, VLCC and Aframax engines are assumed to be subject to a limit of 14.4 g/kW·h, based on a low-speed engine (less than 130 rpm), constructed between 2011 and 2016 ("Tier II"). For tractor tugs, an engine speed of 750 rpm is assumed, corresponding to a Tier II emission factor of 9.6 g/kW·h. The engine power at 100% load for an Aframax and a VLCC at 100% load is assumed to be 13,000 kW and 26,000 kW, respectively (MAN Diesel and Turbo 2013). The tractor tugs used for shoreside mooring of the Aframax are assumed to have a maximum load of 7460 kW (10,000 hp) each, based on operational experience.

Figure 13-5: MARPOL Annex VI NO_X Emission Limits

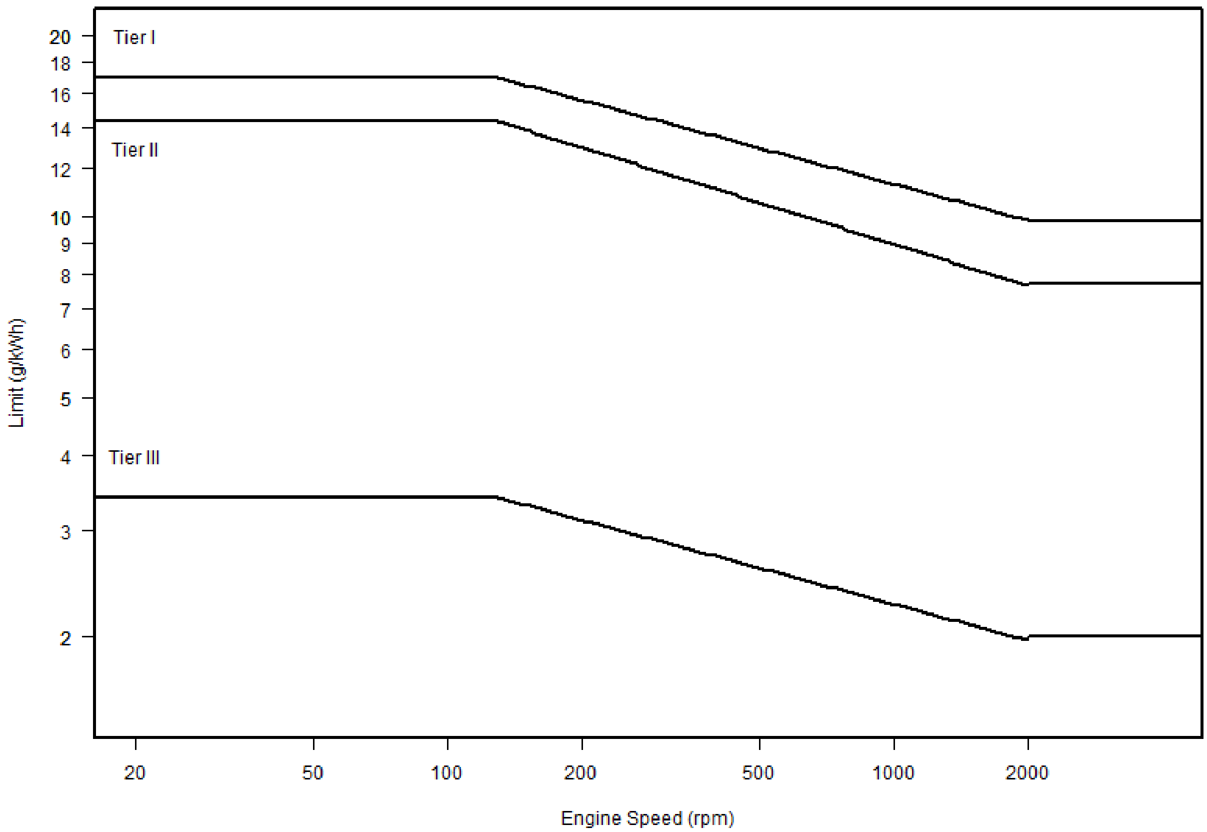


Table 13-6: Assumed Engine Loads and NO_X Emission Rates for Vessel Propulsion Systems

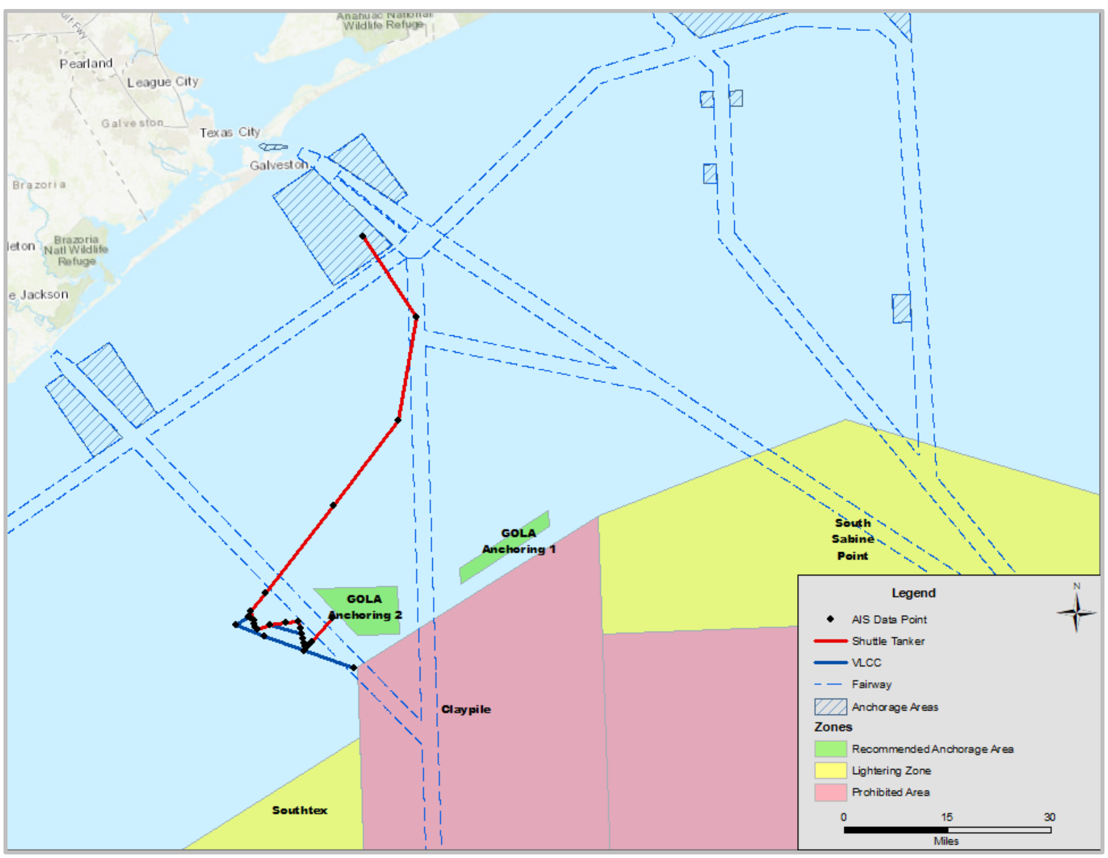
Vessel	Mode	Engine Load (%)	NO_X emission rate (lb/hr)
Aframax	In transit (loaded)	90%	371
Aframax	In transit (unloaded)	60%	248
Aframax	Lightering	90%	371
Aframax	Docked (loading)	10%	41
VLCC	Lightering	25%	206
VLCC	Docked (loading)	10%	83
Tractor Tug	Mooring assist	100%	158

The assumed load and implied NO_X emission rate for different operating modes is given in Table 13-6. Lightering operations generally take place with both ships underway at low speeds, moored side-by-side. For the VLCC, a load factor of 25% is assumed based on use of propulsion engines and operation of ballast pumps. For the Aframax, a higher load factor of 90% is assumed based on the use of propulsion engines, operation of the cargo pumps at their maximum rate, and operation of the vessel's inert gas generation system at its maximum rate. The assumed load is consistent with operational experience indicating that an Aframax tanker consumes similar amounts of fuel when underway laden, and when discharging cargo at a shoreside terminal. Tractor tugs operate at high power (assumed 100% load) while assisting with mooring operations.

Tankers typically consume auxiliary power while docked at a terminal or while anchored and awaiting instructions. During loading, the ship's ballast pumps are in operation, but not its cargo pumps or its inert gas generator. This analysis assumes that auxiliary power operations are equivalent to 10% load. Emissions from auxiliary power operation are estimated during times when a ship is docked and loading. Periods when a vessel is at an offshore anchorage area awaiting instructions are not included in the analysis.

In order to estimate the time to complete a reverse lightering rendezvous, itineraries for pairs of vessels known to have completed a reverse lightering operation were studied using AIS data. When two crude oil tankers (one a VLCC, the other a shuttle tanker) signal the same location, course, and speed, and both signal their status as "restricted maneuverability," they are presumed to be engaged in a reverse lightering operation. The diagram in Figure 13-6 illustrates the method for estimating the duration of a reverse lightering operation. The two vessels first begin to travel along the same course, signaling "restricted maneuverability," at 0300 hours, and the last such transmission occurs at 1800 hours on the same day. At the end of the rendezvous, the shuttle tanker returns north to a shoreside terminal, and the VLCC continues on an east-southeast course out of the Gulf of Mexico. The paths appear to diverge at one point during the rendezvous, but this is because the VLCC does not signal it position for three hours.

Figure 13-6: Trajectories for shuttle tanker (red) and VLCC (blue) lightering within GOLA (left)



For the lightering rendezvous depicted in Figure 13-6, a total duration of 15 hours is observed. Other operations have been observed with apparent durations ranging from 12–24 hours. The duration of a lightering rendezvous is therefore conservatively assumed to be 12 hours for purposes of estimating emissions from the vessel engines. AIS data has also been used to estimate 12 hours as the time it takes for a shuttle tanker to travel between a shoreside location in Corpus Christi or Houston and the corresponding offshore lightering area. Therefore, each reverse lightering operation is assumed to involve 24 hours of transit for the Aframax shuttle tanker (12 hours unloaded and 12 hours loaded).

The duration of a loading operation at a terminal is assumed to be 12 hours for an Aframax loading at a shoreside terminal (similar to the duration of a lightering rendezvous). Tractor tug assist operations during mooring of an Aframax typically require 2–3 hours per unique operations, so a duration of 2.5 hours per tug is used for this analysis.

Assuming that each reverse lightering operation involves the transfer of 500,000 Bbl from an Aframax shuttle tanker to a VLCC, NO_X emission factors for each reverse lightering event are shown in Table 13-7.

13.2.2.4.5 TOTAL AIR QUALITY IMPACTS FOR EXISTING CONDITIONS

Table 13-7: Summary of NO_X Emission Factors for Lightering

Activity	NO_X Emission Rate (lb/event)	NO_X Emission Factor (lb/MBbl)
Controlled Loading Onshore	120	0.24
Onshore tanker engines	492	0.98
Onshore assist tugs	790	1.58
Transit	7428	14.86
Lightering	6924	13.85
Total	15754	31.51

Total emissions for reverse lightering are summarized in Table 13-8. VOC emissions for reverse lightering are similar to those expected to result from the deepwater port (cf. estimates below). The most important aspect of existing air quality in the context of the Project is the prevalent use of shuttle tankers and associated inner-harbor traffic. Crude oil exports are currently facilitated to a large extent by shuttle tankers whose primary function is to ferry cargoes of crude oil between VLCC’s and shoreside terminals. The net effect of the Project will be to reduce the extent to which traffic from these vessels is necessary to support crude oil exports.

Table 13-8: Total VOC and NOX emissions from export of Project-equivalent Volume of Crude Oil via Reverse Lightering

Activity	VOC Emissions (tpy)	NO_X Emissions (tpy)
Uncontrolled Loading	23,098	
Controlled Loading at terminal	231	46
Lightering Vessel Engines		6,004

Total	23,329	6,050

13.2.3 Proposed Project Construction Impacts

13.2.3.1 Noise

Details of factors that may produce impacts are described in Appendix A: Construction, Operation and Decommissioning Procedures. The environmental consequences of the Proposed Project will vary in duration and significance. Four levels of impact duration were considered: temporary, short-term, long-term, and permanent. Temporary impacts generally occur during construction & decommissioning, with the resource returning to pre-construction conditions almost immediately afterward. Short-term impacts are considered to be those that may continue for up to 3 years following construction. Impacts are considered long-term if the resource will require more than 3 years to recover. A permanent impact could occur as a result of any activity that modified a resource to the extent that it will not return to pre-construction conditions during the life of the Project, such as within the footprint of Project. When determining the significance of an impact, we consider the duration of the impact, the geographic and biological context in which the impact will occur, and the magnitude and intensity of the impact. The duration, context, and magnitude of impacts vary by resource and therefore significance varies accordingly.

Construction and operation of the Proposed Project are expected to result in temporary and permanent impacts on sound levels in the Proposed Project vicinity. Installation of the Harbor Island Booster Station will generate noise due to operation of construction equipment. Temporary noise during installation of the pipelines will result from typical pipeline construction, HDDs, and vessel activity (including the pipeline lay barge). Construction of the SPM buoy systems will also generate airborne noise from pile-driving and construction and support vessels. Because the SPM buoys will be located about 17.0 mi (27.4 km) from shore, impacts on land-based noise sensitive receptors are anticipated to be limited to the temporary period of onshore and nearshore pipeline installation.

During operations, equipment at the Harbor Island Booster Station will result in localized noise. No airborne noise impacts will occur for pipelines and noise from the offshore and inshore underwater pipelines will be limited to the sound of liquid flow underwater (see Section 8: Wildlife and Protected Resources). Ongoing operation of equipment on the SPM buoys, as well as loading and support vessel activity, will also generate noise. Airborne noise can adversely affect human activity; both underwater and airborne noise can interfere with biological resources including marine mammals, sea turtles, fish, and birds. Airborne and underwater noise impacts on fauna are addressed in Section 8: Wildlife and Protected Resources.

13.2.3.1.1 HARBOR ISLAND BOOSTER STATION

The primary sources of noise for construction of the Harbor Island Booster Station will be operation of internal combustion engines in construction equipment including cranes, compressors, generators, welders, excavators. During construction, sound levels will temporarily increase in the immediate vicinity of the site.

Using an estimated number of construction equipment for construction of the Harbor Island Booster Station, the composite sound level associated with the construction was estimated. A composite sound level is typically used to describe the overall noise generated by multiple noise-generating units operating at the same time and was generated by adding the sound level of each piece of operating equipment. A standard formula to calculate sound attenuation over distance (assuming no attenuation due to damping from vegetation or other barriers) was used to estimate the composite sound level at the nearest NSA.

$L(R2) = L(R1) - 20 \cdot Log10(R2/R1)$

$L(R1)$ = Sound level at initial location

L(R2) = Sound level at the new location

R1 = Distance from the noise source to initial location

R2 = Distance from noise source to the new location

Table 13-9 identifies the sound levels associated with typical construction equipment and the estimated composite construction noise levels at a distance of 50 ft (15 m) and at the nearest NSA (a park) to construction of the Harbor Island Booster Station. One piece of equipment of each type was assumed to be operating simultaneously at any given time for the calculation of composite noise levels; the estimate is conservative, since it is unlikely that all equipment will be operated simultaneously. The construction equipment types are based on currently available information; the specific equipment required for installation of each Proposed Project component will be determined by the construction contractor. Based on the assessment in Table 13-9, and since most construction at the Harbor Island Booster Station will occur during daylight hours, we do not anticipate that construction noise will exceed the level recommended in USEPA's guidance (55 dBA L_{dn}). Construction contractors of the Booster Station should follow general best management practices and noise control practices by operating only necessary equipment simultaneously and limiting the operation of idle equipment when not required.

Table 13-9: Representative Construction Equipment Noise Sources for the Harbor Island Booster Station Construction (L_{max})[a]

Equipment	Sound Pressure Level (dBA) at 50 ft	Equipment Count[c]	Composite Sound Level (50 ft/15 m)	Composite Sound Level at the nearest NSA (4,400 ft/1,341 m)
Backhoe	78	1	78	39.1
Bulldozer	82	1	82	43.1
Dump Truck	76	1	76	37.1
Front End Loader	79	1	79	40.1
Generator	87	1	87	48.1
Grader	89	1	89	50.1
Pickup Truck	75	1	75	36.1
Composite Sound Level			**92.2**	**53.3**

a L_{max} is the highest measured sound level observed during a measurement period.
b The sound level in dBA at 50 ft (15 m) is a measured value; the estimate at the nearest NSA is a conservative modeled estimate assuming no attenuation other than by distance.
c one piece of equipment of each type assumed to be operating at any given time for calculation of composite sound level at the site
Sources: FHWA 2006, Hoover and Keith, Inc. 2000.

13.2.3.1.2 PIPELINES

Sources of noise associated with construction of the pipelines are expected to include internal combustion engines of equipment supporting typical pipeline construction, HDDs, vessel activity (including the pipeline lay barge), and jetting to bury the Offshore Pipelines after they are laid on the seafloor.

ONSHORE/INSHORE PIPELINE INSTALLATION

The primary sources of noise during Onshore Pipeline construction will be generated by internal combustion engines in construction equipment and the HDD drill rigs. The equipment used for installation of the pipelines will be similar to the equipment used for construction of the Harbor Island Booster Station.

Table 13-10 estimates the composite sound levels associated with typical pipeline construction at various distances from construction. The estimate is conservative, since it is unlikely that all equipment will be operated simultaneously. The construction equipment counts are an estimate based on currently available information; the specific equipment required for installation of each Proposed Project component will be determined by the construction contractor. Composite construction noise could exceed the USEPA-recommended 55 dBA L_{dn} (which is equivalent to a continuous sound level of 48.6 dBA when nighttime construction is planned) along the pipelines. Pipeline construction is expected to occur over a 4-month period for the Onshore Pipelines, and over an 8.5-month period for the Inshore Pipelines; however, active pipeline construction at any location will be temporary. Construction will occur primarily during daylight hours. Typical pipeline construction is expected to move along the pipelines' route, such that any single area experiences only a short duration of construction noise. Because land-based pipeline installation will be temporary and limited to the period of active construction, impacts on noise receptors will be localized and negligible.

Table 13-10: Representative Construction Equipment Noise Sources for Typical Pipeline Construction (L_{max})[a]

Equipment	Sound Pressure Level (dBA) at 50 ft	Equipment Count	Composite Sound Level (50 ft/15 m)	Composite Sound Level (1,000 ft/ 305 m)	Composite Sound Level (2,500 ft/762 m)	Composite Sound Level (1 mi/1.6 km)
Excavator	81	6	88.8	62.8	54.8	48.3
Generator	87	3	91.8	65.8	57.8	51.3
Crane/ Sideboom	85	5	92.0	66.0	58.0	51.5
Pickup Truck	75	2	78.0	52.0	44.0	37.5
Welder/Torch	74	5	81.0	55.0	47.0	40.5
Composite Sound Level			**96.1**	**70.0**	**62.1**	**55.6**

a L_{max} is the highest measured sound level observed during a measurement period

b The sound level in dBA at 50 ft (15 m) is a measured value; the estimate at the nearest NSA is a conservative modeled estimate assuming no attenuation other than by distance.

Sources: FHWA 2006, Hoover and Keith, Inc. 2000.

HDD pipeline installation requires stationary drilling equipment to operate for a longer timeframe to allow for the drilling of a borehole and installation of the pipelines without digging a trench. BWTT will use HDD construction to install the pipelines at four locations along the Onshore Pipelines and six locations along the Inshore Pipelines. HDD activities will require up to an estimated 9 weeks at each location, although often less, in addition to time required for pre-laying the pipeline, and could require 24-hour construction. Table 13-11 quantifies the sound levels due to HDD construction measured at the nearest NSAs within 0.5 mi of each HDD entry and exit location. Detail regarding the methods used to assess HDD construction noise, as well as figures depicting each HDD and the nearest NSAs, are included in Appendix S.

Table 13-11: Noise Impacts for the Nearest NSA within 0.5 mi of Each HDD[a]

HDD No	Entry/Exit Location	NSA Description	Distance and Direction to Construction Workspace (ft/m)	Ambient Sound Level (L_{dn} dBA)	L_{dn} due to HDD Construction (dBA)	L_{dn} (HDD + Ambient; dBA)	Increase Above Ambient (dB)
Onshore Pipelines							
2	entry	Residence	1,700 ft (518 m; W)	54.4	53.5	57.0	2.6
	exit	Residence	1,650 ft (503 m; NW)	54.4	42.4	54.7	0.3
4	entry	Residences	150 ft (46 m; W)	56.7	78.6	78.6	21.9
	exit	Residence	450 ft (137 m; SW)	53.5	54.3	56.9	3.4
Inshore Pipelines							
5	entry	Residences	2,200 ft (671 m; W)	60.5	48.8	60.8	0.3
	exit	Residence	150 ft (46 m; S)	57.5	66.8	67.3	9.8
6	entry	Residences (RV Park)	700 ft (213 m; S)	61.3	62.7	65.0	3.7
	exit	Residences (RV Park)	1,100 ft (335 m; SE)	61.3	46.6	61.4	0.1
7	entry	Residences (RV Park)	700 ft (213 m; S)	61.3	62.7	65.0	3.7
	exit	Residence	900 ft (274 m; SE)	65.7	48.6	65.8	0.1
10	entry	Piping plover critical habitat	1,300 ft (396 m; E)	59 .0	57.7	61.4	2.4

a No NSAs were identified within 0.5 mi of HDDs 1, 3, and 8. HDD 9 will affect the same NSA as HDD 10; given the limited sound contribution from HDD 10, which is located nearer to the NSA, additional analysis is not provided. The entry location for HDDs 6 and 7 is at the same site.

Estimated noise from HDD construction could exceed the USEPA's guideline level of 55 dBA L_{dn} at the nearest residential NSAs to four locations (the HDD 4 entry, HDD 5 exit, HDD 6 entry, and HDD 7 entry sites) without additional noise mitigation. As described in Appendix S and Table 13-12, if additional recommended noise mitigation measures are employed at each location, the sound level at the NSA nearest to each HDD will be below 55 dBA L_{dn} and the sound level increases above ambient will not be perceptible (less than 3 dB). Because HDD construction will be limited to 9 weeks or less at each location and given noise mitigation measures identified in Appendix S, noise impacts from HDD construction would be temporary and minor.

Table 13-12: Noise Impacts for the HDDs with Additional Recommended Mitigation

HDD No	Entry/Exit Location[a]	NSA Description	Distance and Direction to Construction Workspace (ft/m)	Ambient Sound Level (L_{dn} dBA)	L_{dn} due to HDD Construction with Mitigation (dBA)[b,c]	L_{dn} (HDD + Ambient; dBA)	Increase Above Ambient (dB)
Onshore Pipelines							
4	entry	Residences	150 ft (46 m; W)	56.7	54.4b	58,7	2.0
Inshore Pipelines							
5	exit	Residence	150 ft (46 m; S)	57.5	53.5a	58.9	1.4
6	entry	Residences (RV Park)	700 ft (213 m; S)	61.3	52.6a	61.9	0.6
7	entry	Residences (RV Park)	700 ft (213 m; S)	61.3	52.6a	61.9	0.6

a The entry location for HDDs 4 and 5 is at the same site.
b Mitigation includes a 20-ft (6-m) high temporary barrier between the construction workspace and the nearest NSA.
c Mitigation includes a 24-ft (7-m) high temporary barrier between the construction workspace and the nearest NSA and enclosures surrounding equipment.

Where the entry location for HDD 10 will be near designated critical habitat for the piping plover, HDD construction is estimated to exceed 55 dBA L_{dn}; however, the estimated sound level increase during HDD construction at the nearest critical habitat will be 2.4 dBA, which is less than the 3 dB limit for a perceptible change. HDD 9 is within 0.5 mi of the same designated critical habitat; however, it is further from the habitat and impacts will therefore be less. Given the negligible change and short (maximum 9-week-long) period for HDD construction at each location, sound level impacts on this habitat will be temporary and negligible. Impacts of construction noise on terrestrial wildlife, including piping plovers and sea turtles that could use the beach near HDDs 9 and 10, are addressed in Section 8: Wildlife and Protected Resources.

OFFSHORE (UNDERWATER) PIPELINE INSTALLATION

Typically, installation of the pipelines in the GOM will be conducted by jetting/trenching using a pipe laying barge and support vessels. The Offshore Pipelines will be installed by the pipe laying barge for about 26.4 mi (42.5 km). Trenching and backfilling for installation of the pipelines will be completed using a submersible pipeline jetting sled operated from a pipe laying barge. Similar to onshore construction, underwater pipeline installation will progress along the route such that construction at any one location is of short duration. However, pipe laying may occur up to 24 hours per day.

The Proposed Project is in an area subject to noise impacts by commercial vessels operating in the Intracoastal Waterway and navigational fairways in the GOM. Airborne noise from construction and support vessels will be consistent with other vessel activity in the Proposed Project vicinity. Sound levels from the pipe laying barge are estimated to be about 90 dBA (consistent with OSHA's 8-hour permissible noise exposure level of 90 dBA) and will be consistent with other vessels operating in the GOM and Intracoastal Waterway. Therefore, nearshore underwater pipeline construction will have localized, negligible impacts on the airborne noise environment.

13.2.3.1.3 SPM BUOY SYSTEMS

Construction of the SPM buoy systems will use equipment similar to that used to install other offshore platforms and structures. Installation of the facilities will occur over 16 weeks. Offshore construction of the Project will only require that a portion of the construction equipment operate at a given time, and equipment is expected to vary for different construction stages. Sources of noise associated with construction of the SPM buoy systems are expected to include pile-driving equipment, as well as the operation of internal combustion engines used to power barges and service vessels. Sound levels are expected to be similar to the levels associated with onshore use of combustion-powered construction equipment; however, sound levels for offshore facility installation have not been measured. Vessels used to transport construction equipment and personnel will also generate airborne noise; however, limited vessel activity will occur near shore and most will be at the SPM buoy systems site. Given the distance from shore, construction of the Proposed Project will not exceed the 55 dBA L_{dn} recommended in USEPA's guidance to minimize impacts on NSAs. Construction of the Proposed Project will result in temporary, minor noise level increases in the immediate vicinity of the SPM buoy systems.

Pile-driving will be used for installation of the pipeline end manifold (PLEM) foundation and anchor piles, at each SPM buoy system, and will occur in depths between 88.5 and 89.5 feet (27.0 and 27.3 m). The intensity of sound produced during pile-driving is dependent on the material and size of the pile, depth of water, and method of pile-driving. A total of 10 steel or concrete 18-inch (0.5-m) diameter piles will be installed using an impact hydraulic hammer for the PLEMs. In addition, 24 steel or concrete 72-inch- (1.8-m-) diameter piles will be installed using an impact hydraulic hammer for the anchor piles (6 pairs of 2 piles at each SPM buoy system). Pile-driving will occur over the 16-week-long installation timeframe for the SPM buoy systems, and only one pile will be driven at a time. The airborne sound level associated with pile-driving is estimated to be about 104 dBA at a distance of 50 ft (15 m) but, given the temporary period planned for pile-driving and the distance of the Proposed Project from shore, will not affect onshore NSAs (Hoover & Keith, Inc. 2000).

Offshore noise from installation of the SPM buoy systems will be temporary and limited to the period of active construction. Given the intermittent, temporary nature of construction noise and distance from shore, impacts on human receptors will be negligible.

13.1.1.1 Air Quality

During construction of the offshore portions of the project, air emissions would result from construction equipment, including pipe laying vessels, vessels used for installation of the SPM buoys, and supply vessels. For vessels subject to MARPOL Annex VI, the most significant air pollutant emissions would be NO_X emissions from vessel engines. Since construction vessels would not remain in a particular location for an extended period of time during the construction phase, air quality impacts from the construction phase are expected to be of short-term duration, insignificant, and not adverse. Loading operations, which represent the most significant air quality impact during operations, would not occur during the construction phase.

Air quality impacts associated with Onshore and Inshore Construction activities would consist of emissions from construction equipment as well as possible particulate emissions from excavation and land clearing activities. These impacts would be of a short-term duration, would be subject to control measures (summarized below), and are assumed to be insignificant and not adverse.

Diesel-fired construction equipment must be manufactured in accordance with EPA regulations applying to non-road compression ignition engines (40 CFR Parts 89, 1039), which limit emissions of NO_X, CO, SO_2, particulate and non-methane hydrocarbons from such equipment. The formation of dust during construction operations is subject to TCEQ regulations at 30 TAC § 111.145, which establishes minimum required measures to suppress dust formation. These include the use of water to control dust formation during construction and land clearing operations, and the use of enclosures during sandblasting operations.

13.2.4 Proposed Project Operation Impacts

13.2.4.1 Noise

13.2.4.1.1 HARBOR ISLAND BOOSTER STATION

Noise sources during operations at the Harbor Island Booster Station will include engines, pumps, and other mechanical equipment. The major noise-generating equipment present on site will include four 5,500 horsepower electric motor-driven crude oil pumps. The Harbor Island Booster Station pumping systems will be located within noise abatement housings to minimize noise during operations to the maximum extent practicable. Because all of the equipment will not be operated simultaneously, and since the Harbor Island Booster Station will only be operated during loading, operational sound levels will vary. As a worst-case estimate during each very large crude carrier (VLCC) loading event, the Harbor Island Booster Station will operate for about 40 hours (a maximum of about 320 days a year for the maximum export volume of 192 VLCCs per year); additional pigging runs will require about 4 hours of operation and could be conducted as frequently as every month. Appendix S includes an acoustical assessment, with methodology, used to estimate the sound contribution of operation of the Harbor Island Booster Station at the nearest NSAs; impacts are summarized in Table 13-13. Operation of the Harbor Island Booster Station will not result in an audible increase (3 dB) above ambient sound levels at the nearest NSAs; therefore, impacts due to operations will be permanent but negligible.

Table 13-13: Operational Noise for the Harbor Island Booster Station

NSA Description	Distance and Direction to Construction Workspace(ft/m)	Ambient Sound Level (L_{dn} dBA)	L_{dn} due to the Booster Station	L_{dn} (Booster Station + Ambient)	Increase Above Ambient
Park	4,400 ft (1,341 m; S)	51.2	42	51.3	0.1
Residences	5,000 ft (1,524 m; SSW)	44.9	40.5	45.2	0.3

Because operations will emit continuous sound, the Harbor Island Booster Station could affect nearby wildlife. Noise could affect animal behavior, and cause wildlife species to move away from the noise or relocate to avoid the sound. However, given the availability of similar habitat near the facility, given the negligible impact on sound levels at NSAs less than 1 mi from the site, the use of noise abatement housings, and because operational noise will quickly attenuate with distance from the facility, the increased noise will result in permanent, but negligible impacts on wildlife. See Section 8: Wildlife and Protected Resources for additional detail regarding wildlife impacts.

13.2.4.1.2 PIPELINES

Because the SPM buoy systems will be located about 17.0 mi (27.4 km) from shore, impacts on land-based noise sensitive receptors are anticipated to be limited to the temporary period of onshore and nearshore pipeline installation. No onshore or inshore operational noise impacts are anticipated for the pipelines.

Operation of the valve station will be limited to activation of shut off valves during emergencies and routine maintenance. A motor for operation of the valve will be the source of operational sound; no pumps will be installed. Activation of the valve will emit a short burst of sound that could startle wildlife and/or cause them to leave the immediate vicinity. Sound levels will immediately return to previous conditions following activation of the valve, and wildlife will be expected to return to nearby habitat shortly thereafter. Given the short duration of sound associated with operation of the onshore valve station and its infrequent operation, impacts on wildlife will be negligible.

13.2.4.1.3 SPM BUOYS

Noise from operation of the SPM buoy systems will be virtually non-existent because the SPM buoy systems do not contain any mechanical engines, pumps, or generators that will be running continuously during operation. The only noise sources located at the SPM buoy systems will be assistant vessels such as tugs and the VLCC while it is moored to the SPM buoy system. Because noise from operations of the SPM buoy systems will be minimal, and any noise produced will be controlled to meet standards established for worker protection, impacts on airborne noise at the SPM buoy systems site will be localized, minor, and limited to the times when vessels are moored. Given the distance of the Project facilities from shore, no airborne noise impacts on land-based receptors from operation of the SPM buoy systems will occur. While noise from operation of the vessels at the SPM buoy systems could impact recreational boating and fishing in the vicinity of the site, establishment of the 3,609-ft (1,100-m) Safety Zone around each of the SPM buoy systems will exclude recreational vessels from the immediate area. Therefore, noise from SPM buoy systems operations is not expected to impact recreational activity.

Intermittent noise will be generated by support tugs and VLCCs calling at the SPM buoy systems (about 192 times per year). Noise from service vessels and VLCCs will be transient in the immediate Project vicinity, limited to the time when they are approaching, loading, and leaving the SPM buoy systems. VLCCs that will call at the SPM buoys are similar to other vessels operating in the GOM, as described in Section 13.2.2.2.2. Further, supply vessels and VLCCs transiting to the SPM buoy systems will generally use established shipping lanes. A minimum of two support tugs and one smaller support vessel will be on location at the SPM buoy systems during operations. No significant increase in vessel traffic is anticipated in the Project area, and therefore airborne noise impacts from vessel traffic during operations will be localized and negligible.

13.1.1.2 Air Quality

Air emissions are not expected during operation of the pipelines. Air emissions from operation of the Harbor Island Booster Station are expected to be of an insignificant nature, as noted above, emitting equipment and activities, such as storage tanks wastewater treatment, and pipeline pigging, would be subject to control requirements under the Texas SIP, and will qualify for a Permit by Rule. The remainder of the discussion on air quality impacts from the operation phase of the project is confined to the SPM buoys.

During operation of the SPM buoys, air emissions will result from vessel operations and from loading with submerged fill and vessel VOC management operations. While loading with submerged fill and vessel VOC management emission rates would be of a similar magnitude to existing conditions (reverse lightering), the project would have a reduced impact compared to existing conditions in that it would be associated with a relatively lower level of vessel traffic.

Total air emissions associated with the project, including emissions from stationary sources (loading operations) and mobile sources (vessel traffic), are summarized below, and their impacts on air quality are estimated using computerized dispersion modeling. Dispersion modeling results are summarized in the present section, while a more detailed discussion of the methodology employed appears in Appendix T (Air Dispersion Modeling Report). A separate air quality analysis, based on photochemical modeling, has been conducted as part of the required Prevention of Significant Deterioration permit application. This analysis is confined to emissions from stationary sources, and appears in in the PSD Permit Application submitted for the Proposed Project (Volume I).

In the context of characterizing project air quality impacts, impacts for a particular pollutant are deemed “significant” if they could result in a concentration in excess of a USEPA Significant Impacts Level (SIL), and are deemed “adverse” if they could result in a violation of an applicable NAAQS. When air emissions of criteria pollutants from the project itself are considered, air quality impacts are of a long-term nature and are not adverse for any air pollutant. Air quality impacts may be significant for Ozone, NO_X and $PM_{2.5}$, but not for any other criteria pollutant. When the impact of the project is considered in light of existing conditions (discussed above), the net impact is not expected to be significant for any pollutant.

13.2.4.1.4 EMISSION FACTORS FOR LOADING OPERATIONS

Emissions are generated during loading operations when vapors in the headspace of a ship's cargo tank are displaced. A loading loss emission factor, expressed in units of lb/Mgal liquid loaded, is estimated following EPA Publication AP-42, Section 5.2, equation (1) (USEPA 1995):

$$L_L = 12.46\frac{SPM}{T}$$

S is a dimensionless saturation factor, assumed to be 0.2 for ship loading. P, M, and T represent the VOC vapor pressure, vapor phase molecular weight, and liquid surface temperature, respectively. The constant 12.46 is the inverse of the ideal gas constant, when expressed in units of (Mgal·psia)/(lb-mol·°R). For units of (MBbl·psia)/(lb-mol·°R), the leading coefficient is multiplied by 42. In order to obtain the VOC emission rate, the loading loss is multiplied by the crude oil throughput in the appropriate units.

In order to estimate the vapor phase molecular weight, data collected by Hendler et al. are considered (Hendler 2009). Hendler et al. report the complete speciation of vapors emitted from breather vents at tank batteries in 33 crude oil gathering stations in Texas (11 oil tank batteries and 22 condensate tank batteries). The 11 samples corresponding to the oil tank batteries were used as the basis for estimation. Estimates were made based on the VOC species present, rather than total hydrocarbons (including methane and ethane). This is appropriate since methane, ethane, nitrogen and carbon dioxide in a crude oil may weather out before it is exported. This assumption also makes the estimated VOC emission rate more conservative, since these constituents have low molecular weights. One sample was discarded since its speciation was reported as 100% methane. The molecular weight of each of the VOC species reported was weighted by that species' mass fraction in the sample. When vapor phase molecular weights were calculated in this manner, they ranged from 53.0 lb/lbmol to 109.8 lb/lbmol, with an average of 72.4 lb/lbmol. The loading loss factor is therefore calculated assuming a vapor phase molecular weight of 72.4 lb/lbmol.

T is taken as the monthly average annual ambient temperature for Corpus Christi, as reported in AP-42, Chapter 7, or 531.72°R (72.1°F).

The vapor pressure of the liquid is based on a maximum Reid Vapor Pressure of 9.5. This value is a specification in the tariff for the crude oil pipeline which will feed the deepwater port. Reid Vapor Pressure is converted to True Vapor Pressure using AP-42, Chapter 7, Equation 7.1-13b. At 72.1°F, RVP 9.5 corresponds to 8.44 psia. Therefore, P is taken to be 8.44 psia.

The loading loss factor is therefore calculated as 120.3 lb VOC/MBbl crude oil loaded. When the expected maximum throughput of 384 MMBbl/yr is considered, total VOC emissions are 23,098 tons per year (tpy). While loaded crude oil is expected to be predominantly "sweet," hydrogen sulfide (H_2S) are conservatively estimated based on a vapor phase content of 130 ppmw H_2S in the emitted crude oil vapors,[9] or 2.9 tpy.

13.2.4.1.5 EMISSION FACTORS FOR SHIP ENGINES

As noted above, emission factors for NO_X from marine diesel engines are based on MARPOL Annex VI limits. Emissions of SO_2 from marine fuel oil combustion are based on MARPOL Annex VI, Regulation 14, which limits the

[9] Cf. the submitted Prevention of Significant Deterioration (PSD) permit application (Volume I) for additional details on the methodology for estimating H_2S emissions.

total sulfur content of marine fuel oils to 1,000 ppmw in the North America ECA. Emissions for other products of combustion are based on EPA AP-42 emission factors, Section 3.4, Table 3.4-1.

Table 13-14: Emission Factors and Total Emissions from Ship Engines during Project Operations

Pollutant	Emission Factor (lb/hp-hr)	Total Emissions (tpy)
NO_X (VLCC)	0.0237	723
NO_X (Tug and Workboat)	0.0158	397
CO	0.0055	307
SO_2	0.001	43
Particulate	0.0007	39
VOC	0.0007	39

Engine loads used to estimate emission rates are based on an assumed worst-case operating scenario. The worst-case scenario is one where there are two VLCC's present at the facility, and both are undergoing loading operations. During loading, the VLCC propulsion system is on standby, but its ballast pumps will be operating at near full capacity. It is assumed that the VLCC's onboard diesel generators are operating at a peak load during this operation, and this is estimated as equivalent to power consumption at 10% load for the propulsion system. During loading operations, the tractor tug is moored to the VLCC stern and applies assist when necessary to prevent the VLCC from making contact with the SPM. Since the wind and weather often provides the necessary force to keep the VLCC the proper distance from the SPM, the tug is not continually applying thrust, and its representative load is assumed to be 25%. The smaller workboat assists with hose handling and other light duty assist operations and is also modeled as having a 25% load during operations.

Table 13-15: Assumed Engine Loads and NO_X Emission Rates for Vessel Propulsion Systems

Vessel	Mode	Engine Load (%)
VLCC	Moored (loading)	10%
Tug	Mooring assist	25%
Workboat	Light duty assist	25%

13.2.4.1.6 EFFECTS ON AMBIENT CONCENTRATIONS OF AIR POLLUTANTS

In order to quantify the air quality impact of the operation phase of the project, modeling analyses were performed for criteria pollutants, and impacts were compared to the applicable NAAQS. Additional analysis was performed for crude oil vapors and for hydrogen sulfide. Estimated impacts were compared to health effects screening levels established by the TCEQ Toxicology Division, and to state ambient air quality standards (30 TAC Chapter 112), respectively.

Because ozone is not directly emitted but is formed in the atmosphere via secondary reactions between air pollutants, ozone impacts due to loading operations were estimated using photochemical grid modeling. A source-specific photochemical modeling analysis was conducted following EPA guidance (USEPA 2016). The Comprehensive

Air Quality Model with Extensions (CAMx) was used to generate estimates of the likely maximum impact of the source on design ozone values near the project location. Results are summarized below, in table 13-16.

Table 13-16: Ozone Analysis (Photochemical Model)

Receptor type	SIL (ppb)	Maximum impact (ppb)	Background concentration (ppb)	Cumulative impact (ppb)
Land-based	1.0	1.6	62	63.6
Over water	1.0	4.8	62	66.8

Source: Tsirigotis 2018

The maximum impact of 4.8 ppb from the project at any receptor occurs over water. The project impact at the maximally impacted land-based receptor is 1.8 ppb, and the land-based area of impact (i.e., region where project impacts may exceed the applicable significant impacts level [SIL]) is confined to Mustang Island. Based on the estimated worst-case impacts from the project, the project will not cause or contribute to any violation of the current NAAQS for ozone (40 CFR § 52.21(d).

For other pollutants, air impacts were estimated using the American Meteorological Society-EPA Regulatory Model (AERMOD), a gaussian plume dispersion model. Offshore meteorological data were pre-processed using the Coupled Ocean Atmosphere Response Experiment (COARE) procedure. For the criteria pollutants emitted by the site, impacts in excess of the SIL are predicted for the 1-hr and Annual NO_2 NAAQS. For other pollutants, estimated project impacts are below the applicable SIL.

Table 13-17: NAAQS Analysis (Dispersion Model)

Pollutant	Averaging Time	Predicted Impact (µg/m^3)	SIL (µg/m^3)
CO	1-hr	34.3	2,000
CO	8-hr	7.6	500
NO_2	1-hr	147.1	7.5
NO_2	Annual	9.5	1
SO_2	1-hr	3.4	7.8
PM_{10}	24-hr	0.5	5
$PM_{2.5}$	24-hr	0.4	1.2
$PM_{2.5}$	Annual	0.06	0.2

For pollutants where the project-specific modeled concentration exceeds an applicable SIL, USEPA guidance indicates a refined analysis. The refined analysis includes more detailed simulation procedures, consideration of existing air quality, and consideration of emissions from other stationary sources in the general vicinity of the project. In this case, the refined analysis has considered a representative monitored background concentration for NO_2 as well as NO_X emissions from offshore platforms within 25 km of the SPM buoys. The results of the refined analysis indicate that the project will not result in an exceedance of the NO_2 NAAQS at any offshore or onshore location meeting the definition of “ambient air” (40 CFR § 50.1(e)).

Table 13-18: Refined NO_2 NAAQS Analysis

Averaging Time	Background Concentration (µg/m^3)	Project + Background (µg/m^3)	Standard (µg/m^3)
1-hr	53.3	174.7	188
Annual	4.5	14.0	100

Emissions of crude oil vapor and hydrogen sulfide were evaluated using dispersion modeling, and estimated impacts were compared to established TCEQ Effects Screening Levels (ESL’s) and to State Property Line Standards for Sulfur Compounds (30 TAC Chapter 112).

Table 13-19: Crude Oil and H_2S Dispersion Modeling Results

Air Contaminant	Averaging Period	Project Impact (µg/m^3)	ESL/Standard (µg/m^3)
Crude oil (< 1 wt.% benzene)	1-hr	33,774	3500
Crude oil (< 1 wt.% benzene)	Annual	319	350
Hydrogen sulfide	30-min	21.9	162

Under TCEQ guidelines, air contaminant concentrations occurring over industrial waters are allowable if the maximum impact is no greater than 25 times the applicable ESL, and if impacts at the maximally impacted receptor do not exceed 10 times the ESL for more than 24 hours of annual meteorological data (Thomas 2001). Based on these guidelines crude oil impacts are allowable. No exceedance of the ESL is predicated at any land-based receptor. Maximum hydrogen sulfide impacts are less than the state standard that would apply if the impacts occurred in state jurisdictional waters.

The results of the quantitative analysis presented in this section indicate that no adverse air quality impacts are expected for the project. The modeling methodology and results for both analyses are presented more fully in Appendix T.

13.2.5 Proposed Project Decommissioning Impacts

13.2.5.1 Noise

At the end of its useful life (50 years), the Proposed Project will be decommissioned. Decommissioning of the Project will include abandonment in-place of the Onshore and Inshore Pipelines, removal of the Harbor Island Booster Station, and removal of the Offshore Pipelines (from a point about 3,900 ft [1,188.7 m] offshore) and SPM buoy systems. Removal of the components will result in minor sound level increases similar to those associated with installation; underwater pipeline removal will progress along the route such that activity at any one location is of short duration. The SPM buoy systems will be removed using divers and offshore cranes. The Offshore Components will generally be disconnected and hauled to shore for proper disposal. The anchor piles will either be removed by vibration or cutting the piles 15 ft (4.6 m) below the mudline. The removal by vibration involves utilizing a vibrating hammer to loosen and remove the pile, as opposed to the impact hammer that will drive in piles during construction. A crane will be attached to the top of the pile and will apply tension to retrieve the piling at the surface.

Decommissioning activity will result in a temporary sound level increase in the immediate vicinity of the SPM buoy systems due to increased vessel activity, and sound generated by disassembly and removal of the facilities. The need for blasting to remove Project facilities is not anticipated. Therefore, decommissioning of the Project will not result in significant noise impacts; impacts will be temporary and minor to negligible.

13.2.5.2 Air Quality

Decommissioning of the Project will include abandonment in-place of the Onshore and Inshore Pipelines, removal of the Harbor Island Booster Station, and removal of the Offshore Pipeline and SPM buoys. Removal of the components will result in short-term air emissions associated with the operation of construction and demolition equipment. Air Quality impacts for these activities would be of a short-term nature, have control requirements similar to construction activities (cf. above), and are not expected to be significant or adverse.

13.2.6 Summary of Proposed Project Impacts

13.2.6.1 Noise

Construction and operation of the Proposed Project are expected to result in temporary and permanent impacts on sound levels in the Proposed Project vicinity. Installation of the Harbor Island Booster Station will generate noise due to operation of construction equipment; however, noise is not expected to exceed the USEPA's guidance level (55 dBA L_{dn}) at the nearest NSA, which is about 0.8 mi (1.3 km) away.

Temporary noise during installation of the pipelines will result from typical pipeline construction, HDDs, and vessel activity (including the pipeline lay barge). Composite construction noise for typical land-based pipeline construction could exceed the USEPA-recommended 55 dBA L_{dn} (which is equivalent to a continuous sound level of 48.6 dBA when nighttime construction is planned) along the pipelines. Pipeline construction is expected to occur over a 4-month period for the Onshore Pipelines, and over an 8.5-month period for the Inshore Pipelines; however, active pipeline construction at any location will be temporary.

Estimated noise from HDD construction could exceed the USEPA's guideline level of 55 dBA L_{dn} at the nearest residential NSAs to four HDD locations (the HDD 4 entry, HDD 5 exit, HDD 6 entry, and HDD 7 entry sites) without additional noise mitigation. However, if additional recommended noise mitigation measures are employed at each location, the sound level at the NSA nearest to each HDD will be below 55 dBA L_{dn} and the sound level increases above ambient will not be perceptible (less than 3 dB). Because HDD construction will be limited to a maximum of 9 weeks at each location, and given BWTT's intent to implement noise mitigation measures identified in Section 13.5, noise impacts from HDD construction will be temporary and minor. Impacts from HDD construction on noise levels at sensitive wildlife habitat (including designated critical habitat for the piping plover) will be temporary and negligible.

Construction of the SPM buoy systems will also generate airborne noise from pile-driving and construction and support vessels. Offshore noise from installation of the SPM buoy systems will be temporary and limited to the period of active construction. Given the intermittent, temporary nature of construction noise and distance from shore, impacts on human receptors will be negligible.

During operations, equipment at the Harbor Island Booster Station will result in localized noise. Operation of the Harbor Island Booster Station will not result in an audible increase above ambient sound levels at the nearest NSAs; therefore, impacts due to operations will be permanent but negligible. Noise from operation of the SPM buoy systems will be virtually non-existent because the SPM buoy systems do not contain any mechanical engines, pumps, or generators that will be running continuously during operation. Intermittent noise will be generated by support tugs and VLCCs calling at the SPM buoy systems (about 192 times per year). No significant increase in vessel traffic is anticipated in the Proposed Project area, and therefore airborne noise impacts from vessel traffic during operations will be localized and negligible.

Decommissioning of the Proposed Project will result in minor sound level increases during removal of Proposed Project facilities similar to those associated with installation; activity at any one location is of short duration. Therefore, decommissioning of the Proposed Project will not result in significant noise impacts; impacts will be temporary and minor to negligible.

13.2.6.2 Air Quality

Air Quality could be impacted during construction of the Project due to emissions of dust and products of combustion from construction equipment and excavation/land clearing activities onshore/inshore and emissions of products of combustion from construction and supply vessels offshore.

There are anticipated to be insignificant emissions from storage tanks, pipeline pigging and wastewater treatment facilities. The operational impacts to air quality include emissions of hydrocarbons from loading of the vessels with a work-practice of submerged fill loading and vessel VOC management and emissions of products of combustion from VLCC and support vessels.

During decommissioning, there is potential for air quality impacts due to emissions of dust and products of combustion from construction equipment and demolition/ land clearing activities and emissions of products of combustion from demolition and supply vessels.

13.3 Alternative Project

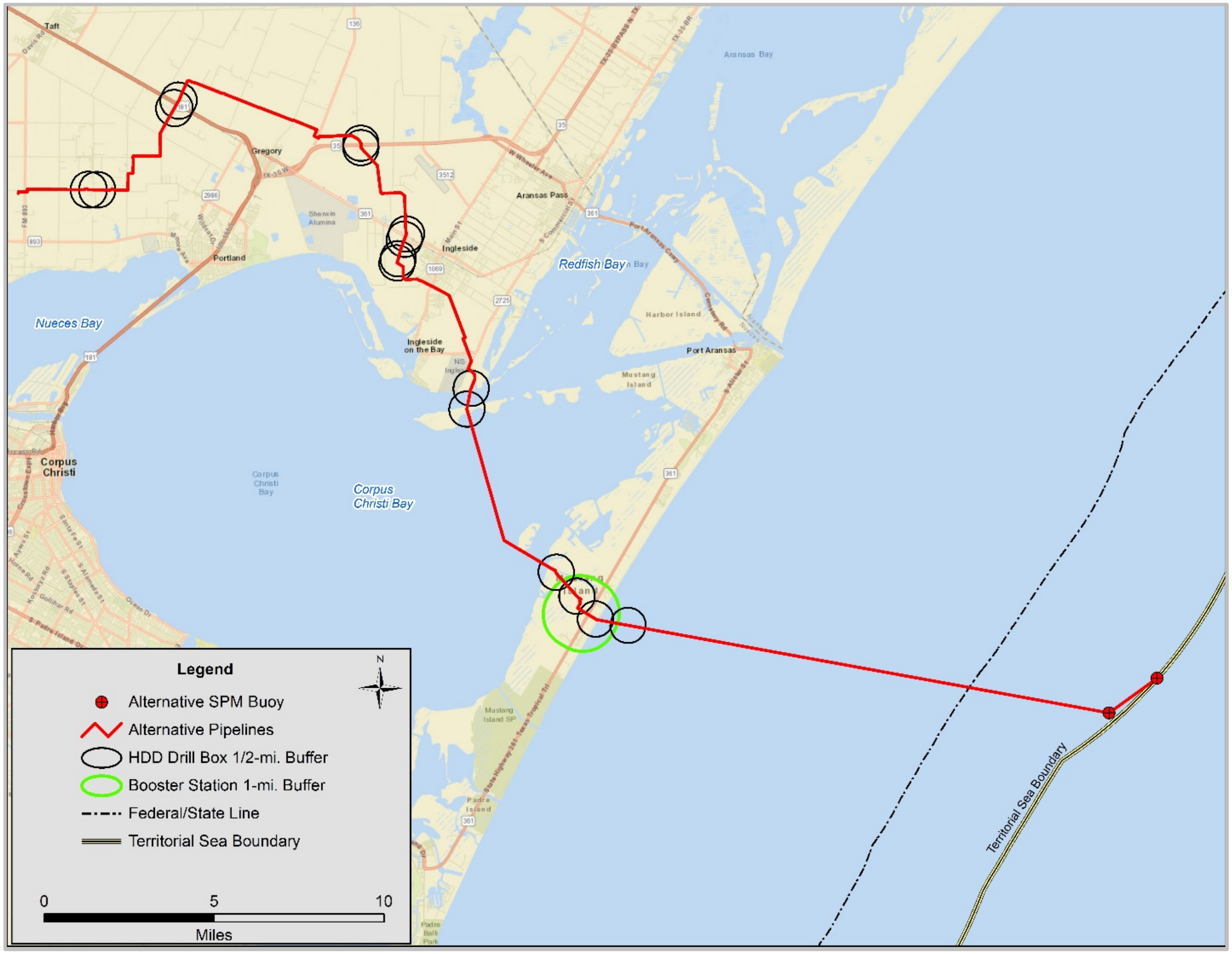
The Alternative Project would include installation of approximately 48.6 mi (78.2 km) of dual, 30-inch-diameter pipeline and the offshore SPM buoy systems located in 87 ft (27 m) of water, within the Exclusive Economic Zone (EEZ). Impacts on airborne noise would occur during construction, operations, and decommissioning of the Alternative Project components in the vicinity of NSAs ; those impacts are discussed below. Refer to Appendix A: Construction, Operation and Decommissioning Procedures, for a detailed description of techniques, procedures, and phases of the Alternative Project that were used to evaluate environmental consequences in the following sections.

13.3.1 Alternative Project Area

13.3.1.1 Noise

The Alternative Project area considered for ambient sound and noise impacts includes the nearest NSAs within 0.5 mi of HDD construction and within 1 mi of the Alternative Booster Station, as well as other potential noise receptors in the immediate vicinity of the Onshore Pipelines, Inshore Pipelines, Offshore Pipelines, and both SPM buoys (which make up the SPM buoy systems). The Alternative Project area is depicted in Figure 13-7. Underwater sound is addressed in Section 8: Wildlife and Protected Resources.

Figure 13-7: Alternative Project Area, Noise Analysis



13.3.1.1.1 AMBIENT NOISE

The Alternative Project crosses similar land uses and is located within about 10 mi (16 km) southwest of the Proposed Project in onshore and inshore areas. Therefore, the Alternative Project would be subject to similar existing ambient noise sources, including local road traffic, high altitude aircraft overflights, helicopters, commercial and recreational vessels, and natural sounds such as wildlife vocalizations, wind, and vegetation. Land uses and their associated human activities have different ambient sound levels.

NSAs in the vicinity of the Alternative Project are similar to those near the Proposed Project, including residences in the communities crossed by the pipelines, such as Ingleside. HDDs would be used to cross sensitive environmental features, major roads, and, where feasible, inshore and nearshore waters, similar to the Proposed Project. Field surveys were not conducted along the Alternative Project to quantify ambient sound levels; however, the nearest NSAs within 0.5 mi of each HDD entry and exit location and within 1 mi of the Alternative Booster Station were identified using available aerial imagery. Ambient sound levels at these locations would be similar to those identified for the Proposed Project, and Table 13-20, below, identifies the nearest NSAs within 0.5 mi of each Alternative HDD and the nearest NSAs to the Alternative Booster Station. NSAs are depicted in Figure 13-8; however, HDD 2 is the same as HDD 2 along the Proposed Project and NSAs in the vicinity are assessed in Appendix S.

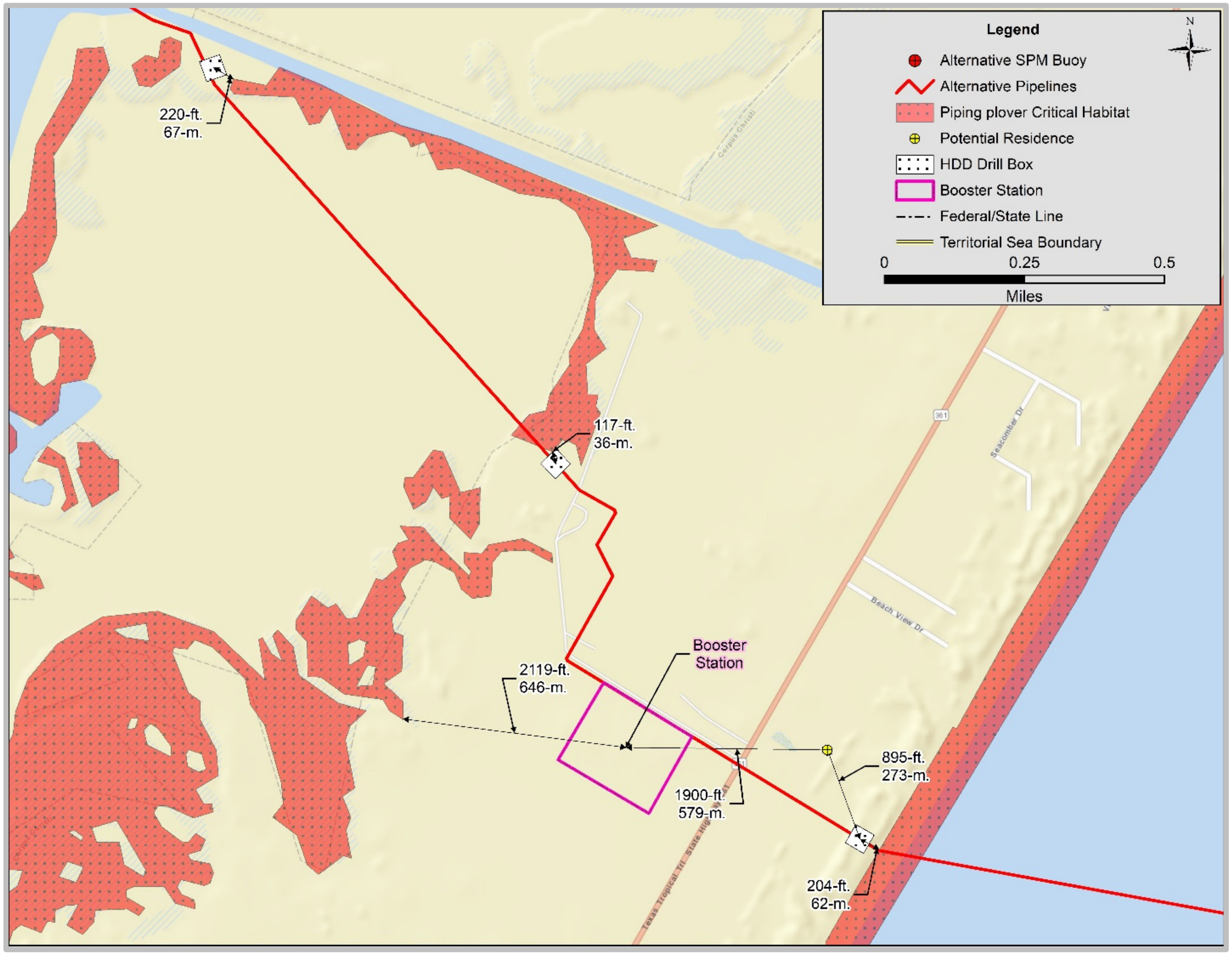
Table 13-20: Nearest Noise Sensitive Areas within 0.5 mi of Alternative HDDs and 1 mi of the Alternative Booster Station

Facility/ HDD Number	HDD Entry/ Exit Location	NSA Description[a]	Distance and Direction to Construction Workspace (ft/m)	Ambient Sound Level (L_{dn} dBA)[b]
Alternative Booster Station				
Booster Station		Potential Residence	1,900 ft (579 m; S)	51.2
		Piping plover critical habitat	2,119 ft (646 m; NW)	59.0
Alternative Onshore Pipelines				
2	entry	Residence	1,700 ft (518 m; W)	54.4
	exit	Residence	1,650 ft (503 m; NW)	54.4
Alternative Inshore Pipelines				
7	entry	Piping plover critical habitat	117 ft (32 m; NW)	59.0
	exit	Piping plover critical habitat	220 ft (67 m; SE)	59.0
8	entry	Piping plover critical habitat	204 ft (62 m; E)	59.0
		Potential Residence	895 ft (273 m; SE)	51.2

[a] No NSAs were identified within 0.5 mi of HDDs 1, 3, 4, 5, and 6. The final identification of HDD entry and exit pits along the Alternative Pipelines are pending. HDD 2 is the same as HDD 2 along the Proposed Project.

[b] Sound levels are based on similar NSAs where noise measurements were collected for the Proposed Project, as presented in Table 13-3.

Figure 13-8: NSAs in the Vicinity of the Alternative Project HDDs and Booster Station



The Alternative Onshore Pipelines would cross predominantly developed areas in Ingleside. Outside of incorporated areas, the Alternative Onshore Pipelines cross predominantly open and agricultural land, as well as some areas of wetlands. Where the Alternative Booster Station would be installed on Mustang Island, the nearest potential NSA is about 0.4 mi (0.6 km) away from the site center. The facility site is on undeveloped, open land (see Section 12: Coastal Zone Uses, Recreation, and Aesthetics). Similarly, where onshore construction activities are planned on Mustang Island, the Alternative Inshore Pipelines would cross primarily undeveloped land, but adjacent to existing disturbance (e.g., roadways, powerlines).

13.3.1.2 Climatology/Meteorology

The Alternative Project is in the same region as the Proposed Project; therefore, the climate and meteorological conditions are similar to the conditions at the Proposed Project site described above in Section 13.2.2.1.

13.3.1.3 Air Quality

The Alternative Project area differs from the Proposed Project in the specific onshore location of project components however, for the sake of this analysis, the area and scope of analysis are considered the same due to the general location of the Alternative Project in the Corpus Christi area and the Western Gulf of Mexico.

13.3.2 Alternative Project Construction Impacts

13.3.2.1 Noise

13.3.2.1.1 BOOSTER STATION

The primary sources of noise for construction of the Alternative Booster Station would be operation of internal combustion engines in construction equipment including cranes, compressors, generators, welders, excavators. During construction, sound levels would temporarily increase in the immediate vicinity of the site, and impacts would be similar to those described in Section 13.2.2.2.2 for the Proposed Project.

Using an estimated number of construction equipment for construction of the Alternative Booster Station, the composite sound level associated with the construction was estimated using the method described above for the Proposed Project.

Table 13-21 identifies the sound levels associated with typical construction equipment and the estimated composite construction noise levels at a distance of 50 ft (15 m) and at the nearest NSA (a potential residence) to construction of the Alternative Booster Station. The estimates are conservative, since it is unlikely that all equipment would be operated simultaneously. The construction equipment counts are an estimate based on currently available information; the specific equipment required for installation of each Alternative Project component would be determined by the construction contractor. Based on the assessment in Table 13-21, we estimate that construction at the Alternative Booster Station could exceed the level recommended in USEPA’s guidance (55 dBA L_{dn}) if all equipment operates simultaneously.

Table 13-21: Representative Construction Equipment Noise Sources for Alternative Booster Station Construction (L_{max})[a]

Equipment	Sound Pressure Level (dBA) at 50 ft	Equipment Count	Composite Sound Level (50 ft/15 m)	Composite Sound Level at the nearest NSA (1,900 ft/579 m)
Backhoe	78	1	78	46.4
Bulldozer	82	1	82	50.4
Dump truck	76	1	76	44.4
Front end loader	79	1	79	47.4
Generator	87	1	87	55.4
Grader	89	1	89	57.4
Pickup truck	75	1	75	43.4
Composite Sound Level			**92.2**	**60.6**

a L_{max} is the highest measured sound level observed during a measurement period

b The sound level in dBA at 50 ft (15 m) is a measured value; the estimate at the nearest NSA is a conservative modeled estimate assuming no attenuation other than by distance.

Sources: FHWA 2006, Hoover & Keith, Inc. 2000.

13.3.2.1.2 PIPELINES

ONSHORE/INSHORE PIPELINE INSTALLATION

Similar to the Alternative Project, the primary sources of noise during construction of the Alternative Onshore Pipelines would be generated by internal combustion engines in construction equipment and the HDD drill rigs. Table 13-10 estimates the composite sound levels associated with typical pipeline construction at various distances from construction for the Proposed Project, and construction noise associated with the Alternative Project would be similar. Composite construction noise could exceed the USEPA-recommended 55 dBA L_{dn} (which is equivalent to a continuous sound level of 48.6 dBA when nighttime construction is planned) along the pipelines. Pipeline construction would be expected to occur over a schedule similar to the Proposed Project and active pipeline construction at any location would be temporary. The exception would be installation of the pipelines within Corpus Christi Bay via underwater jetting/trenching methods, described below for offshore pipeline installation, which would have a slightly longer construction duration as compared to the Proposed Project. Construction would be scheduled to occur primarily during daylight hours. Typical pipeline construction is expected to move along the pipeline route, such that any single area experiences only a short duration of construction noise. Because Alternative Onshore Pipeline installation would be temporary and limited to the period of active construction, impacts on noise receptors would be localized and negligible.

BWTT would use HDD construction to install the pipelines along the Alternative Project. HDDs would be used to cross sensitive environmental features, major roads, and, where feasible, inshore and nearshore waters, similar to the Proposed Project. Impacts at nearby NSAs would be similar to those identified in Table 13-10 for the Proposed Project.

Field surveys were not conducted along the Alternative Project to quantify ambient sound levels; however, NSAs within 0.5 mi of each HDD entry and exit location along the Alternative Project were identified using available aerial imagery. Estimated noise impacts from HDD construction based on the data collected for the Proposed Project are presented in Table 13-11 using the standard formula to calculate sound attenuation over distance described above.

Table 13-12 quantifies the sound levels due to HDD construction measured at the nearest NSAs within 0.5 mi of each HDD entry and exit location.

Estimated noise from HDD construction would be expected to exceed the USEPA's guideline level of 55 dBA L_{dn} at the nearest residential NSAs to HDD construction. BWTT would likely implement mitigation measures similar to those identified in Section 13.2.3.1.2 for the Proposed Project to minimize impacts. Further, because HDD construction would be limited to an estimated maximum of 9 weeks at each location, noise impacts from HDD construction along the Alternative Project is expected to be temporary and minor.

Where HDD construction would occur near designated critical habitat for the piping plover, construction of the Alternative Project could result in more than a perceived doubling of sound (10 dB) as described in Table 13-22. Impacts due to noise from HDD construction would be temporary, and the use of HDD construction would avoid disturbance of critical habitat due to trenching. Impacts of construction noise on terrestrial wildlife, including piping plovers and sea turtles that could use the beach near the Alternative Project, are addressed in Section 8: Wildlife and Protected Resources.

BWTT would also install portions of the Alternative Pipelines using underwater jetting/trenching methods, as described below for offshore pipeline installation. Impacts from vessel activity in inshore areas along the Proposed Project will not occur. Impacts due to underwater trenching in inshore areas would be similar to those described for offshore pipeline installation along the Proposed Offshore Pipelines.

Table 13-22: Noise Impacts for the Nearest NSA within 0.5 mi of Each HDD[a]

HDD No	Entry/Exit Location	NSA Description	Distance and Direction to Construction Workspace (ft/m)	Ambient Sound Level (L_{dn} dBA)	L_{dn} due to HDD Construction (dBA)	L_{dn} (HDD + Ambient; dBA)	Increase Above Ambient (dB)
Onshore Pipelines							
2[b]	entry	Residence	1,700 ft (518 m; W)	54.4	53.5	57.0	2.6
	exit	Residence	1,650 ft (503 m; NW)	54.4	42.4	54.7	0.3
Inshore Pipelines							
7	entry	Piping plover critical habitat	117 ft (32 m; NW)	59.0	76.7	76.8	17.8
	exit	Piping plover critical habitat	220 ft (67 m; SE)	59.0	60.6	62.9	3.9
8	entry	Piping plover critical habitat	204 ft (62 m; E)	59.0	71.9	72.1	13.1
		Potential Residence	895 ft (273 m; SE)	51.2	59.1	59.7	8.5

a No NSAs were identified within 0.5 mi of HDDs 1, 3, 4, 5, and 6. The final locations of HDDs entry and exit pits along the Alternative Pipelines have not been determined.
b HDD 2 is the same as HDD 2 along the Proposed Project.

OFFSHORE (UNDERWATER) PIPELINE INSTALLATION

Typically, installation of the pipelines in the GOM would be conducted by jetting/trenching using a pipe laying barge and support vessels. The Alternative Offshore Pipelines would be installed by the pipe laying barge for about 16.2

mi (26.1 km). Trenching and backfilling for installation of the pipelines would be completed using a submersible pipeline jetting sled operated from a pipe laying barge. Similar to onshore construction, underwater pipeline installation would progress along the route such that construction at any one location is of short duration. However, pipe laying may occur up to 24 hours per day.

The Alternative Project is in an area subject to noise impacts by commercial vessels operating in the Intracoastal Waterway and navigational fairways in the GOM. Airborne noise from construction and support vessels would be consistent with other vessel activity in the Project vicinity. Sound levels from the pipe laying barge are estimated to be about 90 dBA (consistent with OSHA's 8-hour permissible noise exposure level of 90 dBA), and would be consistent with other vessels operating in the GOM and Intracoastal Waterway. Therefore, nearshore underwater pipeline construction would have localized, negligible impacts on the airborne noise environment.

13.3.2.1.3 SPM BUOYS

Similar to the Proposed Project, noise from operation of the Alternative SPM buoy systems would be virtually non-existent because the SPM buoy systems do not contain any mechanical engines, pumps, or generators that would be running continuously during operation. The only noise sources located at the Alternative SPM buoy systems would be assistant vessels such as tugs and the VLCC while it is moored to the SPM buoy system. Because noise from operations of the SPM buoy systems would be minimal, and any noise produced would be controlled to meet standards established for worker protection, impacts on airborne noise at the SPM buoy systems site would be localized, minor, and limited to the times when vessels are moored. Given the distance of the Alternative Project facilities from shore, no airborne noise impacts on land-based receptors from operation of the SPM buoy systems would occur. While noise from operation of the vessels at the SPM buoy systems could impact recreational boating and fishing in the vicinity of the site, establishment of the Safety Zone around each of the SPM buoy systems would exclude recreational vessels from the immediate area. Therefore, noise from SPM buoy systems operations is not expected to impact recreational activity.

As with the Proposed Project, intermittent noise would be generated by support tugs and VLCCs calling at the Alternative Project SPM buoy systems (about 192 times per year). Noise from service vessels and VLCCs would be transient in the immediate Alternative Project vicinity, limited to the time when they are approaching, loading, and leaving the SPM buoy systems. VLCCs that would call at the SPM buoy systems are similar to other vessels operating in the GOM, as described in Section 13.3.1.1.1. Further, supply vessels and VLCCs transiting to the Alternative SPM buoy systems would generally use established shipping lanes. A minimum of two support tugs ad one smaller support vessel would be on location at the SPM buoy systems during operations. No significant increase in vessel or traffic is anticipated in the Alternative Project area, and therefore airborne noise impacts from vessel traffic during operations would be localized and negligible.

13.3.2.2 Air

Air quality impacts associated with Onshore and Inshore Construction activities would consist of emissions from construction equipment as well as possible particulate emissions from excavation and land clearing activities. These impacts would be of a short-term duration, would be subject to control measures (summarized below), and are assumed to be insignificant and not adverse.

Diesel-fired construction equipment must be manufactured in accordance with EPA regulations applying to non-road compression ignition engines (40 CFR Parts 89, 1039), which limit emissions of NO_X, CO, SO_2, particulate and non-methane hydrocarbons from such equipment. The formation of dust during construction operations is subject to TCEQ regulations at 30 TAC § 111.145, which establishes minimum required measures to suppress dust formation. These include the use of water to control dust formation during construction and land clearing operations, and the use of enclosures during sandblasting operations.

13.3.3 Alternative Project Operation Impacts

13.3.3.1 Noise

13.3.3.1.1 BOOSTER STATION

Noise sources during operations at the Alternative Booster Station would include engines, pumps, and other mechanical equipment. Similar to the Proposed Project, the major noise-generating equipment present on site would include four 5,500 horsepower electric motor-driven crude oil pumps that would be located within noise abatement housings to minimize noise during operations. Because all of the equipment at the pump station would not be operated simultaneously, and since the Alternative Booster Station would only be operated during loading, operational sound levels would vary. Estimated noise impacts from operation of the Alternative Booster Station based on the data collected for the Proposed Project are presented in Table 13-23 using the standard formula to calculate sound attenuation over distance described above. Operation of the Alternative Booster Station would not result in an audible increase above ambient sound levels at the nearest residential NSA; therefore, impacts due to operations would be permanent but negligible.

Table 13-23: Operational Noise for the Alternative Booster Station

NSA Description	Distance and Direction to Construction Workspace(ft/m)	Ambient Sound Level (L_{dn} dBA)	L_{dn} due to the Booster Station	L_{dn} (Booster Station + Ambient)	Increase Above Ambient
Potential Residence	1,900 ft (579 m; S)	51.2	49.3	53.4	2.2
Piping plover critical habitat	2,119 ft (646 m; NW)	59.0	48.0	59.3	0.3

Because operations would emit continuous sound, the Alternative Booster Station could affect nearby wildlife. Noise could affect animal behavior, and cause wildlife species to move away from the noise or relocate to avoid the sound. However, given the availability of similar habitat near the facility, the minor impact on sound levels at designated critical habitat areas less than 1 mi from the site, the use of noise abatement housings, and because operational noise would quickly attenuate with distance from the facility, the increased noise would result in permanent, but negligible impacts on wildlife. See Section 8: Wildlife and Protected Resources for additional detail regarding wildlife impacts.

13.3.3.1.2 PIPELINES

Because the SPM buoy systems for the Alternative Project would be located 13.4 nautical miles (15.4 mi [24.8 km]) off the coast of Mustang Island), similar to the Proposed Project, impacts on land-based noise sensitive receptors are anticipated to be limited to the temporary period of onshore and nearshore pipeline installation. No onshore or inshore operational noise impacts are anticipated for the pipelines.

13.3.3.1.3 SPM BUOYS

Noise from operation of the Alternative SPM buoy systems would be virtually non-existent because the SPM buoy systems do not contain any mechanical engines, pumps, or generators that would be running continuously during operation. The only noise sources located at the SPM buoy systems would be assistant vessels such as tugs and the VLCC while it is moored to the SPM buoy system. Because noise from operations of the SPM buoy systems would be minimal, and any noise produced would be controlled to meet standards established for worker protection, impacts on airborne noise at the Alternative SPM buoy systems site would be localized, minor, and limited to the times when vessels are moored. Given the distance of the Alternative Project facilities from shore, no airborne noise impacts on land-based receptors from operation of the SPM buoy systems would occur. While noise from operation of the vessels at the Alternative SPM buoy systems could impact recreational boating and fishing in the vicinity of the site, establishment of the Safety Zone around each of the SPM buoy systems would exclude recreational vessels from the immediate area. Therefore, noise from operation of the Alternative SPM buoy systems is not expected to impact recreational activity.

Similar to the Proposed Project, Intermittent noise would be generated by support tugs and VLCCs calling at the Alternative SPM buoy systems. Noise from service vessels and VLCCs would be transient in the immediate Alternative Project vicinity, limited to the time when they are approaching, loading, and leaving the SPM buoy systems. VLCCs that would call at the SPM buoy systems are similar to other vessels operating in the GOM, as described in Section 13.3.1.1.1. Further, supply vessels and VLCCs transiting to the SPM buoy systems would generally use established shipping lanes. No significant increase in vessel traffic is anticipated in the Alternative Project area, and therefore airborne noise impacts from vessel traffic during operations would be localized and negligible.

13.3.3.2 Air Quality

The Alternative Project does not materially differ from the Proposed Project in terms of the level of air pollutant emissions expected. The activities that give rise to the most significant emissions of air pollutants (loading operations vessel traffic during operations) are substantially similar under both the Proposed Project and the Alternative Project. Since significant air quality impacts from the Project would be confined to the offshore areas in the vicinity of the SPM buoys, and offshore existing conditions are similar for both the Proposed and Alternative Projects, no qualitative difference in air impacts is anticipated for the alternative project.

Although significant onshore air quality impacts are not expected under either scenario, it is relevant to note that the SPM buoys are located closer to a populated area under the alternative project. To the extent onshore air quality impacts occur, they would be more likely to occur at a populated area under the alternative project.

13.3.4 Alternative Project Decommissioning Impacts

13.3.4.1 Noise

Similar to the Proposed Project, decommissioning of the Alternative Project would include abandonment in-place of the Onshore and Inshore Pipelines, removal of the Alternative Booster Station, and removal of the Offshore Pipelines and SPM buoys. Removal of the components would result in minor sound level increases similar to those associated with installation; underwater pipeline removal would progress along the route such that activity at any one location is of short duration. Decommissioning activity would result in a temporary sound level increase in the immediate vicinity of the Alternative SPM buoys due to increased vessel activity, and sound generated by disassembly and removal of the facilities. The need for blasting to remove Alternative Project facilities is not anticipated. Therefore, decommissioning would not result in significant noise impacts.

13.3.4.2 Air

Decommissioning of the Alternative Project will include abandonment in-place of the Onshore and Inshore Pipelines, removal of the Booster Station, and removal of the Offshore Pipeline and SPM buoys. Removal of the components will result in short-term air emissions associated with the operation of construction and demolition equipment. Air Quality impacts for these activities would be of a short-term nature, have control requirements similar to construction activities (above), and are not expected to be significant or adverse.

13.3.5 Summary of Alternative Project Impacts

13.3.5.1 Noise

Construction and operation of the Alternative Project are expected to result in temporary and permanent impacts on sound levels in the Project vicinity. Installation of the Alternative Booster Station would generate noise due to operation of construction equipment. The nearest potential NSA is about 0.4 mi (0.6 km) away from the site center and construction at the Alternative Booster Station could exceed the level recommended in USEPA's guidance (55 dBA L_{dn}) if all equipment operates simultaneously.

Temporary noise during installation of the Alternative Pipelines would result from typical pipeline construction, HDDs, and vessel activity (including the pipeline lay barge). Composite construction noise for typical land-based pipeline construction could exceed the USEPA-recommended 55 dBA L_{dn} (which is equivalent to a continuous sound level of 48.6 dBA when nighttime construction is planned) along the pipelines. Pipeline construction is expected to occur over a schedule similar to the Proposed Project and active pipeline construction at any location would be temporary. The exception would be installation of the pipelines within Corpus Christi Bay via underwater jetting/trenching methods; impacts from vessel activity in inshore areas along the Proposed Project will not occur.

Estimated noise from HDD construction could exceed the USEPA's guideline level of 55 dBA L_{dn} at the nearest residential NSAs to one location without additional noise mitigation. However, BWTT would implement noise mitigation measures such that the sound level at the NSA nearest to each HDD would be below 55 dBA L_{dn} and the sound level increases above ambient would not be perceptible (less than 3 dB). Because HDD construction would be limited to a maximum of 9 weeks at each location, and given BWTT's intent to implement noise mitigation measures, noise impacts from HDD construction of the Alternative Project would be temporary and minor. Impacts from HDD construction on noise levels at sensitive wildlife habitat (including designated critical habitat for the piping plover) could result in more than a perceived doubling of sound (10 dB). Impacts due to noise from HDD construction would be temporary, and the use of HDD construction would avoid disturbance of critical habitat due to trenching.

Construction of the Alternative SPM buoy systems would also generate airborne noise from pile-driving and construction and support vessels. Offshore noise from installation of the Alternative SPM buoy systems would be temporary and limited to the period of active construction. Given the intermittent, temporary nature of construction noise and distance from shore, impacts on human receptors would be negligible.

During operations, equipment at the Alternative Booster Station would result in localized noise. Operation of the Alternative Booster Station would not result in an audible increase above ambient sound levels at the nearest NSA; the estimated increase is 2.2 dB. Therefore, impacts due to operations would be permanent but negligible. Noise from operation of the SPM buoy systems would be virtually non-existent because the Alternative SPM buoy systems do not contain any mechanical engines, pumps, or generators that would be running continuously during operation. Intermittent noise would be generated by support tugs and VLCCs calling at the Alternative SPM buoy systems (about 192 times per year). No significant increase in vessel traffic is anticipated in the Alternative Project area, and therefore airborne noise impacts from vessel traffic during operations would be localized and negligible.

Decommissioning of the Alternative Project would result in minor sound level increases during removal of Project facilities similar to those associated with installation; activity at any one location is of short duration. Therefore, decommissioning of the Alternative Project would not result in significant noise impacts; impacts would be minor to negligible.

13.3.5.2 Air Quality

Air Quality could be impacted during construction of the Project due to emissions of dust and products of combustion from construction equipment and excavation/land clearing activities onshore/inshore and emissions of products of combustion from construction and supply vessels offshore.

There are anticipated to be insignificant emissions from storage tanks, pipeline pigging and wastewater treatment facilities. The operational impacts to air quality include emissions of hydrocarbons from loading of the vessels with a work-practice of submerged fill loading and vessel VOC management and emissions of products of combustion from VLCC and support vessels.

During decommissioning, there is potential for air quality impacts due to emissions of dust and products of combustion from construction equipment and demolition/ land clearing activities and emissions of products of combustion from demolition and supply vessels.

13.4 Summary of Impacts

A summary of impacts for both the Proposed Project and Alternative Project is presented in Table 13-24 below.

13.4.1 Noise

Construction and operation of the Proposed and Alternative Projects are expected to result in temporary and permanent impacts on sound levels in the Project vicinity. Installation of the Harbor Island Booster Station and the Alternative Booster Station will generate noise due to operation of construction equipment. The nearest potential NSAs are about 0.8 mi (1.3 km) from the Harbor Island Booster Station and 0.4 mi (0.6 km) away from the Alternative Booster Station site center. At those distances, construction of the Harbor Island Booster Station is not expected to exceed the USEPA's guidance level (55 dBA L_{dn}); however, construction of the Alternative Booster Station would if all equipment operates simultaneously.

Temporary noise during installation of the Proposed and Alternative Pipelines will result from typical pipeline construction, HDDs, and vessel activity (including the pipeline lay barge). Composite construction noise for typical land-based pipeline construction could exceed the USEPA-recommended 55 dBA L_{dn} (which is equivalent to a continuous sound level of 48.6 dBA when nighttime construction is planned) along the pipelines. Pipeline construction is expected to occur over a similar schedule for each Project scenario. However, the installation of the Alternative Inshore Pipelines within Corpus Christi Bay via underwater jetting/trenching methods would result in temporary noise impacts from vessel activity; similar impacts in inshore areas along the Proposed Project will not occur.

Estimated noise from HDD construction could exceed the USEPA's guideline level of 55 dBA L_{dn} at the nearest residential NSAs to four locations along the Proposed Project and one location along the Alternative Project. However, BWTT would implement noise mitigation measures such that the sound level at the NSA nearest to each HDD would be below 55 dBA L_{dn} and the sound level increases above ambient would not be perceptible (less than 3 dB) under either Project scenario. Because HDD construction will be limited to a maximum of 9 weeks at each location, and given BWTT's intent to implement noise mitigation measures, noise impacts from HDD construction of the Proposed and Alternative Projects will be temporary and minor. Impacts from HDD construction on noise levels at sensitive wildlife habitat (including designated critical habitat for the piping plover) will be temporary and negligible for the Proposed Project; however, the Alternative Project could result in more than a perceived doubling of sound (10 dB).

Construction of the Proposed and Alternative SPM buoy systems will also generate airborne noise from pile-driving and construction and support vessels. Offshore noise from installation of the SPM buoy systems will be temporary and limited to the period of active construction. Given the intermittent, temporary nature of construction noise and distance from shore, impacts on human receptors will be negligible.

During operations, equipment at the Harbor Island and Alternative Booster Stations will result in localized noise. Operation of the Harbor Island and Alternative Booster Stations will not result in an audible increase above ambient sound levels at the nearest NSA; the estimated increase is up to 0.3 dB under the Proposed Project and 2.2 dB under the Alternative Project. Therefore, impacts due to operations will be permanent but negligible. Noise from operation of the SPM buoy systems will be virtually non-existent because the Alternative SPM buoy systems do not contain any mechanical engines, pumps, or generators that will be running continuously during operation. Intermittent noise will be generated by support tugs and VLCCs calling at the Alternative SPM buoy systems (about 192 times per year).

No significant increase in vessel traffic is anticipated in the Project area, and therefore airborne noise impacts from vessel traffic during operations will be localized and negligible.

Decommissioning of the Proposed and Alternative Projects will result in minor sound level increases during removal of Project facilities similar to those associated with installation; activity at any one location is of short duration. Therefore, decommissioning of the Proposed and Alternative Projects will not result in significant noise impacts; impacts will be minor to negligible.

In summary, construction and operation of the Proposed and Alternative Projects are expected to result in temporary and permanent impacts on sound levels in the Project vicinity. Installation of the Harbor Island and Alternative Booster Stations will generate noise due to operation of construction equipment. The nearest potential NSAs are about 0.8 mi (1.3 km) from the Harbor Island Booster Station and 0.4 mi (0.6 km) away from the Alternative Booster Station site center. At those distances, construction of the Harbor Island Booster Station is not expected to exceed the USEPA's guidance level (55 dBA L_{dn}); however, construction of the Alternative Booster Station would if all equipment operates simultaneously. In addition, greater noise impacts would occur on sensitive wildlife habitat during HDD construction of the Alternative Project. Finally, while neither of the Proposed and Alternative Booster Stations will result in an audible noise level increase at the nearest NSAs, the noise increase associated with the Alternative Booster Station would be greater. Therefore, the Proposed Project is the least environmentally damaging practicable alternative (LEDPA).

13.4.2 Air Quality

Air Quality could be impacted during construction of the Project due to emissions of dust and products of combustion from construction equipment and excavation/land clearing activities onshore/inshore and emissions of products of combustion from construction and supply vessels offshore.

There are anticipated to be insignificant emissions from storage tanks, pipeline pigging and wastewater treatment facilities.

The operational impacts to air quality include emissions of hydrocarbons from loading of the vessels with a work-practice of submerged fill loading and vessel VOC management and emissions of products of combustion from VLCC and support vessels. No exceedance of the ESL is predicated at any land-based receptor. Maximum hydrogen sulfide impacts are less than the state standard that would apply if the impacts occurred in state jurisdictional waters. The results of the quantitative analysis presented in this section indicate that no adverse air quality impacts are expected for the project.

During decommissioning, there is potential for air quality impacts due to emissions of dust and products of combustion from construction equipment and demolition/ land clearing activities and emissions of products of combustion from demolition and supply vessels.

Table 13-24: Summary of Impacts

		Construction	Operation	Decommissioning
NOISE				
Proposed Project	**Onshore**	Temporary, minor increased noise due to operation of construction equipment, including HDDs, along the pipelines for installation. With planned mitigation, HDDs will not result in perceptible sound increases at NSAs.	None.	None; the Onshore Pipelines will be abandoned in-place.
	Inshore	Temporary, minor increased noise due to operation of construction equipment, including HDDs, along the pipelines for installation and at the Harbor Island Booster Station; USEPA guidance levels are not expected to be exceeded for construction of the Harbor Island Booster Station. Temporary, negligible impacts on noise levels at sensitive wildlife habitat during HDDs.	Permanent, negligible impacts due to increased noise during Harbor Island Booster Station operation (0.3 dB increase at the nearest NSA).	Temporary, minor to negligible increased noise due to operation of construction equipment during removal of the Harbor Island Booster Station.
	Offshore	Temporary, negligible impacts on human receptors from increased noise due to operation of vessels and pile-driving for installation of the pipelines and SPM buoy systems.	Intermittent, localized, negligible increased noise due to operation of vessels during VLCC loading.	Temporary, minor to negligible increased noise due to operation of construction equipment and vessel activity.
Alternative Project	**Onshore**	Increased noise due to operation of construction equipment, including HDDs. With planned mitigation, HDDs would not result in perceptible sound increases at NSAs.	None.	None; the Alternative Onshore Pipelines would be abandoned in-place.
	Inshore	Temporary, minor increased noise due to operation of construction equipment, including HDDs, along the pipelines for installation and at the Alternative Booster Station. *Noise from construction of the Alternative Booster Station could exceed USEPA guidance levels at the nearest NSA. *Temporary, minor noise from vessel activity during installation of the pipelines across Corpus Christi Bay. *Temporary doubling of sound or more at sensitive wildlife habitat during HDDs.	Permanent, negligible impacts due to increased noise during Alternative Booster Station operation (2.2 dB increase at the nearest NSA).	Temporary, minor to negligible increased noise due to operation of construction equipment during removal of the Alternative Booster Station.
	Offshore	Temporary, negligible impacts on human receptors from increased noise due to operation of vessels and pile-driving for installation of the pipelines and SPM buoy systems.	Intermittent, localized, negligible increased noise due to operation of vessels during VLCC loading.	Temporary, minor to negligible increased noise due to operation of construction equipment and vessel activity.

Table 13-24: Summary of Impacts

		Construction	Operation	Decommissioning
AIR QUALITY				
Proposed Project	**Onshore**	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.	None.	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.
	Inshore	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.	Insignificant emissions from storage tanks, pipeline pigging and wastewater treatment facilities.	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.
	Offshore	Emissions of products of combustion from construction and supply vessels.	Emissions of hydrocarbons from loading with a work-practice of submerged fill loading and vessel VOC management; emissions of products of combustion from VLCC and support vessels.	Emissions of products of combustion from construction and supply vessels.
Alternative Project	**Onshore**	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.	None.	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.
	Inshore	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.	Insignificant emissions from storage tanks, pipeline pigging and wastewater treatment facilities.	Emissions of dust and products of combustion from construction equipment and excavation/land clearing activities.
	Offshore	Emissions of products of combustion from construction and supply vessels.	Emissions of hydrocarbons from loading with a work-practice of submerged fill loading and vessel VOC management; emissions of products of combustion from VLCC and support vessels.	Emissions of products of combustion from construction and supply vessels.

*indicates an environmental consequence that is more impactful as compared to the other Project alternative.

13.5 Mitigation of Proposed Project Impacts

The Proposed Project is the least environmentally damaging practicable alternative (LEDPA) choice in regard to air quality and noise impacts. Therefore, mitigation measures for the anticipated air quality and noise from only the Proposed Project are discussed in this section.

Impacts from pipeline construction on nearby NSAs will be temporary during active construction in the immediate vicinity. Noise will be attenuated using housing structures on all pumps or mechanical engines that emit noise above the acceptable limit, meeting all regulations. As recommended in Appendix S, BWTT will investigate the use of site-specific noise mitigation at HDDs 4, 5, 6, and 7, including the use of temporary barriers between construction workspace and nearby NSAs and enclosures surrounding HDD equipment.

Given the distance of the SPM buoys and Harbor Island Booster Station from NSAs, impacts are not anticipated and additional noise mitigation measures are not necessary for the Project. However, the Harbor Island Booster Station pumping systems will be located within noise abatement housings to minimize noise during operations to the maximum extent practicable

For air quality purposes, mitigation measures correspond to control measures specified in an applicable regulation or in an enforceable construction or operating permit. Anticipated control requirements have been identified at various points in the preceding discussion and should be regarded as specific mitigation measures that will be undertaken.

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Response to PSD Incompleteness Notification, Items 1 and 10

The response to this item is divided into two portions. First, BWTX briefly responds to the specific questions about the emissions calculation methodology presented in the application. Second, BWTX presents a proposed, revised emission calculation methodology.

Methodological Remarks

The data in the referenced publication was selected because BWTX felt that it was methodologically apt: it was the only study identified providing comprehensive, directly measured data on the composition of vapors in the headspace of a crude oil storage tank. As EPA observes, however, several assumptions had to be made in order to use the data to develop emission factors. These assumptions were guided by two customary heuristics in developing emission calculations: first, assumptions should be scientifically-based, and should be conservative to the extent that their accuracy is not known; and second, they should be susceptible to verification in the form of permit monitoring requirements.

The mean was selected for several parameters for which multiple results were reported because these parameters were treated as random variables. A sample mean corresponds to the expected value of a random variable.

The solubility of gases in liquids is usually pressure-dependent, and not well-modeled by Raoult's law.[1] When the pressure of a system is suddenly reduced (e.g., when crude oils are removed from reservoirs), "weathering" or flash volatilization of gaseous compounds such as methane, ethane, carbon dioxide and nitrogen is expected. This intuition is consistent with the speciation data discussed below. Excluding these low-molecular weight compounds from the vapor phase molecular weight estimation was a conservative assumption which tended to increase reported emissions.

Basic assay data were compiled from fourteen crude oil samples representing the range of crude oils BWTX expects to handle. Reported dissolved H_2S values range from 0–2 ppm, consistent with assumed value of 2 ppm used in the application.

Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14
H_2S (ppm)	1	1	2	2	2	2	1	1	1	0	–	1	2	1

BWTX understands stabilized lease condensate to be a type of crude oil, when factors such as geologic reservoir and volatility are controlled for, and is unaware of any methodology for identifying a particular sample of unknown provenance as "crude oil" rather than "condensate." This understanding is reflected in the terms of the suggested NOMA. To answer EPA's specific question, BWTX does not currently plan to load condensate at the SPM terminal.

[1] J. H. Hildebrand. "Solubility." J. Am. Chem. Soc. 1916, 38(8) 1452–1473.

Revised Methodology for Determining Speciated Emission Rates

In order to address EPA's request to "calculate emissions based on known values for the crude oil you intend to export for all pollutants," BWTX obtained detailed sampling data for five crude oil samples which are representative of the range of crude oils that BWTX expects to handle.

Data available for each sample included a boiling point distribution (ASTM D7169), a detailed hydrocarbon analysis (ASTM D7169 Appendix 1), relative densities of different cuts (various methods), and an analysis of the LPG cut (initial boiling point–70° F; ASTM D2163). The data provided detailed information on the liquid phase composition of a crude oil sample.

In order to estimate the composition of the vapors in equilibrium with each liquid sample, BWTX computed mole fractions for each constituent. Next, published K-factor nomographs[2] were used to determine equilibrium gas phase mole fractions of methane and ethane, and Raoult's law was used to determine gas phase partial pressures for all other constituents. Raoult's law was not used for methane and ethane because their respective critical temperatures may be exceeded at ambient conditions.

In order to determine the molecular weight of the crude oil sample as a whole, the molecular weight of each cut for which relative densities were reported was determined using the following published correlation,[3] where T_b is the middle boiling point of a petroleum fraction in Kelvins and d is the relative density of the cut.

$$MW = \frac{0.010770 T_b^{1.52869+0.06486 \ln\left(\frac{T_b}{1078-T_b}\right)}}{d} \tag{1}$$

The proportion of the total sample corresponding to a particular cut, as well as the middle boiling point of each cut, was determined from boiling curves. For the LPG cut, the molecular weight was calculated directly from the speciation data mentioned above rather than from Goossens' correlation. The liquid phase average molecular weight is the harmonic mean of the molecular weights of the various cuts, weighted by their mass fractions.

Once mole fractions were calculated for each constituent reported in the detailed hydrocarbon analysis (the number of positively identified constituents ranged from 82–91), partial pressures were calculated for each constituent (excepting methane and ethane) using Raoult's law at two temperatures: 72.1° F (annual average) and 95° F (assumed worst-case hourly average). Pure component vapor pressures were calculated from Antoine equation coefficients downloaded from NIST Webbook. Where published coefficients were not identifiable, a structurally similar isomer was selected as a surrogate for purposes of determining vapor pressures.

Constituent-specific partial pressures and calculated yi values for methane and ethane were used to develop a complete speciation of the vapor phase in equilibrium with the liquid phase of the sample, and thence to calculate the vapor phase molecular weight. Once the average vapor phase molecular weight was estimated, it was possible to determine the vapor phase mass fraction of each constituent. Additionally,

[2] Gas Processors Suppliers Association. 2004. Engineering Data Book (Sec. 25). Tulsa, OK.

[3] Goossens, Adriaan G. Prediction of Molecular Weight of Petroleum Fractions. Ind. Eng. Chem. Res. 1996, 35: 985–988.

partial pressures were summed to obtain a total vapor pressure and a total VOC vapor pressure for each sample and temperature (ten values total). Vapor phase molecular weights (lb/lbmol), VOC vapor pressures (psia), and emission rates (based on product throughputs and pumping rates represented in the application) are reported below for each sample and temperature condition.

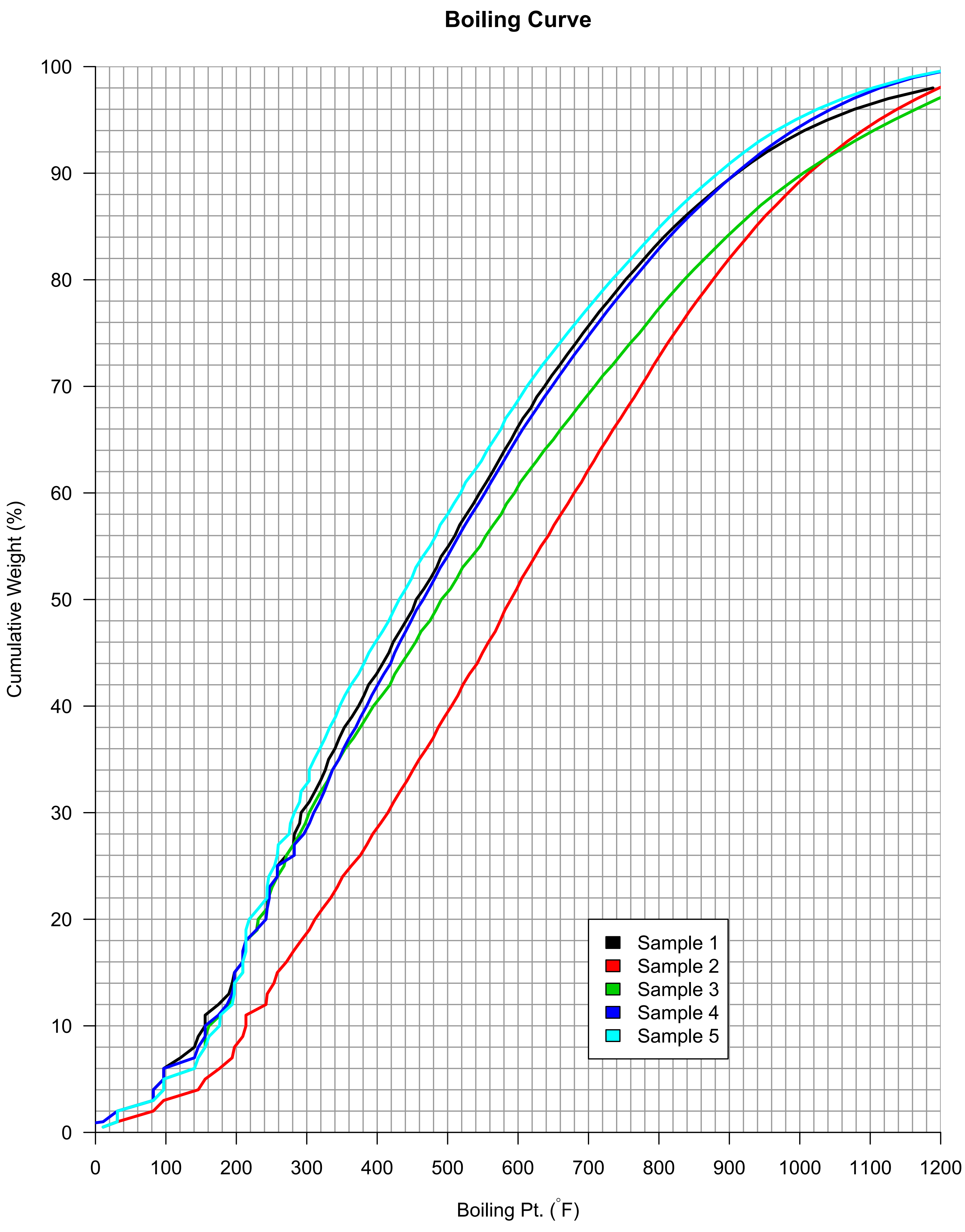
Sample	1	2	3	4	5
MW (72.1° F)	59.37	57.07	56.89	53.04	55.94
MW (95° F)	60.32	58.09	57.75	53.57	56.79
HC VP (72.1° F)	5.24	3.37	4.59	6.44	4.55
HC VP (95° F)	7.74	4.94	6.74	9.32	6.67
VOC VP (72.1° F)	5.24	3.31	4.38	5.86	4.28
VOC VP (95° F)	7.74	4.83	6.36	8.28	6.18
HC ER (lb/hr)	7488	4607	6247	8007	6071
HC ER (tpy)	11767	7276	9859	12904	9611
VOC ER (lb/hr)	7488	4504	5892	7118	5632
VOC ER (tpy)	11767	7144	9407	11749	9051

Vapor phase mass fractions for HAP constituents are summarized below for each sample at the T=95° F condition. Styrene was detected in only one sample. Isooctane, cresols, and naphthalene were not positively identified in any sample.

Sample	1	2	3	4	5
n-Hexane	3.20 %	3.09 %	3.57 %	3.13 %	3.57 %
Benzene	0.34 %	0.058 %	0.35 %	0.20 %	0.34 %
Toluene	0.19 %	0.13 %	0.28 %	0.13 %	0.33 %
m-Xylene	0.097 %	0.046 %	0.048 %	0.037 %	0.074 %
p-Xylene	0.049 %	0.056 %	0.034 %	0.028 %	0.043 %
o-Xylene	0.022 %	0.021 %	0.018 %	0.014 %	0.022 %
Ethylbenzene	0.011 %	0.017 %	0.027 %	0.011 %	0.021 %
Styrene	0.001 %	—	—	—	—

More detailed results, supporting calculations and figures are included as in Appendix A of this submission. While the results of this analysis generally support the assumptions originally made in the permit application, BWTX believes that EPA's preference is to use site-specific data to estimate emission rates, and requests that the source's potential to emit be updated based on the revised emission rates presented herein.

Appendix A-1— Boiling Curves for Five Crude Oil Samples


Boiling Curve
Cumulative Weight (%)
Boiling Pt. (°F)
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
Sample 1
Sample 2
Sample 3
Sample 4
Sample 5

Appendix A-2— Sample Calculation for Liquid Phase Molecular Weight Estimation

$$\text{MW} = g(T_b, d) = \frac{0.010770 T_b^{1.52869+0.06486 \ln\left(\frac{T_b}{1078-T_b}\right)}}{d} \tag{2}$$

$$T/K = f(T/^\circ F) = \frac{T/^\circ F + 459.67}{1.8} \tag{3}$$

$$\text{MW} = g \circ (f \circ T_b, d) \tag{4}$$

Where:

$T_b =$ Middle poiling point of fraction (K) (from boiling curve)
$d =$ Relative density of fraction (dimensionless)

Cuts for which density data are available ($^\circ F$):

IBP – 70
70 – 155
155 – 185
185 – 210
210 – 270
270 – 335
335 – 380
380 – 450
450 – 510
510 – 580
580 – 660
660 – 785
785 – 900
900 – 1050
1050 – FBP

For Sample 1,

$$T_b/^\circ F = \begin{bmatrix} - \\ 105.1 \\ 161.6 \\ 197.1 \\ 243.8 \\ 299.8 \\ 354.9 \\ 415.9 \\ 479.9 \\ 544.8 \\ 618.2 \\ 718.4 \\ 837.1 \\ 962.6 \\ 1166.2 \end{bmatrix} \quad d = \begin{bmatrix} - \\ 0.6494 \\ 0.6974 \\ 0.7172 \\ 0.7402 \\ 0.7614 \\ 0.7676 \\ 0.7780 \\ 0.7956 \\ 0.8095 \\ 0.8227 \\ 0.8418 \\ 0.8516 \\ 0.8649 \\ 0.8820 \end{bmatrix} \quad \mathsf{MW}/\frac{\mathsf{lb}}{\mathsf{lbmol}} = \begin{bmatrix} \mathsf{MW}_{\mathsf{LPG}} = 58.9 \\ 78.0 \\ 88.0 \\ 95.9 \\ 107.2 \\ 122.6 \\ 141.6 \\ 163.9 \\ 188.3 \\ 216.5 \\ 252.8 \\ 309.9 \\ 298.3 \\ 518.4 \\ 832.1 \end{bmatrix} \tag{5}$$

$\mathsf{MW}_{\mathsf{LPG}}$ is determined directly from the LPG analysis.

$$\mathsf{MW}_{avg} = \left(\frac{\sum_{i=1}^{n} w_i \mathsf{MW}_i^{-1}}{\sum_{i=1}^{n} w_i} \right)^{-1} \tag{6}$$

$$w/\%\text{(from boiling curve)} = \begin{bmatrix} 2.76 \\ 7.17 \\ 2.77 \\ 4.49 \\ 8.72 \\ 9.54 \\ 5.39 \\ 8.16 \\ 6.96 \\ 7.94 \\ 8.16 \\ 10.34 \\ 7.05 \\ 5.82 \\ 4.72 \end{bmatrix} \tag{7}$$

$$\mathsf{MW} = 156.7\ \mathsf{lb/lbmol} \tag{8}$$

Appendix A-3— Speciation Calculations

Sample 1, T=72.1° F

Average Molecular Weight		
Liquid Phase:	156.75	lb/lbmol
Vapor Phase:	59.37	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.00	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-butane	1.90000	0.05124	32.33790	1.65696	0.31595	30.93028
propane	0.32000	0.01137	128.84470	1.46558	0.27946	20.75558
i-butane	0.60000	0.01618	46.68395	0.75538	0.14404	14.10059
i-pentane	1.85000	0.04019	12.06945	0.48509	0.09250	11.24029
n-pentane	2.17000	0.04714	8.94467	0.42168	0.08041	9.77108
n-hexane	2.15000	0.03911	2.59458	0.10146	0.01935	2.80818
2-methylpentane	1.36000	0.02474	3.65310	0.09037	0.01723	2.50103
3-methylpentane	0.86000	0.01564	3.27061	0.05116	0.00976	1.41594
n-heptane	2.04000	0.03191	0.77018	0.02458	0.00469	0.79093
cyclopentane	0.25000	0.00559	5.50431	0.03075	0.00586	0.69273
2-methylhexane	0.94000	0.01470	1.11769	0.01643	0.00313	0.52889
methylcyclohexane	1.30000	0.02075	0.78425	0.01628	0.00310	0.51323
3-methylhexane	0.90000	0.01408	1.04376	0.01469	0.00280	0.47289
methylcyclopentane	0.38000	0.00708	2.35878	0.01669	0.00318	0.45122
cyclohexane	0.52000	0.00968	1.66588	0.01613	0.00308	0.43608
2,2-dimethylbutane	0.10000	0.00182	5.54852	0.01009	0.00192	0.27932
toluene	1.11000	0.01888	0.47674	0.00900	0.00172	0.26639
n-octane	1.76000	0.02415	0.23106	0.00558	0.00106	0.20472
benzene	0.20000	0.00401	1.61828	0.00649	0.00124	0.16293
2-methylheptane	0.84000	0.01153	0.34326	0.00396	0.00075	0.14515
3-methylheptane	0.73000	0.01002	0.34326	0.00344	0.00066	0.12614
2,4-dimethylpentane	0.14000	0.00219	1.68004	0.00368	0.00070	0.11840
2,2-dimethylpropane	0.01000	0.00022	22.76363	0.00495	0.00094	0.11459
2,3-dimethylpentane	0.18000	0.00282	1.17057	0.00330	0.00063	0.10607
1t,3-dimethylcyclopentane	0.14000	0.00223	1.28929	0.00288	0.00055	0.09086
1t,2-dimethylcyclopentane	0.13000	0.00208	1.28929	0.00268	0.00051	0.08437
2,2-dimethylpentane	0.09000	0.00141	1.79972	0.00253	0.00048	0.08154
1,3-dimethylbenzene	1.03000	0.01521	0.13786	0.00210	0.00040	0.07148
2,2,3-trimethylpentane	0.16000	0.00220	0.83572	0.00183	0.00035	0.06731

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1c,3-dimethylcyclopentane	0.08000	0.00128	1.28929	0.00165	0.00031	0.05192
2,2,3-trimethylhexane	0.53000	0.00648	0.18914	0.00123	0.00023	0.05046
4-methylheptane	0.29000	0.00398	0.34223	0.00136	0.00026	0.04996
1c,2t,3-trimethylcyclopentane	0.35000	0.00489	0.26991	0.00132	0.00025	0.04756
n-nonane	1.60000	0.01955	0.05669	0.00111	0.00021	0.04566
1,1-dimethylcyclopentane	0.07000	0.00112	1.28929	0.00144	0.00027	0.04543
2,4-dimethylhexane	0.17000	0.00233	0.50803	0.00119	0.00023	0.04348
1,4-dimethylbenzene	0.49000	0.00723	0.14614	0.00106	0.00020	0.03605
3,3-dimethylpentane	0.05000	0.00078	1.41421	0.00111	0.00021	0.03560
1t,4-dimethylcyclohexane	0.16000	0.00223	0.26991	0.00060	0.00012	0.02174
2,3-dimethylhexane	0.09000	0.00123	0.39143	0.00048	0.00009	0.01773
1,2-dimethylbenzene	0.29000	0.00428	0.10833	0.00046	0.00009	0.01581
1c,2c,3-trimethylcyclopentane	0.11000	0.00154	0.26991	0.00041	0.00008	0.01495
i-propylcyclopentane	0.11000	0.00154	0.26991	0.00041	0.00008	0.01495
1c,2-dimethylcyclohexane	0.12000	0.00168	0.24055	0.00040	0.00008	0.01453
3,3-dimethylhexane	0.06000	0.00082	0.47758	0.00039	0.00007	0.01443
2,2-dimethylhexane	0.05000	0.00069	0.57233	0.00039	0.00007	0.01441
3-methyloctane	0.48000	0.00587	0.05669	0.00033	0.00006	0.01370
2-methyloctane	0.47000	0.00574	0.05669	0.00033	0.00006	0.01341
4-methyloctane	0.35000	0.00428	0.05669	0.00024	0.00005	0.00999
1,1-dimethylcyclohexane	0.07000	0.00098	0.26991	0.00026	0.00005	0.00951
2,5-dimethylheptane	0.32000	0.00391	0.05669	0.00022	0.00004	0.00913
2,2,3-trimethylbutane	0.01000	0.00016	1.75367	0.00027	0.00005	0.00883
ethylbenzene	0.10000	0.00148	0.15620	0.00023	0.00004	0.00786
2-methyl-3-ethylpentane	0.03000	0.00041	0.50948	0.00021	0.00004	0.00769
2,5-dimethylhexane	0.03000	0.00041	0.50948	0.00021	0.00004	0.00769
1c,2t,4-trimethylcyclopentane	0.05000	0.00070	0.26991	0.00019	0.00004	0.00679
3,4-dimethylhexane	0.03000	0.00041	0.36235	0.00015	0.00003	0.00547
1t,2c,3-trimethylcyclopentane	0.04000	0.00056	0.26991	0.00015	0.00003	0.00543
3-methyl-3-ethylpentane	0.02000	0.00027	0.38632	0.00011	0.00002	0.00389
2,3,5-trimethylhexane	0.03000	0.00037	0.18914	0.00007	0.00001	0.00286
4,4-dimethylheptane	0.10000	0.00122	0.05669	0.00007	0.00001	0.00285
2,2,5-trimethylhexane	0.02000	0.00024	0.27648	0.00007	0.00001	0.00278
3,3-diethylpentane	0.07000	0.00086	0.05669	0.00005	0.00001	0.00200
3,3-dimethylheptane	0.07000	0.00086	0.05669	0.00005	0.00001	0.00200
2,3,4-trimethylhexane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00190
c-octene-2	0.01000	0.00014	0.28862	0.00004	0.00001	0.00145
1,1-methylethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
1c,3-dimethylcyclohexane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
2t-ethylmethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
3c-ethylmethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
3t-ethylmethylcyclopentane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00136
1c,2t,4t-trimethylcyclohexane	0.03000	0.00037	0.07721	0.00003	0.00001	0.00117
3,5-dimethylheptane	0.04000	0.00049	0.05669	0.00003	0.00001	0.00114

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
3,4-dimethylheptane	0.03000	0.00037	0.05669	0.00002	0.000004	0.00086
Styrene	0.01000	0.00015	0.10747	0.00002	0.000003	0.00054
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
1c,2t,4c-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
2,2-dimethylheptane	0.01000	0.00012	0.05669	0.00001	0.000001	0.00029
4-ethylheptane	0.01000	0.00012	0.05669	0.00001	0.000001	0.00029

Sample 1, T=95°F

Average Molecular Weight		
Liquid Phase:	156.75	lb/lbmol
Vapor Phase:	60.32	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	0.00	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-butane	1.90000	0.05124	47.45453	2.43152	0.31417	30.27285
propane	0.32000	0.01137	176.65380	2.00940	0.25963	18.97994
i-butane	0.60000	0.01618	67.05331	1.08497	0.14018	13.50808
i-pentane	1.85000	0.04019	18.67352	0.75051	0.09697	11.59899
n-pentane	2.17000	0.04714	14.16178	0.66763	0.08626	10.31810
n-hexane	2.15000	0.03911	4.43665	0.17350	0.02242	3.20270
2-methylpentane	1.36000	0.02474	6.08944	0.15063	0.01946	2.78060
3-methylpentane	0.86000	0.01564	5.48122	0.08574	0.01108	1.58270
n-heptane	2.04000	0.03191	1.42681	0.04553	0.00588	0.97728
cyclopentane	0.25000	0.00559	8.96348	0.05008	0.00647	0.75238
2-methylhexane	0.94000	0.01470	2.01204	0.02959	0.00382	0.63502
methylcyclohexane	1.30000	0.02075	1.42286	0.02953	0.00382	0.62105
3-methylhexane	0.90000	0.01408	1.88579	0.02655	0.00343	0.56985
methylcyclopentane	0.38000	0.00708	4.03151	0.02853	0.00369	0.51437
cyclohexane	0.52000	0.00968	2.90982	0.02818	0.00364	0.50803
toluene	1.11000	0.01888	0.90368	0.01706	0.00220	0.33679
2,2-dimethylbutane	0.10000	0.00182	8.93253	0.01625	0.00210	0.29991
n-octane	1.76000	0.02415	0.46549	0.01124	0.00145	0.27507
benzene	0.20000	0.00401	2.86487	0.01150	0.00149	0.19238
2-methylheptane	0.84000	0.01153	0.66923	0.00771	0.00100	0.18875
3-methylheptane	0.73000	0.01002	0.66923	0.00670	0.00087	0.16403
2,4-dimethylpentane	0.14000	0.00219	2.93417	0.00643	0.00083	0.13792
2,3-dimethylpentane	0.18000	0.00282	2.08700	0.00588	0.00076	0.12613
2,2-dimethylpropane	0.01000	0.00022	33.79926	0.00734	0.00095	0.11348
1t,3-dimethylcyclopentane	0.14000	0.00223	2.27727	0.00509	0.00066	0.10704
1t,2-dimethylcyclopentane	0.13000	0.00208	2.27727	0.00473	0.00061	0.09940
1,3-dimethylbenzene	1.03000	0.01521	0.28049	0.00427	0.00055	0.09700
2,2-dimethylpentane	0.09000	0.00141	3.11782	0.00439	0.00057	0.09421
2,2,3-trimethylpentane	0.16000	0.00220	1.51201	0.00332	0.00043	0.08123
2,2,3-trimethylhexane	0.53000	0.00648	0.37895	0.00245	0.00032	0.06743
4-methylheptane	0.29000	0.00398	0.66709	0.00265	0.00034	0.06495

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-nonane	1.60000	0.01955	0.11691	0.00229	0.00030	0.06281
1c,2t,3-trimethylcyclopentane	0.35000	0.00489	0.52453	0.00256	0.00033	0.06164
1c,3-dimethylcyclopentane	0.08000	0.00128	2.27727	0.00291	0.00038	0.06117
2,4-dimethylhexane	0.17000	0.00233	0.96101	0.00224	0.00029	0.05485
1,1-dimethylcyclopentane	0.07000	0.00112	2.27727	0.00254	0.00033	0.05352
1,4-dimethylbenzene	0.49000	0.00723	0.29779	0.00215	0.00028	0.04899
3,3-dimethylpentane	0.05000	0.00078	2.47165	0.00193	0.00025	0.04149
1t,4-dimethylcyclohexane	0.16000	0.00223	0.52453	0.00117	0.00015	0.02818
2,3-dimethylhexane	0.09000	0.00123	0.75123	0.00093	0.00012	0.02270
1,2-dimethylbenzene	0.29000	0.00428	0.22572	0.00097	0.00012	0.02198
1c,2c,3-trimethylcyclopentane	0.11000	0.00154	0.52453	0.00081	0.00010	0.01937
i-propylcyclopentane	0.11000	0.00154	0.52453	0.00081	0.00010	0.01937
1c,2-dimethylcyclohexane	0.12000	0.00168	0.47036	0.00079	0.00010	0.01895
3-methyloctane	0.48000	0.00587	0.11691	0.00069	0.00009	0.01884
2-methyloctane	0.47000	0.00574	0.11691	0.00067	0.00009	0.01845
3,3-dimethylhexane	0.06000	0.00082	0.90338	0.00074	0.00010	0.01820
2,2-dimethylhexane	0.05000	0.00069	1.06869	0.00073	0.00009	0.01794
4-methyloctane	0.35000	0.00428	0.11691	0.00050	0.00006	0.01374
2,5-dimethylheptane	0.32000	0.00391	0.11691	0.00046	0.00006	0.01256
1,1-dimethylcyclohexane	0.07000	0.00098	0.52453	0.00051	0.00007	0.01233
ethylbenzene	0.10000	0.00148	0.31926	0.00047	0.00006	0.01072
2,2,3-trimethylbutane	0.01000	0.00016	3.01654	0.00047	0.00006	0.01013
2-methyl-3-ethylpentane	0.03000	0.00041	0.96528	0.00040	0.00005	0.00972
2,5-dimethylhexane	0.03000	0.00041	0.96528	0.00040	0.00005	0.00972
1c,2t,4-trimethylcyclopentane	0.05000	0.00070	0.52453	0.00037	0.00005	0.00881
1t,2c,3-trimethylcyclopentane	0.04000	0.00056	0.52453	0.00029	0.00004	0.00704
3,4-dimethylhexane	0.03000	0.00041	0.69690	0.00029	0.00004	0.00702
3-methyl-3-ethylpentane	0.02000	0.00027	0.73113	0.00020	0.00003	0.00491
4,4-dimethylheptane	0.10000	0.00122	0.11691	0.00014	0.00002	0.00393
2,3,5-trimethylhexane	0.03000	0.00037	0.37895	0.00014	0.00002	0.00382
2,2,5-trimethylhexane	0.02000	0.00024	0.54293	0.00013	0.00002	0.00365
3,3-diethylpentane	0.07000	0.00086	0.11691	0.00010	0.00001	0.00275
3,3-dimethylheptane	0.07000	0.00086	0.11691	0.00010	0.00001	0.00275
2,3,4-trimethylhexane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00254
c-octene-2	0.01000	0.00014	0.57018	0.00008	0.00001	0.00191
1,1-methylethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
1c,3-dimethylcyclohexane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
2t-ethylmethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
3c-ethylmethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
3t-ethylmethylcyclopentane	0.01000	0.00014	0.52453	0.00007	0.00001	0.00176
1c,2t,4t-trimethylcyclohexane	0.03000	0.00037	0.16373	0.00006	0.00001	0.00165
3,5-dimethylheptane	0.04000	0.00049	0.11691	0.00006	0.00001	0.00157
3,4-dimethylheptane	0.03000	0.00037	0.11691	0.00004	0.00001	0.00118
Styrene	0.01000	0.00015	0.22287	0.00003	0.000004	0.00075

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000003	0.00055
1c,2t,4c-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000003	0.00055
2,2-dimethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00039
4-ethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00039

Sample 2, T=72.1° F

Average Molecular Weight		
Liquid Phase:	189.92	lb/lbmol
Vapor Phase:	57.07	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00004964	%
Methane y_i	982.09	ppm
Methane Mass% Vap	0.02760403	%
Ethane K:	28.63	
Ethane p_i:	0.06	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.25000	0.01077	128.84470	1.38734	0.41877	32.35932
n-butane	0.74000	0.02418	32.33790	0.78194	0.23603	24.04011
i-butane	0.25000	0.00817	46.68395	0.38136	0.11511	11.72466
i-pentane	0.81000	0.02132	12.06945	0.25735	0.07768	9.82121
n-pentane	0.98000	0.02580	8.94467	0.23075	0.06965	8.80609
n-hexane	1.03000	0.02270	2.59458	0.05890	0.01778	2.68471
2-methylpentane	0.60000	0.01322	3.65310	0.04831	0.01458	2.20194
methylcyclopentane	0.70000	0.01580	2.35878	0.03726	0.01125	1.65874
3-methylpentane	0.38000	0.00837	3.27061	0.02739	0.00827	1.24855
methylcyclohexane	1.54000	0.02979	0.78425	0.02336	0.00705	1.21329
cyclohexane	0.64000	0.01444	1.66588	0.02406	0.00726	1.07107
cyclopentane	0.18000	0.00487	5.50431	0.02683	0.00810	0.99533
ethane	0.01000	0.00063		0.06101	0.01808	0.95284
n-heptane	1.04000	0.01971	0.77018	0.01518	0.00458	0.80467
3-methylhexane	0.43000	0.00815	1.04376	0.00851	0.00257	0.45088
2-methylhexane	0.36000	0.00682	1.11769	0.00763	0.00230	0.40422
1t,2-dimethylcyclopentane	0.31000	0.00600	1.28929	0.00773	0.00233	0.40152
1t,3-dimethylcyclopentane	0.22000	0.00426	1.28929	0.00549	0.00166	0.28495
1c,3-dimethylcyclopentane	0.19000	0.00368	1.28929	0.00474	0.00143	0.24609
n-octane	0.99000	0.01646	0.23106	0.00380	0.00115	0.22981
2,3-dimethylpentane	0.15000	0.00284	1.17057	0.00333	0.00100	0.17639
2-methylheptane	0.44000	0.00732	0.34326	0.00251	0.00076	0.15173
1,1-dimethylcyclopentane	0.10000	0.00193	1.28929	0.00249	0.00075	0.12952
1c,2t,3-trimethylcyclopentane	0.42000	0.00711	0.26991	0.00192	0.00058	0.11388
2,2,3-trimethylhexane	0.57000	0.00844	0.18914	0.00160	0.00048	0.10831
toluene	0.22000	0.00453	0.47674	0.00216	0.00065	0.10536
3-methylheptane	0.26000	0.00432	0.34326	0.00148	0.00045	0.08966
2,4-dimethylpentane	0.05000	0.00095	1.68004	0.00159	0.00048	0.08439
2,2-dimethylhexane	0.14000	0.00233	0.57233	0.00133	0.00040	0.08049
1c,2c,3-trimethylcyclopentane	0.25000	0.00423	0.26991	0.00114	0.00034	0.06779
2,2-dimethylbutane	0.01000	0.00022	5.54852	0.00122	0.00037	0.05574

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-nonane	0.94000	0.01392	0.05669	0.00079	0.00024	0.05354
1t,4-dimethylcyclohexane	0.19000	0.00322	0.26991	0.00087	0.00026	0.05152
benzene	0.03000	0.00073	1.61828	0.00118	0.00036	0.04877
n-propylcyclopentane	0.17000	0.00288	0.26991	0.00078	0.00023	0.04610
4-methylheptane	0.13000	0.00216	0.34223	0.00074	0.00022	0.04469
2,2,3-trimethylpentane	0.05000	0.00083	0.83572	0.00069	0.00021	0.04198
1,4-dimethylbenzene	0.28000	0.00501	0.14614	0.00073	0.00022	0.04111
2,5-dimethylhexane	0.08000	0.00133	0.50948	0.00068	0.00020	0.04095
2,4-dimethylhexane	0.08000	0.00133	0.50803	0.00068	0.00020	0.04083
2,2-dimethylpentane	0.02000	0.00038	1.79972	0.00068	0.00021	0.03616
1,3-dimethylbenzene	0.24000	0.00429	0.13786	0.00059	0.00018	0.03324
1c,2t,4-trimethylcyclopentane	0.12000	0.00203	0.26991	0.00055	0.00017	0.03254
1t,2c,3-trimethylcyclopentane	0.12000	0.00203	0.26991	0.00055	0.00017	0.03254
2-methyl-3-ethylpentane	0.06000	0.00100	0.50948	0.00051	0.00015	0.03071
2,3-dimethylhexane	0.06000	0.00100	0.39143	0.00039	0.00012	0.02359
2t-ethylmethylcyclopentane	0.08000	0.00135	0.26991	0.00037	0.00011	0.02169
i-propylcyclopentane	0.08000	0.00135	0.26991	0.00037	0.00011	0.02169
2,2,3-trimethylbutane	0.01000	0.00019	1.75367	0.00033	0.00010	0.01762
1c,2-dimethylcyclohexane	0.07000	0.00118	0.24055	0.00028	0.00009	0.01692
1,1-dimethylcyclohexane	0.06000	0.00102	0.26991	0.00027	0.00008	0.01627
1,2-dimethylbenzene	0.14000	0.00250	0.10833	0.00027	0.00008	0.01524
2,3,5-trimethylhexane	0.08000	0.00118	0.18914	0.00022	0.00007	0.01520
3,3-dimethylpentane	0.01000	0.00019	1.41421	0.00027	0.00008	0.01421
ethylbenzene	0.08000	0.00143	0.15620	0.00022	0.00007	0.01255
3-methyloctane	0.21000	0.00311	0.05669	0.00018	0.00005	0.01196
1c,2-dimethylcyclopentane	0.04000	0.00077	0.26991	0.00021	0.00006	0.01085
3-ethylhexane	0.03000	0.00050	0.33317	0.00017	0.00005	0.01004
2-methyloctane	0.17000	0.00252	0.05669	0.00014	0.00004	0.00968
3,3-dimethylhexane	0.02000	0.00033	0.47758	0.00016	0.00005	0.00960
4-methyloctane	0.15000	0.00222	0.05669	0.00013	0.00004	0.00854
3c-ethylmethylcyclopentane	0.03000	0.00051	0.26991	0.00014	0.00004	0.00813
3t-ethylmethylcyclopentane	0.03000	0.00051	0.26991	0.00014	0.00004	0.00813
3-methyl-3-ethylpentane	0.02000	0.00033	0.38632	0.00013	0.00004	0.00776
3,4-dimethylhexane	0.02000	0.00033	0.36235	0.00012	0.00004	0.00728
1,1-methylethylcyclopentane	0.02000	0.00034	0.26991	0.00009	0.00003	0.00542
2,5-dimethylheptane	0.09000	0.00133	0.05669	0.00008	0.00002	0.00513
2,6-dimethylheptane	0.02000	0.00030	0.18914	0.00006	0.00002	0.00380
c-octene-2	0.01000	0.00017	0.28862	0.00005	0.00001	0.00290
3,3-dimethylheptane	0.05000	0.00074	0.05669	0.00004	0.00001	0.00285
4-ethylheptane	0.05000	0.00074	0.05669	0.00004	0.00001	0.00285
2,2,5-trimethylhexane	0.01000	0.00015	0.27648	0.00004	0.00001	0.00278
1c,3-dimethylcyclohexane	0.01000	0.00017	0.26991	0.00005	0.00001	0.00271
1,1,4-trimethylcyclohexane	0.03000	0.00045	0.07721	0.00003	0.00001	0.00233
2,4,4-trimethylhexane	0.01000	0.00015	0.22259	0.00003	0.00001	0.00224

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.01000	0.00015	0.18914	0.00003	0.00001	0.00190
2,4-dimethylheptane	0.01000	0.00015	0.18914	0.00003	0.00001	0.00190
3,3-diethylpentane	0.03000	0.00044	0.05669	0.00003	0.00001	0.00171
1,1,3-trimethylcyclohexane	0.02000	0.00030	0.07721	0.00002	0.00001	0.00155
3,4-dimethylheptane	0.02000	0.00030	0.05669	0.00002	0.00001	0.00114
2,4-dimethylheptene-1	0.01000	0.00015	0.08699	0.00001	0.000004	0.00087
nonene-1	0.01000	0.00015	0.08699	0.00001	0.000004	0.00087
1,1,2-trimethylcyclohexane	0.01000	0.00015	0.07721	0.00001	0.000004	0.00078
1c,2t,4c-trimethylcyclohexane	0.01000	0.00015	0.07721	0.00001	0.000004	0.00078
3,5-dimethylheptane	0.01000	0.00015	0.05669	0.00001	0.000003	0.00057

Sample 2, T=95° F

Average Molecular Weight		
Liquid Phase:	189.92	lb/lbmol
Vapor Phase:	58.09	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00004964	%
Methane y_i	1116.67	ppm
Methane Mass% Vap	0.03083285	%
Ethane K:	35.50	
Ethane p_i:	0.11	psia

Component	m$_{liq}$ (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m$_{vap}$ (%)
propane	0.25000	0.01077	176.65380	1.90213	0.39354	29.87280
n-butane	0.74000	0.02418	47.45453	1.14747	0.23740	23.75321
i-butane	0.25000	0.00817	67.05331	0.54776	0.11333	11.33896
i-pentane	0.81000	0.02132	18.67352	0.39816	0.08238	10.23114
n-pentane	0.98000	0.02580	14.16178	0.36533	0.07559	9.38765
n-hexane	1.03000	0.02270	4.43665	0.10071	0.02084	3.09105
2-methylpentane	0.60000	0.01322	6.08944	0.08052	0.01666	2.47139
methylcyclopentane	0.70000	0.01580	4.03151	0.06368	0.01318	1.90888
methylcyclohexane	1.54000	0.02979	1.42286	0.04238	0.00877	1.48216
3-methylpentane	0.38000	0.00837	5.48122	0.04590	0.00950	1.40888
cyclohexane	0.64000	0.01444	2.90982	0.04203	0.00869	1.25968
ethane	0.01000	0.00063		0.11086	0.02242	1.16063
cyclopentane	0.18000	0.00487	8.96348	0.04369	0.00904	1.09135
n-heptane	1.04000	0.01971	1.42681	0.02813	0.00582	1.00372
3-methylhexane	0.43000	0.00815	1.88579	0.01537	0.00318	0.54850
2-methylhexane	0.36000	0.00682	2.01204	0.01373	0.00284	0.48995
1t,2-dimethylcyclopentane	0.31000	0.00600	2.27727	0.01366	0.00283	0.47752
1t,3-dimethylcyclopentane	0.22000	0.00426	2.27727	0.00969	0.00200	0.33888
n-octane	0.99000	0.01646	0.46549	0.00766	0.00159	0.31172
1c,3-dimethylcyclopentane	0.19000	0.00368	2.27727	0.00837	0.00173	0.29267
2,3-dimethylpentane	0.15000	0.00284	2.08700	0.00593	0.00123	0.21175
2-methylheptane	0.44000	0.00732	0.66923	0.00490	0.00101	0.19918
1,1-dimethylcyclopentane	0.10000	0.00193	2.27727	0.00440	0.00091	0.15404
1c,2t,3-trimethylcyclopentane	0.42000	0.00711	0.52453	0.00373	0.00077	0.14902
2,2,3-trimethylhexane	0.57000	0.00844	0.37895	0.00320	0.00066	0.14611
toluene	0.22000	0.00453	0.90368	0.00410	0.00085	0.13448
3-methylheptane	0.26000	0.00432	0.66923	0.00289	0.00060	0.11770
2,2-dimethylhexane	0.14000	0.00233	1.06869	0.00249	0.00051	0.10120
2,4-dimethylpentane	0.05000	0.00095	2.93417	0.00278	0.00058	0.09924
1c,2c,3-trimethylcyclopentane	0.25000	0.00423	0.52453	0.00222	0.00046	0.08870
n-nonane	0.94000	0.01392	0.11691	0.00163	0.00034	0.07434

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1t,4-dimethylcyclohexane	0.19000	0.00322	0.52453	0.00169	0.00035	0.06741
2,2-dimethylbutane	0.01000	0.00022	8.93253	0.00197	0.00041	0.06042
n-propylcyclopentane	0.17000	0.00288	0.52453	0.00151	0.00031	0.06032
4-methylheptane	0.13000	0.00216	0.66709	0.00144	0.00030	0.05866
benzene	0.03000	0.00073	2.86487	0.00209	0.00043	0.05814
1,4-dimethylbenzene	0.28000	0.00501	0.29779	0.00149	0.00031	0.05640
2,5-dimethylhexane	0.08000	0.00133	0.96528	0.00128	0.00027	0.05223
2,4-dimethylhexane	0.08000	0.00133	0.96101	0.00128	0.00026	0.05200
2,2,3-trimethylpentane	0.05000	0.00083	1.51201	0.00126	0.00026	0.05114
1,3-dimethylbenzene	0.24000	0.00429	0.28049	0.00120	0.00025	0.04553
1c,2t,4-trimethylcyclopentane	0.12000	0.00203	0.52453	0.00107	0.00022	0.04258
1t,2c,3-trimethylcyclopentane	0.12000	0.00203	0.52453	0.00107	0.00022	0.04258
2,2-dimethylpentane	0.02000	0.00038	3.11782	0.00118	0.00024	0.04218
2-methyl-3-ethylpentane	0.06000	0.00100	0.96528	0.00096	0.00020	0.03918
2,3-dimethylhexane	0.06000	0.00100	0.75123	0.00075	0.00016	0.03049
2t-ethylmethylcyclopentane	0.08000	0.00135	0.52453	0.00071	0.00015	0.02838
i-propylcyclopentane	0.08000	0.00135	0.52453	0.00071	0.00015	0.02838
1c,2-dimethylcyclohexane	0.07000	0.00118	0.47036	0.00056	0.00012	0.02227
1,2-dimethylbenzene	0.14000	0.00250	0.22572	0.00057	0.00012	0.02137
1,1-dimethylcyclohexane	0.06000	0.00102	0.52453	0.00053	0.00011	0.02129
2,3,5-trimethylhexane	0.08000	0.00118	0.37895	0.00045	0.00009	0.02051
2,2,3-trimethylbutane	0.01000	0.00019	3.01654	0.00057	0.00012	0.02040
ethylbenzene	0.08000	0.00143	0.31926	0.00046	0.00009	0.01728
3,3-dimethylpentane	0.01000	0.00019	2.47165	0.00047	0.00010	0.01672
3-methyloctane	0.21000	0.00311	0.11691	0.00036	0.00008	0.01661
1c,2-dimethylcyclopentane	0.04000	0.00077	0.52453	0.00041	0.00008	0.01419
2-methyloctane	0.17000	0.00252	0.11691	0.00029	0.00006	0.01344
3-ethylhexane	0.03000	0.00050	0.65042	0.00032	0.00007	0.01320
3,3-dimethylhexane	0.02000	0.00033	0.90338	0.00030	0.00006	0.01222
4-methyloctane	0.15000	0.00222	0.11691	0.00026	0.00005	0.01186
3c-ethylmethylcyclopentane	0.03000	0.00051	0.52453	0.00027	0.00006	0.01064
3t-ethylmethylcyclopentane	0.03000	0.00051	0.52453	0.00027	0.00006	0.01064
3-methyl-3-ethylpentane	0.02000	0.00033	0.73113	0.00024	0.00005	0.00989
3,4-dimethylhexane	0.02000	0.00033	0.69690	0.00023	0.00005	0.00943
2,5-dimethylheptane	0.09000	0.00133	0.11691	0.00016	0.00003	0.00712
1,1-methylethylcyclopentane	0.02000	0.00034	0.52453	0.00018	0.00004	0.00710
2,6-dimethylheptane	0.02000	0.00030	0.37895	0.00011	0.00002	0.00513
3,3-dimethylheptane	0.05000	0.00074	0.11691	0.00009	0.00002	0.00395
4-ethylheptane	0.05000	0.00074	0.11691	0.00009	0.00002	0.00395
c-octene-2	0.01000	0.00017	0.57018	0.00010	0.00002	0.00386
2,2,5-trimethylhexane	0.01000	0.00015	0.54293	0.00008	0.00002	0.00367
1c,3-dimethylcyclohexane	0.01000	0.00017	0.52453	0.00009	0.00002	0.00355
1,1,4-trimethylcyclohexane	0.03000	0.00045	0.16373	0.00007	0.00002	0.00332
2,4,4-trimethylhexane	0.01000	0.00015	0.43934	0.00007	0.00001	0.00297

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.01000	0.00015	0.37895	0.00006	0.00001	0.00256
2,4-dimethylheptane	0.01000	0.00015	0.37895	0.00006	0.00001	0.00256
3,3-diethylpentane	0.03000	0.00044	0.11691	0.00005	0.00001	0.00237
1,1,3-trimethylcyclohexane	0.02000	0.00030	0.16373	0.00005	0.00001	0.00221
3,4-dimethylheptane	0.02000	0.00030	0.11691	0.00003	0.00001	0.00158
2,4-dimethylheptene-1	0.01000	0.00015	0.18738	0.00003	0.00001	0.00127
nonene-1	0.01000	0.00015	0.18738	0.00003	0.00001	0.00127
1,1,2-trimethylcyclohexane	0.01000	0.00015	0.16373	0.00002	0.00001	0.00111
1c,2t,4c-trimethylcyclohexane	0.01000	0.00015	0.16373	0.00002	0.00001	0.00111
3,5-dimethylheptane	0.01000	0.00015	0.11691	0.00002	0.000004	0.00079

Sample 3, T=72.1° F

Average Molecular Weight		
Liquid Phase:	160.51	lb/lbmol
Vapor Phase:	56.89	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.21	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.39000	0.01420	128.84470	1.82911	0.41802	32.40233
n-butane	1.31000	0.03618	32.33790	1.16989	0.26737	27.31670
n-pentane	1.96000	0.04360	8.94467	0.39003	0.08914	11.30487
i-pentane	1.32000	0.02937	12.06945	0.35443	0.08100	10.27321
i-butane	0.28000	0.00773	46.68395	0.36098	0.08250	8.42890
n-hexane	1.84000	0.03427	2.59458	0.08892	0.02032	3.07844
2-methylpentane	1.04000	0.01937	3.65310	0.07076	0.01617	2.44985
ethane	0.03000	0.00160		0.21026	0.04585	2.42341
methylcyclopentane	1.05000	0.02003	2.35878	0.04724	0.01080	1.59706
3-methylpentane	0.75000	0.01397	3.27061	0.04569	0.01044	1.58174
cyclohexane	1.20000	0.02289	1.66588	0.03813	0.00871	1.28905
methylcyclohexane	2.13000	0.03482	0.78425	0.02731	0.00624	1.07715
cyclopentane	0.29000	0.00664	5.50431	0.03653	0.00835	1.02931
n-heptane	1.65000	0.02643	0.77018	0.02036	0.00465	0.81944
3-methylhexane	0.68000	0.01089	1.04376	0.01137	0.00260	0.45767
1t,2-dimethylcyclopentane	0.53000	0.00866	1.28929	0.01117	0.00255	0.44063
2-methylhexane	0.54000	0.00865	1.11769	0.00967	0.00221	0.38919
1t,3-dimethylcyclopentane	0.36000	0.00589	1.28929	0.00759	0.00173	0.29929
benzene	0.28000	0.00575	1.61828	0.00931	0.00213	0.29218
1c,3-dimethylcyclopentane	0.32000	0.00523	1.28929	0.00674	0.00154	0.26604
toluene	0.73000	0.01272	0.47674	0.00606	0.00139	0.22441
n-octane	1.33000	0.01869	0.23106	0.00432	0.00099	0.19817
2,3-dimethylpentane	0.20000	0.00320	1.17057	0.00375	0.00086	0.15096
2,2-dimethylbutane	0.04000	0.00075	5.54852	0.00413	0.00094	0.14311
2-methylheptane	0.64000	0.00899	0.34326	0.00309	0.00071	0.14166
1,1-dimethylcyclopentane	0.16000	0.00262	1.28929	0.00337	0.00077	0.13302
1c,2t,3-trimethylcyclopentane	0.58000	0.00830	0.26991	0.00224	0.00051	0.10095
2,2,3-trimethylhexane	0.71000	0.00889	0.18914	0.00168	0.00038	0.08659
3-methylheptane	0.36000	0.00506	0.34326	0.00174	0.00040	0.07968
2,2-dimethylhexane	0.21000	0.00295	0.57233	0.00169	0.00039	0.07750
1c,2c,3-trimethylcyclopentane	0.29000	0.00415	0.26991	0.00112	0.00026	0.05047

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-methylheptane	0.21000	0.00295	0.34223	0.00101	0.00023	0.04634
n-propylcyclopentane	0.26000	0.00372	0.26991	0.00100	0.00023	0.04525
2,2,3-trimethylpentane	0.08000	0.00112	0.83572	0.00094	0.00021	0.04311
1t,2c,3-trimethylcyclopentane	0.24000	0.00343	0.26991	0.00093	0.00021	0.04177
2,5-dimethylhexane	0.12000	0.00169	0.50948	0.00086	0.00020	0.03942
1t,4-dimethylcyclohexane	0.22000	0.00315	0.26991	0.00085	0.00019	0.03829
n-nonane	0.97000	0.01214	0.05669	0.00069	0.00016	0.03546
2,2-dimethylpentane	0.03000	0.00048	1.79972	0.00086	0.00020	0.03482
1c,2t,4-trimethylcyclopentane	0.20000	0.00286	0.26991	0.00077	0.00018	0.03481
1,3-dimethylbenzene	0.39000	0.00590	0.13786	0.00081	0.00019	0.03467
2-methyl-3-ethylpentane	0.10000	0.00141	0.50948	0.00072	0.00016	0.03285
2,4-dimethylhexane	0.10000	0.00141	0.50803	0.00071	0.00016	0.03276
1,4-dimethylbenzene	0.26000	0.00393	0.14614	0.00057	0.00013	0.02450
2t-ethylmethylcyclopentane	0.13000	0.00186	0.26991	0.00050	0.00011	0.02263
2,4-dimethylpentane	0.02000	0.00032	1.68004	0.00054	0.00012	0.02167
ethylbenzene	0.19000	0.00287	0.15620	0.00045	0.00010	0.01914
3,3-dimethylpentane	0.02000	0.00032	1.41421	0.00045	0.00010	0.01824
2,3-dimethylhexane	0.07000	0.00098	0.39143	0.00039	0.00009	0.01767
i-propylcyclopentane	0.09000	0.00129	0.26991	0.00035	0.00008	0.01566
3-ethylhexane	0.07000	0.00098	0.33317	0.00033	0.00007	0.01504
1,1-dimethylcyclohexane	0.08000	0.00114	0.26991	0.00031	0.00007	0.01392
1,2-dimethylbenzene	0.18000	0.00272	0.10833	0.00029	0.00007	0.01257
2,3,5-trimethylhexane	0.10000	0.00125	0.18914	0.00024	0.00005	0.01220
2,2,3-trimethylbutane	0.01000	0.00016	1.75367	0.00028	0.00006	0.01131
1c,2-dimethylcyclopentane	0.06000	0.00098	0.26991	0.00026	0.00006	0.01044
3c-ethylmethylcyclopentane	0.06000	0.00086	0.26991	0.00023	0.00005	0.01044
3-methyloctane	0.28000	0.00350	0.05669	0.00020	0.00005	0.01024
3,4-dimethylhexane	0.04000	0.00056	0.36235	0.00020	0.00005	0.00935
3,3-dimethylhexane	0.03000	0.00042	0.47758	0.00020	0.00005	0.00924
3t-ethylmethylcyclopentane	0.05000	0.00072	0.26991	0.00019	0.00004	0.00870
1c,2-dimethylcyclohexane	0.05000	0.00072	0.24055	0.00017	0.00004	0.00776
2-methyloctane	0.21000	0.00263	0.05669	0.00015	0.00003	0.00768
3-methyl-3-ethylpentane	0.03000	0.00042	0.38632	0.00016	0.00004	0.00747
4-methyloctane	0.17000	0.00213	0.05669	0.00012	0.00003	0.00621
2,4,4-trimethylhexane	0.03000	0.00038	0.22259	0.00008	0.00002	0.00431
2,5-dimethylheptane	0.11000	0.00138	0.05669	0.00008	0.00002	0.00402
1,1-methylethylcyclopentane	0.02000	0.00029	0.26991	0.00008	0.00002	0.00348
1,1,4-trimethylcyclohexane	0.06000	0.00076	0.07721	0.00006	0.00001	0.00299
2,3,4-trimethylhexane	0.02000	0.00025	0.18914	0.00005	0.00001	0.00244
2,4-dimethylheptane	0.02000	0.00025	0.18914	0.00005	0.00001	0.00244
2,6-dimethylheptane	0.02000	0.00025	0.18914	0.00005	0.00001	0.00244
3,3-dimethylheptane	0.06000	0.00075	0.05669	0.00004	0.00001	0.00219
1,1,3-trimethylcyclohexane	0.04000	0.00051	0.07721	0.00004	0.00001	0.00199
3,3-diethylpentane	0.05000	0.00063	0.05669	0.00004	0.00001	0.00183

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-ethylheptane	0.05000	0.00063	0.05669	0.00004	0.00001	0.00183
1c,3-dimethylcyclohexane	0.01000	0.00014	0.26991	0.00004	0.00001	0.00174
nonene-1	0.02000	0.00025	0.08699	0.00002	0.00001	0.00112
1c,2t,4c-trimethylcyclohexane	0.02000	0.00025	0.07721	0.00002	0.000004	0.00100
3,4-dimethylheptane	0.02000	0.00025	0.05669	0.00001	0.000003	0.00073
1,1,2-trimethylcyclohexane	0.01000	0.00013	0.07721	0.00001	0.000002	0.00050
3,5-dimethylheptane	0.01000	0.00013	0.05669	0.00001	0.000002	0.00037

Sample 3, T=95° F

Average Molecular Weight		
Liquid Phase:	160.51	lb/lbmol
Vapor Phase:	57.75	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	0.38	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.39000	0.01420	176.65380	2.50781	0.39423	30.10500
n-butane	1.31000	0.03618	47.45453	1.71676	0.26988	27.16440
n-pentane	1.96000	0.04360	14.16178	0.61752	0.09707	12.12900
i-pentane	1.32000	0.02937	18.67352	0.54837	0.08620	10.77088
i-butane	0.28000	0.00773	67.05331	0.51849	0.08151	8.20407
n-hexane	1.84000	0.03427	4.43665	0.15205	0.02390	3.56717
ethane	0.03000	0.00160		0.38344	0.05685	2.96035
2-methylpentane	1.04000	0.01937	6.08944	0.11796	0.01854	2.76733
methylcyclopentane	1.05000	0.02003	4.03151	0.08073	0.01269	1.84973
3-methylpentane	0.75000	0.01397	5.48122	0.07657	0.01204	1.79635
cyclohexane	1.20000	0.02289	2.90982	0.06660	0.01047	1.52580
methylcyclohexane	2.13000	0.03482	1.42286	0.04954	0.00779	1.32432
cyclopentane	0.29000	0.00664	8.96348	0.05949	0.00935	1.13586
n-heptane	1.65000	0.02643	1.42681	0.03771	0.00593	1.02873
3-methylhexane	0.68000	0.01089	1.88579	0.02054	0.00323	0.56034
1t,2-dimethylcyclopentane	0.53000	0.00866	2.27727	0.01973	0.00310	0.52740
2-methylhexane	0.54000	0.00865	2.01204	0.01740	0.00274	0.47477
1t,3-dimethylcyclopentane	0.36000	0.00589	2.27727	0.01340	0.00211	0.35824
benzene	0.28000	0.00575	2.86487	0.01648	0.00259	0.35052
1c,3-dimethylcyclopentane	0.32000	0.00523	2.27727	0.01191	0.00187	0.31843
toluene	0.73000	0.01272	0.90368	0.01149	0.00181	0.28826
n-octane	1.33000	0.01869	0.46549	0.00870	0.00137	0.27053
2-methylheptane	0.64000	0.00899	0.66923	0.00602	0.00095	0.18716
2,3-dimethylpentane	0.20000	0.00320	2.08700	0.00669	0.00105	0.18239
1,1-dimethylcyclopentane	0.16000	0.00262	2.27727	0.00596	0.00094	0.15922
2,2-dimethylbutane	0.04000	0.00075	8.93253	0.00666	0.00105	0.15613
1c,2t,3-trimethylcyclopentane	0.58000	0.00830	0.52453	0.00435	0.00068	0.13294
2,2,3-trimethylhexane	0.71000	0.00889	0.37895	0.00337	0.00053	0.11757
3-methylheptane	0.36000	0.00506	0.66923	0.00339	0.00053	0.10528
2,2-dimethylhexane	0.21000	0.00295	1.06869	0.00315	0.00050	0.09807
1c,2c,3-trimethylcyclopentane	0.29000	0.00415	0.52453	0.00218	0.00034	0.06647

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-methylheptane	0.21000	0.00295	0.66709	0.00197	0.00031	0.06121
n-propylcyclopentane	0.26000	0.00372	0.52453	0.00195	0.00031	0.05959
1t,2c,3-trimethylcyclopentane	0.24000	0.00343	0.52453	0.00180	0.00028	0.05501
2,2,3-trimethylpentane	0.08000	0.00112	1.51201	0.00170	0.00027	0.05286
2,5-dimethylhexane	0.12000	0.00169	0.96528	0.00163	0.00026	0.05062
1t,4-dimethylcyclohexane	0.22000	0.00315	0.52453	0.00165	0.00026	0.05042
n-nonane	0.97000	0.01214	0.11691	0.00142	0.00022	0.04955
1,3-dimethylbenzene	0.39000	0.00590	0.28049	0.00165	0.00026	0.04780
1c,2t,4-trimethylcyclopentane	0.20000	0.00286	0.52453	0.00150	0.00024	0.04584
2-methyl-3-ethylpentane	0.10000	0.00141	0.96528	0.00136	0.00021	0.04218
2,4-dimethylhexane	0.10000	0.00141	0.96101	0.00135	0.00021	0.04199
2,2-dimethylpentane	0.03000	0.00048	3.11782	0.00150	0.00024	0.04087
1,4-dimethylbenzene	0.26000	0.00393	0.29779	0.00117	0.00018	0.03383
2t-ethylmethylcyclopentane	0.13000	0.00186	0.52453	0.00098	0.00015	0.02980
ethylbenzene	0.19000	0.00287	0.31926	0.00092	0.00014	0.02651
2,4-dimethylpentane	0.02000	0.00032	2.93417	0.00094	0.00015	0.02564
2,3-dimethylhexane	0.07000	0.00098	0.75123	0.00074	0.00012	0.02298
3,3-dimethylpentane	0.02000	0.00032	2.47165	0.00079	0.00012	0.02160
i-propylcyclopentane	0.09000	0.00129	0.52453	0.00068	0.00011	0.02063
3-ethylhexane	0.07000	0.00098	0.65042	0.00064	0.00010	0.01989
1,1-dimethylcyclohexane	0.08000	0.00114	0.52453	0.00060	0.00009	0.01834
1,2-dimethylbenzene	0.18000	0.00272	0.22572	0.00061	0.00010	0.01775
2,3,5-trimethylhexane	0.10000	0.00125	0.37895	0.00047	0.00007	0.01656
3-methyloctane	0.28000	0.00350	0.11691	0.00041	0.00006	0.01430
1c,2-dimethylcyclopentane	0.06000	0.00098	0.52453	0.00051	0.00008	0.01375
3c-ethylmethylcyclopentane	0.06000	0.00086	0.52453	0.00045	0.00007	0.01375
2,2,3-trimethylbutane	0.01000	0.00016	3.01654	0.00048	0.00008	0.01318
3,4-dimethylhexane	0.04000	0.00056	0.69690	0.00039	0.00006	0.01218
3,3-dimethylhexane	0.03000	0.00042	0.90338	0.00038	0.00006	0.01184
3t-ethylmethylcyclopentane	0.05000	0.00072	0.52453	0.00038	0.00006	0.01146
2-methyloctane	0.21000	0.00263	0.11691	0.00031	0.00005	0.01073
1c,2-dimethylcyclohexane	0.05000	0.00072	0.47036	0.00034	0.00005	0.01028
3-methyl-3-ethylpentane	0.03000	0.00042	0.73113	0.00031	0.00005	0.00958
4-methyloctane	0.17000	0.00213	0.11691	0.00025	0.00004	0.00868
2,4,4-trimethylhexane	0.03000	0.00038	0.43934	0.00016	0.00003	0.00576
2,5-dimethylheptane	0.11000	0.00138	0.11691	0.00016	0.00003	0.00562
1,1-methylethylcyclopentane	0.02000	0.00029	0.52453	0.00015	0.00002	0.00458
1,1,4-trimethylcyclohexane	0.06000	0.00076	0.16373	0.00012	0.00002	0.00429
2,3,4-trimethylhexane	0.02000	0.00025	0.37895	0.00009	0.00001	0.00331
2,4-dimethylheptane	0.02000	0.00025	0.37895	0.00009	0.00001	0.00331
2,6-dimethylheptane	0.02000	0.00025	0.37895	0.00009	0.00001	0.00331
3,3-dimethylheptane	0.06000	0.00075	0.11691	0.00009	0.00001	0.00307
1,1,3-trimethylcyclohexane	0.04000	0.00051	0.16373	0.00008	0.00001	0.00286
3,3-diethylpentane	0.05000	0.00063	0.11691	0.00007	0.00001	0.00255

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
4-ethylheptane	0.05000	0.00063	0.11691	0.00007	0.00001	0.00255
1c,3-dimethylcyclohexane	0.01000	0.00014	0.52453	0.00008	0.00001	0.00229
nonene-1	0.02000	0.00025	0.18738	0.00005	0.00001	0.00164
1c,2t,4c-trimethylcyclohexane	0.02000	0.00025	0.16373	0.00004	0.00001	0.00143
3,4-dimethylheptane	0.02000	0.00025	0.11691	0.00003	0.000005	0.00102
1,1,2-trimethylcyclohexane	0.01000	0.00013	0.16373	0.00002	0.000003	0.00072
3,5-dimethylheptane	0.01000	0.00013	0.11691	0.00001	0.000002	0.00051

Sample 4, T=72.1° F

Average Molecular Weight		
Liquid Phase:	156.73	lb/lbmol
Vapor Phase:	53.04	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.58	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.70000	0.02488	128.84470	3.20556	0.54688	45.46606
n-butane	1.85000	0.04988	32.33790	1.61316	0.27521	30.15826
n-pentane	2.20000	0.04779	8.94467	0.42746	0.07293	9.91995
i-butane	0.36000	0.00971	46.68395	0.45317	0.07731	8.47213
i-pentane	1.11000	0.02411	12.06945	0.29102	0.04965	6.75356
ethane	0.06000	0.00313		0.57642	0.08953	5.07587
n-hexane	2.0000	0.03637	2.59458	0.09437	0.01610	2.61589
2-methylpentane	1.06000	0.01928	3.65310	0.07042	0.01201	1.95205
methylcyclopentane	1.0000	0.01862	2.35878	0.04393	0.00749	1.18908
3-methylpentane	0.72000	0.01309	3.27061	0.04283	0.00731	1.18709
n-heptane	1.82000	0.02847	0.77018	0.02192	0.00374	0.70662
cyclopentane	0.25000	0.00559	5.50431	0.03075	0.00525	0.69369
methylcyclohexane	1.33000	0.02123	0.78425	0.01665	0.00284	0.52581
cyclohexane	0.55000	0.01024	1.66588	0.01706	0.00291	0.46188
1t,2-dimethylcyclopentane	0.70000	0.01117	1.28929	0.01441	0.00246	0.45496
3-methylhexane	0.81000	0.01267	1.04376	0.01322	0.00226	0.42619
2-methylhexane	0.58000	0.00907	1.11769	0.01014	0.00173	0.32679
1t,3-dimethylcyclopentane	0.44000	0.00702	1.28929	0.00905	0.00154	0.28597
1c,3-dimethylcyclopentane	0.38000	0.00607	1.28929	0.00782	0.00133	0.24698
benzene	0.20000	0.00401	1.61828	0.00649	0.00111	0.16316
n-octane	1.29000	0.01770	0.23106	0.00409	0.00070	0.15026
2,3-dimethylpentane	0.23000	0.00360	1.17057	0.00421	0.00072	0.13572
2-methylheptane	0.73000	0.01002	0.34326	0.00344	0.00059	0.12632
1,1-dimethylcyclopentane	0.16000	0.00255	1.28929	0.00329	0.00056	0.10399
toluene	0.40000	0.00680	0.47674	0.00324	0.00055	0.09613
3-methylheptane	0.46000	0.00631	0.34326	0.00217	0.00037	0.07960
1c,2t,3-trimethylcyclopentane	0.58000	0.00810	0.26991	0.00219	0.00037	0.07892
2,2-dimethylhexane	0.27000	0.00370	0.57233	0.00212	0.00036	0.07790
2,2,3-trimethylhexane	0.64000	0.00782	0.18914	0.00148	0.00025	0.06102
2,2-dimethylbutane	0.02000	0.00036	5.54852	0.00202	0.00034	0.05594
4-methylheptane	0.27000	0.00370	0.34223	0.00127	0.00022	0.04658

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1t,2c,3-trimethylcyclopentane	0.33000	0.00461	0.26991	0.00124	0.00021	0.04490
1c,2t,4-trimethylcyclopentane	0.32000	0.00447	0.26991	0.00121	0.00021	0.04354
1c,2c,3-trimethylcyclopentane	0.28000	0.00391	0.26991	0.00106	0.00018	0.03810
n-propylcyclopentane	0.27000	0.00377	0.26991	0.00102	0.00017	0.03674
2-methyl-3-ethylpentane	0.12000	0.00165	0.50948	0.00084	0.00014	0.03082
2,5-dimethylhexane	0.12000	0.00165	0.50948	0.00084	0.00014	0.03082
2,4-dimethylhexane	0.12000	0.00165	0.50803	0.00084	0.00014	0.03073
n-nonane	1.04000	0.01271	0.05669	0.00072	0.00012	0.02972
2,2,3-trimethylpentane	0.07000	0.00096	0.83572	0.00080	0.00014	0.02949
1t,4-dimethylcyclohexane	0.21000	0.00293	0.26991	0.00079	0.00014	0.02857
1,3-dimethylbenzene	0.37000	0.00546	0.13786	0.00075	0.00013	0.02571
i-propylcyclopentane	0.17000	0.00237	0.26991	0.00064	0.00011	0.02313
2t-ethylmethylcyclopentane	0.16000	0.00223	0.26991	0.00060	0.00010	0.02177
2,3-dimethylhexane	0.11000	0.00151	0.39143	0.00059	0.00010	0.02171
1,4-dimethylbenzene	0.27000	0.00399	0.14614	0.00058	0.00010	0.01989
2,2-dimethylpentane	0.02000	0.00031	1.79972	0.00056	0.00010	0.01814
2,4-dimethylpentane	0.02000	0.00031	1.68004	0.00053	0.00009	0.01694
3-ethylhexane	0.09000	0.00123	0.33317	0.00041	0.00007	0.01512
3,3-dimethylpentane	0.02000	0.00031	1.41421	0.00044	0.00008	0.01426
3-methyloctane	0.39000	0.00477	0.05669	0.00027	0.00005	0.01115
3,4-dimethylhexane	0.06000	0.00082	0.36235	0.00030	0.00005	0.01096
1c,2-dimethylcyclopentane	0.08000	0.00128	0.26991	0.00034	0.00006	0.01089
2,3,5-trimethylhexane	0.11000	0.00134	0.18914	0.00025	0.00004	0.01049
1,2-dimethylbenzene	0.18000	0.00266	0.10833	0.00029	0.00005	0.00983
3-methyl-3-ethylpentane	0.05000	0.00069	0.38632	0.00027	0.00005	0.00974
1c,2-dimethylcyclohexane	0.08000	0.00112	0.24055	0.00027	0.00005	0.00970
1,1-dimethylcyclohexane	0.07000	0.00098	0.26991	0.00026	0.00005	0.00952
3c-ethylmethylcyclopentane	0.07000	0.00098	0.26991	0.00026	0.00005	0.00952
3t-ethylmethylcyclopentane	0.06000	0.00084	0.26991	0.00023	0.00004	0.00816
ethylbenzene	0.10000	0.00148	0.15620	0.00023	0.00004	0.00787
2-methyloctane	0.26000	0.00318	0.05669	0.00018	0.00003	0.00743
3,3-dimethylhexane	0.03000	0.00041	0.47758	0.00020	0.00003	0.00722
4-methyloctane	0.24000	0.00293	0.05669	0.00017	0.00003	0.00686
2,4,4-trimethylhexane	0.05000	0.00061	0.22259	0.00014	0.00002	0.00561
3,3-dimethylheptene-1	0.12000	0.00149	0.08699	0.00013	0.00002	0.00526
2,6-dimethylheptane	0.04000	0.00049	0.18914	0.00009	0.00002	0.00381
2,5-dimethylheptane	0.12000	0.00147	0.05669	0.00008	0.00001	0.00343
2,4-dimethylheptane	0.03000	0.00037	0.18914	0.00007	0.00001	0.00286
1,1-methylethylcyclopentane	0.02000	0.00028	0.26991	0.00008	0.00001	0.00272
1c,3-dimethylcyclohexane	0.02000	0.00028	0.26991	0.00008	0.00001	0.00272
1,1,4-trimethylcyclohexane	0.06000	0.00074	0.07721	0.00006	0.00001	0.00234
3,3-diethylpentane	0.08000	0.00098	0.05669	0.00006	0.00001	0.00229
3,3-dimethylheptane	0.07000	0.00086	0.05669	0.00005	0.00001	0.00200
1,1,3-trimethylcyclohexane	0.05000	0.00062	0.07721	0.00005	0.00001	0.00195

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00191
4-ethylheptane	0.05000	0.00061	0.05669	0.00003	0.00001	0.00143
1c,2t,4c-trimethylcyclohexane	0.03000	0.00037	0.07721	0.00003	0.000005	0.00117
3,4-dimethylheptane	0.04000	0.00049	0.05669	0.00003	0.000005	0.00114
2,4-dimethylheptene-1	0.02000	0.00025	0.08699	0.00002	0.000004	0.00088
nonene-1	0.02000	0.00025	0.08699	0.00002	0.000004	0.00088
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00039
3,5-dimethylheptane	0.01000	0.00012	0.05669	0.00001	0.000001	0.00029

Sample 4, T=95° F

Average Molecular Weight		
Liquid Phase:	156.73	lb/lbmol
Vapor Phase:	53.57	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	1.03	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.70000	0.02488	176.65380	4.39501	0.53058	43.67220
n-butane	1.85000	0.04988	47.45453	2.36724	0.28578	31.00513
n-pentane	2.20000	0.04779	14.16178	0.67678	0.08170	11.00335
i-butane	0.36000	0.00971	67.05331	0.65090	0.07858	8.52525
i-pentane	1.11000	0.02411	18.67352	0.45025	0.05436	7.32038
ethane	0.06000	0.00313		1.03445	0.11102	6.23121
n-hexane	2.0000	0.03637	4.43665	0.16138	0.01948	3.13379
2-methylpentane	1.06000	0.01928	6.08944	0.11739	0.01417	2.27965
methylcyclopentane	1.0000	0.01862	4.03151	0.07508	0.00906	1.42381
3-methylpentane	0.72000	0.01309	5.48122	0.07177	0.00866	1.39378
n-heptane	1.82000	0.02847	1.42681	0.04062	0.00490	0.91711
cyclopentane	0.25000	0.00559	8.96348	0.05008	0.00605	0.79141
methylcyclohexane	1.33000	0.02123	1.42286	0.03021	0.00365	0.66834
cyclohexane	0.55000	0.01024	2.90982	0.02980	0.00360	0.56521
1t,2-dimethylcyclopentane	0.70000	0.01117	2.27727	0.02544	0.00307	0.56299
3-methylhexane	0.81000	0.01267	1.88579	0.02389	0.00288	0.53946
2-methylhexane	0.58000	0.00907	2.01204	0.01825	0.00220	0.41214
1t,3-dimethylcyclopentane	0.44000	0.00702	2.27727	0.01599	0.00193	0.35388
1c,3-dimethylcyclopentane	0.38000	0.00607	2.27727	0.01381	0.00167	0.30562
n-octane	1.29000	0.01770	0.46549	0.00824	0.00099	0.21207
benzene	0.20000	0.00401	2.86487	0.01150	0.00139	0.20236
2-methylheptane	0.73000	0.01002	0.66923	0.00670	0.00081	0.17254
2,3-dimethylpentane	0.23000	0.00360	2.08700	0.00751	0.00091	0.16953
1,1-dimethylcyclopentane	0.16000	0.00255	2.27727	0.00582	0.00070	0.12868
toluene	0.40000	0.00680	0.90368	0.00615	0.00074	0.12766
3-methylheptane	0.46000	0.00631	0.66923	0.00422	0.00051	0.10872
1c,2t,3-trimethylcyclopentane	0.58000	0.00810	0.52453	0.00425	0.00051	0.10744
2,2-dimethylhexane	0.27000	0.00370	1.06869	0.00396	0.00048	0.10191
2,2,3-trimethylhexane	0.64000	0.00782	0.37895	0.00296	0.00036	0.08565
4-methylheptane	0.27000	0.00370	0.66709	0.00247	0.00030	0.06361
2,2-dimethylbutane	0.02000	0.00036	8.93253	0.00325	0.00039	0.06309

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
1t,2c,3-trimethylcyclopentane	0.33000	0.00461	0.52453	0.00242	0.00029	0.06113
1c,2t,4-trimethylcyclopentane	0.32000	0.00447	0.52453	0.00234	0.00028	0.05928
1c,2c,3-trimethylcyclopentane	0.28000	0.00391	0.52453	0.00205	0.00025	0.05187
n-propylcyclopentane	0.27000	0.00377	0.52453	0.00198	0.00024	0.05002
n-nonane	1.04000	0.01271	0.11691	0.00149	0.00018	0.04294
2-methyl-3-ethylpentane	0.12000	0.00165	0.96528	0.00159	0.00019	0.04091
2,5-dimethylhexane	0.12000	0.00165	0.96528	0.00159	0.00019	0.04091
2,4-dimethylhexane	0.12000	0.00165	0.96101	0.00158	0.00019	0.04073
1t,4-dimethylcyclohexane	0.21000	0.00293	0.52453	0.00154	0.00019	0.03890
2,2,3-trimethylpentane	0.07000	0.00096	1.51201	0.00145	0.00018	0.03738
1,3-dimethylbenzene	0.37000	0.00546	0.28049	0.00153	0.00018	0.03665
i-propylcyclopentane	0.17000	0.00237	0.52453	0.00125	0.00015	0.03149
2t-ethylmethylcyclopentane	0.16000	0.00223	0.52453	0.00117	0.00014	0.02964
2,3-dimethylhexane	0.11000	0.00151	0.75123	0.00113	0.00014	0.02918
1,4-dimethylbenzene	0.27000	0.00399	0.29779	0.00119	0.00014	0.02840
2,2-dimethylpentane	0.02000	0.00031	3.11782	0.00098	0.00012	0.02202
2,4-dimethylpentane	0.02000	0.00031	2.93417	0.00092	0.00011	0.02073
3-ethylhexane	0.09000	0.00123	0.65042	0.00080	0.00010	0.02067
3,3-dimethylpentane	0.02000	0.00031	2.47165	0.00077	0.00009	0.01746
3-methyloctane	0.39000	0.00477	0.11691	0.00056	0.00007	0.01610
1c,2-dimethylcyclopentane	0.08000	0.00128	0.52453	0.00067	0.00008	0.01482
3,4-dimethylhexane	0.06000	0.00082	0.69690	0.00057	0.00007	0.01477
2,3,5-trimethylhexane	0.11000	0.00134	0.37895	0.00051	0.00006	0.01472
1,2-dimethylbenzene	0.18000	0.00266	0.22572	0.00060	0.00007	0.01435
1c,2-dimethylcyclohexane	0.08000	0.00112	0.47036	0.00053	0.00006	0.01329
1,1-dimethylcyclohexane	0.07000	0.00098	0.52453	0.00051	0.00006	0.01297
3c-ethylmethylcyclopentane	0.07000	0.00098	0.52453	0.00051	0.00006	0.01297
3-methyl-3-ethylpentane	0.05000	0.00069	0.73113	0.00050	0.00006	0.01291
ethylbenzene	0.10000	0.00148	0.31926	0.00047	0.00006	0.01128
3t-ethylmethylcyclopentane	0.06000	0.00084	0.52453	0.00044	0.00005	0.01111
2-methyloctane	0.26000	0.00318	0.11691	0.00037	0.00004	0.01074
4-methyloctane	0.24000	0.00293	0.11691	0.00034	0.00004	0.00991
3,3-dimethylhexane	0.03000	0.00041	0.90338	0.00037	0.00004	0.00957
3,3-dimethylheptene-1	0.12000	0.00149	0.18738	0.00028	0.00003	0.00794
2,4,4-trimethylhexane	0.05000	0.00061	0.43934	0.00027	0.00003	0.00776
2,6-dimethylheptane	0.04000	0.00049	0.37895	0.00019	0.00002	0.00535
2,5-dimethylheptane	0.12000	0.00147	0.11691	0.00017	0.00002	0.00495
2,4-dimethylheptane	0.03000	0.00037	0.37895	0.00014	0.00002	0.00402
1,1-methylethylcyclopentane	0.02000	0.00028	0.52453	0.00015	0.00002	0.00370
1c,3-dimethylcyclohexane	0.02000	0.00028	0.52453	0.00015	0.00002	0.00370
1,1,4-trimethylcyclohexane	0.06000	0.00074	0.16373	0.00012	0.00001	0.00347
3,3-diethylpentane	0.08000	0.00098	0.11691	0.00011	0.00001	0.00330
1,1,3-trimethylcyclohexane	0.05000	0.00062	0.16373	0.00010	0.00001	0.00289
3,3-dimethylheptane	0.07000	0.00086	0.11691	0.00010	0.00001	0.00289

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,3,4-trimethylhexane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00268
4-ethylheptane	0.05000	0.00061	0.11691	0.00007	0.00001	0.00206
1c,2t,4c-trimethylcyclohexane	0.03000	0.00037	0.16373	0.00006	0.00001	0.00173
3,4-dimethylheptane	0.04000	0.00049	0.11691	0.00006	0.00001	0.00165
2,4-dimethylheptene-1	0.02000	0.00025	0.18738	0.00005	0.00001	0.00132
nonene-1	0.02000	0.00025	0.18738	0.00005	0.00001	0.00132
1,1,2-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000002	0.00058
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000002	0.00058
3,5-dimethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00041

Sample 5, T=72.1° F

Average Molecular Weight		
Liquid Phase:	152.85	lb/lbmol
Vapor Phase:	55.94	lb/lbmol
Methane / Ethane		
Methane K:	167.10	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	28.63	
Ethane p_i:	0.26	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.44000	0.01525	128.84470	1.96514	0.45897	36.17973
n-butane	1.30000	0.03419	32.33790	1.10556	0.25821	26.82880
n-pentane	1.82000	0.03856	8.94467	0.34489	0.08055	10.38919
i-butane	0.30000	0.00789	46.68395	0.36831	0.08602	8.93789
i-pentane	1.13000	0.02394	12.06945	0.28894	0.06748	8.70386
ethane	0.04000	0.00203		0.26466	0.05821	3.12922
n-hexane	1.85000	0.03281	2.59458	0.08514	0.01988	3.06327
2-methylpentane	1.02000	0.01809	3.65310	0.06609	0.01544	2.37798
cyclohexane	1.62000	0.02942	1.66588	0.04901	0.01145	1.72229
methylcyclohexane	2.94000	0.04577	0.78425	0.03589	0.00838	1.47145
methylcyclopentane	0.94000	0.01707	2.35878	0.04027	0.00941	1.41501
3-methylpentane	0.63000	0.01117	3.27061	0.03655	0.00854	1.31497
n-heptane	1.90000	0.02898	0.77018	0.02232	0.00521	0.93388
cyclopentane	0.17000	0.00371	5.50431	0.02039	0.00476	0.59717
3-methylhexane	0.71000	0.01083	1.04376	0.01130	0.00264	0.47294
1t,2-dimethylcyclopentane	0.52000	0.00810	1.28929	0.01044	0.00244	0.42786
2-methylhexane	0.57000	0.00869	1.11769	0.00972	0.00227	0.40658
2,3-dimethylbutane	0.11000	0.00195	4.06734	0.00794	0.00185	0.28553
benzene	0.27000	0.00528	1.61828	0.00855	0.00200	0.27885
1c,3-dimethylcyclopentane	0.33000	0.00514	1.28929	0.00662	0.00155	0.27152
1t,3-dimethylcyclopentane	0.31000	0.00483	1.28929	0.00622	0.00145	0.25507
toluene	0.83000	0.01377	0.47674	0.00656	0.00153	0.25252
n-octane	1.53000	0.02047	0.23106	0.00473	0.00110	0.22562
1,1-dimethylcyclopentane	0.23000	0.00358	1.28929	0.00462	0.00108	0.18924
2-methylheptane	0.81000	0.01084	0.34326	0.00372	0.00087	0.17744
1c,2t,3-trimethylcyclopentane	0.88000	0.01199	0.26991	0.00324	0.00076	0.15158
2,3-dimethylpentane	0.18000	0.00275	1.17057	0.00321	0.00075	0.13447
2,2-dimethylbutane	0.03000	0.00053	5.54852	0.00295	0.00069	0.10623
2,2-dimethylhexane	0.27000	0.00361	0.57233	0.00207	0.00048	0.09862
3-methylheptane	0.41000	0.00549	0.34326	0.00188	0.00044	0.08982
2,4-dimethylpentane	0.07000	0.00107	1.68004	0.00179	0.00042	0.07505

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-propylcyclopentane	0.35000	0.00477	0.26991	0.00129	0.00030	0.06029
1t,2-dimethylcyclohexane	0.37000	0.00504	0.24055	0.00121	0.00028	0.05680
1t,4-dimethylcyclohexane	0.32000	0.00436	0.26991	0.00118	0.00027	0.05512
1,3-dimethylbenzene	0.61000	0.00878	0.13786	0.00121	0.00028	0.05367
4-methylheptane	0.23000	0.00308	0.34223	0.00105	0.00025	0.05023
n-nonane	1.31000	0.01561	0.05669	0.00089	0.00021	0.04740
ethylcyclopentane	0.11000	0.00171	0.67389	0.00115	0.00027	0.04731
2,3-dimethylhexane	0.18000	0.00241	0.39143	0.00094	0.00022	0.04496
i-propylcyclopentane	0.25000	0.00341	0.26991	0.00092	0.00021	0.04306
1c,2t,4-trimethylcyclopentane	0.24000	0.00327	0.26991	0.00088	0.00021	0.04134
1t,2c,3-trimethylcyclopentane	0.22000	0.00300	0.26991	0.00081	0.00019	0.03790
3-ethylpentane	0.06000	0.00092	0.98304	0.00090	0.00021	0.03764
2,2,3-trimethylhexane	0.29000	0.00346	0.18914	0.00065	0.00015	0.03500
1,1,4-trimethylcyclohexane	0.70000	0.00848	0.07721	0.00065	0.00015	0.03449
2,2-dimethylpentane	0.03000	0.00046	1.79972	0.00082	0.00019	0.03446
2,4-dimethylhexane	0.10000	0.00134	0.50803	0.00068	0.00016	0.03242
1,4-dimethylbenzene	0.33000	0.00475	0.14614	0.00069	0.00016	0.03078
2,5-dimethylhexane	0.08000	0.00107	0.50948	0.00055	0.00013	0.02601
1,1-dimethylcyclohexane	0.13000	0.00177	0.26991	0.00048	0.00011	0.02239
3,3-dimethylpentane	0.02000	0.00031	1.41421	0.00043	0.00010	0.01805
2t-ethylmethylcyclopentane	0.10000	0.00136	0.26991	0.00037	0.00009	0.01723
1,2-dimethylbenzene	0.22000	0.00317	0.10833	0.00034	0.00008	0.01521
ethylbenzene	0.15000	0.00216	0.15620	0.00034	0.00008	0.01495
3-ethylhexane	0.07000	0.00094	0.33317	0.00031	0.00007	0.01488
1c,2-dimethylcyclopentane	0.08000	0.00125	0.26991	0.00034	0.00008	0.01378
3-methyloctane	0.35000	0.00417	0.05669	0.00024	0.00006	0.01266
3,3-dimethylhexane	0.04000	0.00054	0.47758	0.00026	0.00006	0.01219
2,2,3-trimethylbutane	0.01000	0.00015	1.75367	0.00027	0.00006	0.01119
2-methyl-3-ethylpentane	0.03000	0.00040	0.50948	0.00020	0.00005	0.00975
3,4-dimethylhexane	0.04000	0.00054	0.36235	0.00019	0.00005	0.00925
2-methyloctane	0.25000	0.00298	0.05669	0.00017	0.00004	0.00904
3c-ethylmethylcyclopentane	0.05000	0.00068	0.26991	0.00018	0.00004	0.00861
3t-ethylmethylcyclopentane	0.05000	0.00068	0.26991	0.00018	0.00004	0.00861
4-methyloctane	0.21000	0.00250	0.05669	0.00014	0.00003	0.00760
3-methyl-3-ethylpentane	0.03000	0.00040	0.38632	0.00016	0.00004	0.00740
1,1-methylethylcyclopentane	0.03000	0.00041	0.26991	0.00011	0.00003	0.00517
2,6-dimethylheptane	0.04000	0.00048	0.18914	0.00009	0.00002	0.00483
2,5-dimethylheptane	0.13000	0.00155	0.05669	0.00009	0.00002	0.00470
1c,2-dimethylcyclohexane	0.03000	0.00041	0.24055	0.00010	0.00002	0.00461
2,4,4-trimethylhexane	0.03000	0.00036	0.22259	0.00008	0.00002	0.00426
*1c,3c,5-trimethylcyclohexane	0.07000	0.00085	0.07721	0.00007	0.00002	0.00345
1c,3-dimethylcyclohexane	0.02000	0.00027	0.26991	0.00007	0.00002	0.00345
4-ethylheptane	0.08000	0.00095	0.05669	0.00005	0.00001	0.00289
2,3,4-trimethylpentane	0.01000	0.00013	0.44990	0.00006	0.00001	0.00287

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,2,3,4-tetramethylpentane	0.02000	0.00024	0.20988	0.00005	0.00001	0.00268
2,3,4-trimethylhexane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00241
2,4-dimethylheptane	0.02000	0.00024	0.18914	0.00005	0.00001	0.00241
3,3-diethylpentane	0.06000	0.00072	0.05669	0.00004	0.00001	0.00217
c-octene-2	0.01000	0.00014	0.28862	0.00004	0.00001	0.00184
2,4-dimethylheptene-1	0.03000	0.00036	0.08699	0.00003	0.00001	0.00167
1c,2t,4c-trimethylcyclohexane	0.03000	0.00036	0.07721	0.00003	0.00001	0.00148
2,3,5-trimethylhexane	0.01000	0.00012	0.18914	0.00002	0.00001	0.00121
3,5-dimethylheptane	0.03000	0.00036	0.05669	0.00002	0.000005	0.00109
1,1,3-trimethylcyclohexane	0.02000	0.00024	0.07721	0.00002	0.000004	0.00099
i-butylcyclopentane	0.02000	0.00024	0.07721	0.00002	0.000004	0.00099
3,3-dimethylheptane	0.02000	0.00024	0.05669	0.00001	0.000003	0.00072
3,4-dimethylheptane	0.02000	0.00024	0.05669	0.00001	0.000003	0.00072
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.07721	0.00001	0.000002	0.00049
2,2-dimethylheptane	0.01000	0.00012	0.05669	0.00001	0.000002	0.00036

Sample 5, T=95° F

Average Molecular Weight		
Liquid Phase:	152.85	lb/lbmol
Vapor Phase:	56.79	lb/lbmol
Methane / Ethane		
Methane K:	190.00	
Methane Mass% Liq	0.00000000	%
Methane y_i	0.00	ppm
Methane Mass% Vap	0.00000000	%
Ethane K:	35.50	
Ethane p_i:	0.48	psia

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
propane	0.44000	0.01525	176.65380	2.69433	0.43569	33.83301
n-butane	1.30000	0.03419	47.45453	1.62237	0.26235	26.85258
n-pentane	1.82000	0.03856	14.16178	0.54605	0.08830	11.21901
i-pentane	1.13000	0.02394	18.67352	0.44704	0.07229	9.18480
i-butane	0.30000	0.00789	67.05331	0.52902	0.08555	8.75602
ethane	0.04000	0.00203		0.48112	0.07218	3.82230
n-hexane	1.85000	0.03281	4.43665	0.14558	0.02354	3.57266
2-methylpentane	1.02000	0.01809	6.08944	0.11017	0.01782	2.70360
cyclohexane	1.62000	0.02942	2.90982	0.08561	0.01384	2.05185
methylcyclohexane	2.94000	0.04577	1.42286	0.06512	0.01053	1.82085
methylcyclopentane	0.94000	0.01707	4.03151	0.06883	0.01113	1.64953
3-methylpentane	0.63000	0.01117	5.48122	0.06125	0.00990	1.50308
n-heptane	1.90000	0.02898	1.42681	0.04135	0.00669	1.18000
cyclopentane	0.17000	0.00371	8.96348	0.03321	0.00537	0.66327
3-methylhexane	0.71000	0.01083	1.88579	0.02042	0.00330	0.58280
1t,2-dimethylcyclopentane	0.52000	0.00810	2.27727	0.01843	0.00298	0.51545
2-methylhexane	0.57000	0.00869	2.01204	0.01749	0.00283	0.49920
benzene	0.27000	0.00528	2.86487	0.01514	0.00245	0.33669
1c,3-dimethylcyclopentane	0.33000	0.00514	2.27727	0.01170	0.00189	0.32711
toluene	0.83000	0.01377	0.90368	0.01244	0.00201	0.32648
2,3-dimethylbutane	0.11000	0.00195	6.69218	0.01306	0.00211	0.32042
n-octane	1.53000	0.02047	0.46549	0.00953	0.00154	0.31000
1t,3-dimethylcyclopentane	0.31000	0.00483	2.27727	0.01099	0.00178	0.30729
2-methylheptane	0.81000	0.01084	0.66923	0.00725	0.00117	0.23595
1,1-dimethylcyclopentane	0.23000	0.00358	2.27727	0.00815	0.00132	0.22799
1c,2t,3-trimethylcyclopentane	0.88000	0.01199	0.52453	0.00629	0.00102	0.20092
2,3-dimethylpentane	0.18000	0.00275	2.08700	0.00573	0.00093	0.16352
2,2-dimethylhexane	0.27000	0.00361	1.06869	0.00386	0.00062	0.12560
3-methylheptane	0.41000	0.00549	0.66923	0.00367	0.00059	0.11943
2,2-dimethylbutane	0.03000	0.00053	8.93253	0.00475	0.00077	0.11664
2,4-dimethylpentane	0.07000	0.00107	2.93417	0.00313	0.00051	0.08940

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
n-propylcyclopentane	0.35000	0.00477	0.52453	0.00250	0.00040	0.07991
1t,2-dimethylcyclohexane	0.37000	0.00504	0.47036	0.00237	0.00038	0.07575
1,3-dimethylbenzene	0.61000	0.00878	0.28049	0.00246	0.00040	0.07448
1t,4-dimethylcyclohexane	0.32000	0.00436	0.52453	0.00229	0.00037	0.07306
4-methylheptane	0.23000	0.00308	0.66709	0.00205	0.00033	0.06678
n-nonane	1.31000	0.01561	0.11691	0.00183	0.00030	0.06666
ethylcyclopentane	0.11000	0.00171	1.24259	0.00213	0.00034	0.05950
2,3-dimethylhexane	0.18000	0.00241	0.75123	0.00181	0.00029	0.05886
i-propylcyclopentane	0.25000	0.00341	0.52453	0.00179	0.00029	0.05708
1c,2t,4-trimethylcyclopentane	0.24000	0.00327	0.52453	0.00171	0.00028	0.05480
1t,2c,3-trimethylcyclopentane	0.22000	0.00300	0.52453	0.00157	0.00025	0.05023
1,1,4-trimethylcyclohexane	0.70000	0.00848	0.16373	0.00139	0.00022	0.04989
2,2,3-trimethylhexane	0.29000	0.00346	0.37895	0.00131	0.00021	0.04784
3-ethylpentane	0.06000	0.00092	1.78043	0.00163	0.00026	0.04650
1,4-dimethylbenzene	0.33000	0.00475	0.29779	0.00141	0.00023	0.04277
2,4-dimethylhexane	0.10000	0.00134	0.96101	0.00129	0.00021	0.04183
2,2-dimethylpentane	0.03000	0.00046	3.11782	0.00143	0.00023	0.04071
2,5-dimethylhexane	0.08000	0.00107	0.96528	0.00103	0.00017	0.03361
1,1-dimethylcyclohexane	0.13000	0.00177	0.52453	0.00093	0.00015	0.02968
2t-ethylmethylcyclopentane	0.10000	0.00136	0.52453	0.00071	0.00012	0.02283
1,2-dimethylbenzene	0.22000	0.00317	0.22572	0.00071	0.00012	0.02161
3,3-dimethylpentane	0.02000	0.00031	2.47165	0.00075	0.00012	0.02152
ethylbenzene	0.15000	0.00216	0.31926	0.00069	0.00011	0.02084
3-ethylhexane	0.07000	0.00094	0.65042	0.00061	0.00010	0.01982
1c,2-dimethylcyclopentane	0.08000	0.00125	0.52453	0.00065	0.00011	0.01827
3-methyloctane	0.35000	0.00417	0.11691	0.00049	0.00008	0.01781
3,3-dimethylhexane	0.04000	0.00054	0.90338	0.00048	0.00008	0.01573
2,2,3-trimethylbutane	0.01000	0.00015	3.01654	0.00046	0.00007	0.01313
2-methyloctane	0.25000	0.00298	0.11691	0.00035	0.00006	0.01272
2-methyl-3-ethylpentane	0.03000	0.00040	0.96528	0.00039	0.00006	0.01260
3,4-dimethylhexane	0.04000	0.00054	0.69690	0.00037	0.00006	0.01213
3c-ethylmethylcyclopentane	0.05000	0.00068	0.52453	0.00036	0.00006	0.01142
3t-ethylmethylcyclopentane	0.05000	0.00068	0.52453	0.00036	0.00006	0.01142
4-methyloctane	0.21000	0.00250	0.11691	0.00029	0.00005	0.01069
3-methyl-3-ethylpentane	0.03000	0.00040	0.73113	0.00029	0.00005	0.00955
1,1-methylethylcyclopentane	0.03000	0.00041	0.52453	0.00021	0.00003	0.00685
2,5-dimethylheptane	0.13000	0.00155	0.11691	0.00018	0.00003	0.00662
2,6-dimethylheptane	0.04000	0.00048	0.37895	0.00018	0.00003	0.00660
1c,2-dimethylcyclohexane	0.03000	0.00041	0.47036	0.00019	0.00003	0.00614
2,4,4-trimethylhexane	0.03000	0.00036	0.43934	0.00016	0.00003	0.00574
*1c,3c,5-trimethylcyclohexane	0.07000	0.00085	0.16373	0.00014	0.00002	0.00499
1c,3-dimethylcyclohexane	0.02000	0.00027	0.52453	0.00014	0.00002	0.00457
4-ethylheptane	0.08000	0.00095	0.11691	0.00011	0.00002	0.00407
2,3,4-trimethylpentane	0.01000	0.00013	0.84444	0.00011	0.00002	0.00368

Component	m_{liq} (%)	χ_i	p_i° (psia)	p_i (psia)	y_i	m_{vap} (%)
2,2,3,4-tetramethylpentane	0.02000	0.00024	0.41398	0.00010	0.00002	0.00360
2,3,4-trimethylhexane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00330
2,4-dimethylheptane	0.02000	0.00024	0.37895	0.00009	0.00001	0.00330
3,3-diethylpentane	0.06000	0.00072	0.11691	0.00008	0.00001	0.00305
c-octene-2	0.01000	0.00014	0.57018	0.00008	0.00001	0.00248
2,4-dimethylheptene-1	0.03000	0.00036	0.18738	0.00007	0.00001	0.00245
1c,2t,4c-trimethylcyclohexane	0.03000	0.00036	0.16373	0.00006	0.00001	0.00214
2,3,5-trimethylhexane	0.01000	0.00012	0.37895	0.00005	0.00001	0.00165
3,5-dimethylheptane	0.03000	0.00036	0.11691	0.00004	0.00001	0.00153
1,1,3-trimethylcyclohexane	0.02000	0.00024	0.16373	0.00004	0.00001	0.00143
i-butylcyclopentane	0.02000	0.00024	0.16373	0.00004	0.00001	0.00143
3,3-dimethylheptane	0.02000	0.00024	0.11691	0.00003	0.000005	0.00102
3,4-dimethylheptane	0.02000	0.00024	0.11691	0.00003	0.000005	0.00102
1c,2t,3c-trimethylcyclohexane	0.01000	0.00012	0.16373	0.00002	0.000003	0.00071
2,2-dimethylheptane	0.01000	0.00012	0.11691	0.00001	0.000002	0.00051

Appendix A-4— Antoine Coefficients and Molecular Weights

$$\log_{10}(P/\text{bar}) = A - \frac{B}{T/\text{K} + C} \tag{9}$$

Compound	Formula	Mol. Wt.	VPsurrogate	A	B	C
$\ast$1c,3c,5-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1-nonene	—	—	—	4.079	1,435.359	−67.615
1-octene	—	—	—	4.058	1,353.486	−60.386
1,1-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1,1-dimethylcyclopentane	C_7H_{14}	98.188	—	3.955	1,226.557	−50.393
1,1-methylethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1,1,2-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1,1,3-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1,1,4-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1,2-dimethylbenzene	C_8H_{10}	106.167	—	4.938	1,901.373	−26.268
1,3-dimethylbenzene	C_8H_{10}	106.167	—	5.092	1,996.545	−14.772
1,4-dimethylbenzene	C_8H_{10}	106.167	—	4.146	1,474.403	−55.377
1c,2-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	3.967	1,369.525	−57.110
1c,2-dimethylcyclopentane	C_7H_{14}	98.188	i-propylcyclopentane	—	—	—
1c,2c,3-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,2t,3-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,2t,3c-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1c,2t,4-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,2t,4c-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1c,2t,4t-trimethylcyclohexane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
1c,3-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1c,3-dimethylcyclopentane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	—	—	—
1c,3c,5c-trimethylcyclohexane	C_9H_{18}	126.242	—	—	—	—
1t,2-dimethylcyclohexane	C_8H_{16}	112.215	1c,2-dimethylcyclohexane	—	—	—
1t,2-dimethylcyclopentane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	—	—	—
1t,2c,3-trimethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
1t,3-dimethylcyclopentane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	—	—	—
1t,4-dimethylcyclohexane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
2-methyl-3-ethylpentane	C_8H_{18}	114.231	2,5-dimethylhexane	—	—	—
2-methylheptane	C_8H_{18}	114.231	—	4.042	1,337.468	−59.457
2-methylhexane	C_7H_{16}	100.204	—	4.007	1,240.869	−53.047
2-methyloctane	C_9H_{20}	128.258	n-nonane	—	—	—
2-methylpentane	C_6H_{14}	86.177	—	3.964	1,135.410	−46.578
2,2-dimethylbutane	C_6H_{14}	86.177	—	3.880	1,081.176	−43.807
2,2-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
2,2-dimethylhexane	C_8H_{18}	114.231	—	4.133	1,367.457	−48.436
2,2-dimethylpentane	C_7H_{16}	100.204	—	3.940	1,190.298	−49.807
2,2-dimethylpropane	C_5H_{12}	72.150	—	3.864	950.318	−36.329
2,2,3-trimethylbutane	C_7H_{16}	100.204	—	3.922	1,203.362	−46.776

Compound	Formula	Mol. Wt.	VPsurrogate	A	B	C
2,2,3-trimethylhexane	C_9H_{20}	128.258	—	4.414	1,592.354	−42.627
2,2,3-trimethylpentane	C_8H_{18}	114.231	2,2,4-trimethylpentane	—	—	—
2,2,3,4-tetramethylpentane	C_9H_{20}	128.258	—	3.960	1,376.496	−58.063
2,2,4-trimethylpentane	—	—	—	3.937	1,257.840	−52.415
2,2,5-trimethylhexane	C_9H_{20}	128.258	—	4.252	1,471.761	−48.948
2,3-dimethylbutane	C_6H_{14}	86.177	—	3.935	1,127.187	−44.200
2,3-dimethylhexane	C_8H_{18}	114.231	—	4.059	1,351.645	−55.257
2,3-dimethylpentane	C_7H_{16}	100.204	—	3.987	1,242.609	−50.806
2,3,4-trimethylhexane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2,3,4-trimethylpentane	C_8H_{18}	114.231	—	4.156	1,420.710	−44.618
2,3,5-trimethylhexane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2,4-dimethylheptane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2,4-dimethylheptene-1	C_9H_{18}	126.242	1-nonene	—	—	—
2,4-dimethylhexane	C_8H_{18}	114.231	—	3.989	1,292.707	−57.970
2,4-dimethylpentane	C_7H_{16}	100.204	—	3.961	1,197.608	−50.877
2,4,4-trimethylhexane	C_9H_{20}	128.258	—	3.991	1,378.043	−58.046
2,5-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
2,5-dimethylhexane	C_8H_{18}	114.231	—	3.980	1,284.664	−59.032
2,6-dimethylheptane	C_9H_{20}	128.258	2,2,3-trimethylhexane	—	—	—
2t-ethylmethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
3-ethylheptane	C_9H_{20}	128.258	—	—	—	—
3-ethylhexane	C_8H_{18}	114.231	—	4.040	1,339.865	−59.479
3-ethylpentane	C_7H_{16}	100.204	—	4.005	1,254.119	−53.004
3-methyl-3-ethylpentane	C_8H_{18}	114.231	—	4.048	1,380.130	−49.963
3-methylheptane	C_8H_{18}	114.231	2-methylheptane	—	—	—
3-methylhexane	C_7H_{16}	100.204	—	3.999	1,243.759	−53.524
3-methyloctane	C_9H_{20}	128.258	n-nonane	—	—	—
3-methylpentane	C_6H_{14}	86.177	—	3.974	1,152.368	−46.021
3,3-diethylpentane	C_9H_{20}	128.258	n-nonane	—	—	—
3,3-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
3,3-dimethylheptene-1	C_9H_{18}	126.242	1-nonene	—	—	—
3,3-dimethylhexane	C_8H_{18}	114.231	—	3.859	1,243.387	−62.655
3,3-dimethylpentane	C_7H_{16}	100.204	—	3.956	1,230.986	−47.568
3,4-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
3,4-dimethylhexane	C_8H_{18}	114.231	—	4.098	1,382.877	−52.831
3,5-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
3c-ethylmethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
3t-ethylmethylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
4-ethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
4-methylheptane	C_8H_{18}	114.231	—	4.060	1,347.236	−58.539
4-methyloctane	C_9H_{20}	128.258	n-nonane	—	—	—
4,4-dimethylheptane	C_9H_{20}	128.258	n-nonane	—	—	—
benzene	C_6H_6	78.114	—	4.018	1,203.835	−53.226
c-nonene-3	C_9H_{18}	126.242	1-nonene	—	—	—

Compound	Formula	Mol. Wt.	VPsurrogate	A	B	C
c-octene-2	C_8H_{16}	112.215	1-octene	—	—	—
cyclohexane	C_6H_{12}	84.161	—	3.970	1,203.526	−50.287
cyclopentane	C_5H_{10}	70.134	—	4.003	1,119.208	−42.412
ethane	C_2H_6	30.070	—	—	—	—
ethylbenzene	C_8H_{10}	106.167	—	4.075	1,419.315	−60.539
ethylcyclopentane	C_7H_{14}	98.188	—	4.023	1,305.001	−51.755
i-butane	C_4H_{10}	58.123	—	4.328	1,132.108	0.918
i-butylcyclopentane	C_9H_{18}	126.242	i-propylcyclohexane	—	—	—
i-pentane	C_5H_{12}	72.150	—	3.915	1,020.012	−40.053
i-propylcyclohexane	—	—	—	3.997	1,452.816	−63.759
i-propylcyclopentane	C_8H_{16}	112.215	—	4.017	1,383.340	−54.742
methylcyclohexane	C_7H_{14}	98.188	1,1-dimethylcyclopentane	3.952	1,272.865	−51.520
methylcyclopentane	C_6H_{12}	84.161	—	3.988	1,186.059	−47.108
n-butane	C_4H_{10}	58.123	—	4.356	1,175.581	−2.071
n-heptane	C_7H_{16}	100.204	—	4.028	1,268.636	−56.199
n-hexane	C_6H_{14}	86.177	—	4.003	1,171.530	−48.784
n-nonane	C_9H_{20}	128.258	—	3.825	1,492.928	−55.895
n-octane	C_8H_{18}	114.231	—	4.049	1,355.126	−63.633
n-pentane	C_5H_{12}	72.150	—	3.989	1,070.617	−40.454
n-propylcyclopentane	C_8H_{16}	112.215	i-propylcyclopentane	—	—	—
nonene-1	C_9H_{18}	126.242	—	4.079	1,435.359	−67.615
propane	C_3H_8	44.097	—	4.537	1,149.360	24.906
Styrene	C_8H_8	104.152	—	4.059	1,459.909	−59.551
t-7-methyloctene-3	C_9H_{18}	126.242	1-nonene	—	—	—
toluene	C_7H_8	92.141	—	4.142	1,377.578	−50.507

REPORT:
Single Point Mooring Safety and Performance

Prepared for

BlackburnCarter Law Firm

Prepared by

RSJ Consulting

MAY 2019

EXECUTIVE SUMMARY

A Single Point Mooring (SPM), also known as a single buoy mooring, is a buoy anchored offshore that serves as a mooring point as well as an interconnection for tankers loading or offloading liquid products. SPMs typically consist of the buoy body, mooring and anchoring elements, product transfer system, and supporting components. There are currently 38 different types of SPMs. The Texas Gulf Terminals Project Deepwater Port plans to utilize a Catenary Anchor Leg Mooring (CALM). A CALM is the most common type of SPM and is capable of handling Very Large Crude Carriers (VLCCs). A CALM consists of a floating buoy anchored to the seabed by catenary chain legs which are secured to anchors or piles. One or more elastic mooring hawsers hold the tanker captive to a turntable which is mounted on top of the buoy by means of a bearing. The bearing allows the turntable to freely weathervane so that the tanker can take up the position of least resistance to the prevailing weather at all times. Fluid product is transferred via the CALM to or from the tanker by floating and subsea hose systems. When the tanker moves off station, due to the effects of wind, wave and current, certain anchor legs are lifted. This generates a restoring force which tends to return the system to the equilibrium position.

There are currently 646 SPMs utilized throughout the world as they require less investment in comparison with traditional port systems and facilities. Over 200 SPMs are similar in design or usage to the proposed Texas Gulf Terminals Project. Sixteen SPMs are located in the U.S. Of these, the two facilities most representative of the Texas Gulf Terminals Project are Barbers Point, installed in 31 meters of water two miles south of Oahu, Hawaii in 2012; and the Louisiana Offshore Oil Port (LOOP), installed in 35 meters of water 16 miles southeast of Port Fourchon, Louisiana in 1980. In the last ten years, SPMs have been built for operations in Argentina, Australia, Brazil, Japan, Romania, Spain, and Thailand, among other countries.

RSJ searched accident and spill records from the International Tanker Owners Pollution Federation (ITOPF); the Bureau of Safety and Environmental Enforcement (BSEE) Bureau of Ocean Energy Management (BOEM), and the Minerals Management Service of the U.S. Department of Interior; National Oceanic and Atmosphere Administration (NOAA) Office of Response and Restoration; U.S. Coast Guard; U.S. Department of Transportation; and the National Transportation Safety Board. This broad search for SPM incident data was then followed by a more focused site-specific search of all United States SPMs. Based on the available data, RSJ determined SPMs have been safely and effectively utilized for oil and gas loading/offloading operations for almost 60 years.

Single Point Mooring Fleet Overview

Based on data contained in *The Offshore Logistics Register 2018 (*Clarksons Research, 2018)[1], there are currently 646 SPMs in the global fleet today throughout all regions of the world. The first SPM was constructed in 1959 by Gusto Shipyard (now SBM Offshore) for Shell Oil.[2] **Table 1** depicts the annual number of SPMs added each year beyond 1977. Approximately five more SPMs are under construction that will be active in the next 2-3 years.

TABLE 1

RSJ searched accident and spill records from the International Tanker Owners Pollution Federation (ITOPF); the Bureau of Safety and Environmental Enforcement (BSEE) Bureau of Ocean Energy Management (BOEM), and the Minerals Management Service of the U.S. Department of Interior; National Oceanic and Atmosphere Administration (NOAA) Office of Response and Restoration; U.S. Coast Guard; U.S. Department of Transportation; and the National Transportation Safety Board. This broad search for SPM incident data was then followed by a more focused site-specific search of all United States SPMs. Based on the available data, RSJ determined SPMs have been safely and effectively utilized for oil and gas loading/offloading operations for almost 60 years.

[1] Clarksons Research Services. (2018). *The Offshore Logistics Register 2018*. London, England.
[2] https://www.sbmoffshore.com/who-we-are/history/#2

Depths of Single Point Moorings

CALMs are usually located in water depths between 20 to 100 meters and are connected to a shore storage facility (tank farm) or to offshore production platforms by means of a submarine pipeline. Since early 2000, the CALM design has been used and adapted to deepwater conditions, greater than 1,000 meters. For this application, the CALM is used as an offloading system for a deepwater Floating Production Storage and Offloading unit (FPSO). The Texas Gulf Terminals Project SPM will be located at a depth of approximately 30 meters. **Table 2** depicts the depths of all existing SPMs.

TABLE 2

Depth (meters)	# of SPMs
0-19	50
20-39	267
40-59	73
60-79	47
80-99	46
100-124	29
125-149	17
150-199	6
200-299	4
300-499	18
500-749	7
750-999	9
1000-1249	11
1250-1499	12
1500-1999	4
>= 2000	4

**42 SPMs no data for depth*

Locations of Single Point Moorings

SPMs are utilized throughout the world as they require less investment in comparison with traditional port systems and facilities. In the last ten years, SPMs have been built for operations in Argentina, Australia, Brazil, Japan, Romania, Spain, and Thailand, among other countries. **Table 3** lists the general regions of the globe the current 646 SPMs are located.

TABLE 3

Region	# of SPMs
North America	44
NW Europe	64
South America	67
Mediterranean	78
West Africa	85
Middle East	123
Asia Pacific	185

A review of the Clarksons Research Register identified over 200 SPMs located throughout the world that are similar in design or usage to the proposed Texas Gulf Terminals Project. The remainder of this report focuses on the SPMs located or planned within the waters of the United States.

Single Point Moorings in the United States

The following SPMs are located in the United States:

- **Barbers Point SPM**
- **Louisiana Offshore Oil Port SPMs (SALM 102, 103, 104A)**
- **Cascade / Chinook STP (BW Pioneer FPSO STP)**
- **Phoenix Turret (Helix Producer 1 Floating Production Unit (FPU) Turret)**
- **Stones Turret (Turritella FPSO BTM)**
- **Gulf Gateway Energy Bridge STL LNG Terminal**
- **Northeast Gateway A; Gateway B (Northeast Gateway Deepwater Port – LNG Import)**
- **Neptune LNG North Buoy (STL LNG Buoy); Neptune LNG South Buoy (STL LNG Terminal)**
- **Worldwide Use #1 SPM; Worldwide Use #2-#7 SPM**
- **Worldwide Use CALM**
- **Delfin LNG SPM (*MARAD Approved Deepwater Port – License Issuance Pending*)**

Of the sixteen U.S. SPMs, the following three are related to offshore oil and gas production:

Cascade / Chinook STP (BW Pioneer FPSO STP): Submerged Turret Production Mooring (STP) installed in 2010 in the Gulf of Mexico (Walker Ridge Block 249) in approximately 2,600 meters of water. The BW Pioneer, with an oil storage capacity of 500,000 bbl, was installed in February 2010. It is equipped to process up to 80,000 bbl/day of produced fluids and 16 MMscf/day of gas. Petroleo Brasileiro SA (Petrobras) became the first oil company to operate a Floating Production Storage and Offloading (FPSO)-type production system in U.S. waters (operational Feb 25, 2012). The Cascade and Chinook fields employ shuttle tankers to transport produced oil and use self-sustainable submerged pumps and risers in the production train.

Phoenix Turret (Helix Producer 1 Floating Production Unit (FPU) Turret): Installed in 2010 in the Gulf of Mexico (Green Canyon Block 237) in approximately 670 meters of water. The Helix Producer I can produce 30,000 bbl/day of oil, 70 million cubic feet of gas, and 50,000 bbl/day of water.

Stones Turret (Turritella FPSO BTM): Installed in the Gulf of Mexico (Walker Ridge Block 551) in a record 2,896 meters of water. It is the largest disconnectable buoy. The Turritella, with an oil storage capacity of 800,000 bbl and processing capability of 60,000 bbl/day of oil and 15 MMscf/day of gas, arrived on site in early 2016. Production began in September 2016.

All three SPMs have the ability to disconnect the turret mooring system in order for the FPSO/FPU to vacate the area to avoid severe weather.

Of the sixteen U.S. SPMs, the following six are related to Liquified Natural Gas (LNG) import or export:

Gulf Gateway Energy Bridge STL LNG Terminal: Installed in the Gulf of Mexico 116 miles offshore of Louisiana in 91 meters of water in 2005. It served as an LNG Import Facility Deepwater Port with an average throughput capacity of 500 million standard cubic feet per day. The facility was decommissioned in 2012 "due to the dramatic shift in the supply-demand balance in the United States from the proliferation of shale gas."

Northeast Gateway A; Gateway B (Northeast Gateway Deepwater Port – LNG Import): Two buoys installed in 2007 13 miles south-southeast of Gloucester, Massachusetts in approximately 90 meters of water. It serves as an LNG Import Facility Deepwater Port with an average throughput capacity of 400 million standard cubic feet per day and a peak throughput of 800 million standard cubic feet per day.

Neptune LNG North Buoy (STL LNG Buoy); Neptune LNG South Buoy (STL LNG Terminal): SPMs were installed in 2009 10 miles south of Gloucester, Massachusetts in approximately 81 meters of water. It serves as an LNG Import Facility Deepwater Port with an average throughput capacity of 500 million standard cubic feet per day and a peak throughput of 750 million standard cubic feet per day. The U.S. Army Corps of Engineers said Neptune LNG filed for a permit to decommission the facility in March 2017. The September 4, 2018 Federal Register published notice to notify the public of a license amendment and continuation of a suspension of port operations at the Neptune Deepwater Port through June 2022.

Delfin LNG SPM (*MARAD Approved Deepwater Port – License Issuance Pending*): The project will make use of an existing subsea pipeline system to transport LNG from the current platform in Cameron Parish, Louisiana, to four floating LNG vessels (FLNGVs), which are moored roughly 50 miles offshore in the Gulf of Mexico. The platform will serve as the connection point for the Enbridge Offshore Pipelines system. The FLNGVs will be moored to a single point mooring system located near the platform. In addition, they are expected to receive and cool the natural gas on-board to -260°F in order to convert it into liquefied natural gas (LNG). The LNG will then be transported to international customers directly from the FLNGVs via LNG carriers.

The Worldwide Use #1 SPM, Worldwide Use #2-#7 SPM, and Worldwide Use CALM are part of a U.S. Department of Defense program of Rapidly Deployable SPMs for the Naval Sea Systems Command. They were developed in the 1980s and can be installed in water depths of 10-20 meters. The systems are mobile and can be installed and operational along with a pipeline within 48 hours.

The final two SPM projects are the most representative of the Texas Gulf Terminals Project Deepwater Port plans: Barbers Point and the Louisiana Offshore Oil Port (LOOP). Both sites load/unload liquid product via their respective SPMs.

Barbers Point SPM:
The Barbers Point SPM is a CALM buoy serving Par Hawaii Refining LLC located approximately 2 miles south from Oahu, Hawaii in 31 meters of water. The current CALM was installed in 2012 to replace a Single Anchor Leg Mooring (SALM) in the same location. The installation date of the original SPM cannot be determined, but throughput data exists beginning in 1987. Tankers of up to 150,000 dead weight tons (dwt) carrying up to 800,000 bbl of crude oil can discharge over the SPM. It takes about 48 hours to discharge a load. 60% of all petroleum products enter Hawaii via this location.

The SPM buoy's top deck is designed to swivel, allowing a tanker to act like a weathervane and remain head-on in the wind. The tanker is secured to the mooring by an 18-in. circumference double hawser. In addition, a 4,000 hp chartered tug pulls on the tanker's stern during loading and unloading operations to prevent the vessel from riding up on the mooring. In crude oil unloading operations, three floating hoses 840 ft in length connect the tanker to the mooring and submarine hoses, which in turn are connected to the under-water pipelines going to the refinery's storage area.

The previous SPM (which was a different type of SPM than the one planned at the Texas Gulf Terminals Project) was the site of the following accidents / spills[3,4]:

- 1987 - 100 bbl spill: split hose
- 1989 - 200 bbl bunker oil from ship and 400 bbl crude from damaged buoy; Exxon Houston broke free from SALM and grounded
- 1990 (January) Texaco Connecticut collided with buoy; 400 bbll spill
- 1990 (November) Grounding of the Texaco Connecticut; None of the cargo or fuel tanks were breached resulting in minimal oil spilled (likely residual oil from bilges of pump room that was breached)
- 1998 Tesoro 117 bbl hose spill

The facility was located in state waters and lacked more stringent federal oversight regulations for deepwater ports at the time, however additional measures have since been implemented that have prevented a recurrence of accidents and spills at the existing SPM. Some of those safety measures include:

- Tight weather operating windows which give vessels more time to suspend operations and leave the mooring or delay approach in case of bad weather or sea conditions.
- Maintenance of vessel engines on immediate standby.
- Use of a geographical positioning system to establish precise ship location, speed, and direction.

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[3] National Transportation Safety Board. (1990). *Marine Accident Report. Grounding of the U.S. Tank Ship Star Connecticut, Pacific Ocean, Near Barbers Point, Hawaii, November 6, 1990*.
[4] County of Santa Barbara / U.S. Army Corps of Engineers. (1992). *Draft EIR GTC Gaviota Marine Terminal Project, Supplemental Environmental Impact Report / Statement*. Part C Environmental Analysis System Safety p. C.5-98.

- Monitoring with a remote device the ocean current and wind speed/direction at the mooring.
- Employment of breakaway couplings for each floating hose string of the SPM, which seal oil in the hoses in the event a tanker inadvertently breaks away.
- Continuous monitoring of the strain being placed on the mooring system.
- The crude oil unloading rate and strain on the hawser are monitored in the pumphouse. The system is so sensitive that the effect of up-and-down wave action on the hawser strain can be seen on the screen. The warning system is alarmed to 75% of what is considered the allowable stress, which is about a 25% discount over the maximum.
- The SPM and floating hoses are part of a rigorous maintenance program.

Louisiana Offshore Oil Port SPMs (SALM 102, 103, 104A):
The Louisiana Offshore Port, also known as the LOOP Marine Terminal, consists of three SPMs. It is permitted/licensed as a Deepwater Port: Oil Import/Export Facility with a maximum throughput capacity of 1.2 million barrels per day. The SPMs were installed in 1980 in approximately 35 meters of water 16 miles southeast of Port Fourchon, Louisiana in the Gulf of Mexico. The facility has survived six hurricanes with no damage thus far. Operations shut down for only four days during Hurricane Andrew.

There have been no major oil spills at LOOP since operations began in 1981. On average, less than 0.00000011 barrel of oil has spilled per million barrels of oil transported. For over three and a half decades, LOOP has safely and successfully received, stored and delivered more than twelve billion barrels of crude oil to U.S. refineries while protecting the communities and natural environment of southern Louisiana.[5] LOOP credits the following for their environmental, health, and safety record:

- Continuously monitoring the integrity of its pipelines with a real time computer-based leak detection system capable of identifying the size and location of any leak in terms of leak rate, barrels lost and location.
- Having real time information from the sophisticated line surveillance system noted above facilitating a rapid response to a leak event thus minimizing the environmental impact by isolating the source of the leak and dispatching repair and clean-up crews.
- Periodic in line inspections of its crude oil pipeline utilizing a “Smart Pig”.
- Weekly integrity checks by divers of marine hoses utilized for transporting crude oil from offloading vessels to the LOOP pipeline system.
- Weekly overflights for visual inspections of the pipeline corridor.
- Visual inspections within the pipeline using a robotic system with remote video monitoring capabilities.
- Utilizing a fleet of sophisticated vessels that patrol the Port area and support the marine operations. The largest of these vessels, the LOOP Responder, is a 7,000

[5] https://www.loopllc.com/Environmental-Awareness/Environment

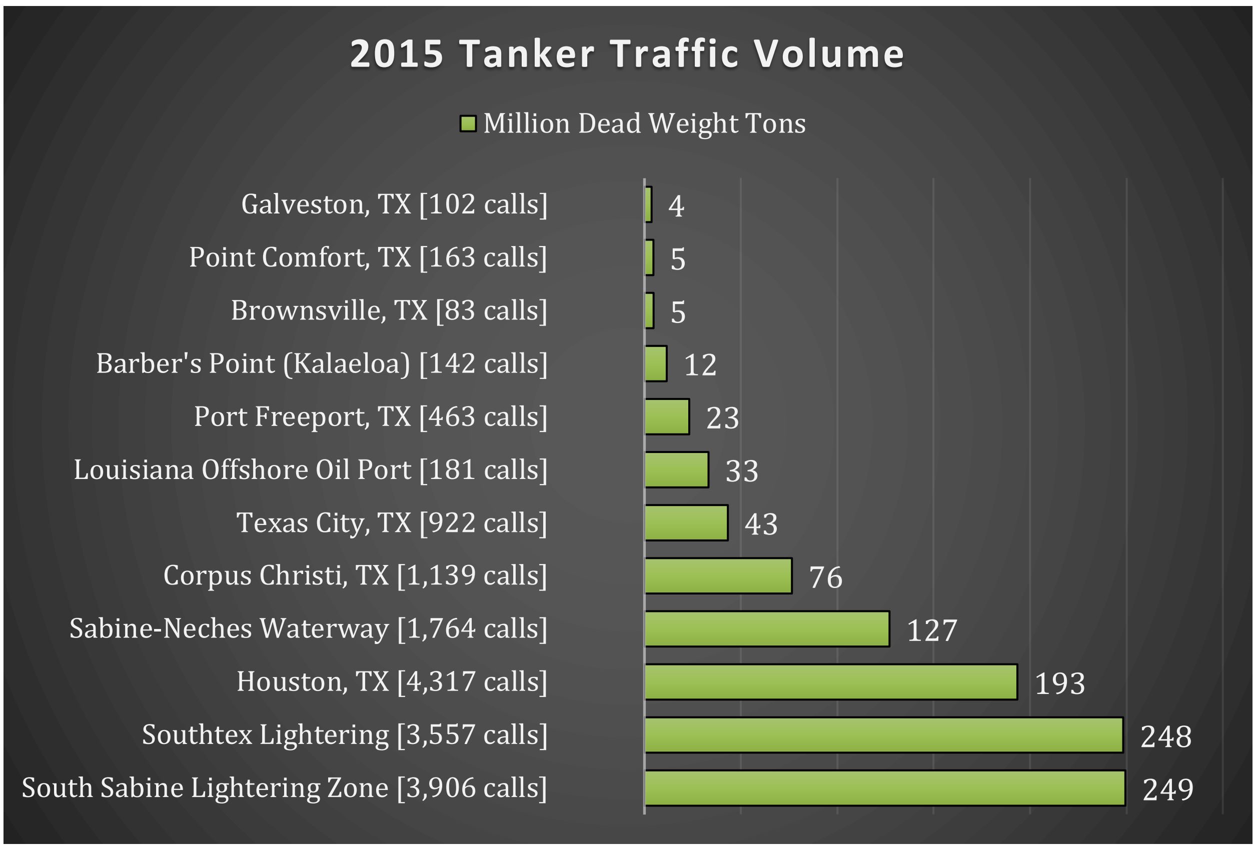
– horsepower tractor tug capable of assisting any supertanker if it loses power or steering while entering/offloading/exiting the LOOP restricted safety zone.

- Maintaining an array of oil containment, recovery and remediation equipment capable of responding to an incident or oil release.
- Maintaining a Facility Response Plan that accommodates changing realities and new technologies.
- Reinforcing readiness and instilling good operating practices by testing its Facility Response Plan during annual “spill drills” that simulate potential incidents.
- Working closely with federal, state and local agencies during annual drills and throughout the year to integrate resources and plan responses to theoretical accidents.

Associated Tanker Traffic Overview

The most recent data available from the U.S. Department of Transportation Maritime Administration is from 2015 and is depicted in **Table 4** below. A map of the ports is included as **Figure 1**. Included along with Barbers Point and LOOP SPMs are all Texas regional ports and lightering zones. With only one deepwater port in the Gulf of Mexico, the bulk of all tankers must go through the lightering zones to offload product to ships small / shallow enough to enter Texas Ports.

TABLE 4

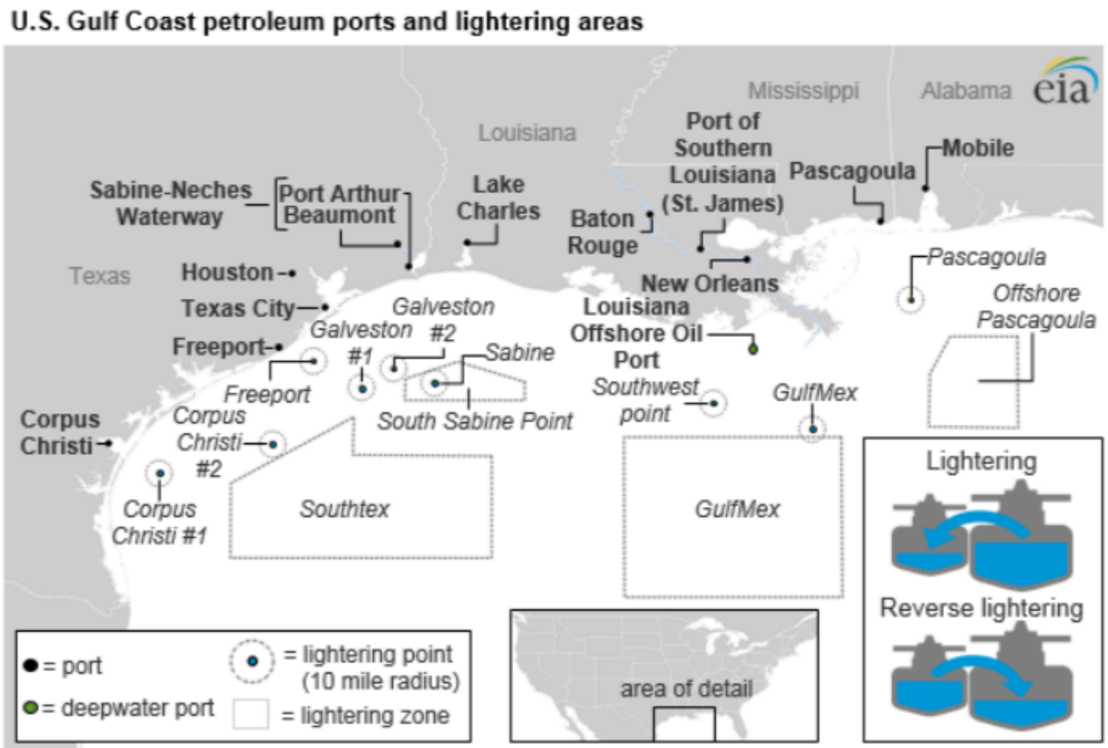


Spills and accidents are reported to many different organizations federally and internationally. A centralized clearing house of consistent accident or spill data does not exist. Data collection responsibilities overlap and shift amongst federal agencies historically as well as regionally. However, a review of several publicly available spill / accident reports, databases, and news articles indicates both SPMs and lightering operations are relatively safe resulting in only sporadic small spills historically. Marine accidents in general have also been significantly minimized and trending downward since the early 1990s[6] due to industry self-policing (operating and maintenance procedures),

[6] Bureau of Safety and Environmental Enforcement. (2016). *2016 Update of Occurrence Rates for Offshore Oil Spills*. U.S. Department of Interior.

new regulations, increased federal oversight, training requirements, and new technologies. Each event (call) carries similar risk probabilities therefore less calls would create less opportunities for an accident to take place. Obviously larger ships can carry more product but a higher percentage of larger ships are double-hulled (reducing risk of leaks/discharge) with more and more single-hulled ships retiring each year due to the International Convention for the Prevention of Pollution from Ships (MARPOL Convention) requirements for certain ships constructed after 1996.

FIGURE 1



Source: U.S. Energy Information Administration

BW★TX

Via E-mail

Ms. Cynthia Kaleri
Branch Chief, Air Permits, Monitoring & Grants
U.S. EPA Region 6, 6PD
1201 Elm Street, Ste. 500
Dallas, TX 75270

Re: Prevention of Significant Deterioration (PSD) Permit Application
Bluewater Texas Terminal LLC ("BWTX")

November 26, 2019

Dear Ms. Kaleri:

BWTX hereby submits a supplement to its pending PSD Permit Application.

The supplement consolidates certain information previously submitted to EPA and also contains additional analysis and proposals as requested by EPA. In order to facilitate integration of the supplement with information previously provided to EPA, it is presented as a revision to Section 4 of the PSD permit application.

I certify that, based on information and belief formed after reasonable inquiry, that the statements and information contained in these documents are true, accurate and complete.

If you have any additional questions regarding this application, please contact Ms. Chaitali Dave of Phillips 66 Company at chaitali.r.dave@p66.com or 832-765-1069; or Dr. Jesse Lovegren of DiSorbo Consulting, LLC, at jlovegren@disorboconsult.com or 512-961-4471.

Yours,

D Farris

David Farris
Vice President
BWTT

Enclosure

Section 4
Control Technology Review (revised)

4.1 Contents

4.2 Executive Summary

A control technology review has been performed which identifies the Best Available Control Technology (BACT) for the proposed facility, following EPA's "Top Down" procedure.

Five control techniques were evaluated for crude oil loading operations at the Deepwater Port. The controls evaluated and the outcomes of this analysis are summarized in Table 4-1.

Table 4-1 Summary of Top Down BACT Analysis

Control Technique Evaluated	Level of Emissions Reduction	Top-Down Steps Evaluated	Comments
Vapor recovery pipeline and PLEM to onshore vapor combustor or vapor recovery unit.	95%	Steps 1–2	Limited data on demonstrated effectiveness. Incompatible with design of BWTX's project. Not technically feasible.
Vapor recovery pipeline and PLEM to offshore (platform-mounted) vapor combustor or vapor recovery unit.	N/A	Step 1	Undemonstrated technology. Not considered available. Additional technical feasibility issues identified when technology is considered in the context of BWTX's project.

Control Technique Evaluated	Level of Emissions Reduction	Top-Down Steps Evaluated	Comments
Recovery system onboard workboat or supply vessel	90–95%	Steps 1–2	Demonstrated for other marine loading faclities. Potential technology transfer candidate. Incompatible with design of BWTX's project. Not technically feasible.
Recovery system onboard loaded vessel	78–95%	Steps 1–2	Demonstrated in offshore loading operations with different business purpose from BWTX's facility. Not available in the context of BWTX's business purpose.
Work practice standard (submerged fill and best management practices)	60%	Steps 1–5	Demonstrated control technique, otherwise required under Section 112 and USCG Requirements. Top-ranked technically feasible technology. Selected as BACT.

The analysis includes proposed compliance monitoring requirements associated with the selected control. These include incorporation by reference of US Coast Guard (USCG) operational requirements as well as standard industry practices for minimizing the formation of VOC emissions during loading operations.

A control technology review was additionally conducted for air emissions from leaking piping components ("equipment leak fugitives"). The top-ranked technology (leakless piping components and limiting the time that components are in VOC service) was selected.

4.3 Introduction

In the case of the proposed new source, the required control technology review involves two requirements:[1]

(1) A major stationary source or major modification shall meet each applicable emissions limitation under the State Implementation Plan and each applicable emissions standard and standard of performance under 40 CFR parts 60 and 61.

(2) A new major stationary source shall apply best available control technology for each regulated NSR pollutant that it would have the potential to emit in significant amounts.

The demonstration contained in the present section covers both requirements. Based on the analysis contained in this section, BWTT believes that BACT should consist of a work practice standard combining requirements for bottom fill design of tankers and the use of best management practices to minimize the formation of VOC emissions during loading operations.

[1] 40 CFR § 52.21(j).

4.4 Applicable emissions limitations

Under 40 CFR § 52.21(j)(1), the owner of a proposed source must meet all applicable SIP, NSPS, and NESHAP requirements in order to receive a PSD pollutant.

Because the proposed facility will be located outside of the jurisdiction of any state, and EPA has not promulgated any federal implementation plan (FIP) for sources in the portion of the Gulf of Mexico where BWTT proposes to construct its facility, BWTT has not identified any applicable SIP emissions limitations. The Texas SIP includes control requirements for marine terminals (30 TAC § 115.212) for facilities located in specific Counties of Texas, including Nueces and San Patricio Counties. To the extent that specific portions of the Texas SIP are interpreted as laws of the nearest coastal state for DWPA licensing purposes, these would not apply since the Deepwater Port will not be located in any County of Texas.

BWTT has also been unable to identify any applicable NSPS emissions limitations.

While the regulatory language refers to NESHAP emissions limitations under 40 CFR Part 61, BWTT understands the requirement to also apply to NESHAP for source categories currently listed under 40 CFR Part 63. Although no source-specific Part 61 or Part 63 NESHAP standard applies to the proposed facility, BWTT is in the process of obtaining approval for a Notice of MACT Approval (NOMA) under 40 CFR Part 63, Subpart C. The expected MACT work practice requirements under the NOMA will include a level of control equivalent to that proposed as BACT herein.

4.5 Best Available Control Technology (BACT) for Deepwater Port Loading Operations

As noted in Section 3, the proposed facility will have the potential to emit VOC in significant amounts, and is therefore required to apply BACT for VOC. BACT is defined as follows:[2]

> *Best available control technology means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.*
>
> *In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61.*
>
> *If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.*

[2] 40 CFR § 52.21(b)(12).

Based on the revised emission calculations in BWTX's July 31, 2019 submission to EPA, PSD BACT requirements do not apply with respect to Greenhouse Gases.

4.5.1 Top-down BACT methodology

One specific approach to identifying BACT for a proposed source is EPA's "top-down" methodology. The use of top-down methodology for all BACT determinations was initially recommended in 1987.[3] A more detailed guidance document was issued in 1990,[4] and this document forms the basis for the present demonstration. The top-down method involves five steps, summarized as follows:[5]

- Step 1. Identify all control techniques with potential applicability to the source, including the use of inherently lower-emitting processes and/or add-on controls. Potentially applicable control technologies include those that have been demonstrated for the same source category as well as transferable technologies that have been demonstrated for a related source category. These include technologies in application outside the United States to the extent that the technologies have been successfully demonstrated in practice on full scale operations. Sources of information for identifying potentially applicable controls are EPA's RACT/BACT/LAER Clearinghouse (RBLC) database, recently-issued permits, control guidelines issued by state and local air pollution control agencies, technical journals, and equipment vendors. Innovative, undemonstrated technologies may optionally be considered at step 1.
- Step 2. Evaluate the technical feasibility of each control technique, and eliminate all infeasible control options. A control technology is considered to be technically feasible if it is both commercially available and applicable to the proposed source. A control technology is deemed to be "available" it if has been previously licensed or otherwise commercially demonstrated. A control technology is "applicable" to a proposed source if there are no physical or chemical characteristics of the emission stream that would prevent application of the technology. If a particular control technology is specified in an issued permit for the same or similar source type, this creates the presumption that it is applicable.
- Step 3. Rank the technically feasible alternatives in order of decreasing effectiveness. The analysis conducted at step 3 should also document the energy impacts, secondary environmental impacts, and cost effectiveness of each control option.
- Step 4. Eliminate control options which have unfavorable energy, environmental, or economic impacts. Specific documentation must be provided by the applicant in case the top-ranked control technology is to be rejected on the basis of energy, environmental or economic impacts.
- Step 5. The highest-ranked remaining alternative is selected as BACT.

EPA's top-down methodology is an approved methodology for use in minor NSR permit reviews conducted in the State of Texas.

4.5.2 Step 1. Identify Potentially Applicable Controls

In order to identify all potentially applicable control technologies, BWTT consulted a variety of information sources, including the following:

- RBLC database
- Permit applications, issued permits, and EPA decision letters

[3] Craig J. Potter (OAR) to Regional Administrators. December 1, 1987. *Improving NSR Implementation*.

[4] EPA Office of Air Quality Planning and Standards. March 15, 1990. *DRAFT "Top-Down" Best Available Control Technology Guidance Document* (henceforth "Top-down BACT").

[5] Top-down BACT, sec. V et passim.

- Supporting documentation in MACT Y rulemaking dockets
- Equipment and control device vendors
- Technical journals and conference proceedings
- Satellite imagery

Although the RBLC database was consulted, BWTT did not identify any potentially applicable controls. The database contains entries for shoreside marine terminals (entries TX-0825, TX-0800, TX-0799, TX-0752) and offshore drilling units (entries FL-0347, FL-0349, FL-0338) but does not contain entries for any deepwater port facilities used to export crude oil, or any other types of offshore loading facilities. Since, to BWTT's knowledge, no new offshore loading terminals have been constructed recently,[6] the lack of information in the RBLC is not unexpected.

In order to ensure that all offshore loading facilities in the United States were identified (whether or not they are mentioned in RBLC), BWTT made an effort to identify all such facilities using a two-step process. First, the registry numbers of various crude oil and chemical tankers were obtained, and AIS data transmissions for these vessels were then purchased from a commercial vessel tracking service. Next, the vessels' itineraries over a particular time period (typically 3–6 weeks) were plotted with GIS software, and the ports where they called were identified through satellite photography. Using this method, BWTT was able to identify offshore terminals with relatively high throughputs. Operating permits were obtained for select facilities of interest in order to determine whether offshore loading operations were subject to control requirements.

This method was extended to identify high-throughput crude oil export terminals in locations outside of the United States. A non-exhaustive list of active VLCCs was obtained from the IMO Global Integrated Shipping Information System, and their itineraries were plotted in order to identify offshore loading terminals capable of accommodating these vessels. Satellite imagery and other publicly available information about the terminal were used to identify the use of emission controls for crude oil loading.

Another source of information has been the rulemaking docket associated with MACT Y,[7] which contains information on control technologies potentially applicable to the types of terminals used in establishing the "offshore loading terminal" subcategory under MACT Y. Because the material in the MACT Y rulemaking docket is approximately 25 years old, it contains information about terminals that are no longer in operation, which were not identifiable through the GIS tracking method described above. Supplemental information about these terminals was obtained through reports issued by various government agencies.[8]

Finally, technical journals and other scholarly publication outlets were consulted in order to identify possible control techniques, including innovative control technologies. BWTT contacted manufacturers of CALM buoy systems and one control device vendor (John Zink Hamworthy Combustion) to identify commercially available controls for similar facilities.

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[6] BWTT located one EPA decision letter (dated April 5, 2018, concerning the Limetree Bay Terminals facility in St. Croix) regarding installation of a SPM loading buoy approximately one mile offshore, at the location of an existing offshore (long pier-type) terminal. The letter contains no discussion of add-on control technologies for the SPM system, except to state that none are planned.

[7] Legacy docket A-90-44.

[8] Prominent sources included the Department of the Interior, Minerals Management Service (currently designated as BOEM), the California Coastal Commission, the California State Lands Commission, and the County of Santa Barbara.

The results of Step 1 review are summarized below in table 4-1, and discussed in more detail further below.

Table 4-2 Potentially Applicable Control Technologies

Summary of Control Technique	Level of Control Achieved
Vapor recovery pipeline and PLEM to onshore vapor combustor or vapor recovery unit.	95%
Vapor recovery pipeline and PLEM to offshore (platform-mounted) vapor combustor or vapor recovery unit.	N/A
Recovery system onboard workboat or supply vessel	90–95%
Recovery system onboard loaded vessel	78–95%
Work practice standard (submerged fill and best management practices)	60%

Vapor recovery pipeline and PLEM to Onshore Control Device

The use of subsea pipelines to route captured loading vapors to a shoreside control device was initially identified through the MACT Y docket. In a July 21, 1993 letter to EPA, Chevron compared the cost of a recently-completed control project for its Richmond, CA "Long Wharf" to a hypothetical project for control of its El Segundo, CA terminal, based on the use of subsea lines.[9] BWTT has determined that such a control system was designed and installed at the Gaviota Interim Marine Terminal (GIMT), and operated for six months. GIMT was also subject to Santa Barbara APCD Rule 327, and was designed with a vapor control system based on the use of subsea vapor lines that carried VOC vapors to an onshore control device. Two 10 ¾"–12" polyethylene vapor lines were installed in a loop to allow for pigging (necessary to remove liquid condensate). The vapor return lines traveled approximately 3500 ft. under water to the onshore portion of the terminal.[10]

BWTT has been unable to identify any other offshore loading facility in the United States actually employing a vapor recovery system similar to that designed for GIMT. Using AIS data and satellite imagery, BWTT attempted to identify facilities outside of the United States using such a control technique. Probable offshore VLCC loading operations of the sea island or SPM type were identified in Venezuela, Iraq, Saudi Arabia (KSA), Israel, Qatar, Kuwait, United Arab Emirates, and Brazil. The most heavily-trafficked terminals were the Ju'aymah Crude Terminal (KSA), the Al Başrah Oil Terminal (Iraq), and the Ras Tanura Terminal (KSA). A platform containing a flare in the vicinity of the Ju'aymah Crude Terminal was determined to be related to a nearby LPG loading terminal, and vapor recovery is not practiced at the crude terminal.[11]

While not an oil-producing country, Israel was found to have one VLCC-capable terminal in proximity to an oil refinery, the Ashkelon Oil Port. According to the terminal owner's website, the terminal is located at the terminus of a pipeline originating in Eilat. The pipeline therefore provides an alternative to the Suez canal for oil shipments. Satellite photography indicates the presence of a control device stack onshore, and the port's handbook states that one of the four mooring buoys at

[9] A-90-44 IV-D-136.

[10] California Coastal Commission. May 23, 1997. Permit Amendment Staff Recommendation. Application File No. E-92-6-A2. Gaviota Terminal Company (GTC). In-place abandonment and/or removal of the offshore components of the Gaviota Interim Marine Terminal.

[11] Ju'aymah Crude & LPG Terminals. Port Handbook.

the terminal makes use of the vapor combustor for controlling loading emissions. The terminal has two multi-buoy moorings and two SPM's. The controlled buoy, Berth 4, is an SPM 3.5 km (2.2 statute miles) from shore.[12] BWTX believes that the terminal in Ashkelon is the only organic liquids loading terminal presently in operation which actually employs this control technique.

Finally, BWTT has taken note of a presentation made by an engineer at John Zink Hamworthy Combustion ("John Zink")[13] that apparently depicts the recovery of crude oil vapors from an SPM-type loading facility using a vapor recovery pipeline and PLEM. Recent correspondence with John Zink confirms that the technology has never been applied in practice (correspondence attached in Appendix A).

Due to the limited amount of data and lack of demonstrated operation of a vapor recovery pipeline-based control system, it is difficult to identify a precise level of effectiveness for this control technology. A control efficiency of 95 percent has been selected since this corresponds to the level of control required under Santa Barbara APCD Rule 327, which GIMT was subject to. BWT also lacks detailed information about the control system at the Ashkelon oil port, and presumes that an efficiency of 95 percent reasonably approximates its actual performance.

Vapor Recovery Pipeline and PLEM to Offshore (Platform-Mounted) Control Device

BWTT understands that a PSD permit application has been filed with EPA describing a vapor recovery pipeline-based system for a deepwater port.[14] The application describes the construction of vapor recovery PLEM's and vapor recovery pipelines laid along the seabed. The vapor recovery pipelines run to a proposed offshore platform (approximately one mile from the loading buoys) containing control devices and equipment used for pigging and handling of liquid condensate. Although the design depicted in the permit application appears similar in concept to that designed for GIMT, the main difference is that the vapor processing system is located on an offshore platform rather than onshore. Because the technology has no demonstrated level of effectiveness, BWTX cannot state any level of emissions reduction and cannot conclude that the technology is "available" for purposes of Step 1 of the BACT analysis.

Recovery system onboard workboat or supply vessel

The concept of mounting a recovery system onboard a workboat or supply vessel moored near an offshore loading berth is mentioned in a June 25, 1992, presentation made by Chevron staff to EPA. The presentation describes a proposal by Public Service Marine, Inc. (PSMI), for a workboat having a 12,500 Bbl/hr vapor processing capacity.[15]

The workboat concept was presented to EPA as a possible strategy for Chevron's Estero Bay marine terminal to achieve compliance with what is currently codified as San Luis Obispo County APCD Rule 427. While the rule was under consideration in 1991, it was not promulgated until 1995, and the compliance date was not until April 26, 1997. The terminal ceased operations no later than mid-

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[12] Europe Asia Pipeline Company. Port of Ashkelon. Information, Operational Procedures and Regulations Handbook. May 2019.

[13] Puglisi, Marco. 2012. Vapor Control on Crude Oil Loading. Accessed April 18, 2019 at https://www.platts.com/IM.Platts.Content/ProductsServices/ConferenceandEvents/2012/pc379/presentations/d2_4_Marco_Puglisi.pdf.

[14] Maritime Administration. *SPOT Terminal Services Deepwater Port License Application*. Docket MARAD-2019-0011. EPA has recently issued a Statement of Basis (SOB) and Draft Permit for this project.

[15] A-90-44 II-E-40.

1999[16] and no workboat was actually deployed at the Estero Bay terminal. For loading operations conducted between 1997 and 1997 compliance with Rule 427 was achieved through the use of emissions offsets.[17]

BWTT is aware of at least one workboat in actual use for the processing of vapors during marine loading operations.[18] Foss Maritime is the owner of the *San Pedro* (reported as calling at Chevron's El Segundo marine terminal), as well as three additional barges (*FDH 35-3, FDH 35-4,* and *FDH 35-5*) equipped with onboard carbon adsorption units. Foss Maritime holds operating permits issued by SCAQMD which restrict the loading rate of each barge to 8,000–12,000 Bbl/hr and restrict cargoes handled to petroleum liquids having a maximum vapor pressure of 0.75 psia at loading temperature.[19]

The system is described as follows by a Foss Maritime employee:[20]

> *"The San Pedro barge is the only barge in the world that we know of that does third-party vapor processing," said Costin. "We had a customer come to us and since we already had our operating permits under the South Coast Air Quality Management District, it was an easy fit to convert the barge to be able to take what we call 'third-party vapors.' It's an ideal platform that we can work offshore because it's outfitted with special mooring and surge gear. As the ship is loading cargo from a terminal or other source, we're connected on the outboard side to their vapor line and they push their vapors down through our system. The barge can process up to 15,000 barrels an hour."*

This technology, therefore, has been demonstrated to a limited extent for the loading of bunker fuels at a conventional, multi-buoy mooring facility. BWTT has additionally located a report referring to the testing of a spray absorption-based control device on a support vessel. Tests were conducted at the Nippon Oil Staging Terminal (NOST) in Kagoshima, Japan, during loading of crude oil.[21] The terminal has jetty-type berths extending up to 0.3 miles from shore.

The assumed control effectiveness for a control device mounted onboard a support vessel is based on the levels of control required under San Luis Obispo APCD Rule 427 and South Coast AQMD Rule 1142.

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[16] California Coastal Commission. August 27, 1999. Item Number W-14a. Revised Findings. Application File No. E-98-26. Chevron Pipeline Company.

[17] SLO APCD. July 3, 1997. Engineering Evaluation: Emission Banking and Permit to Operate. Permits 2147 etc. Chevron Products Company et al.

SLO APCD. April 30, 1998. Permit to Operate C-1232-A-1. Issued to Chevron Pipeline Company.

[18] Marcon International, Inc. December 2004. *Tank Barge Market Report*. Accessed April 18, 2019 at http://www.marcon.com/library/market_reports/2004/TB/TB1204.pdf. At 9.

[19] SCAQMD Permits to Operate R-G2640 (May 12, 2009), G25415 (June 28, 2013), G25416 (June 28, 2013), and G25421 (June 28, 2013).

[20] "Scrubbing VOCs from bunkers helps clean the air." March 23, 2011. *WorkBoat*. Accessed April 18, 2019 at https://www.workboat.com/archive/scrubbing-vocs-from-bunkers-helps-clean-the-air/.

[21] Shibuya, Yoshiki. 2014. Vapor Recovery Technique for Crude Oil Ship Loading— Spray Absorption. JFE Technical Report No. 19. March 2014. 158–166.

Recovery System onboard loaded vessel

BWTT identified the potential use of a control device located onboard the loaded vessel through a comment contained in a USCG rulemaking, referring to technical challenges in implementing vapor recovery at mooring buoys used for loading liquids:[22]

> *The Coast Guard agrees that these types of facilities present some unique problems, and that having the vapor processing unit on board the vessel is a viable option.*

BWTT has identified three instances where this control technique has been used in a sustained fashion, suggesting that it is commercially available.

The Ellwood Marine Terminal (EMT) conducted barge loading of crude oil in compliance with Santa Barbara APCD Rule 327 using dedicated barges with onboard vapor processing systems. The two controlled barges used during EMT's operating history (*Jovalan* and *Olympic Spirit*) were specially designed vessels, and no comparable vessels of the same type were used at the time.[23]

A second example of onboard vapor recovery technology is noted for Chevron's El Segundo marine terminal. The facility is subject to SCAQMD Rule 1142, which requires controls of loading and lightering activities in South Coast Waters. Two active, SCAQMD Permits to Operate have been located for onboard control devices (carbon adsorption).[24] The control devices are associated with two Handymax-sized (340,000 Bbl), Jones Act oil tankers, the *Mississippi Voyager* and the *Florida Voyager*.

A final example of onboard vapor recovery is from shuttle tankers operating in the North Sea.[25] Oil Producers in the Norwegian North Sea are currently subject to a non-methane VOC emission limit of 0.45 kg/m^3 oil loaded (159 lb/MBbl) for transfer operations between an offshore production area such as an F(P)SO and a shuttle tanker. During their service as shuttle tankers,[26] the *Randgrid* and the *Navion Norvegia* employed onboard vapor recovery systems based on carbon adsorption. The control system is visible onboard the *Navion Norvegia*'s deck in one video published by a crew member in 2011.[27]

The range of removal efficiencies for this control technique is based on the Norwegian control requirements mentioned above and the level of control required under South Coast AQMD Rule 1142.

Work Practice Standard (Submerged fill and best management practices)

There are two work practice standards currently applicable to crude oil tankers operating in U.S. waters which have the effect of reducing VOC emissions. These are considered together and referred to as a "combined work practice standard" in subsequent discussion.

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[22] 55 FR 25407. June 21, 1990.

[23] California State Lands Commission. June 1, 2009. Meeting Minutes at 53–55.

[24] SCAQMD Permit to Operate G41614 (July 7, 2016), G28359 (November 13, 2013).

[25] "Developing an effective crude oil vapor recovery system." *Port Technology*. Accessed April 18, 2019 at https://www.porttechnology.org/industry_sectors/developing_an_effective_crude_oil_vapor_recovery_system.

[26] The *Randgrid* has been converted to an FSO and the *Navion Norvegia* to an FPSO.

[27] "Navion Norvegia." Posted by user MrIRA1973. July 26, 2011. Accessed April 18, 2019 at https://www.youtube.com/watch?v=tJvuNoVnZuc.

The first is the bottom fill equipment standard, which applies under USCG regulations,[28] and also to certain loading facilities under MACT Y, including existing offshore loading facilities.[29] EPA has identified the reduction efficiency of this standard as 60%.[30] BWTT believes that EPA's estimate is based on the ratio of saturation factors applicable to submerged loading of trucks and splash loading of trucks: $1 - 0.6/1.45 \approx 60\%$.[31]

MARPOL Annex VI, Regulation 15.6 requires crude oil tankers to have on board and implement a VOC management plan. Guidelines for development of the VOC management plan are further specified in IMO Resolution MEPC.185(59), Annex 10, and in IMO Circular 680. Required elements of VOC management plan relevant to loading operations are the following:[32]

> *The ship should define a target operating pressure for the cargo tanks. This pressure should be as high as safely possible and the ship should aim to maintain tanks at this level during the loading and carriage of relevant cargo;*
>
> *When venting to reduce tank pressure is required, the decrease in the pressure in the tanks should be as small as possible to maintain the tank pressure as high as possible;*
>
> *The amount of inert gas added should be minimized. Increasing tank pressure by adding inert gas does not prevent VOC release but it may increase venting and therefore increased VOC emissions;*

In addition to relying on vessel VOC management plans, BWTX intends to follow best management practices which, though primarily driven by safety and oil spill hazards, also serve to minimize the rate of formation of VOC emissions during loading, and to ensure that fugitive emissions associated with the loading operation are minimized. BWTX will develop a deepwater port operations manual, and is required to conduct transfer operations in accordance with the manual pursuant to 33 CFR § 150.425. The operations manual will include the following requirements (cf. 33 CFR § 156.120):

- Each part of the transfer system is aligned to allow the flow of oil;
- Each part of the transfer system not necessary for the transfer operation is securely blanked or shut off;
- The end of each hose not connected for the transfer of oil is blanked off;
- Prior to transfer, a conference is held which ensures that each person in charge understands the sequence of transfer operations, the transfer rate, and critical stages of the transfer operation;
- Transfer does not occur until the facility operator and person in charge of the receiving vessel agree to begin the transfer operation;

[28] 46 CFR § 153.282.

[29] 40 CFR §§ 63.560(a)(4), (d)(6).

[30] 75 FR 65115. October 21, 2010.

[31] AP-42 Chapter 5, table 5.2-1.

[32] IMO Resolution MEPC.185(59), Annex 10, sec. 1.4.

- The transfer rate is reduced at the start of the load to while ensuring proper hose connections, valve line-ups and piping integrity, and at the end of the load to minimize the risk of pressure surges and overfilling.

These aspects of the operations manual serve to reduce the formation of crude oil vapors in the transfer lines and vessel cargo tanks. An example of a pre-transfer checklist used at a BWTX affiliate for an SPM loading facility in the United Kingdom is attached as an exhibit to illustrate the scope of work practices encompassed by an operations manual. Because weather and sea conditions will vary between the two locations, actual practices at BWTX's facility will be tailored accordingly and will not be identical to those at the UK facility.

The submerged fill standard and the requirement to maintain an operations manual will apply to tankers calling at the proposed facility. While it is difficult to quantify the level of emission reduction achievable through implementation of a VOC management plan, it should be noted that operation of the inert gas generation system during a loading operation would increase the flow of vapors vented from the mast risers, such that the vent flow rate would be higher than that implied by AP-42. BWTT uses the above referenced figure of 60% to account for reductions achievable through use of the combined work practice standard.

The five control techniques identified at Step 1 of the analysis are summarized in Table 4-3. Of these, BWTX believes that four can be judged available and further evaluated at Step 2. Although BWTX proposes to eliminate the second option at Step 1, remarks on potential technical feasibility for BWTX's project are nevertheless included in Step 2 of the analysis for completeness.

Table 4-3 Summary, Step 1 of Top Down Analysis

Control Technique	Analysis	Proceed to Step 2?
Vapor recovery pipeline and PLEM to onshore vapor combustor or vapor recovery unit.	Very limited information on demonstrated performance and commercial availability. Conservatively treated as available for purposes of this analysis.	Yes
Vapor recovery pipeline and PLEM to offshore (platform-mounted) vapor combustor or vapor recovery unit.	No demonstrated performance based on BWTX's review of loading operations in the U.S. and outside of the U.S. Not available.	No, but observations on technical feasibility are provided for completeness.
Recovery system onboard workboat or supply vessel	Available as potential transfer technology.	Yes
Recovery system onboard loaded vessel	Available.	Yes
Work practice standard (submerged fill and best management practices)	Available.	Yes

4.5.3 Step 2. Eliminate Technically Infeasible Controls

At Step 2, technically feasible control alternatives are eliminated. For the reasons described below, BWTT believes that the three alternatives involving add-on controls (onshore control device, control device on workboat, and control device on loaded vessel) are not technically feasible. If the control technique eliminated at Step 1 (control device on offshore platform) were evaluated at Step 2 for BWTX's project, it would also be eliminated on grounds of technical feasibility. The specific feasibility issues are presented separately for each technology identified at Step 1.

Vapor Recovery Pipeline and PLEM to Onshore Control Device

As noted previously, a control system involving a subsea vapor recovery pipeline was designed and implemented at GIMT for six months. The technology is not in use at any U.S.-based facilities, and at only one facility outside of the U.S., and data on its applicability is therefore limited. Both facilities (GIMT and Ashkelon Oil Port), however, have design differences that would make application of the same technology infeasible for BWTX's project.

The MACT Y docket contains correspondence between USCG and Chevron discussing the difficulties in handling liquid condensate formed in the vapor recovery line,[33] as well as a presentation from Chevron noting that such lines were "extremely difficult to permit."[34] BWTT believes that Chevron, as one of the oil companies producing oil to be tankered to market via GIMT, had first-hand experience with the technical difficulties inherent in the use of subsea vapor recovery pipelines. These engineering challenges are best understood through reference to USCG regulations (33 CFR Part 154, Subpar P) requiring that facility vapor control systems eliminate sources of ignition to the maximum practicable extent, and eliminate potential overpressure and vacuum hazards.[35] While the placement of detonation arresters is one issue that would require a regulatory exemption, BWTT believes that the most serious challenge is designing a means for removing liquid condensate from the vapor collection system.[36] Liquid condensate would be expected in subsea vapor recovery pipelines, its formation being encouraged by temperature differences between the ship's cargo tank and the subsea pipeline, the presence of water vapors (especially in inert gas), and the length of the pipeline. If not regularly removed, liquid condensates could cause excessive back-pressure in the vapor return pipeline, and they could flow as liquid slugs, posing a risk to the vapor recovery blowers.

Liquid condensate could be removed through pigging of the vapor recovery pipeline if the pipelines are installed in pairs (allowing for round-trip travel of the pig), and a pigging system of this type was installed in the GIMT vapor recovery system. However, the rate of condensate formation could be significant, and pigging could be required frequently, one or more times *during* a loading operation (transfer operations would have to be suspended), depending on the level of back pressure experienced at connection to the ship's cargo tank. The high volume of the liquid slug returning with the pig would necessitate a solution for catching and disposing of oily wastewater. BWTT expects that such a system would be prone to operational difficulties, and these difficulties would be prohibitive for a vapor recovery pipeline running 25 miles along the seabed and back to shore.

There most important differences between the technology as applied at GIMT and Ashkelon Oil Port, and a potential application to BWTX's project, is the distance of the loading operation to shore. The loading operations at GIMT took place less than one mile from shore, while loading operations at Ashkelon Berth 4 take place two miles from shore. As noted above, the pipeline connection BWTX's facility to the shore is 25 miles long. The back pressure and condensate formation issues noted above may be manageable for a vapor recovery pipeline of 1–2 miles, since frictional losses would be lower, and pigging and other maintenance activities could be managed from the shoreside facility.

[33] A-90-44 II-D-49.

[34] A-90-44 II-E-40.

[35] 33 CFR § 154.2100.

[36] 33 CFR § 154.2100(h).

For a pipeline of 25 miles, however, accommodations made to manage operability issues would prevent BWTX's facility from operating according to its business plan.

Additionally, regulatory issues referred to above would not be a factor in Ashkelon Oil Port's facility, and would have impacted GIMT differently than they would BWTX's project (GIMT was originally designed prior to the effective date of the USCG regulations). The specific issues are as follows:

- US Coast Guard regulations (33 CFR Part 154, Subpar P) require that facility vapor control systems eliminate sources of ignition to the maximum practicable extent, and eliminate potential overpressure and vacuum hazards (33 CFR § 154.2100). Before being placed into operation, vapor control systems must be certified as compliant with USCG regulations by an approved certifying entity. Certain specific safety objectives lack proven solutions in the context of a subsea vapor return pipeline. USCG-approved certifying entities which issue guidelines for SPM-based loading facilities do not provide guidelines for vapor control at such installations, and BWTT questions whether an SPM-based vapor control system could be certified in a reasonable amount of time, or at all.
- VLCC's calling at the facility would be subject to IMO requirements pertaining to inert gas systems. For facilities handling only inerted cargo vapors, USCG regulations specify two options for eliminating ignition sources: either have a detonation arrester within 18 m of the facility vapor connection, or have an inerting system (33 CFR § 154.2105(b)): the inerting system must be at most 22 meters from the facility vapor connection, and cannot operate at a vacuum if it is possible for air to leak in downstream of the injection point (33 CFR § 154.2107).
- A vapor recovery system of the type referred to in this item would be unable to meet these requirements because a detonation system or inerting system could not be located within the prescribed distance from the facility vapor connection. Such a design would require a regulatory exemption (33 CFR § 154.108).

The use of an onshore vapor combustor or vapor recovery unit has very limited demonstrated application, but does appear to be in use at one facility in the world. Based on the distance of BWTX's facility to the shoreline, however, there exist significant physical differences that would undermine the availability of the technology for BWTX's project. Therefore, BWTX proposes to eliminate the technology on grounds of technical feasibility.

Vapor Recovery Pipeline and PLEM to Offshore (Platform-Mounted) Control Device

Two possible approaches to addressing the liquid condensate formation problem are to reduce the length of the vapor recovery pipelines by constructing a fixed or floating offshore structure to house the vapor processing equipment; and modifying the oil tankers with compression equipment, thereby allowing the vapor recovery pipeline to operate at a higher pressure. The former approach would involve challenges due to the remote nature of the platform or floating structure and limited amount of available space (discussed immediately below). In any case it has not been commercially demonstrated, and BWTT regards it as innovative in nature. BWTT assumes that means for designing or retrofitting a crude oil tanker with compression equipment are commercially available, but feels that the technique is not applicable to its proposed facility, since this would entail altering the underlying business plan. This issue is discussed in more detail further below (under the analysis for Recovery system onboard loaded vessel).

Because BWTX's offshore loading facility is of the single-point mooring type, a significant distance would separate the SPM facility from the platform. Unlike other types of offshore loading operations, the loaded vessel is not moored in a fixed position. The platform and control device would have to be located at least 1350 meters from the closest CALM buoy, based on the radius of the proposed Area to be Avoided (ATBA).[37] For other types of offshore loading facilities employing fixed berths, the vapor combustor could be located as near as 30 meters to the loading berth (33 CFR § 154.2109(c)(1)),[38] potentially eliminating the need for a subsea pipeline.

Operating subsea lines to carry loading vapors to a platform and control device installed 1350 meters or more from BWTX's CALM buoys would create operability issues. Two serious and related operability issues are the formation of liquid condensate in the vapor recovery pipeline and backpressure created at the vessel. A third operability issue is corrosion in the vapor recovery pipeline.

Crude oil loading vapors include inert gas contained in a ship's cargo hold, which contains a substantial portion of water vapors. Since the vapor recovery pipeline would traverse temperature gradients as it travels to the seabed and back, vapors would condense in the vapor pipeline, and condensate would have to be removed by pigging. Since both the pig launcher and pig catcher would be located on the platform, dual pipelines would be required for round trip pigging. If the vapor line was 10% full of liquid, and the SPM was a half mile from the platform, the liquid slug from pigging this line would be on the order of 650 cubic feet (5000 gallons). A large sump (about 8' diameter by 20' tall) would be needed to catch the slug (to keep it from going into the vapor blower), and the oily wastewater would have to be regularly pumped up to a tank located on the platform for regular off-take via barge. This would result in substantial water and waste impacts that are not otherwise required for BWTX's project.

The loading vapors coming from a ship are at low pressure (usually less than 2 psig). Ship cargo tanks operate within narrow pressure ranges, outside of which loading operations must be immediately halted. Thus, relatively minor increases in frictional losses in the vapor recovery pipeline (caused by the presence of condensate) would impair operations. Pigging the pipeline as necessary to manage back pressure could be required one or more times during each individual loading operation. The loading operation would have to be suspended since the pig is a potential ignition source. The suspension of loading operations would prevent the facility from operating continuously as intended. Disruption of loading operations would interfere with BWTX's contractual commitments to load within a fixed time period, as vessels engaged must depart on schedule to meet other committed ports of call. In addition, the loading disruption would result in longer vessel idling times and higher rates of vessel emissions than are otherwise required for BWTX's project.

Corrosion would interfere with operability as well. The vapors coming off of a ship would routinely have some level of H_2S, some oxygen, and some water vapor. The presence of these three constituents means that corrosion issues will occur. At BWTX's affiliates, filters and detonation arrestors on marine vapor lines have plugged up due to corrosion products from just a short run (less than 100 feet) of vapor piping. Round-trip pipelines running over 1350 m along the seabed will be susceptible to corrosion, and options for removing the products of corrosion and performing maintenance on the pipeline will be limited because the pipelines will lie approximately 89 feet below water on the ocean floor.

In addition, there are safety considerations which are decisive in BWTX's decision not to construct a special-purpose offshore platform. Since a platform is not otherwise dictated by the design for

[37] 33 CFR § 150.905.

[38] EPA's analysis in promulgating MACT Y refers to the need to "…locate control equipment *adjacent* to the offshore terminal…" (60 Fed. Reg. 48393. Sep. 19, 1995, emphasis supplied), based on an analysis provided by the owner of a platform-type terminal in Riverhead, NY (Docket item A-90-44 IV-D-30). The system was never installed, and the same owner elsewhere protested that the it would be "the most expensive and least beneficial [marine vapor recovery] system in the country…" (Docket Item A-90-44 IV-D-108).

BWTX's facility, it would pose unacceptable risks to the health and safety of persons manning the platform.

Safety is BWTX's number one core value. All project design considerations need to include an evaluation of the safety risks created as part of the operational philosophy. The offshore platform would entail operations that create an inherent risk to personnel safety: transportation of personnel via helicopter, storage of highly flammable and hazardous fuels, and exposure of personnel to harsh offshore weather conditions. The presence of ignition sources (vapor combustion units) in proximity to sources of propane leaks would create the risk of a fire. Rupture of a propane container could result in a fireball or boiling liquid expanding vapor explosion (BLEVE).

The vapor recovery pipelines would require nitrogen to facilitate pigging operations, jet fuel for the helicopter, diesel for the generators, pumps, cranes, etc., and such utilities would have to be delivered in isocontainers via barge, and not received by pipeline. The delivery of utilities via barge increases the vessel traffic to the DWP. Propane storage in particular which would be heavily utilized, with cranes used to lifted containers of compressed, liquefied propane on and off the platform. Crane operations on a platform, especially those that involve a supply boat, are hazardous operations with risks that cannot be fully mitigated.

At onshore operations conducted by BWTX's affiliates, the safety skid is typically located within 100 ft of the ship vapor connection. The safety skid includes equipment that analyzes the loading vapors as they arrive from the ship and injects appropriate quantities of fuel gas (typically natural gas) to ensure that the vapor is out of its explosive range. Since the platform- located VCU would have to be located at least 1350 m from the SPM buoy, considerations other than safety would dictate the location of the safety skid. The blower for the VCU is the most significant ignition source (metal to metal contact), and a spark in a non-inerted vapor stream has the potential of causing a flashback all the way to the ship.

Another safety concern is the operation of helicopters near VCU stacks. Given space limitations, the VCU stacks would exhaust in close proximity to a helideck. If the wind were blowing directly from the VCU stack to the helideck, the helicopter would be in danger of losing power while in flight, because the exhaust gas from the VCU will be low in oxygen and high in temperature.

Consistent with its commitment to safe operations, BWTX has sought to minimize to the extent possible the number of personnel required to be present in harsh offshore conditions. With the current two SPM buoy design, two mooring masters must be present at all times on each VLCC calling at the facility to ensure that all preloading safety checks are conducted, to ensure safe unloading operations and to maintain communications with the onshore facility. The mooring masters will work in shifts and will be lodged onshore. With an offshore platform, BWTX would have to increase the number of personnel and lodge personnel on an offshore platform, creating unwarranted safety risks.

In conclusion, BWTX believes that installing a vapor combustor on an offshore platform is not an available control technology. If it were considered at Step 2, it would be eliminated on grounds of technical feasibility due to operability concerns and safety hazards which are unwarranted in view of the fact that the manned platform would serve no purpose in BWTX's business operations.

Recovery system onboard workboat or supply vessel

BWTT believes that workboat-type technology could conceivably be applied to the offshore loading of crude oil, but believes that there are significant differences between the bunker loading operations controlled by the Foss Maritime barges and BWTX's proposed facility. The three factors are positioning of the workboat, environmental conditions offshore, and the necessary capacity of the recovery system. Since tankers at El Segundo are spread-moored (and therefore held in a fixed position), a workboat can be moored in close proximity to the loaded tanker. Mooring of a service vessel in proximity to a VLCC being loaded at an SPM would require modification of the safety zone and design of the support vessel with a dynamic positioning system to maintain a fixed position with respect to the VLCC. Environmental conditions would present a challenge for achieving continuous reduction of emissions, since the service vessel would have to depart from its position in the event of strong currents or winds. Finally, the size of the vessel and onboard control equipment would have to be scaled up to accommodate a significantly higher volume of vapors: the higher vapor pressure, loading rate, and presence of inert gas in the loading vapors imply a vapor flow rate two orders of magnitude (i.e., approximately 100 times) greater than would be expected for the Foss Maritime barges. Challenges in scaling up the system would interfere with BWTX's ability to operate the system continuously, and the disruption of loading operations would interfere with BWTX's contractual commitments to load within a fixed time period, as vessels engaged must depart on schedule to meet other committed ports of call.

Consequently, BWTT does not believe that the concept of mounting a control system on an offshore support vessel has been demonstrated under representative conditions, and feels that this technology should also be rejected as technically infeasible.

Recovery system onboard loaded vessel

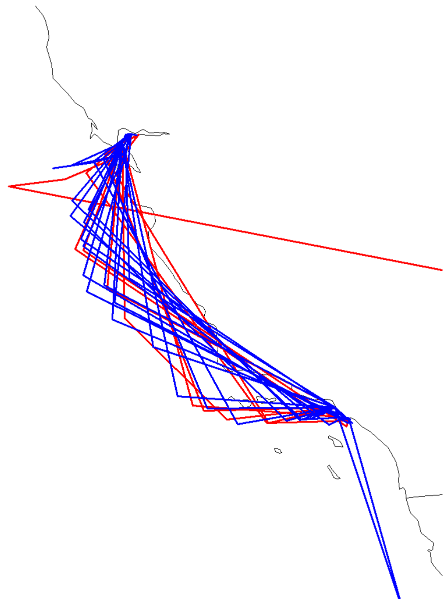
BWTT believes that the concept of modifying an oil tanker to include onboard control equipment can be assumed to be commercially available. Specially-designed tankers have operated, and continue to operate in California coastal waters and in the North Sea. While the vessels operating in California waters were of smaller size (ocean-going barge and Handymax), BWTT has identified Suezmax shuttle tankers operating the North Sea with onboard control equipment. The North Sea shuttle tankers receive cargo from FPSO's (typically via tandem loading rather than SPM), and can be assumed to operate under environmental conditions similar to those applying at the location of the proposed facility.

While commercially available, this technology is only applicable in cases where the facility can restrict the types of loaded ships to specially-designed vessels under the control of the facility owner. This is illustrated below for the El Segundo terminal and for one controlled North Sea shuttle tanker.

In the case of the El Segundo terminal, MARAD data lists the operator of the *Florida Voyager* and the *Mississippi Voyager* as Chevron Shipping Co LLC.[39] Figure 4-1 shows two-month trajectories for the two vessels, indicating that their traffic is almost entirely confined to trips between Long Beach or El Segundo (likely loading areas), and either the Chevron Richmond Refinery "Long Wharf," mentioned above, or the Phillips 66 Rodeo Refinery (likely offloading areas). In this case, Chevron affiliates own the terminal in El Segundo and also operate the ships that are loaded at the terminal along relatively fixed itineraries.

[39] Maritime Administration. United States Flag Privately-Owned Merchant Fleet Report. January 2019.

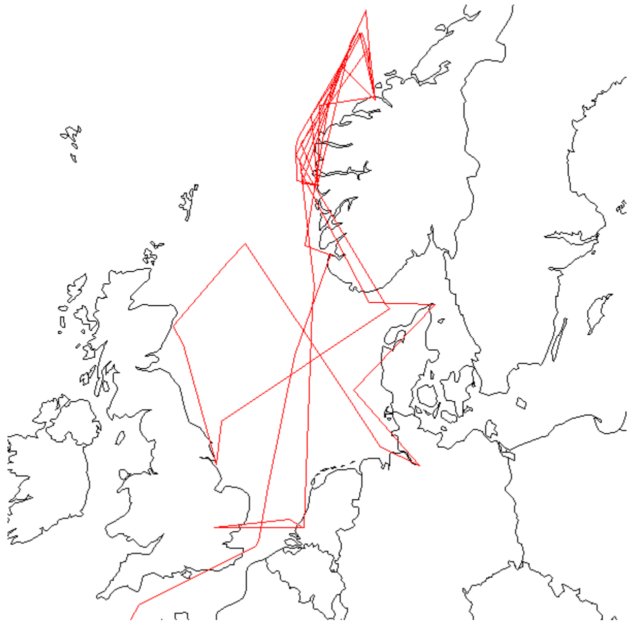
Figure 4-1
Trajectories for the Florida Voyager and the Mississippi Voyager



A similar situation applies in the case of the North Sea shuttle tankers. Individual offshore production sites rely on dedicated fleets of shuttle tankers in cases where produced oil cannot be transported to market via pipeline. Figure 4-2, for example, shows voyage trajectories for the *Randgrid* between October 2014 and May 2015.[40] The tanker calls at ports in Norway, Denmark, Germany, Netherlands and UK, repeatedly returning to offshore areas where oil production units are known to operate.

[40] The May 2015 voyage was to a shipyard in Singapore, presumably for its eventual conversion to an FSO.

Figure 4-2
Trajectory for the Randgrid



All observed examples of onboard control devices are in cases where an offloading point relies on a dedicated fleet of tankers to transport its product. In such a context, the vessels are controlled by the terminal owner, or specific vessels are contracted for use by the terminal owner. In other words, the use of a dedicated vessel fleet is part of the terminal's business model, and it is not unreasonable to impose specific equipment requirements on such a dedicated fleet. In the case of the proposed deepwater port, however, use of control devices onboard the loaded ship is not reasonable. Tankers calling at the port are expected to be foreign-flagged vessels owned and operated by companies unaffiliated with BWTT. While equipment requirements applying to crude carriers may be a reasonable approach to regulating offshore loading and lightering operations, BWTT believes that such requirements cannot be reasonably imposed on a specific terminal.

Therefore, although the technology is commercially available, it is only applicable in cases where the terminal can restrict the types of loaded ships to specially-designed vessels under the control of the terminal owner. When the design of BWTX's project is considered, there are compelling differences which prevent the applicability of onboard control devices. The technology is also not available in the context of an applicant's basic business purpose.

> The permit issuer (here, the Region) should take a "hard look" at the applicant's determination in order to discern which design elements are inherent for the applicant's purpose and which design elements "may be changed to achieve pollutant emissions reductions without disrupting the applicant's basic business purpose for the proposed facility," while keeping in mind that BACT, in most cases, should not be applied to regulate the applicant's purpose or objective for the proposed facility.[41]

[41] *In Re Desert Rock Energy Company, LLC*. 14 E.A.D. 484, 530. September 24, 2009. Internal citations omitted.

Work Practice Standard (Submerged fill and best management practices)

A work practice standard consisting of submerged fill and best management practices is required by otherwise applicable regulations, and is technically feasible.

The Step 2 analysis control techniques identified is summarized in Table 4-3. Of these, only one technology (submerged fill and best management practices) remains.

Table 4-4 Summary, Step 2 of Top Down Analysis

Control Technique	Analysis	Proceed to Step 3?
Vapor recovery pipeline and PLEM to onshore vapor combustor or vapor recovery unit.	When physical design of BWTX's project is considered, length of vapor recovery pipeline makes operational challenges prohibitive. Not technically feasible.	No
Vapor recovery pipeline and PLEM to offshore (platform-mounted) vapor combustor or vapor recovery unit.	Technology has no demonstrated application and will likely present operational challenges. Unwarranted safety risks associated with operating an offshore platform not otherwise indicated by BWTX's project design. Not technically feasible.	No
Recovery system onboard workboat or supply vessel	Considering throughput and materials to be loaded at BWTX's facility, the necessary scale-up of this technology would present operability challenges which prevent its successful transfer. Not technically feasible.	No
Recovery system onboard loaded vessel	Technically feasible for a facility that can restrict its operations to a small number of specially-designed vessels. Since this is not compatible with BWTX's business purpose or objective, the technology is not technically feasible for BWTX's facility.	No
Work practice standard (submerged fill and best management practices)	Technically feasible.	Yes

4.5.4 Step 3. Rank remaining alternatives

Since the control technologies involving add-on controls have been eliminated as technically infeasible, the only remaining control alternative is the combined work practice standard. Since bottom fill and VOC management plan requirements apply to all crude oil tankers operating in U.S. waters, and not to terminal owners, BWTT does not foresee any adverse economic impacts from adoption of the work practice standard. For similar reasons, there are no energy or secondary environmental impacts that would result from imposition of the work practice standard.

4.5.5 Step 4. Eliminate alternatives with unfavorable economic, energy, or environmental impacts

As noted at Step 3, the combined work practice standard has no unfavorable economic, energy, or environmental impacts, and is not eliminated at Step 4.

4.5.6 Step 5. Select BACT

The combined work practice standard is the only remaining control alternative, and is proposed for selection as BACT.

4.5.7 BACT Compliance

In order to demonstrate compliance with the proposed BACT for marine vessel loading operations, BWTX proposes the following compliance demonstration requirements. An example of the pre-transfer checklist associated with the required operations manual is attached as an appendix.

- No vessel shall be loaded unless it complies with the equipment design specifications of 46 CFR § 153.282.
- No vessel shall be loaded unless it possesses and implements a VOC management plan consistent with the requirements specified in 40 CFR § 1043.100(b)(1), Regulation 15.6.
- Transfer operations shall be conducted in accordance with an operations manual pursuant to 33 CFR § 150.425.
- During the initial stages of loading into each individual tank the flow rate in its branch line should not exceed a linear velocity of 1 metre/second. When the bottom structure is covered and after all splashing and surface turbulence has ceased, the rate can be increased to the lesser of the ship or shore pipeline and pumping system maximum flow rates, consistent with proper control of the system. Prior to the start of each transfer operations, the above stated owner or operator shall perform a calculation to determine the maximum cargo pumping rate which ensures compliance with this provision.
- Each facility manifold flange shall be equipped with a removable blank flange. The end of each hose not connected for the transfer of oil shall be blanked off. Each part of the transfer system not necessary for the transfer operation shall be securely blanked or shut off. Prior to the removal of blanks from tanker and facility pipelines or hoses, the section between the last valve and blank shall not contain oil under pressure. Precautions to prevent spillage, including inventorying hoses with sea water at the conclusion of each loading operation, shall be implemented.

4.6 Best Available Control Technology Analysis for Equipment Leak Fugitive Emissions

Air emissions from leaking piping components may occur from valves and connectors located on the mooring buoy and floating hose. As discussed in BWTX's July 31, 2019, submission, uncontrolled fugitive emissions would be approximately 0.25 tpy VOC per buoy if SOCMI average emission factors were used.

4.6.1 Top Down Analysis

Candidate control technologies for equipment leak fugitives are listed in Table 4-5. These are referred to as options 1–6, respectively. An additional work practice, referred to as option 7, is also discussed below.

Table 4-5 Identified Control Technologies for Equipment Leak Fugitives

No.	Technology	Control Efficiency
1	Leakless Technology	100%
2	Remote Sensing Technology	Undefined
3	Enhanced LDAR—high quality component and materials of construction	Undefined

No.	Technology	Control Efficiency
4	Instrumental Monitoring of flanges, including via optical gas imaging	75–97%
5	Lower Leak Detection Levels	Undefined
6	Implementing an audio/visual/olfactory (AVO) monitoring program for compounds	30%
7	Limit time in VOC service	50%

For the sake of argument, BWTX assumes that all control options are technically feasible. However, the vessel to transport the leak detection personnel would require specific clearance from the port operator before being allowed to operate in the safety zone if classified as a "support vessel," and would otherwise be forbidden from anchoring in the safety zone or mooring to the SPM (33 CFR § 150.380). It is unlikely that such clearance would be granted during a loading operation, however. Monitoring would therefore have to take place during periods when the facility is idle and when piping components are not in VOC service.

The facility as currently designed employs high quality components which are substantially leakless, and will also employ remote sensing technologies to detect the presence of significant leaks.

Floating hoses are manufactured with leak free elastomeric linings on the inner carcass which prevent leaks of hydrocarbon liquids which might otherwise arise from connections in steel piping. The floating hoses are of double carcass design, such that any leaks forming from the inner carcass are contained.

Flanged connections occur at marine breakaway-dry couplings (MBC's) located at regular intervals along the floating hose. Marine breakaway couplings used in marine offshore oil loading operations generally comprise of a unit joined in two halves incorporating a shut off valve(s) which requires no external power or control source to activate i.e. it is a passive device. The valve(s) are mechanically locked in the open position and fail safe to close when activated. The two halves of the unit will part on load/surge and separation initiates the closure of the valve(s). As the unit separates, flow of the liquid being transferred is stopped and contained within each part of the separated hose (where double closure units are fitted).[42]

The two aspects of floating hose design (leak free interior lining and MBC's) described in the previous paragraph provide complementary protection from small leaks that may occur during routine operations and from significant leaks and spills that could occur during incidents. BWTX believes that the SPM and floating hose flanges can be reasonably classified as "leakless" if installed and operated in accordance with the following requirements and guidelines.

- 33 CFR § 150.405, specifying testing and inspection requirements for floating hoses.
- 33 CFR § 149.650, requiring durability under combined wind, wave, and current forces of the most severe storm that can be expected to occur at the port in any 100-year period.

[42] Oil Companies International Marine Forum (OCIMF). *Information Paper— Marine Breakaway Couplings*. November 2008.

- OCIMF Guide to Purchasing, Manufacturing and Testing of Loading and Discharge Hoses for Offshore Moorings.

- OCIMF SPM Hose Ancillary Equipment Guide.

Remote sensing technology which can detect and locate leaks and other malfunctions will be installed at the deepwater port, as required under 33 CFR § 149.125.

At the end of each loading operation, the floating hoses will be flushed with sea water, with some sea water entering the tanker's slop oil tanks. This work practice serves to limit the amount of time that the floating hose connectors are in VOC service.

The use of leakless components, high quality construction materials, and remote sensing technologies (Options 1–3) is required under USCG regulations, and involves no additional marginal cost. These options have a marginal cost effectiveness of $0/ton. Additionally, the work practice of inventorying floating hoses with sea water when idle (Option 7) has no marginal cost.

Regular monitoring of flanges for leaks using an FID, PID, or optical gas imaging device (options 4–5); or AVO inspections (option 6) would require chartering of a special-purpose vessel and employing skilled technicians to conduct the monitoring. The annualized cost of chartering and fueling the vessel and hiring the operator would be similar for all such options, regardless of the cost of monitoring instrumentation. BWTX believes that such costs would exceed $20,000 per year. However, as noted above, inspections would not be permitted during loading operations, and could only take place when the facility is idle (and the floating hoses are inventoried with sea water). The likelihood of successfully detecting a leak would be reduced, such that the generic control efficiencies cited above would not be realized. If a VOC reduction of 0.08–0.24 tons/yr were realized, it would correspond to a cost effectiveness of $80,000–270,000/ton or greater.

When the technologies identified above are ranked by decreasing control effectiveness, the use of leakless technology is the top ranked option. BWTX does not propose to eliminate the top-ranked option based on energy, environmental or economic impacts.

Therefore, the use of leakless technology, combined with the work practice of inventorying hoses with seawater when idle, is proposed as BACT.

4.6.2 BACT Compliance

In order to ensure leak free performance as represented, BWTX proposes to comply with the USCG regulatory requirements and OCIMF guidelines described above. BWTX also proposes to adhere to a maintenance program for all facility components to detect and repair any potential issues which may result in leaks of VOC to the air. A maintenance checklist currently used at a BWTX affiliate's SPM facility in the United Kingdom is attached as an exhibit. Because weather and sea conditions will vary between the two locations, actual practices at BWTX's facility will be tailored accordingly and will not be identical to those at the UK facility. BWTX's actual maintenance program will adhere, at a minimum, to the Single Point Mooring Maintenance and Operations Guide (SMOG) guidelines issued by OCIMF.

4.7 Appendix— Tetney Facility Maintenance and Pre-berthing Checklists

Humber Refinery

COTH 3696

Tetney MonoBuoy

MM Pre-Berthing Check List

PEARY SPIRIT

Date/Time:

	OK	Fault	Remarks
Pre-Berthing Discussion held with Department Heads			
Workboats Fully Available (Primary /Secondary or Substitute Vessels)			
Environmental Conditions within Berthing Parameters			
MMs Equipment Checked			
MM Equipment Bags Prepared for operations			
Gas Detector Checked and Available for Use			
Sundstrom Masks Checked and Available for Use			
Hand-Held UHFs and VHFs checked and Available for Use			
Portable Load Monitor Checked and Available for Use			
Tanker Mooring Available and Secured to Buoy			
Monobuoy and PLEM valves Prepared and Tested as per Import Work Instructions			

Mooring Masters Comments

Signed ....Mooring Master Items/Faults Noted ....

TRENT FISHER

James Fisher
Marine Services

TETNEY MONOBUOY PRE-BERTHING CHECK LIST

COTH No:		TANKER:		Date: Time:	

		OK	FAULT	REMARKS
1	Floating Hoses Visual inspection for damages deformity and leaks			
2	Floating Hose Lights			Number of Hose Lights in operation
3	Floating Hose Flanges Visual inspection for damage deformity and leaks			
4	Floating Hose String nuts and bolts. Visual inspection for damage and corrosion			
5	Valve Floatation. Visual inspection for integrity			
6	Tanker Mooring Shackles Visual Inspection for damage and loose pins.			
7	Tanker Mooring. Tape replaced as required inspection of splices, eyes & thimbles. Replace jackets were necessary			
8	Chaffe Chain / Connection Chain Visual inspection. Report any damage.			
9	Chain Support Float. Check connecting chain for excessive wear and that it floats correctly once in the water.			
10	Pick Up Rope Visual inspection whilst deploying. Report any damage and replace where necessary			
11	Lifting Gear Check lifting strop and BM's bag prior to use.			

RANK ………………………………………….. **Signature: ………………………………………………………**

Trent Fisher Mate is to confirm they have Inspected item numbers 5-10 and report Any damage. **Signature: ……………………………………………………..**

TETNEY MONOBUOY

PRE-BERTHING CHECK LIST

COTH No:		TANKER:		Date: Time:	

		OK	FAULT	REMARKS
1	Confirm the PLEM valve HPU system is in AUTO and confirm with the Trent Fisher			
2	Open turntable valve and confirm with the Trent Fisher Master that it is in the open position.			
3	Connect 110vAC flying lead. Confirm Batt volt >23.5v			
4	Charge up HPU accumulator			
5	The Trent Fisher Master will request the tank head pressure from Tetney Base on the sealine			
6	Tetney Base will confirm with the Trent Fisher / MM Stroke test can be performed			
7	Tetney Base will perform the stroke test and apply pressure			
8	Tetney Base to confirm test stroke is complete and the PLEM valve is in the closed position			
9	The crew will confirm the pressure on the turntable gauge and report back to the Trent Fisher Master			
10	The Trent Fisher Master will check the pressure and voltage on the telemetry back at Tetney Base			
11	Load monitor block visual check. Check Well valve is full open and report to Tetney			
12	Buoy / floating hose connection			
13	Turntable and well pipe work paying attention to the sea surface in the well			

14	Product Swivel			
15	Turntable and body for damage			
16	Manhole covers for security			
17	Turntable bearing for unusual noise or loss of free movement			
18	Navigation / Deck Lights			
19	ISPS Security Checks			
20	Any other comments			
21	Special Checks – Loadcell Retention Split Nut – Allen bolts tight?			

ENSURE FLYING LEAD DISCONNECTED AND CHARGE SWITCH IN OFF POSITION

RANK ....

NAME : ....

SIGNATURE: ....

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Diver 7

Divers

			OK?
PLEM	Structure	Visual inspection of exposed sections for corrosion/mechanical damage.	
Sub Sea Hoses	Hoses	Visual integrity check of hose body, flanges, bolts & gaskets.	
Sub Sea Hoses	Floats	Visual inspection for position, condition and security.	
Sub Sea Hoses	Drag Chains	Visual inspection for position, condition and security.	
Sub Sea Hoses	Umbilicals	Visual inspection for position, condition and security.	
Sub Sea Hoses	Configuration	Inspect sub-sea hose string’s configuration and report to Tetney.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
SHII 7			
SHII			OK?
Monobuoy Main Body	Structure	Check Monobuoy Draft - (NB Design draft = 3.3m).	
Monobuoy Main Body	Centre Swivel	Visual inspection for signs of leakage.	
Monobuoy Main Body	Centre Swivel	Grease and rotate.	
Monobuoy Main Body	Pipework, brackets and flanges	Visual check for leaks and mechanical damage.	
Monobuoy Main Bearing	Bearing	Visual inspection of water barrage. Check turnbuckles are all OK.	
Monobuoy Main Bearing	Bearing	Grease Main Bearing and rotate Turntable. Check for smooth running.	
Turntable	Structure	Inspect and report any damage or corrosion on any parts of the structure and handrails, including safety bars on ladders to the crane, navaids gantry, chicksan and boarding platform.	
Turntable	Structure	Inspect all areas of the turntable and ensure that housekeeping is maintained at a high standard.	
Turntable	Top Valve	Visual inspection for leaks and mechanical damage.	
Turntable	Pipework, brackets and flanges	Visual inspection for leaks and mechanical damage.	
Turntable	Chicksan	Visual inspection for leaks and mechanical damage.	
Turntable	Expansion piece	Visual inspection for leaks and mechanical damage.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
SHII 7			
Turntable	Brakes	Visual inspection for condition and operability.	
Turntable	Fendering	Inspect and report any damage or wear.	
Turntable	Lifebelts	Inspect and report any damage.	
Turntable	Fire Extinguishers	Inspect and report any damage.	
Floating Hose String	General	Visual inspection for damage, deformity and leaks.	
Floating Hose String	Floating Hose Sections	Visual inspection of Nuts and Bolts for damage and corrosion.	
Floating Hose String	Y-Tank	Visual check for leaks, reporting any unusual trim and mechanical damage to casing and floatation.	
Floating Hose String	Y-Tank	Visual check for leaks and mechanical damage to pipework and flanges.	
Floating Hose String	Y-Tank	Visual inspection for damage or corrosion to nuts, bolts and gaskets.	
Floating Hose String	Lights	Visual check of operation. If damaged replace unit and stanchion with appropriate light.	
Floating Hose String	Lights	Visual inspection for damage and corrosion, straighten stanchion as required.	
HPU	General	Fuel tank level check.	
Diesel Generator	General	Fuel tank level check.	
Crane	General	Check all pipes / hoses for fitting / leakage.	
Crane	General	Visual check for damage to crane structure.	
Crane	General	Check wire for condition.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
SHII 7			
Crane	General	Grease all grease points until fresh grease appears at bearing or bushes.	
Crane	General	Grease pads on telescopic jib.	
Wind Generators	General	Visual and audible operational check.	
Solar Panel	General	Visual check for cleanliness and mechanical damage.	
Anenometer	General	Visual check for mechanical damage and operation.	
Fog Signal	General	Audible check when close to and leaving the Monobuoy. Report any defects.	
Navigation lights	General	Visual check for operation and cleanliness. Report any defects and clean as required.	
Navigation lights	General	Visual check of structure when close to Monobuoy or from tanker.	
Working Lights	General	Visual Inspection when on Monobuoy at night.	
Working Lights	General	Visual inspection of lamp bodies when on Monobuoy during daylight.	
Boarding Lights	General	Visual Inspection when on Monobuoy at night.	
Boarding Lights	General	Visual inspection of lamp bodies when on Monobuoy during daylight.	
Boarding Lights	General	Test both remote and local operation.	
Telemetry	General	Check telemetry battery condition and report any defects.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
SHII 7			
Monobuoy Main Bearing	Greasing System	Check greasing system for excess grease at collection points and check blockage indicators on bearing and centre swivel.	
Monobuoy Main Bearing	Greasing System	Check level in grease supply container and and re-charge when empty.	
Monobuoy Main Bearing	Greasing System	Record counter reading - Start and Finish.	
Floating Hose String	Flanges and Nipples	Visual inspection for damage, corrosion and leaks.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

BM 14

BMs

OK?

Unit	Sub-Unit	Description	OK?
Floating Hose String	Floating Hose Sections	Visual inspection of Rail Hose Lifting Lugs when connecting hoses to each tanker. Report any excessive wear or damage.	
Floating Hose String	Hose-End Valves	Visual inspection for leaks and mechanical damage.	
Floating Hose String	Hose-End Valves	Visual inspection for mechanical damage and corrosion of hose end valve nuts / bolts / spool.	
Floating Hose String	Rail Hose Rigs	Visual inspection of Hose Lifting Rigs for damage, corrosion and security of all components. Report any defects or deformities and replace components as necessary.	
Floating Hose String	Rail Hose Rigs	Visual inspection of Hang-Off Chains for damage, corrosion and security of all components. Report any defects or deformities and replace components as necessary.	
Floating Hose String	Rail Hose Rigs	Visual inspection of Kuplex Clutches for damage, corrosion and security of all components. Report any defects or deformities and replace components as necessary.	
Floating Hose String	Rail Hose Rigs	Visual inspection of Hang-Off Ropes for damage and wear prior to use. Replace as necessary.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
BM 14			
Hose Connection Box	General	Visual inspection of Hose Connection Gear Box for damage, corrosion and security of all components. Check lifting rig and shackles, report any defects.	
Hose Connection Box	General	Clean and grease Nuts and Bolts. Replace any damaged items.	
Hose Connection Box	General	Complete inventory, replace any damaged items and replenish consumables.	
Hose Connection Box	General	Check condition of hose webbing strop.	
Corrosion Inhibitor Skid	General	Visual inspection of Corrosion Inhibitor Skid for damage, corrosion and security of all components. Check lifting rig and shackles, report any defects.	
Telemetry	General	Check reading on portable unit and compare with Tetney remote reading.	
Telemetry	General	Comparison with tanker strain gauge, done with each ship where vessel has suitable equipment.	
Telemetry	General	Check contents of 'Briefcase' and replace missing items, including spare booklets, NOPs, Checklists etc.	
Pickup Rope	General	Check condition of Pick-Up Rope and report any defects.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Elec 31

Electrical

OK?

Unit	Sub-Unit	Description	OK?
Turntable	Structure	Check all cable connections for loose fittings and corrosion.	
Diesel Generator	General	Visual Inspection – check operation during Start/Stop.	
Crane	General	Check operation of limits and condition of switches cabling and glands.	
Wind Generators	General	Check bearing free play radial and axial.	
Solar Panel	General	Voltage output check 0-24 volts.	
Solar Panel	General	Check Solar Panel for water ingress and spray with water repellent.	
Solar Panel	General	Visual inspection for corrosion to terminals.	
Working Lights	General	Re-lamp as required.	
Boarding Lights	General	Re-lamp as required.	
Telemetry	General	Visual check for damage on Load Monitor plug connectors / cable.	
Telemetry	General	Visual inspection for water ingress into Telemetry Control Box, and spray with water repellent.	
Telemetry	General	Check voltage on each Telemetry battery.	
Telemetry	General	Clean Telemetry Battery Terminals and spray with water repellent.	
Telemetry	General	Inspect Telemetry Battery Box and clean filters.	
Telemetry	General	Compare voltage output at Telemetry Battery to that measured at Power and Control Box.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
SHII 31			
SHII			OK?
Monobuoy Main Body	Tanks	Check on whichever tanks can be accessed, for water ingress by sounding and pump out as required. Record the tanks inspected and ensure that all tanks have been checked within a 3 month period.	
Monobuoy Main Bearing	Bearing	Lift two randomly selected water barrage covers and check inside barrage for signs of leakage.	
Turntable	Structure	Grease and rotate all sheaves on the Monobuoy Turntable.	
Turntable	Chicksan	Check chicksan bolt tell tales and torque up if required.	
Winch	General	Run winch in both directions for approx. 2 to 3 minutes.	
Winch	General	Inspect pulling wire.	
Winch	General	Grease all grease points until fresh grease appears from bearing.	
Winch	General	Grease manual brake spindle.	
Winch	General	Operate all changeover valves and check for ease of movement.	
Winch	General	Inspect all hoses from power pack to winch for damage / leaks.	
Winch	General	Check mounting bolts for corrosion / deterioration.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
SHII 31			
Monobuoy Main Bearing	Greasing System	Remove excess grease from collection points.	
Monobuoy Main Bearing	Greasing System	Visual inspection of greasing system.	
Hawser	Tanker Mooring Point	Grease and replace grease nipples on tanker mooring point when required.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Eng 31

Engineers

OK?

Unit	Sub-Unit	Description	Completed
HPU	General	Lub Oil sump level check.	
HPU	General	Cooling water level check.Observed at 42 c	
HPU	General	Fuel tank level check.	
HPU	General	Check save all for water and oil – empty if required.	
HPU	General	Visual check upon starting.	
HPU	General	Running checks: Engine Oil Pressure. 5.6 bar	
HPU	General	Running checks: Cooling Water Temperature.	
HPU	General	Running checks: Check for leaks.	
HPU	General	Check hydraulic oil storage tank level and note with date (Visga 32).	
HPU	General	Running checks: Check hydraulic pressure under load (250 bar). Operated at 110 bar :	
HPU	General	Running Checks: Check for leaks.	
HPU	General	Check for damage, chafing, leaks on the hrdraulic hoses.	
Diesel Generator	General	Lub Oil sump level check.	
Diesel Generator	General	Cooling water level check.	
Diesel Generator	General	Fuel tank level check.	
Diesel Generator	General	Save all to check for oil and water - empty as required.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
Eng 31			
Diesel Generator	General	Inspect cooling fan hub and blades for cracking / damage.	
Diesel Generator	General	Check drive belts for tension and damage.	
Diesel Generator	General	Check for worn / damaged parts.	
Diesel Generator	General	Check operation of louvers (opening / closing).	
Diesel Generator	General	Running checks: Engine Oil Pressure. 82psi	
Diesel Generator	General	Running checks: Cooling Water Temperature.	
Diesel Generator	General	Running checks: Charging Voltage.	
Diesel Generator	General	Running checks: Check for Leaks. Obs at 27.6 V	
Diesel Generator	General	Running checks: Exhaust colour and quantity.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Diver 92

Divers

OK?

Unit	Sub-Unit	Description
Crane	General	Extend Monobuoy crane jib to full reach and inspect exposed surfaces for condition / grease. Where required apply grease to telescopic jib sections.
Monobuoy Main Body	General	Carry out inspection of all the mooring gimble locking gates. Report any missing or loose items.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Grease 92

BMs

OK?

Unit	Sub-Unit	Description
Monobuoy Main Bearing	Greasing System	Send grease sample off for analysis. Review results and establish any remedial requirements.

Divers

OK?

Unit	Sub-Unit	Description
Monobuoy Main Bearing	Greasing System	Flush the bearing with grease through the four manual grease ports.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Poll 92

BMs

Unit	Sub-Unit	Description	OK?
Emergency Spill Trailers	Spill Trailer 1	Complete Spill Trailer 1 Checklist.	
Emergency Spill Trailers	Spill Trailer 2	Complete Spill Trailer 2 Checklist.	
Emergency Spill Trailers	Spill Trailer 3	Complete Spill Trailer 3 Checklist.	
Emergency Spill Bins	Spill Bin 1	Complete Spill Bin 1 Checklist.	
Emergency Spill Bins	Spill Bin 2	Complete Spill Bin 2 Checklist.	
Emergency Spill Bins	Spill Bin 3	Complete Spill Bin 3 Checklist.	
Oil Pollution Store	General	Complete Oil Pollution Store Checklist.	

Remarks

Unit	Sub-Unit	Description	Completed

Pick-Up 92

BMs

			OK?
Pickup Rope	General	Arrange for pick-up rope to be end-for-ended to extend the working life of the rope.	
Pickup Rope	General	Withdraw rope from service when wear dictates. Arrange for new rope to be fitted.	

Remarks

EOMPS Maintenance Task Sheet

Diver 183

Divers

Unit	Sub-Unit	Description	Completed
Sub Sea Hoses	Hoses	Physical check of flange and bolt tightness .	
PLEM	Non-Return Valve	Check flanges and tighten bolts as required.	
PLEM	Non-Return Valve	Visual check for corrosion on NRV. Check flanges and tighten bolts as required.	
PLEM	Non-Return Valve	Check condition of flat cap bolts on NRV.	
PLEM	Grove Valve	Visual check for corrosion on Grove Valve. Check flanges and tighten bolts as required.	
PLEM	Grove Valve	Visual inspection of stem seal on Grove Valve.	

OK?

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

CP 183

CP

OK?

Unit	Sub-Unit	Description
PLEM	Anodes	Measure and record voltage potential on each anode.
PLEM	Anodes	All CP results reported back to ConocoPhillips.
Monobuoy Main Body	Anodes	Measure and record voltage potential on each anode.
Monobuoy Main Body	Anodes	All CP results recorded in CP report.

Divers

OK?

Unit	Sub-Unit	Description
PLEM	Anodes	Carry out dive on the PLEM and record / report condition of anodes. Assist with the measurement of voltage potential on each anode.
Monobuoy Main Body	Anodes	Carry out dive around the skirt of the Monobuoy and record / report condition of anodes.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

SHII 183

SHII

OK?

Crane	General	Test emergency winch lower procedure.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Chain 183

Inspect

			OK?
Chaffe Chain - Tanker	General	Measurements taken to detect any wear and report on findings. Replace if wear exceeds 12% of original diameter. Original diameter = 76mm.	
Chaffe Chain - Buoy	General	Measurements taken to detect any wear and report on findings. Replace if wear exceeds 12% of original diameter. Original diameter = 76mm.	
Shackles	General	Measurements taken to detect any wear and report on findings. Replace shackles if wear exceeds 12% of original diameter. Original diameter = 115mm.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Lift 183

SHII

OK?

Unit	Sub-Unit	Description	OK?
Turntable	Divers Davit and winch	Monobuoy Diver retrieval davit and Sala winch to be Inspected and certified by a competent person under LOLER regulations.	
Corrosion Inhibitor Skid	General	Inhibitor Injection Skid lifting rig to be Inspected and certified by a competent person under LOLER regulations.	
Workboats	Spurn Haven II	SHII Diver retrieval davit and Sala winch to be Inspected and certified by a competent person under LOLER regulations.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Hose 183

Divers

OK?

Floating Hose String	Floating Hose Sections	Swim floating hose string and check condition of bolts. Tighten as required.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Bridle 365

Inspect

			OK?
Turntable	Divers Davit and winch	Monobuoy Diver retrieval davit and Sala winch to be Inspected and certified by a competent person.	
Turntable	Tanker Mooring Bridle and Shackles	Measured and Inspected.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Lloyds 365

Lloyds

OK?

Monobuoy Main Body	Tanks	All tanks opened and compartments visually inspected.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Hose 365a

BMs

OK?

Unit	Sub-Unit	Description
Floating Hose String	General	Inspection of nuts and bolts in Grimsby Docks – replace as necessary.
Floating Hose String	Floating Hose Sections	Inspection in Grimsby Docks. Full internal and external condition inspection with Dunlop technician. Replace hoses as required.
Floating Hose String	Floating Hose Sections	Replace as required during annual inspection or on 10th inspection whichever comes first.
Floating Hose String	Hose-End Valves	Hose-end valves to be inspected, and changed out as required.
Floating Hose String	Marine Breakaway Couplings	Replace and test breakstuds on MBCs to inspection schedule.
Floating Hose String	Flanges and Nipples	Inspection in Grimsby Docks – replace gaskets as necessary in any opened flanges.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

SHII 365

SHII

OK?

Unit	Sub-Unit	Description	
Monobuoy Main Bearing	Greasing System	Change Greasing system filter elements.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Rope 365a

BMs

OK?

Hawser	General	Remove all floatation jackets, drift "D" Shackles and conduct a thorough inspection, complete checklist and record any defects.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Lift 365a

Inspect

OK?

Unit	Sub-Unit	Description	OK?
Corrosion Inhibitor Skid	General	Annual inspection and certification by a competent person.	
Workboats	Spurn Haven II	SHII Diver retrieval davit and Sala winch to be Inspected and certified by a competent person.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Eng 365

OK?

Engineers

Unit	Sub-Unit	Description	Completed
HPU	General	Visual check for corrosion / damage.	
Diesel Generator	General	Take engine oil sample for analysis. (sample to be taken from dipstick tube when up to temp.).	
Diesel Generator	General	Change oil and filter.	
Diesel Generator	General	Change fuel filter.	
Diesel Generator	General	Change air filter.	
Diesel Generator	General	Change drive belts if required.	
Diesel Generator	General	Drain cooling system, fill with clean water and top up with anti freeze Check anti freeze level with hydrometer.	
Diesel Generator	General	Check air charge cooler.	
Diesel Generator	General	Check valve clearances.	
HPU	Diesel Driver	Take oil sample for analysis (take from dip stick tube when up to temperature).	
HPU	Diesel Driver	Change oil (Disola W).	
HPU	Diesel Driver	Change oil filter.	
HPU	Diesel Driver	Change fuel filter.	
HPU	Diesel Driver	Change air filter.	
HPU	Diesel Driver	Inspect and change drive belts as required.	
HPU	Diesel Driver	Drain cooling system and fill with clean water and anti freeze. Check anti freeze level with hydrometer.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
Eng 365			
HPU	Diesel Driver	Check air charge cooler.	
HPU	Diesel Driver	Check valve clearances.	
HPU	Diesel Driver	Test automatic shutdown system.	
HPU	Diesel Driver	Test injectors.	
HPU	Hydraulic Unit	Change filters if required. (see indicator on high pressure filter).	
HPU	Hydraulic Unit	Sample hydraulic fluid, send for analysis – (Take sample from tank, not pipework).	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Elec 365

BMs

OK?

Unit	Sub-Unit	Description
Telemetry	General	Carry out PAT testing of Berthing Master's gear used for tanker operations: Telemetry portable unit / battery chargers / cables / adapters / extension lead etc. Work to be carried out in association with PAT testing of workboat equipment.

Electrical

OK?

Unit	Sub-Unit	Description
Wind Generators	General	Remove and inspect slip ring brushes for wear, replace as required.
Navigation lights	General	Change out full set annually.
Earthing and Zoning	General	Check earth continuity of Monobuoy electrical systems.
Earthing and Zoning	General	Disconnect all earth connections and copperslip / clean as required.
Earthing and Zoning	General	Visual inspection of all zoned equipment.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Lloyds 912

Lloyds

OK?

Monobuoy Main Body	Tanks	Full Lloyds Survey of Monobuoy, including hull thickness measurements.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Hydr 1825

Engineers

OK?

HPU	Hydraulic Unit	Drain and prepare hydraulic reservoir and accumulator for inspection and re-certification.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed
MBC 1460			
BMs			OK?
Floating Hose String	Marine Breakaway Couplings	Send back to manufacturer for overhaul.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Stores 183

BMs

OK?

Marine Stores	General	Half-yearly inventory of Marine Stores. Ensure stock levels are brought up to the minimum holding where required.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

CS 183

Divers

OK?

Turntable	Chicksan	Carry out six-monthly check on tensions on the Chicksan Bolts, and adjust as required.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Sealine Pressure Test

BMs

OK?

Sub Sea Hoses	Hoses	Pressure testing in situ of the hoses, and by extension the sealine, should be performed approximately every six months depending upon environmental conditions at the buoy. The test should consist of raising the internal pressure in the hose to its rated pressure, or its operating pressure + 50%, whichever is the lower, and then holding it for a period of three hours. Visual inspection of the system should only commence when the pressure has stabilised.	
Sub Sea Hoses	Hoses	Add historical record to EOMPS database.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Well Valve Telemetry

Electrical

OK?

Telemetry	General	Well valve telemetry showing red/green whether valve is open or closed.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Diver 31 - Chain Angles

BMs

OK?

Unit	Sub-Unit	Description
Monobuoy Main Body	General	Record measured angles in CHAINCAL.xls and advise any required adjustments. Make entry in the EOMPS section of the database where required.

Divers

OK?

Unit	Sub-Unit	Description
Monobuoy Main Body	General	Measure and record chain angles to ensure correct tension on each of the Monobuoy mooring chains.

Remarks

Unit	Sub-Unit	Description	Completed

Diver 31 - Configuration

BMs

OK?

Unit	Sub-Unit	Description
Sub Sea Hoses	Hoses	Record measured values in HOSECONFIG.xls, print out result and file. Advise on any concerns making a record in the EOMPS section of the database.

Divers

OK?

Unit	Sub-Unit	Description
Sub Sea Hoses	Hoses	Measure and record spot locations on the sub-sea hose system to allow recording of hose configuration.

Remarks

EOMPS Maintenance Task Sheet

Sub-Sea Hose Change

BMs

Unit	Sub-Unit	Description	Completed / OK?
Sub Sea Hoses	Hoses	Co-ordinate planning of routine Sub-Sea hose change. Ensure risk assessments and procedures are reviewed.	
Sub Sea Hoses	Hoses	Oversight of the arrangements for supply of all equipment required to carry out planned operations.	
Sub Sea Hoses	Hoses	Arrange for safe preparation and isolation of Sub-Sea hose system and Sealine prior to commencement of Sub-Sea hose change	
Sub Sea Hoses	Hoses	Arrange for safe preparation and de-isolation of Sub-Sea hose system and Sealine on completion of Sub-Sea hose change.	

SHII

Unit	Sub-Unit	Description	OK?
Sub Sea Hoses	Hoses	Carry out Sub-Sea hose change.	
Workboats	General	Carry out preparation of workboats to carry out replacement of Sub-Sea hoses, including preparation of diving equipment, four-point mooring and auxilliary hydraulic equipment.	
Workboats	General	De-mobilise workboats following on from Sub-Sea hose change.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Grease 365

BMs

OK?

Monobuoy Main Bearing	Bearing	Check bearing drains (6 of) are clear.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

BM 365

BMs

OK?

Corrosion Inhibitor Skid	General	Inspect mechanical condition of skid for damage and corrosion. Arrange for repairs as required.	
Corrosion Inhibitor Skid	General	Arrange for testing of skid as required.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Rail Hose Rig 183a

SHII

OK?

Floating Hose String	Rail Hose Rigs	Hose Lifting Rigs to be changed out very six months and returned to competent authority for refurbishment. After refurbishment and certification by a competent authority under LOLER regulations spare units should be stored on SHII ready for use.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Rail Hose Rig 183b

SHII

OK?

Floating Hose String	Rail Hose Rigs	Hang-off chains to be renewed. Replaced units to be returned to Hammond and Taylor for refurbishment.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Fire Extinguisher Maintenance

SHII

OK?

Unit	Sub-Unit	Description
Turntable	Fire Extinguishers	Test and recharge Monobuoy fire extinguishers as necessary.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Lift 365b

SHII

OK?

Unit	Sub-Unit	Description	OK?
Winch	General	Monobuoy winch and wire to be Inspected and certified by a competent person under LOLER regulations.	
Crane	General	Monobuoy crane and wire to be Inspected and certified by a competent person under LOLER regulations.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Rail Hose Rig 365b

SHII

OK?

Floating Hose String	Rail Hose Rigs	Kuplex clutches to be renewed. Replaced units to be returned to Hammond and Taylor for refurbishment.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Rope 365b

BMs

OK?

Support Float	General	Thorough inspection for damage, and renew connecting chain and shackles.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

MBC 365

GT

OK?

Unit	Sub-Unit	Description
Floating Hose String	Marine Breakaway Couplings	Carry out Annual Inspection of one MBC. Alternate yearly. Unit to be stripped down, inspected and refurbished as required.

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Leak 92

Divers

OK?

Unit	Sub-Unit	Description	
Leak Detection System	General	Carry out integrity test on sub-sea hose leak detection umbilicals.	
Leak Detection System	General	Test telemetry alarm function on the leak detection system for the sub-sea hoses.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Poll 183

BMs

OK?

Unit	Sub-Unit	Description	OK?
Emergency Spill Trailers	Spill Trailer 1	Revalidate DADS certification for Pollution Equipment Trailers	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Instrument 365

Electrical

OK?

Unit	Sub-Unit	Description	OK?
Pressure and Temperature Sensors	General	Annual calibration PPM done on temperature and pressure sensors.	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

BM 90

BMs

OK?

Unit	Sub-Unit	Description	OK?
Hose Connection Box	General	Visual Inspection of all hand tools	
Hose Connection Box	General	Inspection of long handled ring spanners to include audible "tap" test	
Hose Connection Box	General	Inspection of ratchet spanner(s) should include function testing of the ratchet mechanism and lubrication	
Hose Connection Box	General	Annual replacement of spanners to be carried out in first quarter	

Remarks

EOMPS Maintenance Task Sheet

Unit	Sub-Unit	Description	Completed

Seabed Survey

BMs

OK?

Seabed	General	Arrange for survey of seabed within the Tetney Harbour Area by suitably qualified and authorised contractors

Remarks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1201 ELM STREET, SUITE 500
DALLAS, TEXAS 75270

February 20, 2020

Mr. David Farris, Vice President
Bluewater Texas Terminals, LLC
2331 CityWest Blvd.
Houston, TX 77042

RE: Completeness Determination of Clean Air Act (CAA) Section 112(g) Case-by-Case MACT Determination Application and Prevention of Significant Deterioration (PSD) Permit Application for the Bluewater Texas Terminals, LLC (BWTX) Deepwater Port (DWP).

Dear Mr. Farris:

The United States Environmental Protection Agency (EPA) received the CAA applications referenced above for the BWTX proposed DWP project on May 31, 2019. The applications are for the offshore portion of the proposed crude oil export project to be located in federal waters off the coastline of San Patricio County, Texas. After our initial review of the applications, we sent notifications that the applications were incomplete on June 28, 2019 for the PSD application, and on July 19, 2019 for the 112(g) application. Based on our review of your responses and supplemental information received from July 31, 2019 to date, we have determined these applications are administratively complete. Even though your applications are being deemed complete, in the course of developing a prospective approval decision on the 112(g) application and a proposed PSD permit, we may identify further technical information that will be essential to enable us to continue processing the applications and make a permit decision. This may include additional information that we believe may be needed to respond to public comments.

We will begin developing a proposed determination on the issuance of a PSD permit and a Notice of MACT Approval (NOMA). EPA is required to comply with public notice and opportunity for public hearing requirements for any proposed action on the applications. In addition, documents important to the proposed determination, such as the draft permit, will be made available for review by the public during the public comment period. EPA will consider and respond to all significant comments in making the final decision on the application and keep a record of the persons commenting and the issues being raised during the public participation process. Also, be aware that if any supporting information substantially changes the original scope of the application or supplements received from BWTX, an amendment or new application may be required.

As discussed on November 6, 2019 when BWTX representatives met with EPA staff in the Region 6 offices, EPA will need a revised title V application for the proposed DWP project. The title V application should be a stand-alone document rather than merely referencing the PSD application, as articulated in my e-mail on February 6, 2020, and my follow-up discussion with Mr. Shanon DiSorbo on February 7, 2020. The application must contain all the required elements identified in 40 CFR § 71.5.

Upon receipt of a revised title V application, we will continue our completeness review and will issue a completeness determination based upon our evaluation of all information provided for your title V application at that time.

Finally, EPA may also use its best judgement to develop a recommended permit action for BWTX which may include our own analysis of information in the applications, based upon technology and sector information available at the time of a proposed permit action. If you have any questions, please feel free to contact me at (214) 665-6772, or Aimee Wilson of my staff at (214) 665-7596.

2/20/2020

X Cynthia J. Kaleri

Cynthia J. Kaleri
Chief, Air Permits Section
Signed by: CYNTHIA KALERI

Appendix B. Cost Effectiveness Calculation for Vapor Combustor System (Offshore Platform)

Item	Description	Basis	Estimation Factor	Item Cost
Capital Costs				
Direct Costs				
1	VCU and Associated Equipment			$ 37,142,400.00
2	Instrumentation	APCCM Chap. 3.2, Sec. 2, Tbl. 2.10 ("Tbl 2.10")	10%	$ 3,714,240.00
3	Sales Tax		6.25%	$ 2,321,400.00
4	Freight		6%	$ 2,228,544.00
5	Total Purchased Equipment Cost (PEC)	Sum of Items 1–4		$ 45,406,584.00
6	Foundations (structure reinforcement)	Tbl 2.10	8 % of PEC	$ 3,632,526.72
7	Handling and Erection	Tbl 2.10	14 % of PEC	$ 6,356,921.76
8	Electrical	Tbl 2.10	4 % of PEC	$ 1,816,263.36
9	Piping	Tbl 2.10	2 % of PEC	$ 908,131.68
10	Instrumentation	Tbl 2.10	1 % of PEC	$ 454,065.84
11	Painting	Tbl 2.10	1 % of PEC	$ 454,065.84
12	Direct Installation Costs	Sum of Items 6–11		$ 13,621,975.20
13	Platform	Platform buy & build		$ 191,000,000.00
14	Vapor Handling	Floating & subsea hoses, buoy & PLEM mods for vapor, subsea vapor pipelines		$ 22,000,000.00
15	Total Direct Costs (TDC)	Sum of Items 5,12–14		$ 272,028,559.20
Indirect Costs				
17	Engineering		12.25% of TDC	$ 33,323,498.50
18	Construction and Field Expenses		8% of TDC	$ 21,762,284.74
19	Contractor fees	Tbl 2.10	10% of TDC	$ 27,202,855.92
20	Start-up	Tbl 2.10	2% of TDC	$ 5,440,571.18
21	Performance Test	Tbl 2.10	1% of TDC	$ 2,720,285.59
22	Total Indirect Costs (TIC)	Sum of Items 17–21		$ 90,449,495.93
23	Contingencies	Tbl 2.10, CF = 0.4 for non-mature technology (cf. APCCM Ch. 2 § 2.6.4)	40% of (TDC+TIC)	$ 108,811,424.08
24	Total Capital Investment (TCI)	Sum of Items 15,22		$ 471,289,479.21
Annual Costs				
Direct Costs				
27	Raw Materials			$ -
28	Utilities	Fuel Gas (VCU), diesel (generators), water (potable), etc. (Scaled by % availability)		$ 88,565,117.86
29	Maintenance		10% of TDC	$ 27,202,855.92
30	Subtotal (Lines 27–29)			$ 115,767,973.78
31	Opex Related to Platform & Vapor Recovery System	Salaries, Helicopter, Support Vessels, lease for additional submerged land, etc.		$ 28,403,350.00
32	Demurrage Fees			$ 5,950,714.00
33	Reliability Services	$0.75/Bbl service fee	53.8% on-stream	$ 133,095,213.65
34	Total Direct Annual Costs	Sum of Items 30–33		$ 283,217,251.43
Indirect Costs				
36	Property Taxes	No state taxation per OCSLA 1333	0% of TCI	$ -
37	Insurance and Administrative Charges	3% of TCI (PCCM sec. 2.5.5.8).	3% of TCI	$ 14,138,684.38
38	Capital Recovery	CRF based on i=0.0425 and n=20 yrs (APCCM sec. 1.5.2)	7.52% of TCI	$ 35,450,316.77
39	Total Indirect Annual Costs			$ 49,589,001.15
Recovery Credits				
41	Materials			$ -
42	Energy			$ -
Totals				
44	Total Annualized Costs	Sum Items 34,39		$ 332,806,252.58
Cost Effectiveness				
46	Baseline VOC Emission Rate			18936 tpy
47	VOC Emission Rate (Alternative)	Control during periods of system availability.	95.0 % reduction	9260 tpy
48	VOC Emissions Reduction			9676 tpy
49	Cost Effectiveness (VOC)	Item 44 / Item 48		**$34,396.27 per ton**

Second Supplement to PSD BACT Analysis (Control Option 3)

This supplement provides additional information and analysis related to Steps 1–4 of the top-down BACT analysis. The purpose of this supplement is to provide additional considerations for elimination of Control Option 3 at Steps 1, 2, and 4. This supplement focuses on two alternatives previously referred to as Options 3 and 7. Previously submitted information[1] is briefly summarized here, rather than being restated in full. BWTX intends to submit a restated PSD application prior to publication of a draft permit and Statement of Basis (SOB) for the project.

Summary of Options 3 and 7

Table 1—Control Options 3 and 7

Alt. No.	Summary of Alternative	Assumed Level of Control
3	Third-party process technology. Vapor Combustor (Vapor recovery pipeline and PLEM to offshore platform).	95%
7	Phillips 66 process technology. Work practice standard (submerged fill and best management practices)	60%

Option 3 consists of modifications to the CALM buoy-based[2] marine loading facility as shown in Figure 1 (below): First, the floating product transfer hose is accompanied by a floating vapor recovery hose which conveys loading vapors from the loaded tanker back to the CALM buoy. Second, the CALM buoy is modified to accept a connection from the floating vapor hose. Third, an additional under-buoy vapor hose carries loading vapors from the modified CALM buoy to the pipeline end manifold (PLEM), which is also modified to accept incoming vapors. Fourth, a pair of vapor pipelines are constructed which run along the seabed from the PLEM to the base of an offshore platform; Fifth, an offshore platform is constructed; Sixth, a vapor riser (i.e., vertical pipeline) carries loading vapors from the subsea vapor pipeline to the platform deck. Seventh, a system consisting of one or more vapor combustors (VCUs), a dock safety skid, enrichment, inerting and fuel delivery facilities is constructed on the platform for destruction of VOC in the loading vapors. Eighth, pig traps are installed on the offshore platform to permit round-trip pigging of the paired subsea vapor pipelines, along with supplies of liquefied nitrogen to provide motive force for the pigs. Such a system for capturing and controlling VOC emissions in loading vapors has been described in a PSD permit application,[3] and has been further analyzed in a separate case-by-case MACT application,[4] but to BWTX's knowledge has not been constructed or demonstrated at any source.

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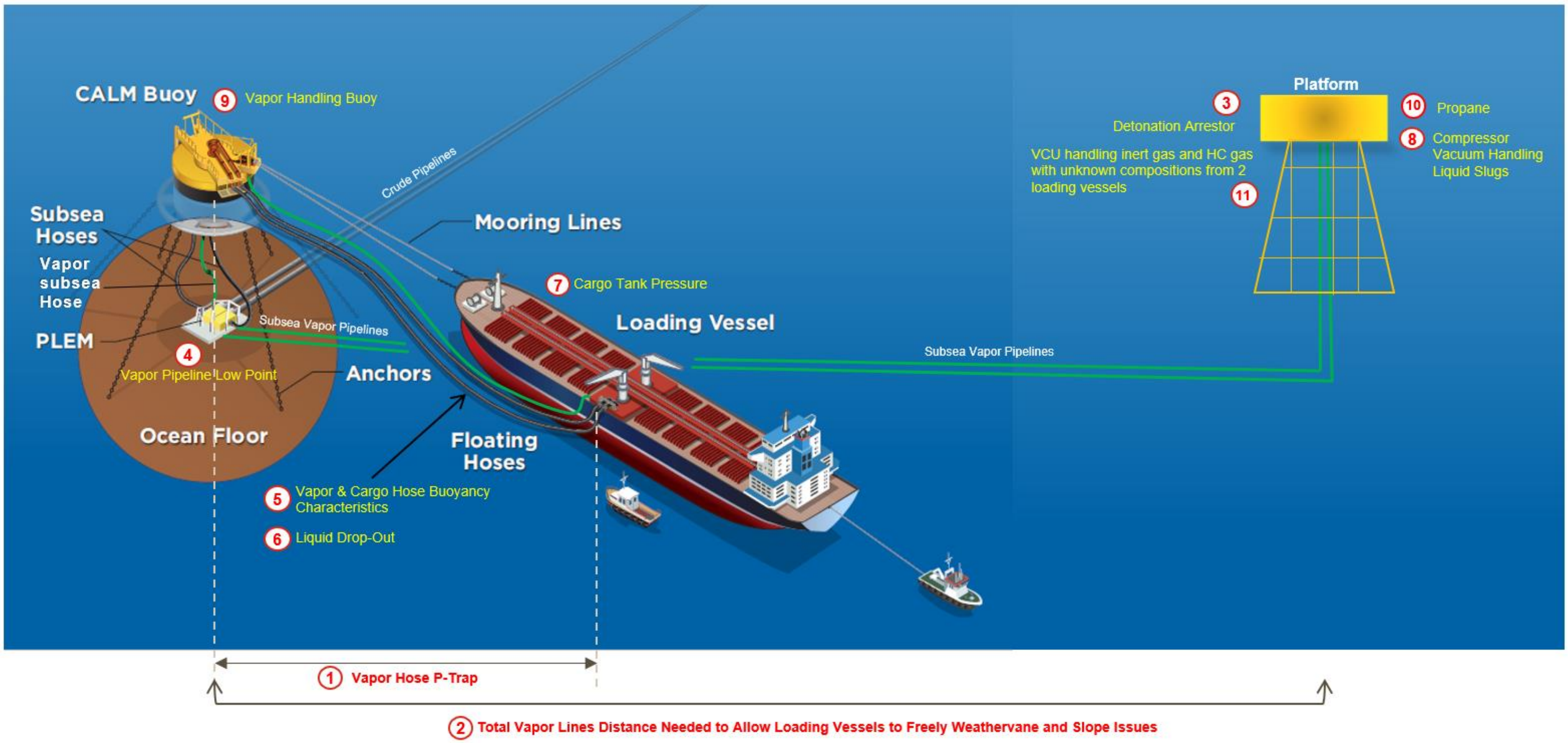
[1] BWTX Submission dated March 27, 2020.

[2] As noted in BWTX's § 112(g) application, a catenary anchor leg mooring (CALM) buoy is a specific type of single point mooring (SPM) buoy which is affixed to the sea bed using catenary anchors.

[3] EPA Region 6. Statement of Basis. Draft Prevention of Significant Deterioration Preconstruction Permit and Title V Operating Permit for SPOT Terminal Services LLC (henceforth "SPOT SOB"). Docket item EPA-R06-OAR-2019-0576-0003.

[4] *Texas Gulflink Project. EPA Notice of Intent Response Letter*. Jun. 21, 2020. Docket item MARAD-2019-0093-0080.

Figure 1— Depiction of Option 3



Option 7 consists of the work practice standard described in BWTX's May 1, 2020, submission (restated § 112(g) application). Vessels calling at the facility are limited to those employing bottom fill and those possessing and implementing a VOC management plan. Transfer operations are conducted using Phillips 66 process technology, following standard operating procedures to minimize the generation of VOC vapors during loading. Each part of the transfer system not necessary for the transfer of oil is blanked off.

Step 1— Identify Alternative Emission Control Techniques

At step 1 of the analysis, control technologies with potential applicability to the source are considered. Potentially applicable technologies are those which have been demonstrated for the same source category, as well as transferable technologies which have been demonstrated for a similar source category.[5] Candidate technologies are identified from a variety of sources, including the RBLC database, recently-issued permits, control guidelines issued by state and local pollution control agencies, technical journals, and equipment vendors. An applicant may optionally consider innovative technologies[6] at step 1, but is not required to do so. Additionally, proposed control options may include inherently lower polluting processes/practices, so long as they do not impermissibly "redefine" the proposed facility.[7] Procedures for determining whether a proposed process modification would constitute source redefinition are primarily described in decisions of the EPA Environmental Appeals Board (EAB) and of several of the U.S. Courts of Appeals.

The control system has no demonstrated application at any source

As noted in BWTX's March 27, 2020, submission to EPA, a control system consisting of a vapor combustion unit housed on an offshore platform has been identified from a draft PSD permit and Environmental Impact statement for a proposed Deepwater Port.[8] Based on a comprehensive review of VOC control technologies for onshore, nearshore, and offshore crude oil loading operations documented in its submissions of March 27, 2020, and May 1, 2020, BWTX has not been able to identify any case where such a control system has been actually constructed or demonstrated. Following EPA guidance, a technology must be both demonstrated and potentially applicable for inclusion at step 1: "An applicant should be able to purchase or construct a process or control device that has already been demonstrated in practice."[9] Option 3 has not been demonstrated, and should be eliminated at step 1 on these grounds.

Facility and operational modifications to accommodate the control system would "redefine" the source

An alternative argument for elimination of Option 3 at step 1 is to hypothesize that BWTX could develop and deploy a vapor capture and control system that has not been demonstrated at a source with a pollutant-bearing stream with similar physical and chemical characteristics. In such a case, modifications to the design or operation of the proposed facility that would "redefine the source" could not be required as BACT.

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[5] NSR Workshop Manual at B.11.
[6] 40 CFR § 52.21(b)(19).
[7] NSR Workshop Manual at B.13–B.14.
[8] Maritime Administration. *Draft Environmental Impact Statement: Sea Port Oil Terminal Deepwater Port Project.* Feb. 2020. Docket item MARAD-2019-0011-0036.
[9] NSR Workshop Manual at B.11.

The United States Court of Appeals for the Ninth Circuit has summarized the EPA's two-part test for determining when the evaluation of a control technology veers into an illegitimate redefinition of the source proposed by the permit applicant.

> First, "the permit applicant initiates the process and . . . defines the proposed facility's end, object, aim or purpose—that is the facility's basic design." The purpose must be "objectively discernable." Additionally, the applicant's proposed definition "must be for reasons independent of air permitting" and cannot be motivated by cost savings or avoidance of risks. Second, EPA takes a "hard look" at the proposed definition to determine which design elements are inherent to the applicant's purpose and which elements can be changed to reduce pollutant emissions without disrupting the applicant's basic business purpose.

Helping Hands Tools v. Envtl. Prot. Agency, 848 F.3d 1185, 1194 (9th Cir. 2016) (citations omitted).[10]

As documented in earlier submissions, BWTX's basic, objectively discernable business purposes include the following:

1. Export up to 384 MMBbl/yr of crude oil via deep draft tankers.
2. Reliably and continuously complete a loading operation for tankers in the VLCC size range which call at the port.
3. Access crude oil supplies from onshore pipeline networks terminating in the Corpus Christi, TX area.
4. Provide an export solution for deep draft tanker loading which avoids safety and environmental hazards occasioned by onshore facilities and reverse lightering.
5. Employ Phillips 66 technology, operational experience, know-how and other intellectual property.

Business purposes 1, 2, and 4 would be disrupted if an offshore platform-based vapor management system were selected as BACT. This is because the undemonstrated control system (including the vapor capture system) cannot be presumed to operate reliably. Indeed, BWTX has estimated that the vapor control system will result in the unavailability of crude loading services for nearly half of the time. *See* Attachment A. Such a significant reduction in crude loading availability/reliability would disrupt the basic business purpose of loading up to 384 MMBbl/yr.[11] Furthermore, building a full-time manned platform to support a VOC control system would frustrate one fundamental motivation to the project design, which is to locate control systems and personnel onshore. As noted in prior submission, this aspect of the project draws on technology, operational experience, and know-how developed by Phillips 66 in operating an SPM facility in the United Kingdom (business purpose 5).

Solutions to the crude loading availability/reliability problem would themselves disrupt other elements of project's basic business purpose. For example, making up lost throughput through

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[10] *Accord Sierra Club v. Envtl. Prot. Agency*, 499 F.3d 653, 655 (7th Cir. 2007) (allowing the permitting authority to exclude "redesign" of the proposed source from the control technology review). *See also Friends of Buckingham v. State Air Pollution Control Bd.*, 947 F.3d 68, 73 (4th Cir. 2020) (describing the EPA's development of the two-part redefining the source principle to resolve an ambiguity in the Act as it applies to major NSR permitting).

[11] *See, e.g.*, *In re City of Palmdale*, PSD App. No. 11-07, 2012 WL 4320533 (Envtl. App. Bd., Sep. 17, 2012) (holding that substitution of solar energy for thermal energy at a proposed power plant would redefine the source by undermining the reliability of the plant to deliver a certain amount of electricity).

reverse lightering (i.e., using lightering vessels to load VLCC-size tankers while the vapor control system is off-line) would disrupt the basic business purpose of deepwater crude loading *instead of* lightering.

Step 2— Technical Feasibility Analysis

While BWTX believes that there exists ample evidence in the administrative record to support elimination of Option 3 at Step 1, EPA may decide to require consideration of a design change. In such a case, an alternative argument is that Option 3 is not technically feasible. <u>Because this option can only be advanced past Step 1 by assuming a redesign of the facility, elements of the redesign (viz., platform-based control system) are treated as part of the hypothetical control alternative for purposes of Step 2</u>.

A control technology is considered to be technically feasible if it is both commercially available and applicable to the proposed source. A control technology is deemed to be "available" it if has been previously licensed or otherwise commercially demonstrated. A control technology is "applicable" to a proposed source if there are no physical or chemical characteristics of the emission stream that would prevent application of the technology. If a commercially available control technology is specified in an issued permit for the same or similar source type, this creates the presumption that it is applicable.[12]

The control system is not available

As noted above, to BWTX's knowledge a control system consisting of a capture system which collects crude oil loading vapors from a single point mooring buoy and processes them using a control device located on an offshore platform has not been demonstrated on any source in practice. While each of the component parts (loading via mooring buoy, subsea pipelines, vapor combustor, offshore platform) has established application, integrating them together into an overall control system is a novel technique. It requires the solution to various engineering problems, including the redesign of system components to handle vapors (described in BWTX's March 27, 2020, submission), that would entail extended time delays and resource penalties of the sort that EPA's permitting guidance does not require.[13] As BWTX and its affiliates have no operational expertise in constructing or operating a manned, offshore platform, such time delays and resource penalties would be especially pronounced.

BWTX recognizes that a control system corresponding to Option 3 has been described in a general way in a pending Deepwater Port License application for a competitor. In order for BWTX to emulate this design, it would require access to detailed engineering plans, engineering contractors, know-how and other intellectual property belonging to a competitor. "[W]hile inherently lower-polluting processes should be considered during the BACT selection process, and there must be serious consideration of pollution control designs for other facilities that are a matter of public record, the permit applicant does not have an obligation to pursue its competitors' trade secrets."[14] Even assuming that the design described by SPOT Terminal Services will eventually be put successfully

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[12] NSR Workshop Manual at B.17–B.18.
[13] Cf. id.
[14] *In re Knauf Fiber Glass, GMBH*. PSD App. Nos. 99-8–99-72, 2000 WL 291422 (Envtl. App. Bd., Mar. 14, 2000).

into practice, it currently represents a process technology belonging to a third party, which is not at the licensing and commercial sales stage, and is not “available” in the context of EPA Guidance.[15]

The control system is not applicable

Evaluation of whether a control system is “applicable” assumes that the control system has been previously found to be “available.”[16] To assume otherwise would make assessments of applicability largely conjectural: permit applicants and reviewing authorities would be tasked with predicting which physical or chemical aspects of a pollutant stream would create incompatibilities for a system having no established operation for *any* pollutant stream. Thus, in BWTX’s case, the physical and chemical characteristics of the pollutant gas stream do not bear comparison to the gas stream characteristics of the “source types to which the technology has been applied previously,”[17] for the simple fact that the technology has not been applied previously. Notwithstanding, BWTX believes that there are sufficient grounds for concluding that Option 3 is not “applicable,” assuming that it were “available.”

Although a draft PSD permit has been published which specifies a control system corresponding to Option 3, and this fact creates the presumption of applicability,[18] BWTX believes that this presumption can be defeated. First, the presumption is grounded in certain assumptions about permit review processes. Generally, permits do not require application of a technology that is not commercially available. Yet applicants are permitted to propose innovative control technologies, and in practice have not been required to obtain a waiver under 40 CFR § 52.21(v) if they do not intend to benefit from the compliance schedule specified under that provision. Because the draft PSD permit in question specifies a control technology that was selected despite its lack of commercial availability and is therefore more like an innovative technology, its final issuance should not create a presumption of applicability.

As described at length in BWTX’s submission of March 27, 2020, the system would be susceptible to operability and safety concerns due to the presence of water vapor in the loading vapors,[19] the length of the vapor recovery pipeline, the narrow range of permissible operating pressures in the oil tanker, the need to frequently pig the vapor recovery pipeline, the need to supply assist gas for the vapor combustors, and the lack of space for placement of detonation arresters.[20]

The technology is neither available nor applicable, and cannot be treated as technically feasible.

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[15] BWTX additionally notes one order (*In the matter of: Pennsauken, New Jersey Recovery Facility*, PSD App. No. 88-8, 1988 WL 249035, Envtl. App. Bd., Nov. 10, 1988) remarking on the “evident willingness of [other] applicants to commence construction” of a facility employing a particular NO_X control technology as a consideration in favor of finding the technology to be “available”. Other facts mentioned in that opinion indicate that the standard of review was based on MSW-specific guidance predating the 1990 Workshop Manual, and that the technology in question had been demonstrated at one additional site. BWTX believes that there are no grounds for treating an undemonstrated, innovative technology as “available” based solely on a permit applicant’s willingness to propose it in a permit application.
[16] NSR Workbook at B.18.
[17] Id.
[18] Id.
[19] Since the exact composition of the “arrival component” of the loading vapors cannot be known, it is generally not possible to accurately estimate, or to operationally reduce, the amount of water vapor entering the emission stream.
[20] Several of the issues are examined in considerable detail in a recent filing for a separate action, which likewise arrived at a conclusion of non-applicability. *Texas Gulflink Project. EPA Notice of Intent Response Letter.* Jun. 21, 2020. Docket item MARAD-2019-0093-0080.

Step 4— Energy and Cost/Economic Impacts Analysis
Notwithstanding the arguments presented under Step 2, EPA may still wish to assume that Option 3 is technically feasible, notwithstanding technical impediments, the technology's lack of commercial availability and its lack of actual demonstration on any source. An alternative argument, therefore, is that Option 3 has unacceptable economic impacts and energy requirements. Before an economic analysis can be developed for Option 3, however, several issues with applying EPA guidance must be addressed.

- While EPA guidance normally requires the use of vendor-supplied design parameters, no vendors exist for the integrated control system.[21]
- While EPA guidance requires cost estimates with ± 30% accuracy, this cannot be achieved because the system has no demonstrated potential for controlling air emissions.[22]
- While EPA guidance generally requires adherence to the OAQPS Air Pollution Control Cost Manual ("APCCM"),[23] the manual itself states clearly that it is not intended for use with new and emerging technologies. [24]
- While EPA guidance requires comparison of the cost-effectiveness of an alternative to "levels experienced by other sources of the same type and pollutant,"[25] there exist no such sources to permit a comparison.
- Underlying EPA guidance on accounting for "lost production" or "foregone revenue" in certain, limited ways, is the assumption that the technology under consideration is mature and has established operational and maintenance requirements.[26] Such assumptions are not appropriate in the present case.

Several of these issues have been addressed by EPA in issuing PSD permits issued for Greenhouse Gases. For those permitting projects, there was a general inclination to conduct economic evaluations of Carbon Capture and Sequestration (CCS), notwithstanding the fact that the individual permitting records may have supported elimination of CCS at Step 1 or Step 2. EPA's actual practice in applying its 2011 GHG Guidance is therefore instructive for determining how to navigate the above issues. Furthermore, EPA Region 6 has recently stated that it intends to translate its 2011 GHG-specific BACT evaluation procedures to the evaluation of PSD applications for certain Deepwater Port facilities in the Gulf of Mexico.[27]

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[21] NSR Workshop Manual at B.32.
[22] Id. at B.35.
[23] NSR Workshop Manual at B.32 –B.35.
[24] APCCM at Chap. 1, p. 1-3 (6th ed.). ("Finally, new and emerging technologies are not generally within the scope of this Manual. The control devices included in this Manual are generally well established devices with a long track record of performance.")
[25] Id. at B.31.
[26] Cf. APCCM at Chap. 2, p. 2-29 (6th ed.), describing accounting for lost production due to unanticipated shutdowns during installation of the control system in retrofit scenarios ("The net revenue … lost during this anticipated shutdown period is a bonafide retrofit expense."). *Pace* NSR Workshop Manual at B.11 ("Lost production costs are not included in the cost estimate for a new or modified source."). Cf. also Allen Basala (EPA EAS) to Anthony Wayne (EPA R6), *Review of Valero Hydrocarbons BACT Analysis*. Dec. 14, 1988, noting that lost production is a redundant expense where the salary for a full-time technician is expensed ("We believe the case for maintenance problems and including lost production as an out-of-pocket expense is overstated."). The 2017 version of APCCM Chapter 2 presents similar guidelines, though phrased in a slightly different manner.
[27] SPOT SOB At 7,9. ("EPA proposes to follow the policies and practices reflected in EPA's *PSD and Title V Permitting Guidance for Greenhouse Gases* (March 2011) … The BACT analyses for this draft permit were

First, in view of the lack of publicly-available information about CCS applications, EPA has endorsed departure from the OAQPS Air Pollution Control Cost Manual, recognizing (as noted above) that use of the manual is not generally appropriate for new and emerging technologies, and that permit applicants have "sensibly utilized the best available information costs"[28] rather than adhering strictly to the APCCM, where doing so would run counter to EPA's primary objective of achieving consistency in decision making for BACT analyses.[29] Second, EPA has recognized that in the case of application of a "first-of-its-kind" technology which has not previously been effectively employed in the same source category, cost-effectiveness calculations are of limited usefulness. Since it is not possible to compare cost-effectiveness of a technology between different sources in the same category,[30] the more apt criterion is the cost of a control alternative relative to the total project cost.[31] Finally, EPA has found it appropriate to depart from the usual assumption that cost estimates be made with a ± 30% accuracy, permitting cost effectiveness calculations to be made "in a less detailed quantitative (or even qualitative) manner."[32] This last allowance is particularly necessary where a permit applicant must estimate the cost of fundamentally redefining its source, or the cost of delays, resource penalties, and foregone revenue associated with application of a non-commercially available technology.

Thus, BWTX believes that the best precedent for analyzing the economic impact of a control technology that has not been demonstrated in practice and does not currently exist at any scale is EPA's approach to CCS for GHG BACT determinations.

The capital and annual costs for a hypothetical vapor control system are set out in Attachment B. In this case, where the evaluated control technology has not been demonstrated in practice and is technically infeasible, it is indisputable that the cost-effectiveness calculation must include all the costs necessary to achieve the basic business purpose of the project. In particular, costs must include the cost of making up the lost availability of crude loading due to the unreliability of the unproven control system. As indicated above, it is appropriate to extend the range of circumstances where "lost production" or "foregone revenue" expenses may be accounted for, and BWTX has taken those costs into account in three ways. First, BWTX has calculated the cost of providing backup crude loading at $0.75/Bbl[33] through reverse lightering (Line 33). Second, BWTX has calculated the demurrage charges paid to vessel operators when loading operations extended beyond the contracted time interval (Line 32). Finally, BWTX has proportionately reduced the cost of utilities (Line 28) as well as the VOC emissions reduction achieved (Line 48) to reflect the reduced use of enrichment gas when the vapor control system is offline.

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conducted in accordance with EPA's [GHG-specific] guidance which outlines the steps for conducting a 'top-down' BACT analysis.").

[28] EPA Region 6. ExxonMobil Chemical Company Baytown Olefins Plant. PSD permit for GHG Emissions PSD-TX-102982-GHG. Responses to Public Comments. Nov. 25, 2013. at 19.

[29] Id.

[30] Cf. GHG Guidance at 43.

[31] *In re ExxonMobil Chemical Company (Baytown Olefins Plant)*, PSD App. No. 13-11, 2014 WL 1979510 (Envtl. App. Bd., May 14, 2014).

[32] GHG Guidance at 42.

[33] Spector, K. *Gulf of Mexico Congestion Risk: Sizing up the Capacity to Export US Crude via Very Large Crude Carriers (VLCCs)*. Columbia Univ. Center on Global Energy Policy. October 2018. At 4.

The analysis indicates an estimated total capital investment of $471 million for the control alternative, and an average cost effectiveness of $34,396/ton VOC removed.[34] These impacts are unacceptable for two reasons:

- First, the average cost effectiveness of Option 3 is above the range of values considered unacceptable by state permitting agencies, <u>even considering that cost effectiveness comparisons are intended to compare technically feasible control options with demonstrated application</u>. Surveyed cost effectiveness thresholds for ozone precursors (VOC and NO_X) used by state permitting authorities range from $8,000–$18,000 per ton of pollutant emissions removed.[35]
- Second, the capital cost of the control system is on the same order of magnitude as the capital cost for the project itself (approximately 50% of the project capital cost). <u>If selected, Option 3 would render the proposed project economically unviable</u>.

As noted in prior submissions, Option 3 also has undesirable energy and secondary environmental impacts. It would generate collateral pollutant emissions from combustion equipment located on the platform and from reverse lightering operations (which are uncontrolled), would cause adverse impacts to benthic organisms and seabed soils, and would increase the risk of marine casualty.

Option 3 has unacceptable energy, environmental, and economic impacts, and should be eliminated from consideration. Therefore, Option 7 is the remaining option and should be selected as BACT.

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[34] In this case the average cost effectiveness is the same as the incremental cost effectiveness. If Lines 28 and 48 are not scaled by the % on-stream time, the average cost effectiveness is $22,730/t.

[35] Recently attested average cost effectiveness values where control options have been *rejected* are $8,317/t NO_X (Louisiana DEQ permit PSD-LA-779M4); $10,124/t NO_X (Oklahoma DEQ permit 2017-1997-C); $13,000/t VOC (Louisiana DEQ permit PSD-LA-806); $11,000–$13,000/t VOC or NO_X (Massachusetts DEP generic thresholds); $17,920/t VOC (TCEQ permit 146824).

Attachment A— Determination of system availability/unavailability

Background on Reliability

The reliability of a system component, R(t),[1] is the probability that the component survives beyond time *t*. The failure rate, h(t), is the probability that a component surviving to time *t* will fail at that instant. R(t) and h(t) are related as follows:

$$h(t) = -\frac{d \ln R(t)}{dt}$$

When the failure rate is plotted against time, it has a "bathtub curve" shape for most real-world systems: the failure rate is high and variable at the start and end of the system's life, and is low and steady during the majority of the system's lifetime. A constant failure rate implies that failures are distributed exponentially. I.e.,

$$R(t) = e^{-\lambda t}$$

Where λ is the failure rate. The mean time between failures (MTBF), θ, is related to the system reliability, and is equal to the inverse of the failure rate. The reliability is 50% when t=θ.

$$\theta = \int_0^\infty R(t)dt = \int_0^\infty e^{-\lambda t} dt = \frac{1}{\lambda}$$

The failure rate for a complete system of *N* components is modeled from individual component failure rates using a series model, where:

$$R_{\text{sys}}(t) = \prod_{i=1}^{N} R_i(t); \qquad \lambda_{\text{sys}} = \sum_{i=1}^{N} \lambda_i$$

The series model is appropriate for systems consisting of a number of components, such that an individual "failure"[2] results in system down-time.

Estimating the Reliability of Option 3

The failure rate of the control system under consideration is estimated using a series model. The failure rates of individual components are estimated from the OREDA, a published database of actual failure rates for components in the offshore oil & gas industry.[3]

Control system components shown in Table 1 are mapped on to components for which published failure rates are given by OREDA as follows (in order of decreasing failure rate):

[1] Concepts discussed are presented in a similar way in most standard texts on reliability engineering. For example, Smith, D.J. 2005. Reliability, Maintainability and Risk: Practical Methods for Engineers (7th ed.). Amsterdam: Elsevier. (Ch. 2). Also, NIST/SEMATECH e-Handbook of Statistical Methods. https://doi.org/10.18434/M32189 (Ch. 8).
[2] "Failure" is defined broadly to refer to any event resulting in down-time.
[3] OREDA. Offshore Reliability Data Handbook (4th ed.). 2002. Høvik: Det Norsk Veritas.

Table 1 Estimated individual component failure rates

G/I	System Component	Surrogate OREDA Component	Mean λ ($\times 10^{-6}$ hr^{-1})
I	Platform main power	Diesel engine, main power	1686.5
G	Oily water treatment	Oily water pump, centrifugal	1554.5
G	Vapor hoses, vapor handling	Reciprocating compressors	1501.5
I	Oily water treatment	Oily water pump, rotary	1099.7
G	Vapor transport blower	Small, electric drive centrifugal compressor (blower)	1047.2
G	Oily water pigging	Small, electric drive centrifugal compressor (blower)	1047.2
I	Fire fighting	Diesel firepump	668.91
I	Vapor pipeline condensate handling	Condensate pumps	595.24
I	Oily water treatment	Separator	526.87
G	Vapor combustor	Direct HC fired heater	421.4
I	Oily water treatment	Vessels	255.91
I	System valves	Control and safety valves	190.63
G	Dock safety system	Diesel engine process shutdown system	190.48
I	Oily water surge tank	Surge tank	95.38
I	Vapor heating	Heating medium pump	92.14
I	System vales	Ball valve, ESD	90.03
I	Platform backup power	Emergency power diesel engine	79.15
I	System valves	Valves, ESD	78.29
I	Vapor pipeline condensate handling	Globe valves, condensate processing	78.1
I	System valves	Ball valves, bypass	27.2
G	Modified SPM/PLEM for vapor handling	Hydraulic power unit topside	13.866
I	Oily water treatment	Butterfly valve, oily water treatment	12.15
I	Platform H_2S detection	H_2S gas detectors	11.46
G	Vapor hoses, vapor handling	Sensors (subsea control system)	9.1973
I	Process sensors	Process sensors, Temperature	6.39
I	Process sensors	Process sensors, pressure	5.55
G	Vapor hoses, vapor handling	Static umbilical	4.4905
I	System valves	PSV, gas systems	3.35
I	Subsea vapor pipeline system	Subsea isolation system	3.0865
I	System valves	Butterfly valve, gas system	2.73
I	Platform fire detection	Fire and gas detectors	0.68
I	Subsea vapor pipeline	Subsea flowline	0.4346
I	Subsea vapor pipeline	Subsea control valve	0.0334

As noted above, a constant failure rate is appropriate for system components which have been broken in and are in good repair. Thus, OREDA λ values lead to a conservatively low estimate of total lifetime failure rate:

> *An important implication of the constant failure rate assumption is that an item is considered to be "as good as new" as long as it is functioning. All failures are purely chance failures and independent of the age of the item.*[4]

To obtain a conservatively *high* estimate of system failure rate for planning purposes, it is desired to estimate the 95% confidence upper-bound failure rate. The population of components surveyed in OREDA cannot be assumed to be normal,[5] so the following procedure, suggested by Smith, is used:[6]

[4] OREDA at 24.
[5] OREDA at 27–29.
[6] Smith, *op.cit.* at 46–48.

When published, industry-specific data are used, the failure rate predicted by the data is multiplied by a range factor, $Range_I$=5 to obtain a 95% confidence upper-bound failure rate for the eventual field failure rate. When generic data are used to make a prediction, a range factor of 8 is used instead. In case data from mixed sources are used, the composite range factor is:

$$\mathrm{Range} = \frac{\sum \lambda_I \times \mathrm{Range}_I + \sum \lambda_G \times \mathrm{Range}_G}{\sum \lambda_I + \sum \lambda_G}$$

Thus, the leftmost column in Table 1 indicates whether a system component of interest was judged to be similar enough to the OREDA surrogate component to warrant use of an “industry-specific” range factor (code “I”). Otherwise, a the range factor for generic data (code “G”) was used. Since several system components do not have any direct OREDA correspondent, use of a generic range factor likely underestimates the eventual field failure rate. For example, vapor hoses and underbuoy vapor hoses would have failure modes beyond those applying to the reciprocating compressor used to convey vapors through them.

Only those system components whose failure was judged to result in down-time for the control system as a whole were chosen, consistent with the use of a series model. For example, failure of a platform crane was not considered, since it is assumed that such a failure would not require loading operations to cease.

Results

Using the series model, the failure rate determined from OREDA data is 11399.8×10^{-6} hr^{-1}, and the calculated composite range factor is 6.524. The 95% upper-bound field failure rate is therefore estimated to be 74368.3×10^{-6} hr^{-1}, and the mean time between failures is θ = 13.45 hr.

The estimated value of θ implies that on average, a load can be conducted for 13.45 hr before a service interruption occurs. For a nominal 25 hr loading time, this implies that the fraction of the throughput that can be delivered before a service interruption occurs:

$$\frac{\theta}{25} = 53.8\%$$

The low predicted on-stream time of the control system follows from the fact that the system consists of a number of interdependent components. Though they may have a high reliability on an individual basis, they nevertheless form a system with low overall reliability.

PUBLIC NOTICE

Bluewater Texas Terminals, LLC
Deepwater Port (DWP)

ANNOUNCEMENT OF CLEAN AIR ACT MACT 112(g) DETERMINATION (NOMA), DRAFT PREVENTION OF SIGNIFICANT DETERIORATION PRECONSTRUCTION PERMIT, DRAFT TITLE V FEDERAL OPERATING PERMIT, AND PUBLIC HEARING

Permit Numbers: R6PSD-DWP-GM8, R6T5-DWP-GM8, and R6NOMA-DWP-GM8

Public Comment Period: November 12, 2020 to December 11, 2020

The United States Environmental Protection Agency (EPA) provides notice of and requests public comments on EPA's proposed permit actions relating to Clean Air Act (CAA) applications for a 112(g) Maximum Achievable Control Technology (MACT) Determination, Prevention of Significant Deterioration (PSD) preconstruction permit, and a title V federal operating permit for the Bluewater Texas Terminals, LLC (BWTX) Deepwater Port (DWP). EPA is also providing notice of plans for holding a public hearing, if requested for the permit actions. If finalized, the proposed permits would regulate air pollutant emissions associated with the project to construct and operate a new DWP export terminal for domestically produced crude oil located in the federal waters of the Gulf of Mexico.

The BWTX DWP is planned to be located approximately 15 nautical miles off the coast of San Jose Island (Aransas County, Texas) at Latitude: 27° 53' 21.70" North, and Longitude: 96° 39' 4.16" West. The BWTX DWP will have two Single Point Mooring (SPM) buoy systems that are remotely controlled and designed to moor Very Large Crude Carrier (VLCC)-sized vessels. The BWTX DWP project will include approximately 27 miles of two new parallel 30-inch diameter crude oil pipelines, which terminate at the two offshore SPM buoy systems. Each SPM buoy system is planned to be positioned in water depths of approximately 89 feet and will consist of a Pipeline End Manifold (PLEM), Catenary Anchor Leg Mooring (CALM) buoy, and other associated equipment. The only sources of air emissions are from marine loading operations and SPM fugitive emissions at the BWTX DWP.

Based on BWTX's proposed project design, the DWP would allow for a single VLCC or other crude oil carrier to moor at each of the two SPM buoys at the same time. Therefore, BWTX's marine loading operations are limited to a maximum of 384,000,000 barrels per year (bbl/yr), based upon a 12-month rolling total basis and the maximum loading rate for vessels being loaded at any time is limited to 80,000 barrels per hour (bbl/hr) regardless if one or both SPM buoys are operating at the same time. The marine loading operations are limited to crude oil, and the product shall not exceed a True Vapor Pressure (TVP) of 11 psia at 100^{o} F.

Company Mailing Address: Bluewater Texas Terminal, LLC
2331 City West Blvd.
Houston, TX 77042

Proposed PSD Preconstruction Permit: Under the provisions of 40 CFR § 52.21, the BWTX DWP Terminal application provided the following facility-wide emission estimates that exceed the PSD review thresholds for criteria pollutants: 18,936 tons per year (tpy) Volatile Organic Compounds (VOC) and 833 tpy Hazardous Air Pollutants (HAP). Therefore, the BWTX DWP Terminal is subject to PSD requirements, whereby the PSD permit will limit emissions of each of these identified pollutants.

Proposed Title V Federal Operating Permit: In accordance with 40 CFR part 71, BWTX is a major stationary source and is subject to federal operating permit requirements. BWTX's proposed project is a title V major stationary source with estimated emissions of 18,936.25 tpy VOC and 833.18 tpy HAP. The title V federal operating permit will authorize the operation of BWTX's offshore DWP export terminal as representing in the supporting administrative record.

Section 112(g) of the CAA and the National Emission Standards for Hazardous Air Pollutants (NESHAP): EPA is providing Notice of MACT Approval (NOMA) for BWTX's application for a case-by-case MACT determination. BWTX's NOMA includes requirements for the use of submerged fill loading to control HAP emissions from the proposed BWTX SPM buoy system. Facility-specific requirements in the NOMA are included as specific terms and conditions in the title V permit.

Permit Documents: Starting on *November 12, 2020*, members of the public may review EPA's administrative record for the permit actions, which includes the following: proposed permits, statement of basis, permit applications, and additional data and supporting documentation used in the development of the proposed permits. Comments received from the public, other government agencies, and the applicant during the public comment period will also become part of the administrative record if the permits are finalized. All documents may be viewed online by visiting https://www.regulations.gov. Once at the Regulations.gov website, search and view all permit documents by entering the docket number **EPA-R06-OAR-2020-0510** into the search box.

How to Comment: An interested individual may submit written comments on EPA's proposed air permitting actions for the BWTX DWP by accessing the website listed above and following the online instructions for posting a comment. Each comment must specify if the comment is related to the PSD preconstruction permit, the title V operating permit, or the 112(g) NOMA. All comments must be posted to the Regulations.gov website under docket **EPA-R06-OAR-2020-0510** by the end of the public comment period on *December 11, 2020*.

EPA will consider and respond to all significant comments in making a final decision regarding each proposed permit action. Similar comments may be grouped together in EPA's response to comments, but EPA will not respond to individual commenters directly. However, all comments will be included in the administrative record without change, and may be available to the public, including any personal information provided, unless the comment includes Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Therefore, please clearly label CBI or other protected information as such. *Please note that an email or postal address must be provided with your comments if you wish to receive responses to comments submitted during the public comment period and direct notification of EPA's final decision regarding the initial and proposed actions.*

Also, if a request for an extension adequately demonstrates why additional time is required to prepare comments, a 30-day extension of the comment period may be granted.

Public Hearing: You have the right to request a public hearing on the proposed permit actions. Any request for a public hearing must be received by EPA ***before November 27, 2020***, and must state the nature of the issues proposed to be raised in the hearing for each permit action. Any request for a public hearing should be provided to EPA by posting a request on the Regulations.gov website listed above under Docket ID **EPA-R06-OAR-2020-0510**. Please note attendance/participation at a public hearing is not required in order to submit written comments.

If a public hearing is held, the public comment period shall *automatically be extended to the close of the public hearing date*. EPA retains the right to cancel the scheduled public hearing if no request for a public hearing is received *by November 27, 2020*, or if EPA determines that there is not a significant interest. If EPA cancels the public hearing, notification of the cancellation will be posted by November 30, 2020 on the Regulations.gov website listed above and also on EPA's website at https://www.epa.gov/publicnotices/notices-search/location/Texas.

> **Special Circumstances - *Virtual* Public Hearing**: *Due to the declaration of a national emergency, EPA has decided to deviate from its typical processes regarding public hearings. Upon receiving recommendations provided by the Centers for Disease Control and Prevention (CDC) in addition to the implementation of social distancing orders to limit the spread of COVID-19, EPA will not be providing an* ***in-person public hearing****, but instead has planned to provide a* ***virtual public hearing*** if a public hearing is held. Due to the logistics involved in planning a virtual meeting, a pre-registration period will be necessary and will last from December 3, 2020 until December 17, 2020. Pre-registration will offer multiple two-hour intervals throughout the day planned for holding the virtual public hearing for those wanting to participate.

If EPA determines that there is significant public interest in either permit action, a ***virtual public hearing*** will be held on **January 5, 2021**, and **January 6, 2021** (second day depending on the number of interested parties who pre-register). EPA will decide on interest and provide access to pre-register with detailed instructions for the ***virtual public hearing*** on our public notice website at https://www.epa.gov/publicnotices/notices-search/location/Texas by December 3, 2020. Depending on the registrations received, EPA may consolidate the multiple two-hour time periods into fewer periods or fewer periods of slightly longer duration, in order to accommodate all those interested in participating. *EPA will send verification by e-mail to all participants who register to inform them of the order of speakers registered and approximate times for speakers registered during the public hearing*.

Final Determination: A final decision to issue or to deny a permit shall be made after all comments have been considered. Notice of the final decision shall be sent to each person who has submitted comments or requested notice of the final permit decision, provided the EPA has adequate contact information.

From:	Kaspar, Paul
To:	Thompson, Ashley
Cc:	Perera, Melissa E CIV; Gocke, Kelsey
Subject:	RE: Bluewater SPM Project- Draft Habitat Restoration Plan
Date:	Wednesday, June 2, 2021 3:45:38 PM
Attachments:	image001.png image003.png

EXTERNAL EMAIL

Ashley,

Thank you for coordinating the draft Habitat Restoration Plan for inclusion in the Bluewater Texas Terminal DEIS documentation, the EPA Wetlands Program has performed a cursory review from the CWA 404 perspective.

In general, the provided documentation should be sufficient to include the DEIS for the solicitation of agency and public input.

At this time, the following recommendations would be offered on the draft HRP:

Provide additional details as to how monitoring will be documented (photographic documentation, report format, report contents, etc.).

Include additional ecological success criteria for emergent wetlands. The current section on emergent wetlands refers to upland habitat. Consider emergent wetland specific criteria such as demonstrating wetland characteristics for soils, hydrology and vegetation; achieving at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction; and maintaining a specific percent cover threshold for invasive species (i.e., <10%) or a reference-threshold.

Paul Kaspar
Environmental Engineer
US. EPA - Region 6 (Houston Lab)
Water Division, NPDES/Wetlands Review Section (WDPN)
10625 Fallstone Road
Houston, TX 77099
Office: 214.665.7459
Fax: 281.983.2124
Email: kaspar.paul@epa.gov

From: Thompson, Ashley <Ashley_Thompson@golder.com>
Sent: Thursday, May 27, 2021 8:32 AM
To: Kaspar, Paul <kaspar.paul@epa.gov>
Cc: Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Gocke, Kelsey <Kelsey_Gocke@golder.com>

Subject: Bluewater SPM Project- Draft Habitat Restoration Plan

Good Morning Paul,

Please see the attached Draft Habitat Restoration Plan provided by the applicant for the Bluewater SPM Project. Can you please review and provide feedback as to whether this is sufficient to include with the DEIS?

Thank you and please let us know if you have any questions.

Ashley Thompson
Senior Biologist

Golder Associates Inc.
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LinkedIn | Instagram | Facebook | Twitter

Work Safe, Home Safe

From: Ehrhart, Jonathan <ehrhart.jonathan@epa.gov>
Sent: Tuesday, June 8, 2021 2:16 PM
To: Mohammad, Sal <Sal_Mohammad@golder.com>
Cc: Wilson, Aimee <Wilson.Aimee@epa.gov>
Subject: BWTX Draft EIS Emissions

EXTERNAL EMAIL

Hi Sal,

Per our conversation yesterday, can you send me a copy of your calculation spreadsheet for VLCC loading fugitives? Looking through the DEIS, the emission estimates are based on an earlier application submittal from BWTX on July 31, 2019. Our proposed permit is based on the emission calculations submitted by BWTX on September 15, 2020 (attached).

Thank you,

Jon Ehrhart | Physical Scientist
U.S. Environmental Protection Agency, Region 6
Air Permits Section (ARPE)
1201 Elm Street, Suite 500
Dallas, Texas 75270
(214) 665-2295

From:	Foley, Paige A CIV
To:	Trahan, Jacob; Thompson, Ashley
Cc:	Perera, Melissa E CIV; Bachman, Roddy C CIV
Subject:	FW: [Non-DoD Source] Bluewater Texas Terminal Deepwater Port
Date:	Thursday, May 14, 2020 10:55:50 AM

EXTERNAL EMAIL

Forwarding comments received from Michael Tucker.

From: Michael Tucker - NOAA Federal <michael.tucker@noaa.gov>
Sent: Thursday, May 14, 2020 11:39 AM
To: Foley, Paige A CIV <Paige.A.Foley@uscg.mil>
Subject: [Non-DoD Source] Bluewater Texas Terminal Deepwater Port

Hi Paige,
I am the NMFS consultation biologist assigned to this project, and I look forward to continuing to work with your team in developing the final Biological Assessment for the project and completing the ESA Section 7 consultation.

I wanted to respond to your request for info on the species/critical habitat that should be included in the BA analyses.

From the list included in your letter, you can remove Smalltooth sawfish, and all of the coral species, as none of these species occur in the action area for this project. It is also likely that the whale species on your list will not be affected by the proposed project, as they rarely occur so close to the Texas Coast. But we will need to complete an analysis of the noise/sound pressure that will be generated during construction activities (once we have the details necessary to conduct such an analysis) before we can determine whether or not they need to be included in the effects analysis.

Feel free to contact me if you have any questions or need more info on these species/critical habitat. Thanks,
Mike

--
Michael Tucker

NOAA Fisheries Southeast Region
U.S. Department of Commerce
Michael.Tucker@NOAA.gov
727-209-5981
https://www.fisheries.noaa.gov/region/southeast

From: Michael Tucker - NOAA Federal
To: Perera, Melissa E CIV
Cc: Thompson, Ashley; Gocke, Kelsey
Subject: Re: Bluewater DWP - Proxy noise level for thrusters on dynamic positioning vessels
Date: Tuesday, June 8, 2021 1:17:11 PM

EXTERNAL EMAIL

Thanks Melissa,
Yes, 180 dB is a reasonable assumption for DP vessel thrusters. We generally don't see any adverse effects from this type of activity/vessel.

Mike

On Tue, Jun 8, 2021 at 12:53 PM Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil> wrote:

> Hi Mike,
>
> We recently found out that Bluewater intends to use dynamic positioning (DP) vessels for pipeline installation if they are available. As you may know, dynamic positioning pipelay vessels use thrusters rather than anchors to maintain position, and thrusters tend to be quite loud. They cited a sound level of 180 dB re: 1 µPa based upon ranges cited in Richardson 1995 and OSPAR Commission 2009 (see excerpt of information provided by Bluewater below). Does NMFS have a preferred noise level proxy to use for dynamic positioning vessels, or is the sound level that they've provided okay? Ashley/Kelsey, please add anything that I might have forgotten. We may bring this up at our interagency call on Bluewater this week, but I thought I'd give you a heads up.
>
> Thanks,
>
> Melissa
>
> Excerpt of information from BWTT:
>
> The installation of the proposed offshore pipeline infrastructure will be conducted using either a
>
> conventionally moored pipelay vessel and/or DP pipelay barge and support vessels. The pipeline installation
>
> will progress along the route such that the construction at any one location is of short duration, and activities
>
> would occur up to 24 hours per day. The mean underwater noise from offshore pipelaying is

> 130.5 dB re: 1
>
> µPa at 0.9 mi (1.5 km), which includes a pipe laying fleet of nine vessels and is similar to the sound pressures
>
> generated by other commercial vessels (Johansson and Andersson 2012). As previously discussed, the
>
> installation of the proposed offshore pipelines would require a pipelay barge and 2 to 3 support vessels and
>
> is therefore expected to produce even lower sound levels. The most prevalent sources of continuous
>
> underwater sound associated with the installation of the proposed offshore pipelines will be the vessels
>
> used for construction, during construction activity and transit. Construction vessels will be in the 164' to 328'
>
> (50- 100 meter) size class, and sound levels for each vessel will likely range between 160 and 180 dB re: 1
>
> µPa (Richardson et. al. 1995, OSPAR Commission 2009).

--
Michael Tucker

Endangered Species Biologist
NOAA Fisheries Southeast Region
U.S. Department of Commerce
727-209-5981
https://www.fisheries.noaa.gov/region/southeast

From:	Michael Tucker - NOAA Federal
To:	Thompson, Ashley
Cc:	Perera, Melissa E CIV; Gocke, Kelsey
Subject:	Re: Bluewater SPM Project- Pile Driving Sound Sources
Date:	Wednesday, June 9, 2021 8:22:19 AM
Attachments:	image001.png image002.png image003.png image004.png

EXTERNAL EMAIL

Hi Ashley,
What I meant to ask is if the ***actual*** piles that will be used will be concrete. I had never heard of using concrete piles for this type of application. Thanks,

Mike

On Wed, Jun 9, 2021 at 8:56 AM Thompson, Ashley <Ashley_Thompson@golder.com> wrote:

> NOTE: This email chain appears to contain email from outside Golder
>
> Good Morning Mike,
>
> The proxies used for the noise analysis are 18-inch concrete and 72-inch steel piles.
>
> Thank you,
>
> **Ashley Thompson**
> *Senior Biologist*
> Golder Associates Inc.
> **T:** +1 281 821-6868 | **C:** +1 941 773 1848
>
> ---
>
> **From:** Michael Tucker - NOAA Federal <michael.tucker@noaa.gov>
> **Sent:** Tuesday, June 8, 2021 3:38 PM
> **To:** Thompson, Ashley <Ashley_Thompson@golder.com>
> **Cc:** Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Gocke, Kelsey <Kelsey_Gocke@golder.com>
> **Subject:** Re: Bluewater SPM Project- Pile Driving Sound Sources
>
> ## EXTERNAL EMAIL
>
> Hi Ashley,
>
> Are the 18" piles proposed to be concrete or steel? If steel, the noise levels would be significantly higher. Otherwise, the rest looks pretty reasonable.
>
> Mike
>
> On Tue, Jun 8, 2021 at 2:04 PM Thompson, Ashley <Ashley_Thompson@golder.com> wrote:

Good Afternoon Mike,

We have the below topic as an agenda item for our Bluewater SPM Project interagency call tomorrow but wanted to provide you with some background prior to the interagency call. In a recent information request, USCG asked that the applicant clarify their reference source for sound source levels used for pile driving and the depth the piles would be driven. See the applicant's response below:

As stated on Page 44 of Appendix K, the National Marine Fisheries Service (NMFS), Southeast Regional Office (SERO), created a sperate spreadsheet to assess underwater impacts on sea turtles and fish (NMFS 2019). This spreadsheet was utilized based on feedback received during pre-application consultations between BWTT and the NMFS. The SERO spreadsheet includes a 72-inch diameter pile with a peak sound level of 214 dB (at 10 m), an RMS value of 189 dB, and a SEL of 182 dB re µPA; as these sound levels were more conservative than the sound levels for an equivalent-sized pile in the GARFO spreadsheet, and these were used as a proxy for the larger piles associated with the Project. An 18-inch diameter concrete pile in a water depth of 10 ft (3 m) was chosen as a proxy for the proposed offshore 18-inch-diameter piles. A copy of the SERO Pile Driving Noise Calculator spreadsheet can be found at https://www.fisheries.noaa.gov/southeast/consultations/section-7-consultation-guidance.

Each of the proposed SPM buoys would require the installation of twelve (12) 72-inch-diameter anchor piles to support the CALM mooring system. Additionally, the PLEM will anchored to the seafloor 18-inch-diameter piles. PLEM 1 will utilize six (6) 18-inch-diameter anchor piles and PLEM 2 will utilize four (4) 18-inch-diameter anchor piles. Based on preliminary engineering, the 72-inch-diameter anchor piles to support the CALM mooring system will be installed to a depth of approximately 120 feet below the mudline. The 18-inch-diameter piles to support the PLEMs will be installed to a depth of 80 feet below the mudline.

Our marine mammal technical lead looked into the proxies used and if the references included proxies that were mitigated. Based on our review, the SERO calculator, which was used to obtain the proxy values for this project, references the "NMFS Technical Guidance document for the Assessment and Mitigation of Hydroacoustic effects on Pile Driving on Fish".

From the NMFS technical guidance, for the 18-inch pile proxy, this table (p. I-2) indicates the data for that proxy is unmitigated (no attenuation system):

Table 1.2-1 and Table 1.2-2 summarize data from many of the projects described in the subsequent chapters for continuous impact hammers and vibratory installation, respectively. These tables do not include sound pressure level data for projects that used attenuation systems or drop hammers because results from these projects were highly variable and cannot be summarized into one sound pressure level for a certain type of pile. Table I.2-3 summarizes all pile driving sounds reported in this compendium that did not use attenuation systems. These tables summarize results from unattenuated pile driving at positions close to the pile and include the pile type; pile size; location of the project; water depth; distance from the pile where the data were collected; measured peak, root mean square (RMS), and sound exposure level (SEL), when available; an approximation of the attenuation rate; and comments and photos when available. These data can be used as a ready reference and for comparative purposes when screening a project. Further acoustical information on specific pile types can be found in each chapter.

Table I.2-1. Summary of Near-Source (10-Meter) Unattenuated Sound Pressure Levels for In-Water Pile Driving Using an Impact Hammer

Approximate Pile Size and Pile Type	Relative Water Depth	Average Sound Pressure Level Measured in dB		
		Peak	RMS	SEL
0.30-meter (12-inch) steel H-type – thin	<5 meters	190	175	160
0.30-meter (12-inch) steel H-type – thick	~5 meters	200	183	170
0.36-meter (14-inch) steel H-type - thick	±6 meters	208	--	177
0.6-meter (24-inch) AZ steel sheet	~15 meters	205	190	180
0.33-meter (13-inch) plastic pile	10 meters	177	153	--
0.30-meter (12-inch) concrete pile	Land-based	176	--	146
0.46-meter (18-inch) concrete pile	<3 meters	185	166	155
0.61-meter (24-inch) concrete pile	~5 meters	185	170	160
0.61-meter (24-inch) concrete pile	~15 meters	188	176	166
0.30-meter (12-inch) steel pipe pile	<5 meters	192	177	--
0.36-meter (14-inch) steel pipe pile	~15 meters	200	184	174
0.41 meters (16-inch) steel pipe pile	3 meters	182	--	158
.051 meter (20-inch) steel pipe pile	± 3meters	204	161	--
0.61-meter (24-inch) steel pipe pile	~15 meters	207	194	178
0.61-meter (24-inch) steel pipe pile	~5 meters	203	190	177
0.76 -meter (30-inch) steel pipe pile	± 3 meters	210	190	177
1-meter (36-inch) steel pipe pile	<5 meters	208	190	180
1-meter (36-inch) steel pipe pile	~10 meters	210	193	183
1.5-meter (60-inch) steel CISS pile	<5 meters	210	195	185
1.7-meter (66-inch) steel pipe pile[1]	Land-based	197[1]	--	173[1]
1.8-meter (72-inch) steel pipe pile	Land-Based	204	--	175
2.2-meter (87-inch) steel pipe pile[2]	Land-based	194[2]	--	160[2]
2.4-meter (96-inch) steel CISS pile	~10 meters	220	205	195

[1] Measured 17 meters from pile
[2] Measured 35 meters from pile
dB = Decibels
CISS = Cast-in-steel shell
RMS = Root mean square
SEL = Sound exposure level

For the 72-inch impact pile proxy, the source referenced in the SERO calculator (Laughlin 2011, attached) and based on the information in the following table, the SPL values used for a proxy were unmitigated at times when bubbles were off and those source level values were used.

Table 2: Summary of Underwater Sound Levels for the SR 529 Ebey Slough Bridge Replacement Project, 72-inch Steel Piles.

Pile	Date	Hydrophone Depth (feet)	Mitigation Type	Highest Absolute Peak (dB)	Avg. RMS ± s.d. (Pascals)	Avg. dB_{RMS}	Total # of Strikes	Avg. Peak ± s.d. (Pascals)	Avg. dB_{peak}	Avg. Reduction[2] (dB)	Highest Single Strike SEL (dB)	Rise Time (millesec.)	Cumulative SEL (dB)
1	10/22/10	4	None[5]	199[1]	970 ± 250	180	192	5934 ± 1633	195	-	171	0.7	168
2	11/10/10	8	None[5]	165	32 ± 5	150	276[4]	142 ± 24	163	-	143	2.8	142
3	1/11/11	10	Bubbles Off	214	2742 + 550	189	26	25005 + 7727	208	-	182	0.3	-
			Bubbles On	177[1]	223 + 161	167	121	762 + 1178	178	30	158	7.1	155
			Bubbles Off	200	689 + 141	177	26	5794 + 1832	195	-	168	7.1	-
4	1/6/11	4	Bubbles Off	177	118 + 31	161	22	475 + 170	174	-	155	2.9	-
			Bubbles On	173	96 + 13	160	243	334 + 74	170	14	151	2.3	151
			Bubbles Off	186[1]	303 + 56	170	22	1567 + 301	184	-	161	1.1	-
			Bubbles On	179	42 + 40	152	88	195 + 192	166	18	155	1.3	-
5	1/6/11	14	Bubbles Off	205	1694 + 227	185	22	14067 + 1731	203	-	176	0.6	-
			Bubbles On	181	238 + 61	168	136	769 + 474	178	25	161	4.5	156
			Bubbles Off	184	785 + 328	178	29	5221 + 2103	194	-	159	0.3	-
			Bubbles On	177	206 + 23	166	73	584 + 119	175	19	156	3.1	-
			Bubbles Off	187	878 + 317	179	25	7328 + 2974	197	-	162	0.4	-
6	1/11/11	10	Bubbles Off	208	2837 + 413	189	21	18157 + 2705	205	-	181	0.7	-
			Bubbles On	172[1]	133 + 13	162	109	434 + 37	173	32	151	2.6	140
			Bubbles Off	181	672 + 155	177	19	4729 + 1484	193	-	156	0.6	-
			Bubbles On	173	141 + 24	163	124	474 + 100	174	19	151	1.6	-
									Average:	**22**			

You'll see that bubbles were on and off during the pile driving activity, so mitigated when bubbles were on, and the values were used in the underwater noise analysis when piling was unmitigated. Here is the related text:

Pier 4, Pile 3

Pile 3 was driven at Pier 4 in approximately seven feet of water with the hydrophone 33 feet from the pile. The bubble curtain was used during the impact drive with the bubbles turned off briefly at the start of the drive, on in the middle of the drive and then off briefly at the end of the drive.

The results of monitoring for Pile 3 indicate (Table 2):

- The highest absolute peak of 214 dB_{peak} was with the bubbles turned off, the hydrophone 10 feet deep and one foot from bottom.
- The average RMS at 10 foot depth ranged from 177 dB_{RMS} to 189 dB_{RMS} with the bubbles off and was 167 dB_{RMS} with the bubbles turned on.
- The highest single strike SEL for the peak strike was 168 dB_{SEL} with the bubbles turned off.

The attenuated cumulative SEL of 155 $dBSEL_{cum}$ did not exceed the 204 $dBSEL_{cum}$ threshold after 121 strikes (Table 2). The SEL was estimated for each individual pile strike while the bubble curtain was active by calculating a 1-second SEL for each pile strike. Plots of the cumulative SEL values for each pile strike (Figure 11, blue line) compares this against the calculated cumulative SEL based on the number of strikes (Figure 11, red dashed line). The two methods differ on average by about 32 decibels with the individual strike method being substantially lower. Neither cumulative SEL exceeded the 204 $dBSEL_{cum}$ threshold.

SR 529 Ebey Slough Bridge Replacement Project **13** Underwater Noise Technical Report
7/16/2013

Would you be able to confirm that the proxies used in the Bluewater underwater noise assessment for pile driving as outlined above are the most current/accurate for NMFS?

Thank you!

Ashley Thompson
Senior Biologist

Golder Associates Inc.
14950 Heathrow Forest Parkway, Suite 280, Houston, Texas, USA 77032
T: +1 281 821-6868 | **C:** +1 941 773 1848 | **golder.com**
LinkedIn | Instagram | Facebook | Twitter

Work Safe, Home Safe

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Michael Tucker

Endangered Species Biologist

NOAA Fisheries Southeast Region
U.S. Department of Commerce
727-209-5981
https://www.fisheries.noaa.gov/region/southeast

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Michael Tucker

Endangered Species Biologist
NOAA Fisheries Southeast Region
U.S. Department of Commerce
727-209-5981
https://www.fisheries.noaa.gov/region/southeast

2 August 2019

Dear Roddy Bachman,

Listed below are our observations regarding the Bluewater Texas Terminal, LLC (Bluewater) project documents you provided in your recent request for agency assistance.

1. The HDD10-Pipeline Exit Location on the southern end of San Jose Island (Engineering Drawings) and trenching and installation of pipelines transects beach nesting habitat for Kemp's ridley (day nesting), loggerhead and green sea turtles (night nesting). Nesting occurs from March 30–October 1st each year. Horizontal directional drilling (HDD) will reduce impacts, but onshore trenching and drilling may still pose a disturbance threat to nesting sea turtles, which are very sensitive to light (night nesting species only), vibrations (including those from loud sounds), and movement, as a predator avoidance mechanism. This is in slight contradiction to the statement on page 8-47 that states "Impacts on the beaches of San Jose Island will also be avoided by HDD." This can be clarified by providing more detail and descriptions regarding how this will be the case. It should at least be placed in the category "may affect, but is not likely to adversely affect".

2. The 80-92 foot water depth indicated for the offshore port is located in the Kemp's ridley sea turtle main migratory pathway and foraging areas, established by satellite tracking adult nesting turtles (Shaver et al. 2016a, 2017a). During construction and operations of the port, threats to this species include disturbance caused by increased boat traffic and impacts from increased pollution caused by increased boat traffic. Of 43 post-nesting Kemp's ridleys tracked by satellite tagging from Mexican nesting beaches, 84% of them migrated north using the nearshore waters off the Texas coast (Shaver & Rubio 2008, Shaver et al. 2016a). The threats to this species are higher since the Kemp's ridley is limited to coastal migration unlike other sea turtle species that can migrate in deeper water. This species is the smallest of the sea turtles and thus has a limited dive depth and cannot forage in deeper water. A portion of adult Kemp's ridleys have also been documented as year round residents in the area where the project is proposed (Shaver & Rubio 2008, Shaver et al. 2016a, b, 2017a) extending the threats to the species beyond the seasonal nesting and migration periods.

3. VolI,Pg. 22-1: Onshore components associated with the proposed deepwater port are defined as those components landward side of the western Redfish Bay mean high tide (MHT) line, located in San Patricio and Aransas Counties, Texas. Inshore components associated with the proposed Project are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico (GOM). Offshore components associated with the proposed Project are defined as those components located seaward of the MHT line located at the interface of San Jose Island and the GOM.

4. Volume II: Environmental Evaluation (Public); Section 8 – Wildlife and Protected Species: The last sentence of the second paragraph under heading "8.2.2.7.2 MARINE REPTILES" (p. 8-46) states that "There are very few sightings of these species in nearshore marine environments.". While this might have been true 10-15 years ago, juvenile green sea turtles have become much more numerous in the inshore waters around the project areas, both inshore and offshore, and are very frequently seen surfacing (Shaver et al. 2017b). There are high concentrations of turtles near the ship channel jetties and in Redfish Bay. As these turtles reach approximately 20–25cm SCL (straight carapace length), they transition from offshore pelagic habitats (w/ Sargassum sp.) to

shallow inshore and nearshore neritic zone habitats where algae and seagrass beds provide forage and shallow water provides safety from larger predators such as sharks (Howell et al. 2016). These juveniles inhabit inshore waters year-round and comprise the largest population of green sea turtles in Texas, with the largest number of individuals residing in the Laguna Madre (Shaver et al. 2017b). This puts them at risk of impact and disturbance during construction for this project, especially in the trench and pipe laying areas. HDD will reduce impacts, but please clarify how it will eliminate all impacts to these turtles.

There is a copy/paste error on page 8-47, the last paragraph of the Kemp's ridley section refers to green sea turtles. There are a few 'USFWS reference' errors that need to be corrected as well, where the one listed in the text does not match with regard to the species in the document reference section.

Both Kemp's ridley sea turtles (day nesting) and to a lesser extent loggerhead sea turtles (nigh nesting) and green sea turtles (night nesting) nest on San Jose and Mustang Island beaches, where the project is proposed. Though this is partially covered in the document, the description is incomplete in some sections.

Within the description of the Kemp's ridley (pp.8-46 to 8-47) the information listed above (#2) regarding migration would strengthen the material.

The main concerns regarding project impacts to sea turtles during construction, routine operation, potential accidents, and end of use decommission are to juvenile green sea turtles and the adult Kemp's ridley sea turtles that inhabit and use those areas. Strengthening the discussion regarding those two species is suggested. Timing of the 9-week HDD construction phase will be important in regards to reducing impacts to avoid nesting season and periods of extreme cold weather when inshore sea turtles can become incapacitated (hypothermic stunned sea turtles described in Shaver et al. 2017b).

Sincerely,

Sincerely,

Jennifer Shelby Walker
Division of Sea Turtle Science and Recovery
Padre Island National Seashore
P.O. Box 181300
20301 Park Road 22
Corpus Christi, TX 78418

Referenced publications:

Howell LN, Reich KJ, Shaver DJ, Landry AM Jr, Gorga CC. (2016) Ontogenetic shifts in diet and habitat of juvenile green sea turtles in the northwestern Gulf of Mexico. Mar Ecol Prog Ser. 559: 217–229

Shaver DJ & Rubio C (2008) Post-nesting movement of wild and head-started Kemp's ridley sea turtles, *Lepidochelys kempii*, in the Gulf of Mexico. Endang Species Res 4:43–55

Shaver DJ, Hart KM, Fujisaki I, Rubio C, et al. (2016a) Migratory corridors of adult female Kemp's ridley turtles in the Gulf of Mexico. Biol Conserv 194:158

Shaver DJ, Rubio C, Walker JS, George J, et al. (2016b) Kemp’s ridley sea turtle (*Lepidochelys kempii*) nesting on the Texas coast: geographic, temporal, and demographic trends through 2014. Gulf Mex Sci 33: 158−178

Shaver DJ, Hart KM, Fujisaki I, Bucklin D, Iverson AR, Rubio C, et al. (2017a) Inter-nesting movements and habitat-use of adult female Kemp's ridley turtles in the Gulf of Mexico. PLoS One 12(3):e0174248

Shaver DJ, Tissot PE, Streich MM, Walker JS, Rubio C, Amos AF, et al. (2017b) Hypothermic stunning of green sea turtles in a western Gulf of Mexico foraging habitat. PLoS ONE 12(3): e0173920.

From:	Shaver, Donna J
To:	Gocke, Kelsey
Subject:	Re: [EXTERNAL] Request for use of nesting data
Date:	Wednesday, January 13, 2021 11:57:59 AM

EXTERNAL EMAIL

Kelsey:

I am sorry for the delay. Yesterday I found out that the email compiled early this week never got sent. Please let me know if you need additional information.

Donna

The summary in the table below is for the period from 1995 to present (26 years). A single Kemp's ridley nest and one loggerhead nest both documented on Mustang Island in 1988 are excluded from this summary. No other excluded years (1979–1994) had nests documented for those beaches.

The number of sea turtle nests documented on these two Texas beaches has been increasing through time with the highest documented numbers occurring for both beaches in 2020 [18 nests for San Jose Island and 14 total nests for Mustang Island (14 nests were also documented in 2018 on Mustang Island)].

	2020	1995–2020 TOTAL
Kemp's ridley (*Lepidochelys kempii*) nests		
San Jose Island	18	51
Mustang Island	13	110
Loggerhead (*Caretta caretta*) nests		
San Jose Island	0	4
Mustang Island	0	2
Green (*Chelonia mydas*) nests		
San Jose Island	0	0
Mustang Island	1	1

United States Department of Agriculture

Natural Resources
Conservation Service

State Office

101 S. Main Street
Temple, TX 76501
Voice 254.742.9800
Fax 254.742.9819

Attention: Jake Trahan

Subject: Bluepoint Pipeline Project
NEPA/FPPA Evaluation

We have reviewed the information provided in your correspondence concerning the proposed project This review is part of the National Environmental Policy Act (NEPA) evaluation. We have evaluated the proposed site as required by the Farmland Protection Policy Act (FPPA).

The proposed site may involve areas of Prime Farmland; however, we consider the location to be exempt from provisions of FPPA due to one or more of the following reasons:

☐ The project site is considered "land committed to urban development" due to the project site's location within an area of land with a density of 30 structures per 40-acre area.

☐The project's site is classified "land committed to urban development" due to its location within the city limits.

☐The project's site encompasses less than 1 acre of Prime Farmland

☐The proposed improvements and rehabilitations do not describe actions that are subject to provisions of FPPA.

☒The installation of sewer lines or subterranean water systems and appurtenances are not considered a permanent conversion of farmland.

As such, no further consideration from protection is necessary. We strongly encourage the use of acceptable erosion control methods during the construction of this project.

If you have further questions, please contact me at 505-516-7822 or by email at mark.palmer@tx.usda.gov.

Sincerely,

Mark V. Palmer Jr.

Digitally signed by Mark V. Palmer Jr.
Date: 2021.03.17 14:22:45 -05'00'

Mark V. Palmer Jr.
NRCS Cartographic Technician

Attachment: None

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request March 17, 2021
Name of Project Bluewater Pipeline Project	Federal Agency Involved DHS
Proposed Land Use Subterranean Pipeline	County and State San Patricio, Texas
PART II *(To be completed by NRCS)*	Date Request Received By NRCS 17MAR2021 / Person Completing Form: Mark V. Palmer

Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated	Average Farm Size
Major Crop(s)	Farmable Land In Govt. Jurisdiction Acres: %	Amount of Farmland As Defined in FPPA Acres: %	
Name of Land Evaluation System Used	Name of State or Local Site Assessment System	Date Land Evaluation Returned by NRCS	

PART III *(To be completed by Federal Agency)*	Site A	Site B	Site C	Site D
	Alternative Site Rating			
A. Total Acres To Be Converted Directly	518.92			
B. Total Acres To Be Converted Indirectly	518.92			
C. Total Acres In Site	518.92			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	195.12			
B. Total Acres Statewide Important or Local Important Farmland	195.12			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted				
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value				
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)				

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	5			
2. Perimeter In Non-urban Use	(10)	5			
3. Percent Of Site Being Farmed	(20)	0			
4. Protection Provided By State and Local Government	(20)	7			
5. Distance From Urban Built-up Area	(15)	0			
6. Distance To Urban Support Services	(15)	0			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	10			
9. Availability Of Farm Support Services	(5)	0			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	5			
TOTAL SITE ASSESSMENT POINTS	160	32	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	0	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	32	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	32	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

Name of Federal agency representative completing this form:

Date: March 15, 2021

(See Instructions on reverse side)

Form AD-1006 (03-02)

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map, or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \times 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

State Agency Correspondence

U.S. Department
of Transportation
**Maritime
Administration**

Administrator

Southeast Federal Center
1200 New Jersey Avenue, SE
Washington, DC 20590

March 23, 2020

The Honorable Ted Cruz
United States Senate
Washington, DC 20510

Dear Senator Cruz:

Thank you for your recent letter expressing support for the Texas-based deepwater port license applications that are currently under review by the Maritime Administration (MARAD), Bluewater Texas Terminals; SPOT Terminal and Texas GulfLink. The deepwater port license application for the Texas COLT deepwater port has been withdrawn, as noted in the attached letter from the applicant.

Pursuant to delegated authority granted by the Secretary of the U.S. Department of Transportation, MARAD serves as the responsible licensing authority for the construction and operation of oil and liquefied natural gas deepwater ports. Together, with the assistance of the U.S. Coast Guard and other Federal, State, and local agencies, MARAD is currently undertaking an in-depth review and analysis of the three current deepwater port license applications proposed for development in the waters of offshore Texas.

It is important to highlight that during the application review process, many factors are taken into consideration before an official Record of Decision is issued by MARAD. Such factors include, but are not limited to, extensive environmental analysis, assessment of an applicant's technical, financial, management and operational capabilities, and consideration of the decision rendered by the governor of the Adjacent Coastal State. Governor Gregory Abbott of Texas has been designated as the Adjacent Coastal State Governor for the Texas deepwater port license applications and is expected to provide his decision at the conclusion of the review process for each application. Enclosed for your information is a detailed outline of the statutorily required deepwater port license application and environmental review process and timeline.

MARAD assures that each deepwater port license application will be given full and objective consideration. We will notify you as soon as the Record of Decision is rendered for each project.

Again, thank you for your expression of support of these important proposals. Should you have any questions regarding this matter or the overall Deepwater Port Licensing Program, please feel free to contact me.

Sincerely,

Mark H. Buzby

Mark H. Buzby

Enclosure: Letter from Texas COLT LLC, Dated December 10, 2019
Deepwater Port Application and Environmental Review Process

Deepwater Port Application and Environmental Review Process

Step 1 Day 0 – 26	Application submittal — Notice of Application issued on day 26
Step 2 Day 27 – 63	Notice of Intent to prepare an Environmental Impact Statement is issued and scoping period begins
Step 3a Day 64 – 151	Draft Environmental Impact Statement is published
Step 3b Day 152 – 197	Public comment on Draft Environmental Impact Statement
Step 3c Day 198 – 251	Final Environmental Impact Statement
Step 3d Day 252 – 266	Final Public Hearing
Step 4 Day 267 – 311	Governor of adjacent coastal state and Federal agency comment period
Step 5 Day 312 – 356	Maritime Administration issues a Record of Decision for the Environmental Impact Statement

Texas COLT LLC

December 10, 2019

Sent via Email

Ms. Yvette M. Fields, Director
Maritime Administration
Office of Deepwater Ports and Offshore Activities
W21-310 (MAR-530)
1200 New Jersey Avenue SE
Washington, DC 20590

Commander Myles J. Greenway
Commandant (CG-OES-2)
Vessel & Facility Operating Standards
U.S. Coast Guard Stop 7509
2703 Martin Luther King Jr. Avenue SE
Washington, DC 20593-7509

RE: Texas COLT Project
Docket ID: MARAD-2019-0012
Notice of Withdrawal of Application

Dear Ms. Fields and Commander Greenway,

On January 31, 2019, Texas COLT LLC filed a license application under the Deepwater Port Act to own, construct, and operate an offshore crude oil export facility in Federal waters in the Gulf of Mexico, approximately 28 nautical miles southeast of Freeport, Texas.

As we discussed by telephone, Texas COLT LLC has decided to withdraw its deepwater port license application. This letter provides notice to the United States Maritime Administration and United States Coast Guard that Texas COLT LLC hereby withdraws its application for a deepwater port license for the project pursuant to 33 C.F.R. § 148.213. We appreciate your and your team's efforts in processing the Texas COLT LLC application to date. We look forward to working with you again in the future if the opportunity arises.

Please feel free to contact me at 218.522.4701 (office) or 715.817.8732 (mobile) or via email at cathryn.hanson@enbridge.com with any questions.

Sincerely,

Cathryn Hanson

Cathryn C. Hanson
Supervisor, Environment Projects
Enbridge

cc: Ken Smith, USCG
Bradley McKitrick, USCG
Linden Houston, MARAD

TEXAS GENERAL LAND OFFICE
GEORGE P. BUSH, COMMISSIONER

August 10, 2020

Mr. Roddy Bachman
Project Manager, Deepwater Ports
U.S. Coast Guard
2703 Martin Luther King Jr, Ave SE
Washington DC, 20593-7509

Re: Bluewater Texas Terminal, LLC Project (MARAD-2019-0094) request for information regarding the Texas General Land Office's pipeline policy

Mr. Bachman,

The Texas General Land Office (GLO) is responsible for managing State-owned submerged land dedicated to the Permanent School Fund. At this time, it has been identified that portions of the pipeline associated with this project are proposed to be located on State-owned submerged land. All project components on State land will require an easement to be authorized by the Commissioner under §51.291 of the Natural Resources Code (NRC).

In accordance with this Statute, all pipelines on State lands must have an active easement with the GLO while the pipelines are being utilized. Pipeline abandonment in place on State-owned submerged lands will not be authorized. All structures must be removed from State land when it is no longer in use. Although each project is unique, current standard language included in a Miscellaneous Easement (ME) authorizing pipelines contains the following:

> Except as otherwise provided by applicable law or rule and subject to obtaining necessary approval from state or federal agencies having applicable jurisdiction, or making best efforts to obtain such permits, Grantee shall, within one hundred twenty (120) days from the date of expiration or sooner termination of this Agreement, initiate removal of all personal property, structures, and the Improvements, and shall restore the Premises (and any other property affected by such removal activities) to the same condition that existed before Grantee entered thereon. Such removal and restoration activities shall be coordinated with the General Land Office in accordance with guidelines in effect at the time of removal/restoration which may include, without limitation, specific removal techniques required for protection of natural resources and mitigation or payment in lieu of mitigation for any and all damages resulting from removal activities, all of which shall be in accordance with generally

accepted current pipeline industry standards using available technology. Grantee shall notify the GRANTOR at least ten (10) days before commencing removal/restoration activities so that a General Land Office field inspector may be present.

A renewal or assignment of the Easement may be granted if the pipeline is still in use. However, removal will be required if there is no further utility of the line.

Please feel free to contact Jesse Solis at 361-886-1630 with any questions.

Sincerely,

Amy Nunez

Amy Nunez
Director, Coastal Field Operations
Texas General Land Office

cc:

Bluewater Texas Terminal LLC
2331 CityWest Blvd
Houston, TX 77042

Ms. Amy Nunez
Texas General Land Office
Coastal Field Operations
1700 N Congress Ave
Austin, TX 78701-1495

August 21, 2020

Re: Bluewater Texas Terminal, LLC Project (MARAD-2019-0094) – Pipeline Abandonment on State Submerged Land

Dear Ms. Nunez:

Bluewater Texas Terminal, LLC (BWTT) writes to provide additional information for the Texas General Land Office's (TXGLO) consideration regarding MARAD Project No. 2019-0094 and the TXGLO's August 10, 2020 correspondence to the U.S. Coast Guard regarding the potential removal of the pipeline associated with the BWTT project from state lands at the decommissioning of the project. .

In the August 10th letter, TXGLO points to a condition in its standard Miscellaneous Easement, which, at the expiration or termination of the easement, calls for the removal of all personal property, structures and improvements from the easement. That Miscellaneous Easement condition also states:

> Such removal and restoration activities shall be coordinated with the General Land Office in accordance with guidelines in effect at the time of removal/restoration which may include, without limitation, specific removal techniques required for protection of natural resources and mitigation or payment in lieu of mitigation for any and all damages resulting from removal activities, all of which shall be ***in accordance with generally accepted current pipeline industry standards using available technology***.

BWTT notes that a specific easement for this project has yet to be negotiated or executed with TXGLO. BWTT is committed to negotiating an easement with TXGLO on terms that are technically feasible, reflective of standard industry practice, environmentally protective, and consistent with Texas and federal requirements.

As detailed further below, certain portions of the project that will cross lands subject to a TXGLO easement would not be able to be removed at the cessation of the project because the technology for such removal does not exist, and the removal of those segments has the potential to cause greater environmental harm than abandonment in place. For that reason, and as discussed in 2019 preapplication meetings with TXGLO, BWTT proposes to abandon certain portions of the pipeline in place in accordance with generally accepted pipeline industry standards and all applicable regulations.

BWTT understands that, to the extent abandonment in place occurs, that an easement with the State will need to be maintained to account for the presence of those abandoned pipeline segments. BWTT will maintain all necessary easements as required by the State.

For our further discussion and negotiation of the necessary easements for this project, BWTT provides the additional information for the agency's review below. Upon review and discussion, BWTT would request that TXGLO provide a clarification letter to the US Coast Guard reflecting this scope for purposes of the BWTT's Deepwater Port License Application (DWPLA) Offshore Pipeline Abandonment In Place Scope review.

Offshore Pipeline Abandonment in Place Scope

BWTT is proposing that the following assets be abandoned in place for the project's decommissioning scope:

HDD 9 (Harbor Island to San Jose Island)

- Horizontal HDD 9 Length: 5,868'
- Line 1 Depth: -78' MLLW
- Line 2 Depth: -88' MLLW

HDD 10 (San Jose Island to Offshore Past Surf Zone)

- Horizontal HDD 10 Length: 5,000'
- Line 1 Depth: -53' MLLW
- Line 2 Depth: -68' MLLW

Offshore Pipelines (HDD 10 Exit to State/Federal Boundary [i.e. 9 Nautical Mile Line])

- 79,178' (14.995 miles)

These segments should be abandoned in place for the following reasons:

- Per TXGLO policy, pipelines would be installed via HDD in tidally influenced areas; these would be installed at significant depths to avoid pipeline exposure.
- According to 30 CFR 250.1750, a pipeline may be decommissioned in place when the Regional Supervisor (BSEE) determines that the pipeline does not constitute a hazard (obstruction) to navigation and commercial fishing operations, would not unduly interfere with other uses of the (Outer Continental Shelf (OCS), or have adverse environmental effect. To remove the pipelines may be impossible and the attempt would cause considerable environmental harm and is not industry standard practice (i.e., sinkholes, pipe breakage, and dunes and critical habitat destruction).
- HDD 9 crosses two federally maintained channels and is required by the USACE to be a minimum of 20' below the authorized depth of dredge for that waterway. The USACE would have to approve of any decommissioning activities associated with the removal of this HDD, which would impact the Aransas Pass Channel and the Gulf Intercostal Waterway (GIWW).
- HDD 10 crosses under environmentally sensitive areas on San Jose Island avoiding impacts to piping plover designated critical habitat, sand dunes beach/shoreline habitat, and strong current influenced waters near the shore. We already have written requirement from the landowners to drain/cap in place the entry/exit points of the HDDs on San Jose Island to avoid any additional environmental impacts from pipeline removal.
- BWTT has confirmed with decommissioning contractors that there are currently no sound methodologies available for removal of such HDDs. Therefore, we cannot determine what the scope and costs would be for removal, as required by MARAD.
- Per MARAD requirement, we have already provided a decommissioning commitment and will be placing a surety bond in place for the life of the asset.

As noted above, upon decommissioning, BWTT will ensure the following:

- An additional easement would be acquired at project decommissioning to leave the offshore portions of the abandoned pipelines in place on state submerged land, as necessary.

- Removal of pipelines will have a decommissioning commitment with an associated surety bond in place for life of the project per MARAD requirements; documentation will be provided to the TXGLO.
- Pipeline will remain buried without exposure; routine surveys for depth of cover will be conducted following the Oil Companies International Marine Forum (OCIMF) maintenance guidelines for offshore pipelines.
- Pipelines that will remain abandoned in place will follow the decommissioning procedures outlined in 30 CFR 250.1751 including: pigging the pipeline; flushing the pipeline; filling the pipeline with seawater; cutting and plugging each end of the pipeline; and burying each end of the pipeline at least 3 feet below the seafloor and covering with protective concrete mats (if required).

I will be contacting you shortly to discuss this decommissioning scope and to request the agency's further review and correspondence with the US Coast Guard reflecting the potential for abandonment in place of these segments upon project decommissioning. In the meantime, you can reach me at melony.a.phillips@p66.com or (832) 596-8995 with any questions.

Regards,

Melony Phillips

Melony Phillips
Phillips 66 – Environmental Director

From:	Brink, Kristie A CIV USARMY CESWG (USA)
To:	Thompson, Ashley
Cc:	Perera, Melissa E CIV; Gocke, Kelsey
Subject:	RE: Bluewater SPM Project- Draft Habitat Restoration Plan
Date:	Wednesday, June 2, 2021 2:49:19 PM
Attachments:	image001.png image002.png

EXTERNAL EMAIL

Ashley,

Yes, the Draft HRP is sufficient to be included in the DEIS.

I do have a minor editorial comment. In Section 3.8.3 Emergent Wetland, the second sentence refers to “restored upland herbaceous habitat” but I believe it was meant to say “restored emergent wetland habitat”. Just so that folks don’t get confused.

Kristie (Brink) Wood
Project Manager, Policy Analysis Branch

U.S. Army Corps of Engineers
Galveston District - Regulatory Division
5151 Flynn Parkway, Suite 306
Corpus Christi, Texas 78411-4318
Office: 361-814-5847 x.1005
Kristie.A.Brink@usace.army.mil

From: Thompson, Ashley <Ashley_Thompson@golder.com>
Sent: Thursday, May 27, 2021 8:34 AM
To: Brink, Kristie A CIV USARMY CESWG (USA) <Kristie.A.Brink@usace.army.mil>
Cc: Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Gocke, Kelsey <Kelsey_Gocke@golder.com>
Subject: [Non-DoD Source] Bluewater SPM Project- Draft Habitat Restoration Plan

Good Morning Kristie,

Please see the attached Draft Habitat Restoration Plan provided by the applicant for the Bluewater SPM Project. Can you please review and provide feedback as to whether this is sufficient to include with the DEIS?

Thank you and please let us know if you have any questions.

Ashley Thompson
Senior Biologist

Golder Associates Inc.
14950 Heathrow Forest Parkway, Suite 280, Houston, Texas, USA 77032
T: +1 281 821-6868 | **C:** +1 941 773 1848 | **golder.com**

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Texas Coastal Ecological Services Field Office
4444 Corona Drive, Suite 215
Corpus Christi, Texas 78411
361/994-9005

In Reply Refer To:
02ETTX00-2019-TA-1995

May 13, 2020

M. J. Greenway
Commander
Chief, Vessel and Facility Operating Standards Division
U.S. Coast Guard

Yvette Fields
Director, Office of Deepwater Port
Licensing and Port Conveyance
Maritime Administration
U.S. Department of Transportation

Dear Commander Greenway and Director Fields:

Thank you for your request, dated April 10, 2020, for informal consultation and technical assistance related to the Bluewater Texas Terminal Services LLC's application for a deepwater port (MARAD-2019-0094). The United States Coast Guard (USCG) and Maritime Administration (MARAD) are developing a Biological Assessment (BA) for the proposed action as the lead Federal agencies responsible for processing the license application submitted by Bluewater Texas Terminal Services LLC (the Applicant), a wholly owned subsidiary of Phillips 66. Under the Deepwater Port Act of 1974, as amended the Applicant is seeking a Federal license to own, construct, operate, and eventually decommission a deepwater port with onshore, inshore, and offshore facilities for the transportation of crude oil for export to the global market in Federal waters (the project). The Applicant proposes offshore facilities approximately 15 nautical miles off the coast of San Patricio County, Texas, and onshore and inshore facilities located within San Patricio, Nueces, and Aransas counties, Texas.

The U.S. Fish and Wildlife Service (Service) is taking this opportunity to assist the USCG and MARAD by providing additional information regarding conservation measures and best management practices in the event that consultation with the Service is needed for the proposed project. We are also including scoping comments in response to the 2019 Notice of Intent to prepare an Environmental Impact Statement. The Service provides the following comments and recommendations in accordance with the Fish and Wildlife Coordination Act ((16 U.S.C. 661-

667(e)); the Endangered Species Act (Act) (16 U.S.C. 1531 et seq.); the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.); and the National Environmental Policy Act (42 U.S.C. 4321-4347).

Threatened and Endangered Species
The USCG and MARAD submitted documentation to the Service requesting confirmation that the following list of Federally-listed species and critical habitat is complete for the counties within the proposed project area: Gulf Coast jaguarundi (*Herpailurus yagouaroundi cacomitli*); ocelot (*Leopardus pardalis*); West Indian manatee (*Trichechus manatus)*; Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*); least tern (*Sterna antillarum*); northern aplomado falcon (*Falco femoralis septentrionalis*); piping plover (*Charadrius melodus)*; red knot (*Calidris canutus rufa)*; whooping crane (*Grus americana)*; the green *(Chelonia mydas)*, loggerhead (*Caretta caretta),* hawksbill *(Eretmochelys imbricata)*, leatherback (*Dermochelys coriacea*), and Kemp's ridley *(Lepidochelys kempii)* sea turtles; golden orb (*Quadrula aurea*); South Texas ambrosia (*Ambrosia cheiranthifolia);* and the slender rush-pea (*Hoffmannseggia tenella*). The documentation we received also included designated critical habitat for piping plover, specifically, Unit TX-16. The list of species provided to the Service is correct. In addition, please consider potential impacts to other piping plover critical habitat within the project's vicinity as well as whooping crane critical habitat in Aransas County.

The Service is proposing to protect the eastern black rail, (*Laterallus jamaicensis jamaicensis*) (rail) as a threatened species under the Act and offers the following technical assistance in preparation of the BA. The eastern black rail is a small secretive marsh bird native to the United States. It is one of four subspecies of black rail, which live in salt, brackish, and freshwater marshes and may occur year-round in appropriate habitats within the project area. The Service is also proposing a special rule under Section 4(d) of the Act that would exempt certain activities from take prohibitions of the Act. Such activities may include mowing and mechanical treatment in wetlands that are required to ensure safety and operation needs for existing infrastructure. Existing infrastructure may include firebreaks, roads, transmission corridor rights-of-way and fence lines. Other potential prohibited activities during the rail critical periods (e.g. nesting, brooding, flightless molt periods) include fire management activities, hay baling, and intensive grazing activities on public lands. No designated critical habitat is being proposed.

The Service is removing the golden orb from candidate status. Recent genetic studies revealed that individuals thought to be golden orb are actually members of a more widespread, common species, the pimpleback (*Cyclonaias pustulosa*). These studies have been widely accepted by the relevant scientific community and the Service. Due to being synonymized with pimpleback, the golden orb is no longer a valid species as defined in the Endangered Species Act and therefore listing is no longer warranted. For more information about this finding, please refer to docket ID# FWS-R2-ES-2019-0034 at http://www.regulations.gov.

Conservation Measures
Section 7 of the Act requires that all Federal agencies consult with the Service to ensure that the actions authorized, funded, or carried out by such agencies do not jeopardize the continued existence of any threatened or endangered species or adversely modify or destroy designated critical habitat of such species. Please note that the Service does not provide concurrence for "no effect" determinations, but making a determination complies with Section 7(a)(2) of the Act. To assist USCG and MARAD in making Section 7 determinations, we provide the following preliminary conservation measures and best management practices for listed species:

<u>All Listed Species</u>

- Work crews should be educated on the appearance, status, and best management practices for all listed species that may occur in the project area, and be able to identify the species and implement appropriate protocols. All personnel must be advised that there are civil and criminal penalties for harming, harassing, or killing threatened or endangered species. Preferably, this information is provided in both English and Spanish.
- A qualified biologist with the authority to temporarily halt work crews should conduct surveys of the work area to identify risks to endangered and threatened species.
- An Operational Spill Response Plan must be in place prior to the start of operations to protect listed species in the event of a release of hazardous material. In the event of a spill of hazardous material, the Applicant will implement its Operational Spill Response Plan. Safety mechanisms such as shutdown valves will be built into the pipeline system to prevent a continuous release of oil.
- Siltation or turbidity barriers shall be made of material that will not entangle wildlife, including sea turtles and manatees. The barriers shall be properly secured and regularly monitored to avoid wildlife entanglement or entrapment.
- To the extent possible, areas already disturbed by past activities or those that will be used later in the construction period should be used for staging, parking, and equipment storage. All access routes into and out of the project disturbance area should be flagged, and no travel outside of those boundaries should be authorized.

<u>Gulf Coast Jaguarundi and Ocelot</u>
These species historically occurred in dense wooded habitats throughout South Texas including Aransas, Nueces, and San Patricio counties. Optimal cover for Gulf Coast jaguarundi and ocelot is equal to or greater than 95% horizontal cover in the first 3-6 feet (1-2 meters (m)) of shrub layer, not including the tree layer. They will use linear areas of less dense brush along drainages, creeks, and fence lines as travel corridors. Where these conditions exist within 10 miles of a

known population, these corridors will be considered as important as the optimal cover sites they connect. Habitat may consist of thorn brush, oak mottes, and dense grasses.

- Pre-construction surveys will identify any Gulf Coast jaguarundi or ocelot habitat in or adjacent to the project area. If habitat is present, the presence of the cats should be assumed.
- Where total avoidance of impacts to optimal cover cat habitat is not practicable, a written plan for minimization must be included in the information submitted to the Service.
- If impacts to listed cats are expected, we recommend formal consultation with the Service to receive specific pre-project planning, construction, and post-construction conservation measures.

<u>West Indian Manatee</u>
The threatened West Indian manatee occasionally occurs throughout Texas coastal waters.

- Staff and crew should be instructed not to feed or water manatees
- The biological monitor should contact the U.S. Fish and Wildlife Service at (361) 533-6765 and the Texas Marine Mammal Stranding Network (TMMSN) if a manatee is sighted. The TMMSN hotline number is 800-962-6625 (800-9MAMMAL).
- All in-water operations, including vessels, must be shut down if a manatee comes within 50 feet (15 m) of the operation. Activities will not resume until the manatee has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapse if the manatee has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

<u>Attwater's Greater Prairie-chicken</u>
This species is restricted to open coastal prairies in Goliad and Refugio counties, Texas.

- In areas where suitable habitat occurs, but the bird has not been documented in recent years, work may proceed with caution.
- Any work conducted in areas where prairie chickens may occur should begin after ten a.m. and end before 4 p.m.
- If mowing is to occur, the grass level should be cut no shorter than 20 cm and a "walk through" should be conducted in the area before mowing occurs in order to reduce impact to Attwater's prairie chickens and/or nests.

<u>Least Tern</u>
In Texas, the interior least tern was listed as endangered in areas more than 50-miles inland from the coast; however, the Service has proposed to delist the least tern due to successful recovery of the species (see http://www.regulations.gov, docket ID# FWS–R4–ES–2018-0082).

Northern Aplomado Falcon

Northern aplomado falcons occur year-round in coastal prairie habitats in South Texas including Nueces, San Patricio, and Aransas counties. Northern aplomado falcons nest on Mustang and San Jose islands.

- Nesting season is February through July; therefore, the preferred time for major work or work that requires a significant amount of equipment is August 1 through January 31. Construction activities for roads, fences, or other facilities that must be built closer than one mile to occupied northern aplomado falcon habitat should occur between August 1 and January 31 to avoid the breeding season. Staging areas for equipment and supplies should be as far as practicable from northern aplomado falcon habitats.
- Projects that would require land clearing and have associated noise and artificial lighting components should be located at least .5 miles (800 m) outside of any known northern aplomado falcon territory. Northern aplomado falcon home range size is estimated to be about 8,400 acres. For management purposes, this can be described as a circle with a radius of two miles (3.2 kilometers) around a particular habitat feature (e.g., a nest site or the preferred roosting site of a territorial northern aplomado falcon).
- During construction or maintenance activities in or within .5 miles (800 m) of northern aplomado falcon habitat (or such distance that noise, light, or other effects reach the habitat), a construction monitor with authority to halt construction at any time the appropriate conservation measures are not being properly implemented as agreed to will be present on site.
- Construction and maintenance activities should be conducted during daylight hours only to avoid noise and lighting issues during the night. If construction or maintenance work activities would continue at night, all lights should be shielded to direct light only onto the work site, the minimum wattage needed should be used, and the number of lights should be minimized. Noise levels should be minimized. All generators should be in baffle boxes (a sound-resistant box that is placed over or around a generator), have an attached muffler, or use other noise-abatement methods in accordance with industry standards.
- Low-level aircraft routes (less than 500 feet/152 m above ground level), including helicopter and light planes, should avoid northern aplomado falcon territories by at least one mile to reduce potential noise and human disturbance effects. Maintaining a distance of 1,500 feet (457 m) above ground level is preferable.
- For the year-round resident northern aplomado falcon, we recommend maintaining a distance of 300 to 600 feet (90-182 m) if birds are observed in the area.

Piping Plovers and Red Knots

These shorebirds occur throughout coastal Texas on beaches, sandflats, tidal flats, algal flats, and dunes and adjacent offshore islands and on spoil islands in the Intracoastal Waterway. Beaches are vital during periods of extreme high tides that cover the flats. The summer nesting season for piping plovers and red knots occurs in different regions of North America and not within the project area.

- Biological monitors should look under equipment for piping plovers, which may be in the area from July 15 to April 1, and for red knots during the spring and fall. The biologist should note that observations at sunrise and sunset are the most effective times to discover the location of roosting birds.
- Report sick or injured piping plovers and red knots to the Service's Corpus Christi Ecological Services office at (361) 533-6765.
- Piping plover critical habitat occurs within the project action area. The Service supports the beneficial use of dredged material within close proximity to designated critical habitat if material meets the specifications of the local beach quality sand (e.g., grain size, color, composition and mineralogy) and the critical habitat maintains its physical and biological features. Material intended for beach placement must not contain hazardous substances as found in Volume 40 of the Code of Federal Regulations, Part 302.4.
- Materials and vehicles required for the project should be staged in upland areas and transported as needed to the proposed work site. Equipment should be driven above the "wet line" on the beach to minimize disturbance of piping plovers.
- Mud or wind tidal flats compress under the weight of construction vehicles, and the resulting depressions or ruts may remain for years. These ruts act as dams, depriving the upper reaches of wind tidal flats from salt water, thereby reducing survival of benthic infauna that the piping plover feeds on. The Service recommends that the number of vehicles transiting from the upland areas to the project site be kept to a minimum, and that vehicles all use the same pathway.
- After the project is completed, the mud or wind tidal flats should be restored to preconstruction slope and contours, and all ruts should be leveled.
- Any future maintenance activities or other work done at the proposed project site should be scheduled during the summer, when the piping plovers are not present.

Whooping Cranes

Whooping cranes spend migratory and wintering periods in several Texas counties, including Aransas, Nueces, and San Patricio counties.

- Whooping cranes regularly occur on Mustang Island and in the Port Aransas Nature Preserve area, Texas. Work in whooping crane areas should be conducted outside of the October to April wintering season. If work will be conducted in whooping crane areas during the October to April wintering season, we recommend considering formal consultation.

Sea Turtles

Sea turtles occur in the inshore and offshore project areas year round in all of Texas' coastal waters and are vulnerable to boat strikes and equipment entrapment. Sea turtle nesting season occurs between March 15 and October 1 and nesting can occur anytime during the day or night. Loggerhead and Kemp's ridley sea turtles nest regularly on San Jose Island. During nesting season, increased numbers of sea turtles are present in the nearshore areas of San Jose Island and females will crawl onto beaches to dig nests in the sand and lay their eggs. The Amos Rehabilitation Keep monitors San Jose Island and Mustang Island for sea turtle nests and tracks.

- If sea turtles or sea turtle tracks are located on the beach, activity should cease immediately within 100 feet (30 m) of the nest site. Immediately contact Padre Island National Seashore at 361-949-8173 ext. 226, or the sea turtle hotline: 866-887-8535 (866-TURTLE5). Remain at the site until a biologist arrives, but do not disturb the sea turtle or tracks. Never walk on or disturb nesting sites. After the turtle is finished laying her eggs, she must be allowed to enter the surf. If a representative cannot stay until a biologist arrives, please carefully mark the site by laying pieces of beach debris, such as pieces of wood or other debris, in a large circle around the nest area, not on top of the nest, so biologists will be able to find the nest when they arrive. Never insert flagging or sticks into the sand around a nest as this could damage the eggs.
- Biological monitors should be used to avoid impacts to sea turtles. Immediately report dead, injured or cold-stunned sea turtles to the Texas Sea Turtle Stranding and Salvage Network at Padre Island National Seashore: 361-949-8173 ext. 226, or the sea turtle hotline: 866-887-8535 (866-TURTLE5).
- If project plans include lighting, lights should be down-shielded and of a low wavelength to avoid disorientation of night-nesting sea turtles and emerging hatchlings making their way to the surf.
- No equipment should enter a work area until after an initial sea turtle survey is conducted and the biological monitor notifies equipment operators that they are clear to proceed. This is especially important for beach operations during nesting season.
- Turtle monitors and/or patrollers should receive Department of the Interior training from Padre Island National Seashore or other approved sources. Biological monitors must be able to recognize sea turtle tracks in the sand.

South Texas Ambrosia and Slender Rush-pea

These species are restricted to a few South Texas counties, including Nueces County. Within occupied habitat, projects should avoid disturbance, including land clearing, introduction and spread of invasive plants, herbivory, altered light levels, trampling, and exposure to toxic substances.

- Surveys should be conducted on all intact habitat prior to initiation of activities that may affect threatened or endangered plant species.
- Where it is necessary to temporarily remove vegetation, cut plants above ground level rather than clearing with bulldozers, root plows, or other implements that disturb the soil.

- Habitat that is degraded through vegetation impacts, invasive plant colonization or other deleterious changes, shall be restored to a condition that is consistent with long-term survival and growth of the listed plant population.
- Transplantation to suitable locations may be possible. Individual plants that have been destroyed may be replaced through propagation and reintroduction in suitable habitat managed by an approved conservation organization. If possible, seeds for propagation should be obtained from populations prior to impact.

Migratory Bird Best Management Practices
To minimize impacts to nesting migratory birds, we recommend conducting surveys if habitat will be cleared with mechanical devices between March 15 and September 15. The Service recommends leaving a buffer of vegetation at least 100 feet (30 m) around nests of Passerines (i.e., songbirds) until young have fledged or the nest is abandoned. Many nesting raptors need buffers of at least 0.25 miles (400 m); however, northern aplomado falcons and eagles need 2 mile (3.2 kilometer) buffers around their nests. For waterbirds nesting near federally permitted activities, the Service recommends an equipment and activity set-back distance of 1,000 feet (304 m). This distance is consistent with the 1,000-foot buffer established for bird rookeries in the Texas General Land Office's Resource Management Codes, and applies to colonial waterbird rookery islands and to tern or black skimmer colonies along shorelines. If an injured bird is encountered during project operations, please report the injured bird to Amos Rehabilitation Keep in Port Aransas, Texas, at 361-749-6793.

EIS Scoping Comments
The Service requests that the USCG and MARAD fully evaluate all potential direct, indirect, and cumulative environmental impacts in the EIS, including federally listed threatened and endangered species, critical habitat, state listed threatened and endangered species, state Species of Greatest Conservation Need, migratory birds, colonial waterbird rookery islands, special aquatic sites, Redfish Bay State Scientific Area, and wetlands. The Service requests evaluation of additional impacts to the inshore portions of the proposed project areas, including increased erosion and loss of shoreline stabilization from pipeline installation, increased vulnerability to oil spills from crude oil pipelines and booster station, and a potential loss of uniqueness and aesthetics in the community of Port Aransas and surrounding recreational and fishing areas (i.e., Lighthouse Lakes Paddling Trail, Port Aransas Nature Preserve, Port Aransas Jetties).

Please also include potential long-term direct, indirect, and cumulative environmental impacts associated with future maintenance and repairs of the pipelines. The Service is concerned about the potential for significant cumulative effects from multiple projects in progress or proposed for Redfish Bay, Corpus Christi Bay, Harbor Island, and Mustang Island.

The Service appreciates the opportunity to provide technical assistance for the Bluewater Texas Terminal project. If you have questions regarding these comments, please contact Mary Kay Skoruppa at (361) 225-7314, or by email at mary_kay_skoruppa@fws.gov.

Sincerely,

Charles Ardizzone
Field Supervisor

cc:
P. Silva, Ecosystem Resources Program, TPWD, Corpus Christi, TX
J. Robinson, Ecosystem Resources Program, TPWD, Corpus Christi, TX
L. Koza, Ecosystem Resource Program, TPWD, Corpus Christi, TX
C. Stevens, Habitat Conservation Division, NMFS, Galveston, TX
D. Shaver, Padre Island National Seashore, NPS, Corpus Christi, TX
P. Kaspar, Region 6 EPA, Dallas, TX
A. Kitto, Region 6, EPA, Dallas, TX
J. Abbott, Risk Assessment & Permit Policy Section, BSEE, Sterling, VA
M. Evans, Plans Section, BOEM, New Orleans, LA
P. Boudreaux, Office of the Environment, BOEM, New Orleans, LA
M. Kimmel, Texas Regulatory Office, USACE, Corpus Christi, TX
J. Solis, Permit Service Center, TGLO, Corpus Christi, TX
A. Nunez, Coastal Field Operations, TGLO, Corpus Christi, TX
J. Zeplin, Coastal Field Operations, TGLO, Corpus Christi, TX
A. Walker, Amos Rehabilitation Keep, Port Aransas, TX
W. Harrell, Classification and Restoration Division, USFWS, Victoria, TX
J. Saenz, Aransas National Wildlife Refuge, Austwell, TX

From:	Perera, Melissa E CIV
To:	"Orms, Mary"; Phillips, Melony; Skoruppa, Mary Kay; Harrell, Wade
Cc:	Dave, Chaitali R; Thompson, Ashley; Perez-Perez, Carlos (MARAD)
Subject:	RE: [EXTERNAL] FW: Bluewater Texas Terminal (BWTT) Project - Whooping Crane Information
Date:	Thursday, October 15, 2020 3:24:39 PM

EXTERNAL EMAIL

Hi Mary,

Yes, everything that you said is correct. The ESA consultation is with us (the Coast Guard) and with the Maritime Administration. The Coast Guard prepares all of the environmental documents, including the EIS and the BA. However, please note that the Maritime Administration issues the deepwater port license, and as such, is the decisionmaker. I've copied the Maritime Administration's project manager on this e-mail – he will make sure that any conservation measures that arise from the Sec 7 consultation appear in the Record of Decision and as conditions to the license. I will, of course, make sure that all agreed-upon BMPs and any conservation measures appear in the EIS.

The more detailed maps that you referred to may be the ones that Golder (the Coast Guard's contractor) has sent you. Golder developed these maps as part of our EIS, which has not yet been published. We hope that they give you the detail required to evaluate whooping crane habitat. Please let us know if you need anything else from us.

V/r,
Melissa

From: Orms, Mary <mary_orms@fws.gov>
Sent: Thursday, October 15, 2020 4:00 PM
To: Phillips, Melony <Melony.A.Phillips@p66.com>; Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>; Harrell, Wade <wade_harrell@fws.gov>
Cc: Dave, Chaitali R <Chaitali.R.Dave@p66.com>; Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Ashley Thompson (Ashley_Thompson@golder.com) <Ashley_Thompson@golder.com>
Subject: [Non-DoD Source] Re: [EXTERNAL] FW: Bluewater Texas Terminal (BWTT) Project - Whooping Crane Information

Melony, Mary Kay emailed me some more detailed maps. We can work with those maps.

Just for my own clarity:
In a previous call we were on, I believe Melissa, you identified yourself as being with the U.S. Coast Guard and the Coast Guard is the federal agency the Service is consulting with. Ashley, you are with Golder, a consultant for the Coast Guard or the applicant? And Dave and Melony, you both are with P66, which is the applicant?

Although the Service is willing to assist the federal agency and the applicant in any way possible, our consultation is with the federal agency, in this case the Coast Guard. All correspondence we provide is through the Coast Guard or their designated consultant. The reason for that is the Coast Guard is ultimately responsible for ensuring the applicant fulfills any agreed upon conservation measures. It also makes it less confusing as to who we are responding to and less likely of any misunderstanding occurring.

Wade, the Whooping Crane Coordinator, and our office will be reviewing the more detailed maps and try to provide further recommendations or concurrences as appropriate.

I will be out of the office this Friday and Monday. If Mary Kay, Wade, and I have available time next week and/or the following, we will provide a response to Melissa within that timeframe.

Please contact me via email at mary_orms@fws.gov.

From: Orms, Mary <mary_orms@fws.gov>
Sent: Thursday, October 15, 2020 1:29 PM
To: Phillips, Melony <Melony.A.Phillips@p66.com>; Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>; Harrell, Wade <wade_harrell@fws.gov>
Cc: Dave, Chaitali R <Chaitali.R.Dave@p66.com>; Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Ashley Thompson (Ashley_Thompson@golder.com) <Ashley_Thompson@golder.com>
Subject: Re: [EXTERNAL] FW: Bluewater Texas Terminal (BWTT) Project - Whooping Crane Information

Melony,
We need a more detailed map. The map should allow us to see what habitat the pipeline is moving through and where and what type of habitat the staging areas will be placed in.

The measures are the usual measures we recommend but, we are unable to concur that those measures would avoid or minimize impacts to whooping crane habitat and would not result in "take" of an individual or habitat.

Thanks,
Mary

From: Phillips, Melony <Melony.A.Phillips@p66.com>
Sent: Thursday, October 15, 2020 12:51 PM
To: Orms, Mary <mary_orms@fws.gov>; Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>
Cc: Dave, Chaitali R <Chaitali.R.Dave@p66.com>; Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Ashley Thompson (Ashley_Thompson@golder.com) <Ashley_Thompson@golder.com>
Subject: [EXTERNAL] FW: Bluewater Texas Terminal (BWTT) Project - Whooping Crane Information

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Hello, Mary and Mary Kay,

I wanted to follow-up on the below e-mail. Do you have any feedback you can share with us? We'd like to close the loop on the project's BMPs.

Thanks,

Melony Phillips, REM
Phillips 66
Environmental Director
M: (+1) 832-596-8995
Address: 2331 CityWest Blvd | M/C: N1084-04 | Houston, TX 77042

From: Phillips, Melony
Sent: Friday, September 25, 2020 2:59 PM
To: 'Orms, Mary' <mary_orms@fws.gov>; 'Skoruppa, Mary Kay' <mary_kay_skoruppa@fws.gov>
Cc: Dave, Chaitali R <Chaitali.R.Dave@p66.com>; 'Justin Wiedeman' <justin@lloydeng.com>; Marisa Weber (marisa@lloydeng.com) <marisa@lloydeng.com>; 'Perera, Melissa E CIV' <Melissa.E.Perera@uscg.mil>; Ashley Thompson (Ashley_Thompson@golder.com) <Ashley_Thompson@golder.com>
Subject: Bluewater Texas Terminal (BWTT) Project - Whooping Crane Information

Hello, Mary and Mary Kay,

Thanks for taking the time to discuss the Bluewater Texas Terminal (BWTT) Project with us yesterday. Based on our conversation, we are submitting the construction schedule and a map from the BA prepared as part of the Application submittal for your review.

While the project does lie within the migratory pathway of Whooping Crane, BWTT has a list of BMPs to avoid negatively effecting this protected species and avoid formal consultation.

The BMPs that pertain to Whooping Crane include:

- A qualified biologist would conduct biological monitoring for the species within suitable habitats to determine if any individuals are present.
- BWTT employees and contractors would receive training on proper identification of the species and procedures for notifying supervisors if the species is observed.
- If individuals are observed within 1,000 feet of construction activities, all work

would cease until the Whooping Crane moves outside that 1,000-foot work buffer of its own accord.

- If equipment over 15 feet high is to be used during construction, the equipment would be flagged or marked to increase visibility and lessen the risk of collisions.
- During nighttime hours and periods of low visibility, all construction equipment containing components that could reach 15 feet would be lowered to prevent any potential interference with the species.

As discussed on the call yesterday, the construction schedule will shift, but not the activity durations, since it will be tied to the issuance of the license.

We appreciate your help and feedback and we'll circle back with you next week to schedule a follow-up call.

Regards,

Melony Phillips, REM
Phillips 66
Environmental Director
M: (+1) 832-596-8995
Address: 2331 CityWest Blvd | M/C: N1084-04 | Houston, TX 77042

From:	Skoruppa, Mary Kay
To:	Trahan, Jacob; Perera, Melissa E CIV; Thompson, Ashley; Gocke, Kelsey
Cc:	Orms, Mary; Harrell, Wade; Anderson, Tim
Subject:	Re: [EXTERNAL] RE: northern aplomado falcons on San Jose Island
Date:	Thursday, December 3, 2020 3:26:49 PM
Attachments:	image003.jpg

EXTERNAL EMAIL

Hi Jake and all,

I was able to get some additional details about the aplomado falcon nest locations on San Jose Island.

Two nest structures are located within 2 miles of the proposed work area. However, neither have ever been used by the falcons. Because there is no history of occupancy at these two sites, they are a low priority, and no monitoring would be required. Any observed nesting behavior should be reported to the USFWS. The nearest nest used in the past on San Jose Island is almost 6 miles away from the proposed pipeline route.

Please let me know if you have any questions.

Best,

Mary Kay

From: Trahan, Jacob <Jacob_Trahan@golder.com>
Sent: Friday, November 20, 2020 12:48 PM
To: Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>; Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Thompson, Ashley <Ashley_Thompson@golder.com>; Gocke, Kelsey <Kelsey_Gocke@golder.com>
Cc: Orms, Mary <mary_orms@fws.gov>; Harrell, Wade <wade_harrell@fws.gov>
Subject: [EXTERNAL] RE: northern aplomado falcons on San Jose Island

Mary Kay,

Thank you for the information regarding the northern aplomado falcons on San Jose Island. You have noted that the southernmost territory on San Jose Island is northeast of the proposed pipeline route. While we are aware that the Service may not be able to give specific location information for a listed species, would you be able to identify if the project workspace is within the 2014 5-year review stated home range of a circle with a radius of 2 miles around the nest site?

In regard to the currently unoccupied artificial nest structure, is that structure located on private lands, or would you be able to provide us with the latitude and longitude of that structure to check for use prior to the start of construction, as recommended in your email?

Regards,

Jake Trahan
Project Manager - Environmental Planning & Permitting
D: +1 (281) 821-6868 x24012 | **C:** +1 (832) 360-5122 |

From: Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>
Sent: Thursday, November 19, 2020 11:41 AM
To: Trahan, Jacob <Jacob_Trahan@golder.com>; Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Thompson, Ashley <Ashley_Thompson@golder.com>; Gocke, Kelsey <Kelsey_Gocke@golder.com>
Cc: Orms, Mary <mary_orms@fws.gov>; Harrell, Wade <wade_harrell@fws.gov>
Subject: northern aplomado falcons on San Jose Island

EXTERNAL EMAIL

Hi Jake and all,

As promised, here is what we know about the status of northern aplomado falcons on San Jose Island. Prior to Hurricane Harvey, six pairs of aplomado falcons were known to occupy San Jose Island. The southern most territory is NE of the proposed pipeline route, however, we do not know the approximate distance at this time. There is an artificial nest structure slightly north of the proposed pipeline, at the southern end of the island but, but to date there has been no known occupancy, although there could be in the future. Therefore, the biological monitor should be made aware of the nest structure location and monitor it for any occupancy during construction and future operational activity.

Mary Kay

Mary Kay Skoruppa
U.S. Fish and Wildlife Service
Texas Coastal Ecological Services
4444 Corona Dr., Suite 215
Corpus Christi, TX 78411
Direct 361-225-7314; Mobile 346-815-0009; Main Office 361-994-9005
mary_kay_skoruppa@fws.gov

From:	Lee, Mary A
To:	Trahan, Jacob; Skoruppa, Mary Kay; Gardiner, Dawn; Orms, Mary
Cc:	Perera, Melissa E CIV; Gocke, Kelsey; Bulliner, Kathryn M; Thompson, Ashley
Subject:	RE: [EXTERNAL] Bluewater - USFWS Meeting- Eastern Black Rail
Date:	Friday, April 2, 2021 12:24:08 PM

EXTERNAL EMAIL

Dear Mr. Trahan,

Yes, those are the correct classification codes for the National Wetland Inventory data. I want to make sure to point out that these go in conjunction with the work that you have done on Landcover data, and neither is perfect. Therefore we appreciate that your office does the ground-truthing as well. I've added a few pictures of the grass canopy for your references. Please note that these are pictures I have taken and are not definitive sources. If you would like to send us the GIS or KMZ of the pathway, we can look at it as well.

The core survey information that you sent is correct. I wanted to clarify that the recommendations mention the document I sent are used to get the best auditory response. The black rail has a detection rate of approximately 0.25 with all of those conditions met. So while the survey can be done outside of those parameters, the relative certainty of the detection declines. The survey protocol is still currently under review both nationally and regionally, and is subject to change. Below are some of the key points for clarification.

- Each point should be surveyed a minimum of 3 times. Due to low detection rates for the species, 5 surveys is ideal. There should be a minimum of 7-10 days between surveys of the same point.
- Kerr call can be used but also the chert and growl. Other rail species (ie Virginia or clapper rails) can be used in addition to the black rail calls
- as mentioned, the surveyor should be experienced in a variety of calls which the black rails make
- survey timing is best at dawn and dusk. It is possible to get calls outside of this time frame especially during the breeding season, however it is less effective.
- calls can also be found at https://www.xeno-canto.org/

If any comment is unclear or did not answer your question please let me know.

Sincerely,

M. Sandra Lee

Wildlife Biologist

Texas Coastal Ecological Services Field Office
U.S. Fish and Wildlife Service
4444 Corona Drive, suite 215
Corpus Christi, TX 78411

Direct line (361) 225-7316
Work Cell (361) 533-6053

Pronouns: she/her/hers

From: Trahan, Jacob <Jacob_Trahan@golder.com>
Sent: Wednesday, March 31, 2021 10:01 AM
To: Lee, Mary A <mary_lee@fws.gov>; Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>; Gardiner, Dawn <dawn_gardiner@fws.gov>; Orms, Mary <mary_orms@fws.gov>
Cc: Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Gocke, Kelsey <Kelsey_Gocke@golder.com>; Bulliner, Kathryn M <kathryn_bulliner@fws.gov>; Thompson, Ashley <Ashley_Thompson@golder.com>
Subject: RE: [EXTERNAL] Bluewater - USFWS Meeting- Eastern Black Rail

NOTE: This email chain appears to contain email from outside Golder

Good Morning,

Thank you for the email regarding the eastern black rail conservation measures. Based on our phone call, can the USFWS please provide follow up responses on the two items listed below:

Item 1) Can the USFWS please review the following Cowardin wetland classification modifiers (for Persistent PEM and E2EM wetlands) and provide confirmation that the modifiers are appropriate for potential eastern black rail habitat:

Nontidal:
- A Temporarily Flooded
- C Seasonally Flooded
- E Seasonally Flooded/Saturated
- J Intermittently Flooded

Tidal:
- P Irregularly Flooded

Freshwater Tidal:
- S Temporarily Flooded - Tidal
- R Seasonally Flooded – Tidal

Once confirmed we will narrow potential habitat within these classifications based on the NWI wetlands layer as ground-truthed by wetland delineations.

<u>Item 2)</u> In addition, we would like confirmation from USFWS on eastern black rail survey protocols as listed below:

Survey protocols

- *5 minutes per survey: First 2 minutes passive listening, 2 minutes of playing EBR calls ki-ki-kerr vocalizations, and finally 1 minute of passive listening.*
  - *The playback should have 20 seconds of ki-ki-kerr followed by 10 seconds of silence, repeated 4 times.*
  - *Calls should be available through e-bird online; contact the USFWS if, after looking online, calls are unavailable.*
- *Data sheets should record the cloud cover percentage, temperature, wind speed, and lunar phase (date, time, surveyors are other key things to note on survey sheets).*
- *Surveyors: at least one person should be proficient at using the protocol and identifying marsh birds by their calls. If necessary, an untrained assistant can accompany a surveyor for safety reasons rather than to collect data. If double observers are used, each surveyor should fill out a separate data sheet and should record their data separately without discussing anything with the other surveyor. Surveyors should not point out a call or a bird to the other during the survey period. Each surveyor should stand 1-2 m away from the other and should keep their pen on their data sheet at all times so that one surveyor is not cued by the sudden writing activity of another surveyor.*

Broadcast Equipment and Placement

- *Surveyors should stand at the survey point coordinates while listening for vocal responses. The broadcast player should be placed approximately 1 m above the ground (hood of truck or on a tri-pod) if possible and should be at least 2 m to one side of the survey point (placing the speaker too close to the surveyors can reduce their ability to hear calling birds). If necessary, the broadcast player can be placed on the ground (if dry) or on the bow of the boat, if applicable. Sound pressure should be 70-80 decibel (dB) at 3 feet in front of the speaker. Surveyors should point the speaker toward the center of the marsh and should not rotate the speaker during the call-broadcast survey. Speakers should not face the surveyors.*

The USFWS must review any modification to the proposed survey protocol in advance to make sure that the efforts will yield useful information. This survey method was taken from literature published on surveys recorded in Texas. Other survey methods have also been published from Florida study areas that are slightly different. The Texas protocol represents a more intensive effort over a shorter period of time than the Florida protocol (7-10 days between surveys, but slightly fewer number of visits). The USFWS is recommending this Texas survey method to complete the task sooner, but either method is acceptable.

Please let us know if you have any follow on questions.

Thank you.

Jake Trahan
Senior Consultant
D: +1 (281) 821-6868 x24012 | **C:** +1 (832) 360-5122 |

From: Lee, Mary A <mary_lee@fws.gov>
Sent: Thursday, March 18, 2021 10:08 PM
To: Trahan, Jacob <Jacob_Trahan@golder.com>; Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>; Gardiner, Dawn <dawn_gardiner@fws.gov>; Orms, Mary <mary_orms@fws.gov>
Cc: Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Gocke, Kelsey <Kelsey_Gocke@golder.com>; Bulliner, Kathryn M <kathryn_bulliner@fws.gov>
Subject: RE: [EXTERNAL] Bluewater - USFWS Meeting- Eastern Black Rail

EXTERNAL EMAIL

Hello,

I wanted to follow up with some of the points that we discussed about the eastern black rail. These are the conservation measures that we discussed. Please note that these conservation measures are still in fluctuation as we better understand the needs and threats to the species. These best management practices have been developed through threats and management practices effects as described in the SSA v1.3, the Federal 4d rule from 2019

- The species may be present in all of the Texas coastal counties year-round. The species is most vulnerable during breeding, chick rearing, and the flightless molt period. Where black rails are present, avoid disturbance activities March 1st through September 30th in suitable BLRA habitat (e.g., dense overhead cover, moist soils that are occasionally dry and interspersed or adjacent to shallow water, depths up to 5 cm but typically <3 cm) as described in the Final Rule (pgs. 63767, 63798, and 63800). If this timing restriction cannot be achieved then the we recommend the following measures:
  - A survey should be done prior to the start of the proposed action to assess BLRA breeding activity within the planned project area. Survey recommendations will be given on a project by project basis, please coordinate with the Texas Coastal Ecological Service's Office.
  - A biological monitor on site should maintain pathways to refugia and avoid clearing in a way that creates isolated pockets of suitable BLRA habitat on the project site. In part this is done by linear clearing in the direction of refugia, and avoiding clearing by decreasing concentric circles.
  - The biological monitor may also be required to maintain a sufficiently slow pace of equipment moving through potential habitat which allows for the

escape of the birds a head. Biological monitors should be aware that the species will run to escape oncoming disturbance and are highly unlikely to fly during day light.

- The biological monitor will have authority to stop work immediately if BLRA chick or eggs are observed within the project area. In addition, the Texas Coastal Ecological Service's Office should be contacted immediately at (281)286-8282.
- If temporary access routes, pipeline routes, or staging areas occur within potential BLRA habitat the contractor must minimize traffic in these areas therefore minimizing the construction foot print, by limiting the number of ingress and egress routes to the maximum extent possible.

Additionally, these are two general best management practice which support black rail populations.

- Keep lighting pointed at work zone for nighttime work and turn off at night while work is not being conducted, as possible. All permanent lighting should be pointed away from potential BLRA habitat, be down shielded, and should follow the Dark Skies or Texas Bird City guidelines for lighting.
- Projects involving revegetation of disturbed areas should use native plants which mimic the local site composition. Propagation of woody species should be avoided.

We discussed during the meeting how slow is "slowly". I spoke with the one of the regional species experts about the speed. The speed is based on the ability of a biological monitor to walk in the habitat ahead of the mower. Essentially this translates to 1-2 miles per hour or the lowest possible speed on the mower. This is based on species expert experience and the threat to nesting and chicks described in the SSA v1.3.

If you have further questions or concerns I would be happy to provide more information. I will follow up next week on the National Wetland inventory wetland descriptions which are appropriate for black rail habitat.

Sincerely,

M. Sandra Lee

Wildlife Biologist
Texas Coastal Ecological Services Field Office
U.S. Fish and Wildlife Service
4444 Corona Drive, suite 215
Corpus Christi, TX 78411

Direct line (361) 225-7316
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Pronouns: she/her/hers

From: Trahan, Jacob <Jacob_Trahan@golder.com>
Sent: Thursday, March 18, 2021 6:42 PM
To: Skoruppa, Mary Kay <mary_kay_skoruppa@fws.gov>; Gardiner, Dawn <dawn_gardiner@fws.gov>; Lee, Mary A <mary_lee@fws.gov>; Orms, Mary <mary_orms@fws.gov>
Cc: Perera, Melissa E CIV <Melissa.E.Perera@uscg.mil>; Gocke, Kelsey <Kelsey_Gocke@golder.com>
Subject: [EXTERNAL] Bluewater - USFWS Meeting- Eastern Black Rail

Hello,

Thank you all for attending the meeting this week to discuss the eastern black rail. Please see attached meeting minutes from the call. It includes a few actions for the USFWS. We will keep the USFWS posted to schedule updates as we move forward with the BA and IDEIS.

Regards,

Jake Trahan
Senior Consultant

14950 Heathrow Forest Parkway, Suite 280, Houston, Texas, USA 77032
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Work Safe, Home Safe

December 4, 2020

Mr. Roddy Bachman
Project Manager, Deepwater Ports
U.S. Coast Guard
2703 Martin Luther King Jr, Ave SE
Washington DC, 20593-7509

Re: Bluewater Texas Terminal, LLC Project (MARAD-2019-0094) language update to General Land Office Easement.

Mr. Bachman,

The Texas General Land Office (GLO) is responsible for managing State-owned submerged land dedicated to the Permanent School Fund. Portions of the pipeline associated with this project are proposed to be located on State-owned submerged land. All project components on State land will require an easement under §51.291 of the Natural Resources Code (NRC). In accordance with this statute, all pipelines on State lands must have an active easement with the GLO while the pipelines are being utilized. Pipeline abandonment in place on State-owned submerged lands will not be authorized. All structures must be removed from State land when no longer in use. Although each project is unique, current standard language included in a Miscellaneous Easement (ME) authorizing pipelines contains the following:

9.02 Except as otherwise provided by applicable law or rule and subject to obtaining necessary approval from state or federal agencies having applicable jurisdiction, or making best efforts to obtain such permits, Grantee shall, within one hundred twenty (120) days from the date of expiration or sooner termination of this Agreement, initiate removal of all personal property, structures, and the Improvements, and shall restore the Premises (and any other property affected by such removal activities) to the same condition that existed before Grantee entered thereon. Such removal and restoration activities shall be coordinated with the General Land Office in accordance with guidelines in effect at the time of removal/restoration which may include, without limitation, specific removal techniques required for protection of natural resources and mitigation or payment in lieu of mitigation for any and all damages resulting from removal activities, all of which shall be in accordance with generally accepted current pipeline industry standards using available technology. Grantee shall notify the GRANTOR at least ten (10) days before commencing removal/restoration activities so that a General Land Office field inspector may be present.

1700 North Congress Avenue, Austin, Texas 78701-1495
P.O. Box 12873, Austin, Texas 78711-2873
512-463-5001 glo.texas.gov

A renewal or assignment of the Easement may be granted if the pipeline is still in use. The following condition was coordinated with the applicant to address removal of the line and will be added to the Easement.

In accordance with generally accepted pipeline industry standards and technology at the time of removal, as required by Section 9.02, if at the time of expiration or earlier termination of the Agreement no feasible methods exist to remove the Improvements without causing significant environmental damage, at the STATE'S sole discretion, the STATE may authorize sections of the Improvements installed via HDD to remain in place, provided the Improvements are sufficiently buried to industry standards and pose no threat to human health and safety or the environment. Grantee will be required to maintain an easement and remain liable for any damages caused by any sections of such Improvements that remain in place in perpetuity.

Please feel free to contact Jesse Solis at 361-886-1630 with any questions.

Sincerely,

Amy Nunez

Amy Nunez
Director, Coastal Field Operations
Texas General Land Office

Cc:

Yvette Fields; Yvette.fields@dot.gov

Perera, Melissa E CIV; Melissa.E.Perera@uscg.mil

Trahan, Jacob; Jacob_Trahan@golder.com

Chaitali Dave; Chaitali.R.Dave@p66.com

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 3, 2020

D'Anne Stites
Compliance and Enforcement
Texas General Land Office
P.O. Box 12873
Austin, Texas 78711

Via: E-mail

Re: TCEQ NEPA Request #2020-016. Texas Bluewater Deepwater Port. San Patricio County.

Dear Ms. Stites

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers the following comments:

In accordance with the general conformity regulations in 40 CFR Part 93, this proposed action was reviewed for air quality impact. The proposed action is located in San Patricio County, which is currently designated as attainment/unclassified for the National Ambient Air Quality Standards for all six criteria air pollutants. General conformity requirements do not apply.

The Office of Water does not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities associated with it are completed in accordance with applicable local, state, and federal environmental permits, statutes, and regulations. We recommend that the applicant take necessary steps to ensure that best management practices are used to control runoff from construction sites to prevent detrimental impact to surface and ground water.

Any debris or waste disposal should be at an appropriately authorized disposal facility. If the facility intends to store hazardous waste for more than 90 days, they need to coordinate with our Waste Permits Division to seek authorization prior to storage.

Thank you for the opportunity to review this project. If you have any questions, please contact the agency NEPA coordinator at (512) 239-0010 or NEPA@tceq.texas.gov

Sincerely,

Ryan Vise,
Division Director
External Relations

November 22, 2019

Mr. Myles J. Greenway
U.S. Coast Guard
2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509

Re: Review
Subj: NHPA Section 106 Review Area of Potential Effect for the Bluewater Deepwater Port Project (MRAD-2019-0094)

Thank you for allowing us to review the document referenced above. This letter serves as comment on the proposed undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC).

The review staff led by Jeff Durst and Amy Borgens of the Archeology Division and Caitlin Brashear of the History Programs Division has completed its review. After reviewing the documentation, we concur that the underwater archeological geophysical remote-sensing investigation conducted by Bob Gearhart of Bob Hydrographics, LLC on 6 December 2018 identified three targets (Anomalies 1-3) that were recommended for avoidance: two of these targets occur in state waters and one is in federal waters. The avoidance margins for Anomalies 1-3 are defined as thus: 150 meters beyond the magnetic contours for Anomaly 1; 50 meters from the sonar target of the archeological site of Anomaly 2; and 50 meters beyond the contours of Anomaly 3. Anomalies 2 and 3 are in an area wherein pipeline installation will occur via horizontal directional drilling, so no impacts will be introduced to these two targets by the Bluewater SPM project.

Regarding above-ground resources, and based on the overall site, height, and design of proposed permanent above-ground resources, we recommend assessing an indirect APE of one mile for the Harbor Island Booster Station.

Regarding the on-shore element of the project review, we are unable to provide eligibility determinations for sites 41NU286 and 41NU289 at this time as the THC has not received a draft of the archeological report that presents the findings for these sites. Once we have been provided with this draft report we will review it and provide our comments to the U.S. Coast Guard and the Maritime Administration.

Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If we may be of further assistance, please call Jeff Durst of our staff at 512/463-8884, Amy Borgens at 512/463-9505 or Caitlin Brashear at 512/463-5851.**

Sincerely,

Jeff Durst

for
Mark Wolfe, State Historic Preservation Officer
MW/jjd

Cc: Yvette M. Fields, Office of Deepwater Port Licensing and Port Conveyance Maritime Administration

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TECHNICAL MEMORANDUM

To: Caitlin Brashear
Texas Historical Commission
108 West 16th Street
Austin, Texas 78701

From: Victoria Myers, Architectural Historian

Date: January 31, 2020

Re: **Desktop Review of Visual Impacts for Proposed Harbor Island Booster Station, Harbor Island, Nueces County / SWCA Project No. 53739**

PROJECT DESCRIPTION

Lloyd Engineering, Inc. (LEI) on behalf of Bluewater Texas Terminal LLC (BWTT) proposes to construct the Harbor Island Booster Station located on Harbor Island, Nueces County, Texas as part of the larger Bluewater Single Point Mooring Project, previously coordinated with the Texas Historical Commission (THC) under MRAD-2019-0094. Full terrestrial and marine archaeological reports have previously been submitted and finalized under Section 106 of the National Historic Preservation Act. THC comments to the United States Coast Guard on the MARAD submittal requested viewshed impacts on historic resources within 1 mile of the Harbor Island Booster Station in a letter dated November 22, 2019 and received by BWTT on January 10, 2020 (Appendix A). On January 28, 2020, SWCA Environmental Consultants (SWCA) coordinated a call with THC, BWTT, and LEI to provide THC with additional project specifications and for THC to provide the team with guidance for completing the viewshed analysis documentation.

The proposed booster station location is on Harbor Island Road, approximately 0.4 mile north of the Port Aransas Ferry, and will include two crude and two water storage containers each approximately 40 feet high (Appendix B). In addition, the booster station will have smaller tanks and wells, fencing, ramps, levees, a small warehouse and office building, and piping connecting it to the larger project. To finalize the Section 106 component, SWCA conducted a desktop review of the Harbor Island Booster Station and assessed potential viewshed impacts on historic properties.

METHODOLOGY

As part of the terrestrial archaeological study, SWCA performed a cultural resources records review of the full Bluewater Single Point Mooring project area. This included review of data from the THC Texas Archeological Sites Atlas (Atlas). This source provided information on the nature and location of previously conducted archaeological surveys, previously recorded cultural resource sites, locations of National Register of Historic Places (NRHP) properties, State Antiquities Landmarks, Official Texas Historical Markers, Registered Texas Historic Landmarks, cemeteries, and local neighborhood surveys. The review also examined aerial photographs, Bureau of Economic Geology Maps, and the Natural

Resources Conservation Service Web Soil Survey to identify potential for archaeological deposits as well as the Texas Department of Transportation Historic Overlay to identify the presence of potential historic-age structures.

After the initial coordination with THC, LEI provided SWCA the final proposed Harbor Island Booster Station location and SWCA architectural historians were able to conduct the 1-mile review requested by THC and identify the previously identified historic resources located within 1-mile of the project area (Appendix C). The review showed that a portion of the NRHP-listed Aransas Pass Light Station Historic District fell within the boundary.

SWCA also reviewed historic aerial imagery and maps for context. During the context review, SWCA identified previous industrial storage tanks located in the same area on Harbor Island as the proposed booster station. The tanks are visible on the 1968 U.S. Geological Survey map (Appendix D) and in photographs used in the Aransas Pass Light Station Historic District NRHP nomination; the tanks were demolished between 1995 and 2003 based on aerial imagery available on Google Earth. The tanks also appear on a pre-2013 map from the National Geographic Society (Appendix E).

EVALUATION

Aransas Pass Light Station

The center point for the Aransas Pass Light Station is located approximately 1.01 miles northeast from the proposed booster station. Built in 1855, the Aransas Pass Light Station is the second oldest in the state and was in service until 1952 when it no longer provided the best guidance through the Aransas Pass Channel which had shifted nearly one mile south to its current location. The United States Coast Guard, who owned and managed the property since 1939, sold it at auction and it has been in private control since. Views of the structure are only from public waterways. The light station, the tallest point on the site, stands approximately 75 feet above ground level and is located approximately 1.08 miles from the project area. Historic photographs taken from the top of the light station and included in the 1977 NRHP nomination demonstrate that the proposed Harbor Island Booster Station may be visible from the top of the light station (Figure 1).

Figure 1 clearly demonstrates that at the time of listing, the portion of Harbor Island across the channel was visible from the top of the light station just over one mile away. At the time of listing, the viewshed included more industrial storage tanks of similar size as proposed. Since the nomination, aerial imagery shows that a dune on the light station side of the channel has grown, which would provide some additional screening of the project area from the district, although likely still visible from the light station itself due to its height. Historical aerial imagery also shows the original tanks from 1976 were present until the late 1990s when they were demolished. Storage tanks on a parcel northeast of Harbor Island Road first appear on historical aerial imagery between 1985 and 1990, and they remain extant in 2020. Based on this, the setting for the Aransas Pass Light Station Historic District since NRHP designation has included industrial storage within the viewshed. Therefore, SWCA recommends that the proposed Harbor Island Booster Station section of the Bluewater Single Point Mooring Project will have NO ADVERSE EFFECT on historic resources.

Figure 1. Photograph 6 of 6 from the NRHP nomination for the Aransas Pass Light Station, dated 1976 and published in the public record in 1977, Approximate Project Location added by SWCA 2020.

APPENDIX A

THC Correspondence

Enclosure 2

TEXAS HISTORICAL COMMISSION

real places telling real stories

November 22, 2019

Mr. Myles J. Greenway
U.S. Coast Guard
2703 Martin Luther King Jr. Ave. SE
Washington, DC 20593-7509

Re: Review
Subj: NHPA Section 106 Review Area of Potential Effect for the Bluewater Deepwater Port Project (MRAD-2019-0094)

Thank you for allowing us to review the document referenced above. This letter serves as comment on the proposed undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC).

The review staff led by Jeff Durst and Amy Borgens of the Archeology Division and Caitlin Brashear of the History Programs Division has completed its review. After reviewing the documentation, we concur that the underwater archeological geophysical remote-sensing investigation conducted by Bob Gearhart of Bob Hydrographics, LLC on 6 December 2018 identified three targets (Anomalies 1-3) that were recommended for avoidance: two of these targets occur in state waters and one is in federal waters. The avoidance margins for Anomalies 1-3 are defined as thus: 150 meters beyond the magnetic contours for Anomaly 1; 50 meters from the sonar target of the archeological site of Anomaly 2; and 50 meters beyond the contours of Anomaly 3. Anomalies 2 and 3 are in an area wherein pipeline installation will occur via horizontal directional drilling, so no impacts will be introduced to these two targets by the Bluewater SPM project.

Regarding above-ground resources, and based on the overall site, height, and design of proposed permanent above-ground resources, we recommend assessing an indirect APE of one mile for the Harbor Island Booster Station.

Regarding the on-shore element of the project review, we are unable to provide eligibility determinations for sites 41NU286 and 41NU289 at this time as the THC has not received a draft of the archeological report that presents the findings for these sites. Once we have been provided with this draft report we will review it and provide our comments to the U.S. Coast Guard and the Maritime Administration.

GREG ABBOTT, GOVERNOR • JOHN L. NAU, III, CHAIR • MARK WOLFE, EXECUTIVE DIRECTOR
P.O. BOX 12276 • AUSTIN, TEXAS • 78711-2276 • P 512.463.6100 • F 512.475.4872 • thc.texas.gov

Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If we may be of further assistance, please call Jeff Durst of our staff at 512/463-8884, Amy Borgens at 512/463-9505 or Caitlin Brashear at 512/463-5851.**

Sincerely,

for
Mark Wolfe, State Historic Preservation Officer
MW/jjd

Cc: Yvette M. Fields, Office of Deepwater Port Licensing and Port Conveyance Maritime Administration

Enclosure 3

From: noreply@thc.state.tx.us
To: Foley, Paige A CIV; reviews@thc.state.tx.us
Subject: [Non-DoD Source] Project Review: 202003927
Date: Monday, January 6, 2020 9:54:40 AM

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
202003927
Bluewater Deepwater Port Project
Pipeline and Offshore Deepwater Port
Aransas Pass,TX

Dear Paige Foley:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff led by Jeff Durst and Caitlin Brashear has completed its review and has made the following determinations based on the information submitted for review:

Archeology Comments

- No historic properties present or affected. However, if buried cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- THC/SHPO concurs with information provided.
- Draft report acceptable. Please submit another copy as a final report along with shapefiles showing the area where the archeological work was conducted. Shapefiles should be submitted electronically to Archeological_projects@thc.texas.gov.

We have the following comments: THC concurs that sites 41NU289 and 41AS91 are ineligible for inclusion in the National Register of Historic Places based on the lack of buried deposits, cultural features, or temporally diagnostic materials.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: Jeff.Durst@thc.texas.gov, caitlin.brashear@thc.texas.gov.

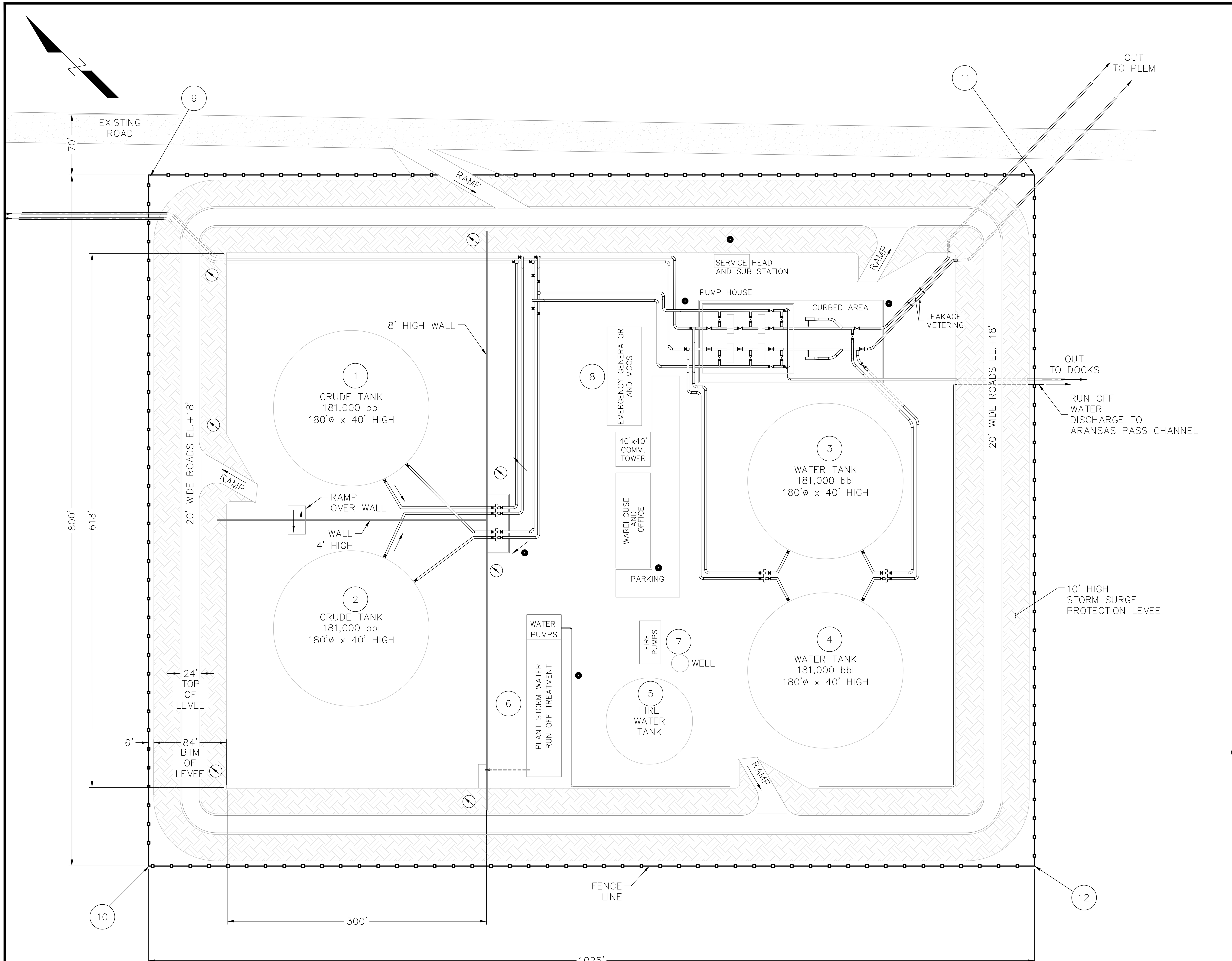
Sincerely,

For Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

APPENDIX B

Engineering Specs



PLAN VIEW
HARBOR ISLAND
BOOSTER STATION

EMISSION TABLE

ITEM	Northing	Easting	Description
1	17201355.40	1446033.37	CRUDE TANK 1
2	17201537.76	1446211.61	CRUDE TANK 2
3	17201093.92	1446545.05	WATER TANK 1
4	17200937.07	1446391.75	WATER TANK 2
5	17201037.63	1446205.13	FIRE WATER TANK
6	17201073.77	1446081.94	RUN OFF WATER CONTROL
7	17201093.22	1446260.63	FIRE PUMPS
8	17201343.22	1446463.47	EMERGENCY GENERATOR

FENCE PERIMETER

ITEM	Northing	Easting	Description
9	17201894.77	1446232.62	NE CORNER
10	17201322.66	1445673.44	NW CORNER
11	17201178.33	1446965.64	SE CORNER
12	17200606.21	1446406.46	SW CORNER

FOAM & WATER MONITOR

FIRE HYDRANT UNITS, 2 1/2" FIRE HOSE CONNECTIONS

* CRUDE PUMP HOUSE PUMPS ARE TO BE IN AN ENCLOSURE TO ATTENUATE SOUND 80' x 100' x 16' HIGH

NOTE:
1. NATURAL GROUND AT SITE ASSUMED TO BE +8' NAVD88
2. NAD83, SPC TEXAS SOUTH US FOOT
3. TANK BARRELS IN SHELL CAPACITY
4. 19 ACRE FACE PERIMETER

GRAPHIC SCALE IN FEET
60' 30' 0 60'

NO.	DESCRIPTION	DATE	APPR
A	ISSUED FOR PERMIT	-	-

ISSUED FOR PERMIT

BW★TX

BLUEWATER TEXAS TERMINAL LLC

BLUEWATER SPM PROJECT
ARANSAS PASS, TEXAS

HARBOR ISLAND BOOSTER STATION

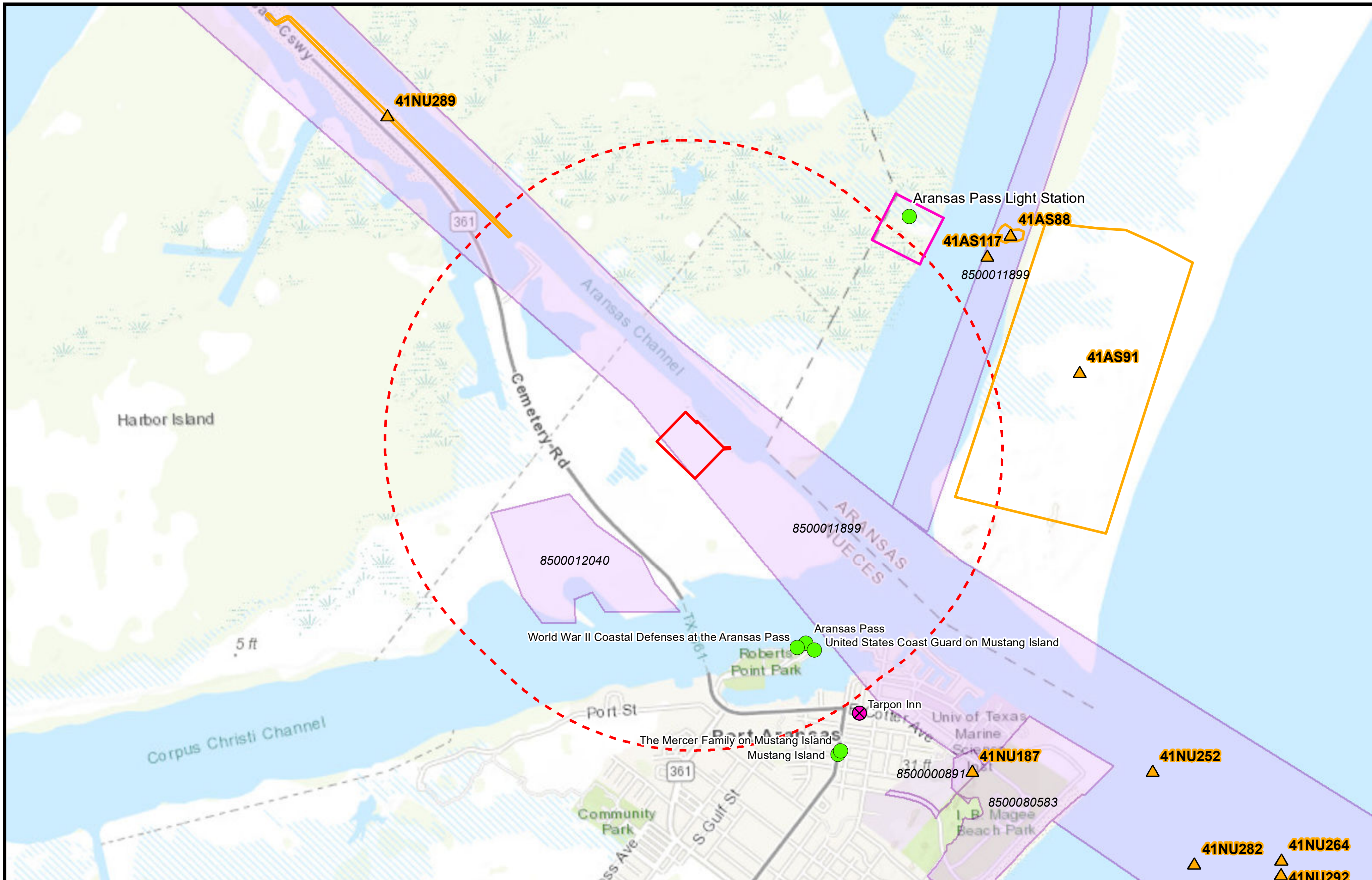
LLOYD ENGINEERING, INC
STATE OF TEXAS, USA
LICENSE NO. F-002846

DESIGN BY:	JSL
DRAWN BY:	RC
DATE:	MAY 2018
SCALE:	AS NOTED @ 22"X34"
SHEET:	11 OF 22
DRAWING NO:	11

REV. B

APPENDIX C

Background Review Results Map



Legend

- Project Boundary
- Background Review Area
- Historical Marker
- TARL Datum
- Previous Survey
- TARL Site Boundary
- NRHP Property
- NRHP Location

Coordinate System: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US
Basemap: USGS 7.5' Topographic
1 inch = 2,500 feet

0 500 1,000 2,000 Feet

N S E W

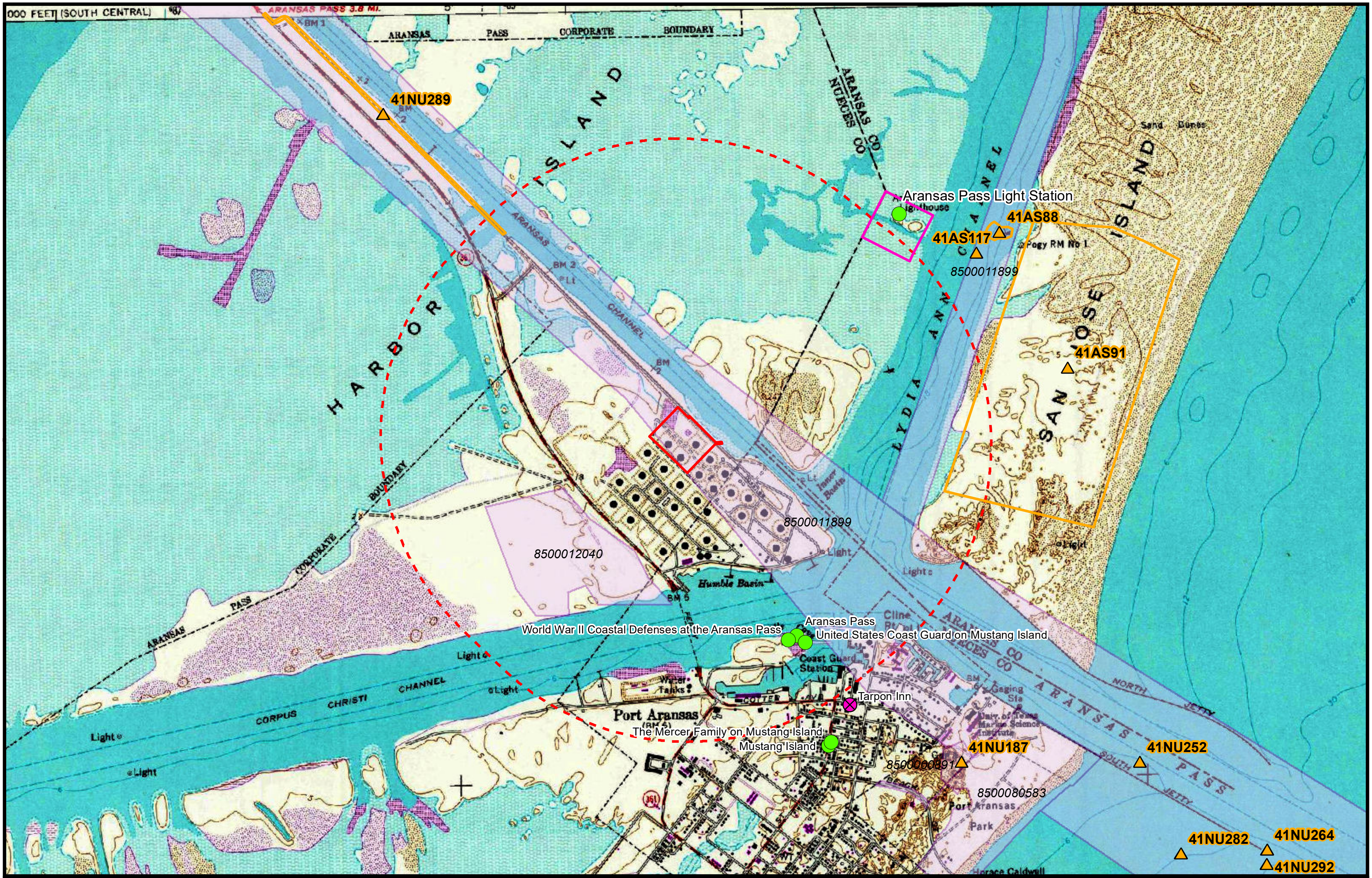
BLUEWATER SPM

BACKGROUND REVIEW RESULTS MAP

APPENDIX C

APPENDIX D

USGS 1968 Topographic Map



Legend

- Project Boundary
- Background Review Area
- Historical Marker
- TARL Datum
- Previous Survey
- TARL Site Boundary
- NRHP Property
- NRHP Location

Coordinate System: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US
Basemap: USGS 7.5' Topographic (1968)
1 inch = 2,500 feet

0 500 1,000 2,000 Feet

N E S W

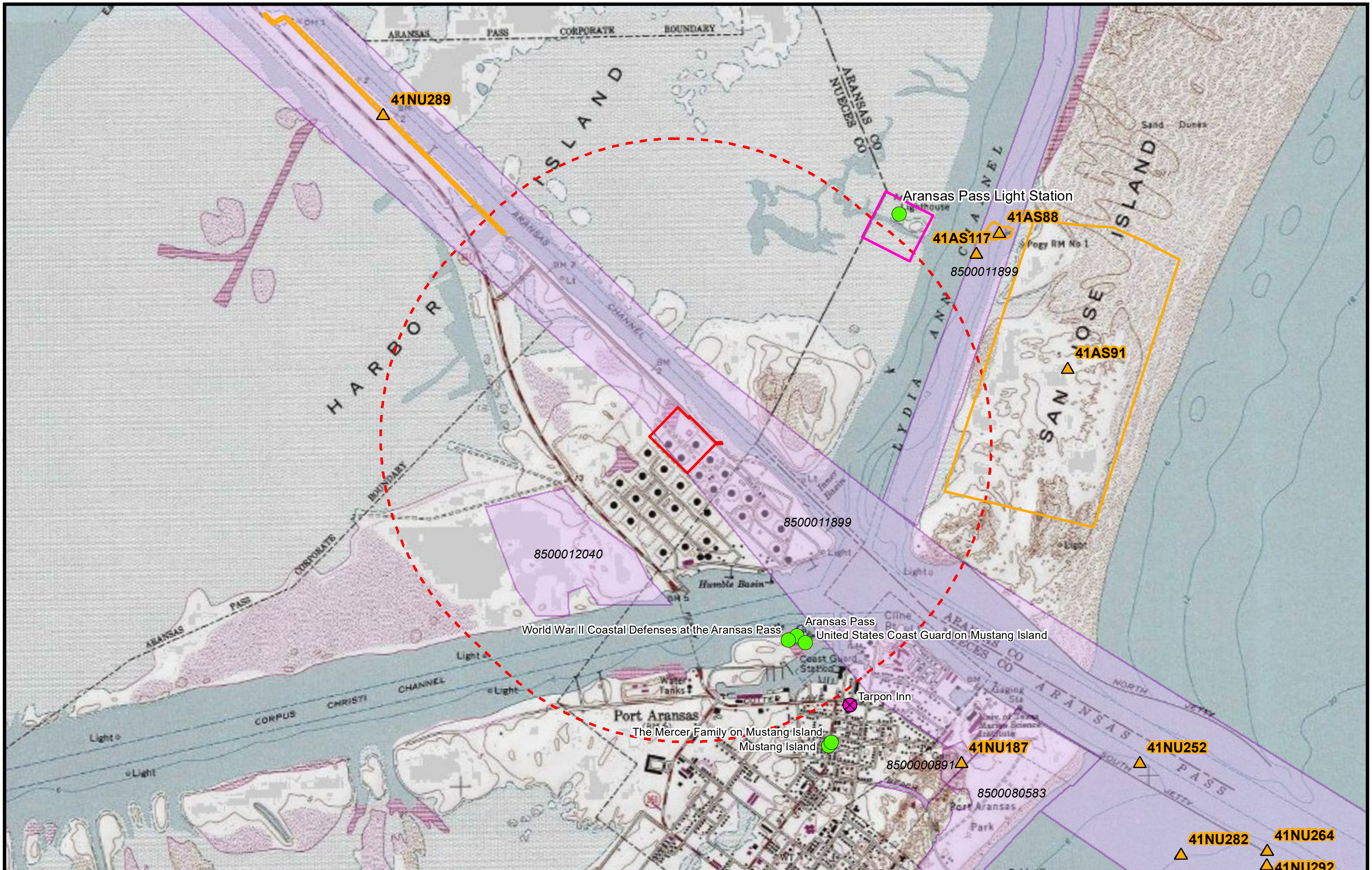
BLUEWATER SPM

USGS 1968 TOPOGRAPHIC MAP BACKGROUND REVIEW RESULTS MAP

APPENDIX D

APPENDIX E

National Geographic Pre-2013 Topographic Map



Legend

- Project Boundary
- Background Review Area
- Historical Marker
- TARL Datum
- Previous Survey
- TARL Site Boundary
- NRHP Property
- NRHP Location

Coordinate System: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US
Basemap: NatGeo 2013 Topographic
1 inch = 2,500 feet

0 500 1,000 2,000 Feet

N S W E

BLUEWATER SPM

NATGEO PRE-2013 TOPOGRAPHIC MAP
BACKGROUND REVIEW
RESULTS MAP

APPENDIX E

From: Foley, Paige A CIV
To: Thompson, Ashley; Trahan, Jacob; Bachman, Roddy C CIV
Cc: Perera, Melissa E CIV
Subject: FW: [Non-DoD Source] Project Review: 202006257
Date: Monday, March 9, 2020 7:37:14 AM

EXTERNAL EMAIL

THC response below.

From: noreply@thc.state.tx.us <noreply@thc.state.tx.us>
Sent: Friday, March 6, 2020 11:21 AM
To: Foley, Paige A CIV <Paige.A.Foley@uscg.mil>; reviews@thc.state.tx.us
Subject: [Non-DoD Source] Project Review: 202006257

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202006257
Bluewater Deepwater Port Project
Pipeline and Offshore Deepwater Port
Aransas Pass,TX

Dear Paige Foley:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas.

The review staff led by Jeff Durst, Caitlin Brashear and Hansel Hernandez has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

• Property/properties are eligible for listing or already listed in the National Register of Historic Places.
• No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

• No historic properties present or affected. However, if buried cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.

We have the following comments: The Aransas Pass Light Station, which was listed in the National Register of Historic Places in 1977 is located within the Area of Potential Effects for Indirect Effects.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: Jeff.Durst@thc.texas.gov, caitlin.brashear@thc.texas.gov, hansel.hernandez@thc.texas.gov

This response has been sent through the electronic THC review and compliance system(eTRAC).Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions.For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

For Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

TEXAS PARKS & WILDLIFE

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August 2, 2019

U.S. Department of Transportation
Docket Management Facility
West Building, Ground Floor, Room W12-140
1200 New Jersey Avenue SE
Washington, DC 20590-0001

Mr. Roddy C. Bachman
Commandant (CG-OES-2)
Attn: Vessel and Facility Operating Standards Division
US Coast Guard STOP 7509
2703 Martin Luther King Jr. Avenue SE
Washington, DC 20593-7509

Re: Deepwater Port License Application: Bluewater Texas Terminal, LLC
Notice of intent; notice of public meeting; request for comments.
Docket No. MARAD-2019-0094

Dear Mr. Bachman:

Texas Parks and Wildlife Department (TPWD) has received a notice of intent (NOI) to prepare an environmental impact statement (EIS) for the proposed ownership, construction, operation, and eventual decommissioning of an offshore deepwater port that would be located in Federal waters approximately 15 nautical miles (17.26 statute miles) off the coast of "San Patricio [*sic*] County", Texas in the Gulf of Mexico (GOM) to export domestically produced crude oil. The proposed project involves the design, engineering, and construction of a deepwater port that includes approximately 56.48 miles of pipeline infrastructure and a booster station. The deepwater port would allow for up to two very large crude carriers (VLCCs), or other crude oil carriers, to simultaneous load crude oil at a rate of 40,000 barrels per hour (bph). Single vessel loading operations would be capable of loading up to approximately 80,000 bph. The facility is expected to service 16 VLCCs per month. The project would consist of offshore, inshore, and onshore components.

Offshore Components

Offshore components would include approximately 27.13 miles of two new 30-inch-diameter crude oil pipelines, two SMP buoy systems, two pipeline end manifold (PLEM) systems, and two caternary anchor leg mooring (CALM) systems. Each pipeline would extend from the Mean High Tide (MHT) line of the GOM on San Jose Island and terminate at a pipeline end manifold (PLEM) system connected to an SPM buoy system located approximately 15 nautical miles off the coast of San Jose and Matagorda Islands (Aransas County, Texas) in approximately

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

89 feet of water in Bureau of Ocean and Energy Management Outer Continental Shelf Matagorda Island Area TX4 lease blocks 698 and 699 of the GOM. Each SPM buoy system and associated PLEM system would be attached to the seafloor by a CALM system comprised of a symmetrically arranged six-leg anchor dual chain configuration extending to twelve 72-inch-diameter pile anchors installed on the seafloor. A vessel would connect to a SPM buoy system via mooring hawsers attached to a rotating table affixed to the SPM buoy system. A moored vessel would transfer crude oil from the SPM buoy system using a floating hose equipped with a marine break-away coupling and strobe lights at 15-foot intervals for detection at night and low-light conditions.

Inshore Components

Inshore components would extend from the MHT line of the GOM on San Jose Island to the MHT line of the western shoreline of Redfish Bay via the Port of Corpus Christi Authority right-of-way that parallels the north side of Highway 361. Inshore components would cross San Jose Island, Lydia Ann Channel, Aransas Channel, Harbor Island, Lighthouse Lakes Park, Stedman Island, Redfish Bay, and the Gulf Intracoastal Waterway. Infrastructure would include approximately 7.15 miles of two new 30-inch-diameter crude oil pipelines connecting to the onshore facility, an approximately 19-acre booster station on Harbor Island and a connection to the offshore pipeline at the interface of San Jose Island and the Gulf of Mexico.

Onshore Components

Onshore infrastructure that would connect the inshore components of the project to a planned multi-use terminal located south of the City of Taft in San Patricio County, Texas consists of approximately 22.20 miles of two new 30-inch-diameter crude oil pipelines. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines, including the two outbound pipelines that would make up the onshore components of this project.

Scope of Environmental Impact Analysis

Based on the information provided, TPWD has concern for potential direct, indirect, and cumulative impacts to emergent wetlands, tidal flats, submerged aquatic vegetation, unvegetated shallow water habitats, marine soft bottoms, native coastal prairies, woodlands, colonial waterbird nesting areas, Gulf beaches, coastal dunes, barrier islands, a public park, a state scientific area, commercial and recreational fishing, wildlife viewing, as well as federal- and state-listed threatened and endangered species and their habitats. To address these concerns, TPWD recommends the Draft EIS include detailed descriptions and evaluations for all phases (construction, operation, and decommissioning) of the project relative to the following:

- An evaluation of direct, indirect, temporary, and cumulative impacts to sensitive coastal resources that would result from the proposed project. Detail Project Maps, as provided in Volume I Appendix A, should include overlays illustrating the location, extent, and type of coastal resources that occur within the vicinity of the project.
- Identify and describe measures that would be taken to avoid and minimize direct, indirect, temporary, and cumulative adverse effects to fish and wildlife and their habitats, including permanent and temporary impacts.
- Potential impacts to all federal- and state-listed rare, threatened, and endangered species and their habitats with a five-mile vicinity of the project.
- Potential impacts to Gulf beaches which provide critical wildlife habitat, such as sea turtle nesting areas and avifauna foraging and roosting areas.
- Potential impacts to commercial and recreational fisheries and associated fishing activities, including both terrestrial and aquatic access routes.
- Potential magnitude of individual and cumulative impacts to egg, larval, and adult states of fish, shellfish, and other aquatic organisms associated with all phases of the project.
- Potential for bird and bat collisions into project infrastructure.
- Potential impacts (physical removal of nesting habitat and disturbance from human foot traffic and machinery use) to bird nesting areas during construction and operation of the proposed project.
- Potential impacts to native coastal prairie vegetation, including barrier island, coastal dunes, depressions, and swales.
- Potential impacts from invasive species and an Invasive Plant Species Control Plan that includes rapid colonizers of disturbed sites, such as Brazilian peppertree (*Schinus terebinthifolia*).
- Potential impacts to public lands and public land uses (e.g., recreation, education, wildlife habitat, conservation, etc.).
- Potential impacts to public access to local parks, state scientific areas, paddling trails, recreational fishing, bird watching, and other outdoor nature-based activities and the development of a Public Access Plan.
- A specific schedule for construction that also identifies when specific construction activities would be initiated and when associated restoration activities would be completed.
- An evaluation of impacts associated with the removal of all offshore, onshore and inshore components of the proposed project resulting from decommissioning activities. The environmental impact statement should not assume that onshore and inshore components will be abandoned in place.
- An evaluation of the individual and cumulative effects of temporary and permanent impacts to recreational and commercial fishing activities including traditional access points such as public parks, kayak launch sites and recreational boat ramps, waterbodies and shorelines.

- An evaluation of individual and cumulative impacts to native woody vegetation from terrestrial land clearing activities that will not be replanted or allowed to re-establish as well as the cumulative effects of unrestored temporary and permanent impacts to terrestrial and aquatic habitats.
- A comprehensive Habitat Restoration Plan that details pre-construction post-construction surveys, reference sites, methods, timing, material sourcing, duration and extent of monitoring activities, success criteria, and adaptive management that will be used to fully restore each terrestrial and aquatic habitat type that may be temporarily affected by the project.
- A comprehensive Compensatory Mitigation Plan that details how unavoidable permanent impacts to aquatic resource functions will be offset in a manner consistent with the Final Mitigation Rule.
- In addition to abandonment in place, potential impacts and cost estimates associated with decommissioning activities that involve the removal and disposal of onshore and inshore components of the project including pipelines, booster station, and other project-related infrastructure.
- A Dredged Material Management Plan for all phases/portions of the project, including decommissioning activities, that includes the size and draft of all equipment that would be used to handle excavated sediments and the minimum water depths located within the work corridors, access routes, and staging areas.
- The potential to re-suspend and redistribute contaminants (including sediments) during all phases of the project that includes facility removal during decommissioning activities; an evaluation of impacts associated with those re-suspended particles; and a plan that details the timing and specific measures that would be taken to avoid and minimize those impacts.
- The potential for facility expansion, such as dredge and fill activities, additional right-of-way, deepening and widening of channels, additional storage tanks or other infrastructure and additional impacts to fish and wildlife habitat.
- On-site stormwater management plan.
- Potential environmental impacts resulting from damages to the proposed project facilities by a major hurricane and A Hurricane Response Plan.

Recommendations

TPWD offers the following recommendations and information for the purpose of avoiding and minimizing impacts to fish and wildlife resources, coastal zone uses, and recreational activities within the vicinity of the proposed project.

General Recommendations

Upland Construction

Recommendation: TPWD recommends the judicious use and placement of sediment control fence to exclude wildlife from areas to be disturbed. In many cases, sediment control fence placement for the purposes of controlling erosion and protecting water quality can be modified minimally to also provide the benefit of excluding wildlife access to construction areas.

- The exclusion fence should be buried at least six inches and be at least 24 inches high.
- The exclusion fence should be maintained for the life of the project and only be removed after the project activities are completed and the disturbed sites have been revegetated or otherwise stabilized.
- Construction personnel should be encouraged to examine the inside of the exclusion area daily to determine if any wildlife species have been trapped inside the area of impact and provide safe egress opportunities prior to initiation of construction activities.
- Regarding pipeline installation and HDD entry pits, any open trenches or deep excavation areas should be covered overnight and/or inspected every morning to ensure no wildlife species have been trapped.
- For open trenches and excavated areas, escape ramps should be installed at an angle of less than 45 degrees (1:1) in excavated areas that will allow trapped wildlife to climb out on their own.
- If any state-listed species are trapped in trenches or excavated areas, they should be removed by personnel permitted by TPWD to handle state-listed species.

Recommendation: For soil stabilization and/or revegetation of disturbed areas within the proposed project area's onshore and upland inshore sections, TPWD recommends utilizing erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding due to a reduced risk to wildlife. If erosion control blankets or mats would be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting should be avoided.

Impacts to Terrestrial Vegetation and Wildlife Habitat

The onshore and inshore components of the proposed project consists of a mixture of habitat types and vegetation communities mapped as agricultural land (row crops), coastal prairie, salty prairie, deep sand grassland, huisache woodland or shrubland, deep sand live oak shrubland, and deep sand live oak forest and woodland. In general, current and past vegetation clearing can be a significant threat to native plant communities in an area because disturbed areas are often revegetated with invasive, introduced species.

> **Recommendation:** To the greatest extent practicable, TPWD recommends avoiding and/or minimizing clearing native woody vegetation and native herbaceous communities (e.g., native grasslands) to construct new access roads or to accommodate heavy equipment access to project sites. Wherever possible, TPWD recommends locating new access roads in previously disturbed areas, including previously cleared right-of-ways (ROWs), utility corridors, etc., or improving existing roads (e.g., private farm and ranch roads). Material and equipment staging areas should be located in previously disturbed upland areas that do not require vegetation clearing.

Volume II, Section 8.2.6.1.3 indicates that construction impacts to native uplands would be long-term (> 6 months to recover) but would be expected to return to pre-construction conditions within three growing seasons. A portion of the onshore pipeline crosses live oak shrubland, live oak forest-woodland habitat (e.g. between MP 19.6 and 20.8). The material provided in Volume I indicates that the proposed onshore and inshore pipeline infrastructure would use established pipeline and utility corridors and previously disturbed areas to the greatest extent practicable.

> **Recommendation:** TPWD appreciates that established pipeline and utility corridors and previously disturbed areas would be used wherever possible. However, in order to preserve a special vegetation community unique to the Live Oak Peninsula, when installing the pipeline through live oak forest, woodland or shrubland habitat on the Live Oak Peninsula, TPWD recommends narrowing the construction corridor to a width of 100 feet. Impacts to the live oaks in this area, many of which are hundreds of years old, will not recover within three growing seasons, thus resulting in permanent impacts. Narrowing the construction corridor would assist in minimizing permanent impacts to this unique habitat.

Colonization by invasive species, particularly invasive grasses and weeds, should be actively prevented. Vegetation management should include removing invasive species early on while allowing the existing native plants to revegetate disturbed areas.

> **Recommendation:** TPWD recommends referring to the Lady Bird Johnson Wildflower Center Native Plant Database (available online) for regionally adapted native species that would be appropriate for post-construction landscaping of disturbed areas. For herbaceous revegetation efforts, TPWD recommends the exclusive use of a mixture of native grasses and forbs. While some introduced grasses that may be presently growing in or adjacent to the project areas can provide suitable forage for livestock and some species of wildlife with proper management, introduced species typically develop into monotypic stands of vegetation that do not provide high quality grassland habitat able to support a diversity of wildlife species. TPWD recommends that

native grasses having the same desirable characteristics as introduced grasses commonly use in revegetation plans be incorporated into project planning and implemented following construction.

Impacts to Aquatic Habitats

Horizontal directional drilling (HDD) methods, such as those proposed by the applicant, are frequently used to avoid and minimize impacts to aquatic resources. Project plans suggest that HDD methods will primarily be used to avoid impacts associated with waterbody crossings

> **Recommendation:** The Inadvertent Returns Contingency Plan should include site specific plans for addressing returns in shallow water habitats that are in and adjacent to submerged or emergent aquatic vegetation and tidal flats. Site specific plans should include preferred access routes and specific protocols and/or guidelines for developing containment and recovery strategies that aim to avoid and minimize secondary impacts from machinery, equipment, foot traffic, and drilling fluid. The plan should also provide protocols and contact information for reporting inadvertent returns to the appropriate state and federal resource agencies. In the event an inadvertent return occurs, an assessment of the impacts and required mitigation should be conducted in consultation with TPWD.

The applicant has not provided sufficient information concerning post-construction restoration of aquatic resources to demonstrate that the impacts will be less than permanent and that there will be no secondary effects from the project. TPWD has concern for the level of restoration success that can be achieved on recent and relict barrier island habitats, especially coastal dune swale complexes, mangrove marshes, and tidal flats.

> **Recommendation:** Because tidal flats and coastal dune swales are difficult to replace, these habitats should be avoided to maximum extent practicable.

<u>Lighting</u>

Lighting would be required throughout the onshore, inshore, and offshore components of the project during construction, operation, and decommissioning of the deepwater port facility. In addition to navigational beacons, lighting would be used for safety and security around facilities. As proposed, the project would minimize terminal lighting to that required for safety and navigation and lights would be down-shielded and/or directed at the water.

Recommendation: Particularly for inshore and onshore facilities, TPWD recommends considering appropriate lighting technologies and best management practices (BMPs) described at the International Dark-Sky Association website.

Specifically, security lighting within any fenced compounds should be fully down-shielded and directed away from vegetation outside of fenced areas. Security lighting around on-ground facilities should also be motion- or heat-sensitive to eliminate constant nighttime illumination. For offshore lighting, lights should be shielded to eliminate both skyward and sea surface illumination (which can attract fishes and invertebrates).

State Regulations

Parks and Wildlife Code

Nongame Birds

State law prohibits any take or possession of nongame birds, including their eggs and nests. Laws and regulations pertaining to state-protection of nongame birds are contained in Chapter 64 of the Texas Parks and Wildlife (TPW) Code. This protection applies to most native bird species, including ground nesting species. Although not documented in the Texas Natural Diversity Database (TXNDD), many bird species which are not listed as *threatened* or *endangered* are protected by Chapter 64 of the TPW Code and are known to be year-round or seasonal residents or seasonal migrants through the proposed project area.

During the winter, south Texas is the southernmost limit for many migratory birds and it is the northernmost extreme in the breeding season (spring-summer) for other species. Additionally, the proposed project area is in the middle of the Central Migratory Flyway through which millions of birds pass during spring and fall migration. Available food, cover, and water sources provide important stopover habitats for Neo-tropical migrants.

Biologically, this area of south Texas is highly productive and provides a range of habitats including large tracts of undeveloped land, grasslands, prairies, woodlands, marsh, and aquatic habitats. The diversity of habitats is suitable to support a diversity of wildlife species. In particular, the range of habitats provides cover, feeding, nesting and loafing areas for many species of birds; grassland birds, Neo-tropical migrants, shorebirds, wading birds, and raptors.

Recommendation: The proposed project is located in a region with very diverse habitats that are within the range and suitable habitat for many rare species and migratory birds. TPWD recommends the Draft EIS thoroughly evaluate the proposed project's potential impacts to nongame birds.

Any vegetation clearing (or ground disturbance that would impact ground nesting birds) that would be required to construct the onshore, inshore or offshore infrastructure (terminal, pipelines, booster station, HDD entry/exit pits), improve existing access roads, or create new access roads should be scheduled to occur outside of the March 15-September 15 migratory bird nesting season. Contractors should be made aware of the potential of encountering non-game migratory birds (either nesting or wintering) in the proposed project site and be instructed to avoid negatively impacting them.

If vegetation clearing or ground disturbance must be scheduled to occur during the nesting season, TPWD recommends the areas to be impacted should be surveyed for active nests by a qualified biologist. Nest surveys should be conducted no more than five days prior to the scheduled clearing to ensure recently constructed nests are identified. If active nests are observed during surveys, TPWD recommends a 150-foot buffer of vegetation/undisturbed area remain around the nest until the young have fledged or the nest is abandoned.

State-listed Species

State law prohibits the capture, trap, take or kill (incidental or otherwise) of state-listed species. Laws and regulations pertaining to state-listed endangered or threatened animals are contained in Chapters 67 and 68 of the TPW Code; laws pertaining to endangered or threatened plants are contained in Chapter 88 of the TPW Code. There are penalties, which may include fines and/or jail time in addition to payment of restitution values, associated with take of state-listed species. A copy of *TPWD Guidelines for Protection of State-Listed Species*, which includes a list of penalties for take of species, can be found on the TPWD website.

For purposes of relocation, surveys, monitoring, and research, terrestrial state-listed species may only be handled by persons permitted through the TPWD Wildlife Permits Program. For more information regarding Wildlife Permits, please contact the Wildlife Permits Office at (512) 389-4647. For the above-listed activities that involve aquatic species please contact the Region 4 Regional Response Coordinator at (361) 825-3246 for the appropriate authorization.

The potential occurrence of state-listed species in the project area is primarily dependent upon the availability of suitable habitat. Direct impacts to high quality or suitable habitat therefore are directly proportional to the magnitude and potential to directly impact state-listed species. State-listed reptiles that are typically slow moving or unable to move due to cool temperatures are especially susceptible to being directly impacted during vegetation clearing for roads, staging areas, easements, or machinery access corridors.

Please be aware that determining the actual presence of a species in a given area depends on many variables including daily and seasonal activity cycles, environmental activity cues, preferred habitat, transiency and population density (both wildlife and human). The absence of a species can be demonstrated only with great difficulty and then only with repeated negative observations, taking into account all the variable factors contributing to the lack of detectable presence.

The application documents prepared for proposed project specifically assessed potential state-listed species impacts for the inshore component of the project and generally assessed them for the onshore component of the project.

Recommendation: TPWD recommends reviewing the most current TPWD annotated county lists of rare species for Nueces, San Patricio and Aransas counties, as rare species could be present depending upon habitat availability. These lists are available online at the TPWD Wildlife Diversity website. Major revisions were made to these lists in April 2019.

Throughout Volume II, Section 8, data from the TXNDD was cited as the source for determining the potential for rare species to occur in in the project area. Volume II, Section 15.3.8.1 cites the lack of TXNDD occurrence data to support the conclusion of the project having no effect on 18 state-listed species. This is an incorrect application of TXNDD data.

Recommendation: Please note that the TXNDD is intended to assist users in avoiding harm to rare species or significant ecological features. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state. Absence of information in an area does not imply that a species is absent from that area. Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presences, absence or condition of special species, natural communities, or other significant features within your project area. These data are not inclusive and **cannot be used as presence/absence data**. They represent species that could potentially be in your project area. This information cannot be substituted for on-the-ground surveys. The TXNDD data is updated continuously based on new, updated and undigitized records; therefore, TPWD recommends requesting the most recent TXNDD data on a regular basis.

Volume II, Section 8.2.2.8 states that review of the TXNDD resulted in occurrences of federally listed species but no state listed species were listed within two miles of the project area. However, Appendix O reports the TXNDD record of a state-listed Texas horned lizard along State Highway 361 on Harbor Island adjacent to the project area.

Recommendation: TPWD recommends the Draft EIS thoroughly evaluate the proposed project's potential impacts to state-listed species in all three project areas; onshore, inshore and offshore. Information provided in future environmental documents should be verified for accuracy and consistency with the most current list. Specific evaluations should be designed to predict project impacts upon natural resources.

Aquatic Resources

In addition to spills, releases, and inadvertent returns of products associated with the construction, operation, or decommissioning of the proposed project, other construction related activities, such as dewatering and maintenance, occurring in or near aquatic habitats (including the GOM and Redfish Bay) may negatively impact fish, shellfish, and other aquatic resources. As the state agency with the primary responsibility for protecting the state's fish and wildlife resources, Chapter 12 Subchapter D of the TPW Code and Chapter 7 Subchapter D of the Water Code authorizes TPWD to investigate fish kills and any type of pollution that may cause loss of fish or wildlife resources, estimate the monetary value of lost resources, and seek restitution or restoration from the party responsible for the fish kill or pollution. Chapter 69 of the Texas Administrative Code (TAC) requires TPWD to actively seek full restitution for and/or restoration of fish, wildlife, and habitat loss occurring as a result of human activities. The restitution value of lost resources can be significant (e.g., at least $500 for each individual of a threatened species and $1,000 for each individual of an endangered species). In addition, the TPW Code makes it a criminal offense to kill any fish or wildlife resources classified as threatened or endangered.

Recommendation: Because the project would require work in and in proximity to aquatic habitats, the project should be coordinated with TPWD's Region 4 Regional Response Coordinator (361-825-3246) for appropriate authorization(s) and technical guidance to ensure protection of aquatic wildlife.

Public Lands

The inshore pipeline route would utilize a 100-foot-wide construction corridor that runs parallel to and north of Highway 361, bisects Redfish Bay and the Redfish Bay State Scientific Area (RBSSA), and runs through the length of Lighthouse Lakes Park. Additional temporary work corridors would provide access to the pipeline corridor and to entry and exit points of horizontally directionally drilled (HDD) segments of the pipeline.

Lighthouse Lakes Park provides public access to the state designated Lighthouse Lakes Paddling Trail that was established by TPWD in 1999. The RBSSA was established by the Texas Parks and Wildlife Commission in 1999 for the purpose of education, scientific research, and preservation of flora and fauna of scientific or educational value. Because of this designation, the RBBSA has special status and the importance of seagrass habitat has since been specifically recognized by state law, not just within the RBSSA, but state-wide. As part of this special status, the policies of the Coastal Management Program as specified in Title 31, Texas Administrative Code section 501.29 require compliance with Chapter 26 of the TPW Code when development projects require the use or taking of any public land within a state park, wildlife management area or preserve, such as RBSSA.

Chapter 26 of the TPW Code provides that a department, agency, political subdivision, county, or municipality of this state may not approve any project that requires the use or taking of public land (designated and used prior to the project as a park, public recreation area, scientific area, wildlife refuge, or historic site) unless it holds a public hearing and determines that there is "no feasible and prudent alternative to the use or taking of such land", and the project "includes all reasonable planning to minimize harm to the land…resulting from the use or taking."

TPWD appreciates the opportunity to comment and provide recommendations concerning the scope of the Draft EIS and for the avoidance and minimization of impacts to state fish and wildlife resources. Questions can be directed to Ms. Jackie Robinson (361-825-3241) or Ms. Leslie Koza (361-825-2329) in Corpus Christi.

Sincerely,

Rebecca Hensley

Rebecca Hensley
Regional Director, Ecosystem Resources Program
Coastal Fisheries Division

RH:LK:JR

Tribal Correspondence

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20592-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1451
Fax: (202) 372-8382
Email: Roddy.C.Bachman@uscg.mil

July 8, 2019

Dear Interested Party:

The U.S. Coast Guard (USCG) and the Maritime Administration (MARAD) announce their intent to prepare an Environmental Impact Statement (EIS) to assist in the evaluation of a Deepwater Port License Application for the Bluewater SPM Project submitted May 30, 2019 by Bluewater Texas Terminals, LLC (BWTT). The application proposes the construction, operation, and the decommissioning of an offshore crude oil deepwater port (DWP) export facility and an offshore terminal with associated inshore and onshore components. The DWP would be located in federal waters within the Outer Continental Shelf (OCS) Mustang Island Area, approximately 15 nautical miles (17.26 statute miles) from San Jose Island, Aransas County, Texas, in water depths of approximately 90 feet. The DWP would consist of two single point mooring (SPM) buoy systems, 56.48 miles of new pipeline infrastructure, and a booster station located on Harbor Island within Aransas, Nueces and San Patricio Counties, Texas.

The inshore component of the proposed Project consists of the infrastructure located between the western Redfish Bay mean high tide (MHT) line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. Infrastructure located within this component consists of approximately 7.15 statute miles of two (2) 30-inch diameter pipelines and an approximately 19-acre booster station located on Harbor Island (Harbor Island Booster Station). The inshore portion of the Project crosses three navigable waterways including the Gulf Intracoastal Waterway, the Aransas Pass Channel, and the Lydia Ann Channel. The pipelines associated with the inshore portion of the Project would cross portions of Texas State submerged lease tract 306 near the Lydia Ann Channel. The Harbor Island Booster Station would consist of the necessary operating and pumping infrastructure to support the transport of crude oil and operations of the DWP.

The onshore component of the Project includes approximately 22.2 statute miles of two (2) 30-inch diameter pipelines extending from the landward side of the MHT line of Redfish Bay to the planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines, two of which would be the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station.

An EIS will be prepared in accordance within the provisions of the Deepwater Port Act (DWPA) of 1974, as amended (33 United States Code [U.S.C.] 1501 *et seq*.); the National Environmental Policy Act (NEPA) (Section 102(2)(c)), as implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); Department of Transportation (DOT) 5610.1C (*Procedures for Considering Environmental Impacts*); USCG Environmental Planning Policy, COMDTINST 5090.1

and the Environmental Planning (EP) Implementing Procedures (IP); and other appropriate and applicable regulations.

Texas is the adjacent coastal state as defined in the DWPA. The Governor of the adjacent coastal state may approve, approve with conditions, or deny the application within 45 days following the final public hearings which follow the publication of the Final EIS. Following this, provided the Governor does not deny the application, the Maritime Administrator will use the EIS and other information to 1) to approve the application, 2) approve the application with conditions, or 3) deny the application.

The USCG and MARAD are now in the scoping period that precedes the preparation of the Draft EIS and we invite the public to submit comments relating to the scope of the EIS. As part of the scoping process, we will hold an informational open house and public meeting at the location listed below. The open house and public meeting are open to the public and all interested parties are encouraged to attend. Written and oral comments will be accepted at the open house and public meeting and comments may be made throughout the scoping process. Below is a schedule of the open house and scoping meeting along with the location of both events. Free parking is available at the hotel.

July 22, 2019 Event	**Time**
Informational Open House	4:00 PM – 6:00 PM
Public Scoping Meeting	6:00 PM – 8:00 PM
Omni Corpus Christi Hotel 900 North Shoreline Boulevard Corpus Christi, TX 78401 361-887-1600	

The enclosed Notice of Intent (NOI) to prepare an EIS published in the Federal Register initiates the ***30-day scoping period ending on August 2, 2019.*** The NOI includes a detailed description of the proposed project, additional scoping meeting logistics, and detailed instructions on submitting comments to the Federal Docket throughout the scoping period.

The Application and supporting materials, including comments, notices and communications, and eventually the Draft and Final EIS may be viewed at the Federal Docket Management Facility website: *http://www.regulations.gov* under docket number MARAD-2019-0094. Comments submitted to the docket receive the same consideration as those made or delivered at the public meetings. These documents are also available for viewing at the following libraries:

- La Retama Public Library, 805 Comanche Street, Corpus Christi, Texas 78401; (361) 826-7055
- Ingleside Public Library, 2775 Waco Street, Ingleside, Texas 78362; (361) 776-5355
- Ed & Hazel Richmond Public Library, 110 North Lamont Street, Aransas Pass, Texas 78336; (361) 758-2350
- Bell Whittington Public Library, 2400 Memorial Parkway, Portland, Texas 78374; (361) 777-4560
- Texas A&M University, Corpus Christi Mary & Jeff Bell Library/Federal Depository, 6300 Ocean Drive #5702, Corpus Christi, Texas 78412; (361) 825-2687
- Robert J. Kleberg Public Library, 220 North 4th Street, Kingsville, Texas 78363; (361) 592-6381
- Owen R. Hopkins Public Library, 3202 McKinzie Road, Corpus Christi, Texas 78410; (361) 826-2350

The Coast Guard and MARAD encourage you to submit comments and related materials regarding the proposed BWTT deepwater port license application. If you do so, please include your name, address, and the Bluewater SPM Project docket number (MARAD-2019-0094). You may submit your comments and materials by mail, hand delivery, fax, or electronic means to the Docket Management Facility. To make sure your comments and related materials are not entered more than once in the docket, please submit them by only one of the following means:

- Electronic (preferred to expedite processing): Through the Federal Docket Management website at *http://www.regulations.gov* under docket number MARAD-2019-0094;
- Mail: Docket Management Facility, Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, Attn: MARAD-2019-0094;
- Personal Delivery: To the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays;
- Fax: To the Docket Management Facility at (202) 493-2251.

To ensure your comments are considered, the Coast Guard and MARAD request that all comments be submitted by *August 2, 2019*. Comments and material received from the public will become part of the official record (or docket) and will be available for inspection or copying at the Docket Management Facility between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also view the information, including this notice and comments, on the Internet at *http://www.regulations.gov* (Docket Number MARAD-2019-0094). An additional set of public meetings and opportunity to comment on the proposed Bluewater SPM Project and the EIS will be available when a Draft EIS is published. Those meetings and the availability of the Draft EIS will be announced in the future correspondence and federal register notice. Final public hearings will be conducted following publication of the Final EIS.

Finally, Golder Associates, Inc. is our 3rd party environmental contract environmental consultant assisting the Coast Guard and MARAD in the application NEPA review process and EIS preparation.

If you have questions about the deepwater port license application, you may contact Mr. Roddy Bachman, Coast Guard at (202) 372-1451 or Roddy.C.Bachman@uscg.mil, or Ms. Yvette Fields, Maritime Administration, at (202) 366-0926 or Yvette.Fields@dot.gov.

Sincerely,

R C Bachman

RODDY C. BACHMAN
Project Manager, Deepwater Ports
Vessel and Facility Operating Standards Division
U.S. Coast Guard

Encl: 1: Bluewater SPM Notice of Intent/Notice of Scoping
2: Project Map

Copy: Ms. Yvette Fields, MARAD
Federal Docket # MARAD-2019-0094

Bluewater SPM Notice of Intent/Notice of Scoping

3. Technical Assistance

As noted throughout the notice, recipients should review FTA's program circulars for general program guidance. FTA headquarters and regional staff will be pleased to answer questions and provide any technical assistance needed to apply for FTA program funds and manage grants. At its discretion, FTA may also use program oversight consultants to provide technical assistance to grantees on a case by case basis. This notice and the program guidance circulars identified in this document may be accessed on FTA's website: *www.transit.dot.gov.*

G. Grant Management

1. Grant Reporting

FTA grantees are required to report on their grants. It is critical to ensure reports demonstrate that reasonable progress is being made on projects. At a minimum, all awards require a Federal Financial Report (FFR) and a Milestone Progress Report (MPR) on an annual basis. Some reports are required quarterly depending on the recipient and the type of projects funded under the grant and FTA's risk-based reporting policy that went into effect on October 1, 2017. The requirements for these reports and other reporting requirements can be found in the latest version of FTA Circular 5010. FTA staff, auditors, and contractors rely on the information provided in the FFR and MPR to review and report on the status of both financial and project-level activities contained in the grant. It is critical that recipients provide accurate and complete information in these reports and submit them by the required due date. Failure to report and/or demonstrate reasonable progress on projects can result in suspension or premature closeout of a grant.

2. Inactive Grants and Grant Closeout

In FY 2019, FTA will continue to focus on identifying and working with recipients to close inactive grants. If appropriate, FTA will act to closeout and deobligate funds from these grants if reasonable progress is not made. The efficient use of funds will further FTA's fulfillment of its mission to provide efficient and effective public transportation systems for the nation.

In October 2018, FTA identified a list of grants that were awarded on or prior to September 30, 2015 that had not disbursed funds since September 30, 2017 or had never disbursed funds. FTA Regional Offices will contact grant recipients with grants that meet these criteria, to close the grant and deobligate any remaining funds unless the grantee can provide information that demonstrates projects funded by the grant remain active and there is a realistic schedule to expedite completion of the projects.

Issued in Washington, DC.

K. Jane Williams,

Acting Administrator.

[FR Doc. 2019–14248 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–57–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0094]

Deepwater Port License Application: Bluewater Texas Terminal LLC (Bluewater)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) Deepwater Port License Application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Corpus Christi, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Bluewater Deepwater Port License Application. The meeting will be held in Corpus Christi, Texas, on Monday, July 22, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Bluewater application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting in Corpus Christi, Texas will be held at the Omni Corpus Christi Hotel, 900 N Shoreline Boulevard, Corpus Christi, Texas, 78401, phone: (361) 887–1600, web address: *https://www.omnihotels.com/hotels/corpus-christi.* Parking is available at the venue.

The public docket for the Bluewater Deepwater Port License Application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Roddy Bachman, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Roddy Bachman, USCG, telephone: 202–372–1451, email: *Roddy.C.Bachman@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public

meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Bluewater Deepwater Port License Application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

Public comment submissions should include:

- Docket number MARAD–2019–0094.
- Your name and address.

Submit comments or material using only one of the following methods:

- Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.
- By mail to the Federal Docket Management Facility (MARAD–2019–0094), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.
- By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.
- By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed Bluewater deepwater port appears in the Bluewater Notice of Application, Wednesday, June 26, 2019 edition of the **Federal Register** (84 FR 30301). The ''Summary of the Application'' from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see **FOR FURTHER INFORMATION CONTACT**).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in ''Summary of the Application'' below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the ''no-action'' alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see **DATES**), and ends when USCG and MARAD have completed the following actions:

- Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case Bluewater, and other interested persons;
- Determines the actions, alternatives and impacts described in 40 CFR 1508.25;
- Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;
- Identifies other relevant permitting, environmental review and consultation requirements;
- Indicates the relationship between timing of the environmental review and other aspects of the application process; and
- At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft

EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in FOR FURTHER INFORMATION CONTACT). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

Bluewater is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico (GOM) to export domestically produced crude oil. The proposed project involves the design, engineering, and construction of a deepwater port, approximately 56.48 miles of pipeline infrastructure, and a booster station. The Bluewater deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses. During single vessel loading operations, the proposed project is capable of loading rates of up to approximately 80,000 barrels per hour (bph) and during simultaneous vessel loading operations, the proposed project is capable of loading rates of 40,000 bph. The facility is expected to service 16 Very Large Crude Carriers (VLCCs) per month.

For the purposes of this application, the proposed Bluewater project is described in three distinguishable segments by locality, to include the onshore components, the inshore components and the offshore components.

Onshore components associated with the proposed Bluewater project are defined as those components on the landward side of the western Redfish Bay Mean High Tide (MHT) line, located in San Patricio and Aransas Counties, Texas. The onshore project components include:

- Approximately 22.20 miles of two (2) new parallel 30-inch-diameter crude oil pipelines extending from a planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines compose the proposed pipeline infrastructure that will extend to the inshore pipeline which connects to the proposed Harbor Island Booster Station (Booster Station) described below.

Inshore components associated with the proposed Bluewater project are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the GOM. Inshore project components include:

- Approximately 7.15 miles of two (2) new 30-inch-diameter crude oil pipelines connecting to the onshore facility, an approximately 19-acre booster station and a connection to the offshore pipeline. The onshore pipeline would be located within San Patricio County, Texas and Nueces County, Texas and the Booster Station would be located on Harbor Island in Nueces County, Texas.
- The Booster Station will include approximately 19 acres of land with two (2) aboveground crude oil storage tanks, each with a total storage capacity of 181,000 barrels and two (2) 181,000-barrel water storage tanks. The purpose of water tanks is to allow for the clearing of the pipeline infrastructure. During clearing operations, water from the water storage tanks would be pumped through the pipelines and back to the Booster Station. The displaced crude oil would be placed in the two crude oil storage tanks.
- Additionally, the Booster Station will contain equipment and piping to provide interconnectivity with the crude oil supply network for the Bluewater project. This would include the installation of four (4) 5,500 horsepower electrically powered motors in a series electronically locked into operation as two booster pumping systems delivering approximately 11,000 horsepower to each of the two (2) 30-inch diameter pipelines. Further, the Booster Station would house the necessary infrastructure to support the transport of crude oil through the proposed pipeline infrastructure to the deepwater port for the loading of moored vessels to include a fire water tank, firewater pumps, stormwater runoff treatment plant and pumps, emergency generator, foam and water monitors and an operations office.

Offshore components associated with the proposed Bluewater project are defined as those components located seaward of the MHT line located at the interface of San Jose Island and the GOM. The offshore project components include:

- Approximately 27.13 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the shoreline crossing at the interface of San Jose Island to the offshore Bluewater deepwater port for crude oil delivery to Single Point Mooring (SPM) buoys.
- Two (2) SPMs in Outer Continental Shelf Matagorda Island Area TX4 lease blocks 698 and 699, approximately 15 nautical miles (17.26 statute miles) off the coast of San Patricio County, Texas in a water depth of approximately 89 feet.
- A catenary anchor leg mooring (CALM) system for each SPM buoy connected to a pipeline end manifold (PLEM) system, mooring hawsers, floating hoses, and sub-marine hoses to allow for the loading of crude oil to vessels moored at the proposed deepwater port. The SPM buoy system will be permanently moored with a symmetrically arranged six-leg anchor dual chain configuration extending to twelve (12) 72-inch-diameter pile anchors installed on the seafloor.
- Each of the proposed SPM buoy systems 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. Two floating hoses equipped with marine break-away couplings will be utilized for the transfer of crude oil from the SPM buoy systems to the moored vessel. Floating hoses will be equipped with strobe lights at 15-foot intervals for detection at night and low-light conditions.

Privacy Act

The electronic form of all comments received into the FDMS can be searched by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). The Department of Transportation Privacy Act Statement can be viewed in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70, pages 19477–78) or by visiting *http://www.regulations.gov.*

(Authority: 33 U.S.C. 1501, *et seq.;* 49 CFR 1.93(h))

Dated: June 27, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–14177 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0093]

Deepwater Port License Application: Texas GulfLink LLC

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Texas GulfLink LLC (Texas GulfLink) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 28.3 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 104 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via two single point mooring buoy systems.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Texas GulfLink deepwater port application. The meeting will be held in Lake Jackson, Texas on Wednesday, July 17, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Texas GulfLink deepwater port license application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting Lake Jackson, TX will take place in the Marriott Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the Texas GulfLink deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0093.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Patrick Clark, USCG or Yvette Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Patrick Clark, U.S. Coast Guard, telephone: 202–372–1358, email: *Patrick.W.Clark@uscg.mil* or Ms. Yvette Fields, Maritime Administration, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent, by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

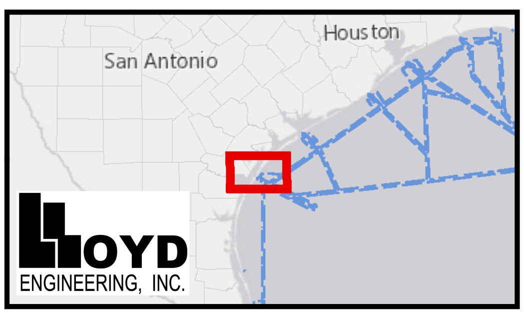
Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend an open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Texas GulfLink deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://*

Project Map



LLOYD ENGINEERING, INC.

Map Details

- SPM Buoy
- Onshore Pipeline
- Inshore Pipeline
- Offshore Pipeline
- Harbor Island Booster Station
- SPM Buoy ATBA and Safety Zones
- Navigational Fairways
- Navigation Channels
- Anchorage Areas

1 inch = 5 miles

0 2.5 5

Miles

N E S W

Coordinate System: NAD 1983 2011 StatePlane Texas South FIPS 4205 Ft US
Projection: Lambert Conformal Conic
Datum: NAD 1983 2011
Units: Foot US

Figure 2
Project Component Map

Bluewater SPM Project
Bluewater Texas Terminal LLC

Date: May 06, 2019

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20592-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1451
Fax: (202) 372-8382
Email: Roddy.C.Bachman@uscg.mil

August 20, 2019

Dear Interested Party:

The U.S. Coast Guard (USCG) and the Maritime Administration (MARAD) announced their intent to prepare an Environmental Impact Statement (EIS) to assist in the evaluation of a Deepwater Port License Application for the Bluewater SPM Project by Bluewater Texas Terminals, LLC (BWTT) on July 3, 2019 in the Federal Register. The application proposes the construction, operation, and the decommissioning of an offshore crude oil deepwater port (DWP) export facility and an offshore terminal with associated inshore and onshore components. The DWP would be located in federal waters within the Outer Continental Shelf (OCS) Mustang Island Area, approximately 15 nautical miles (17.26 statute miles) from San Jose Island, Aransas County, Texas, in water depths of approximately 90 feet. The DWP would consist of two single point mooring (SPM) buoy systems, 56.48 miles of new pipeline infrastructure, and a booster station located on Harbor Island within Aransas, Nueces and San Patricio Counties, Texas.

A letter with maps to inform you of the Bluewater SPM Project and the public scoping period (original package enclosed) was sent in the beginning of July 2019, soon after the July 3, 2019 Federal Register notice was published to inform the public of the intent to prepare an EIS. Publication of that notice began a 30-day scoping process, announced the date and location of public scoping meetings, as well as requested public participation to assist in the identification and determination of the environmental issues to be addressed in the EIS. The scoping comment period for the Bluewater SPM Project is being extended to ***August 30, 2019*** (Federal Register extension notice enclosed) due to delays in getting the application properly posted to the Federal docket. In addition, there were returned mailings due to incorrect addresses from the original mailout. Since corrected addresses were recently received, the USCG and MARAD is sending out this second letter to inform the public of the scoping period extension and to ensure that those interested parties potentially affected by the Project have been contacted.

The USCG and MARAD are in the scoping period that precedes the preparation of the Draft EIS and we invite the public to submit comments relating to the scope of the EIS. The Application and supporting materials, including comments, notices and communications, and eventually the Draft and Final EIS may be viewed at the Federal Docket Management Facility website: *http://www.regulations.gov* under docket number MARAD-2019-0094. These documents are also available for viewing at the following libraries:

- La Retama Public Library, 805 Comanche Street, Corpus Christi, Texas 78401; (361) 826-7055
- Ingleside Public Library, 2775 Waco Street, Ingleside, Texas 78362; (361) 776-5355
- Ed & Hazel Richmond Public Library, 110 North Lamont Street, Aransas Pass, Texas 78336; (361) 758-2350
- Bell Whittington Public Library, 2400 Memorial Parkway, Portland, Texas 78374; (361) 777-4560
- Texas A&M University, Corpus Christi Mary & Jeff Bell Library/Federal Depository, 6300 Ocean Drive #5702, Corpus Christi, Texas 78412; (361) 825-2687
- Robert J. Kleberg Public Library, 220 North 4th Street, Kingsville, Texas 78363; (361) 592-6381
- Owen R. Hopkins Public Library, 3202 McKinzie Road, Corpus Christi, Texas 78410; (361) 826-2350

The Coast Guard and MARAD encourage you to submit comments and related materials regarding the proposed BWTT deepwater port license application. If you do so, please include your name, address, and the Bluewater SPM Project docket number (MARAD-2019-0094). You may submit your comments and materials by mail, hand delivery, fax, or electronic means to the Docket Management Facility. To make sure your comments and related materials are not entered more than once in the docket, please submit them by only one of the following means:

- Electronic (preferred to expedite processing): Through the Federal Docket Management website at *http://www.regulations.gov* under docket number MARAD-2019-0094;
- Mail: Docket Management Facility, Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, Attn: MARAD-2019-0094;
- Personal Delivery: To the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays;
- Fax: To the Docket Management Facility at (202) 493-2251.

To ensure your comments are considered, the Coast Guard and MARAD request that all comments be submitted by ***August 30, 2019***. Comments and material received from the public will become part of the official record (or docket) and will be available for inspection or copying at the Docket Management Facility between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also view the information, including this notice and comments, on the Internet at *http://www.regulations.gov* (Docket Number MARAD-2019-0094). An additional set of public meetings and opportunity to comment on the proposed Bluewater SPM Project and the EIS will be available when a Draft EIS is published. Those meetings and the availability of the Draft EIS will be announced in the future correspondence and federal register notice. Final public hearings will be conducted following publication of the Final EIS.

Finally, Golder Associates, Inc. is our 3rd party environmental contract environmental consultant assisting the Coast Guard and MARAD in the application NEPA review process and EIS preparation.

If you have questions about the deepwater port license application, you may contact Mr. Roddy Bachman, Coast Guard at (202) 372-1451 or Roddy.C.Bachman@uscg.mil, or Ms. Yvette Fields, Maritime Administration, at (202) 366-0926 or Yvette.Fields@dot.gov.

Sincerely,

R C Bachman

RODDY C. BACHMAN
Project Manager, Deepwater Ports
Vessel and Facility Operating Standards Division
U.S. Coast Guard

Encl: 1: Federal Register Notice for Extension of Scoping Period
2: Initial Mailout Package

Copy: Ms. Yvette Fields, MARAD
Federal Docket # MARAD-2019-0094

Bluewater SPM Notice for Extension of Scoping Period

The earliest this transaction may be consummated is August 29, 2019, the effective date of the exemption (30 days after the verified notice was filed).

Watco states that it currently controls, indirectly, 38 Class III rail carriers [1] and one Class II rail carrier, collectively operating in 27 states.[2] For a complete list of these rail carriers and the states in which they operate, see Watco's notice of exemption filed on July 30, 2019.[3] The notice is available at *www.stb.gov.*

Watco represents that: (1) The rail line to be operated by SOFR does not connect with any lines of any other Watco-controlled rail carriers; (2) the proposed continuance in control of SOFR is not part of a series of anticipated transactions that would connect the Line with the rail lines of any other railroad in the Watco corporate family; and (3) the transaction does not involve a Class I rail carrier. The proposed transaction is, therefore, exempt from the prior approval requirements of 49 U.S.C. 11323. *See* 49 CFR 1180.2(d)(2).

Under 49 U.S.C. 10502(g), the Board may not use its exemption authority to relieve a rail carrier of its statutory obligation to protect the interests of its employees. Because the transaction involves control of one Class II and one or more Class III rail carriers, the transaction is subject to the labor protection requirements of 49 U.S.C. 11326(b) and *Wisconsin Central, Ltd.—Acquisition Exemption—Lines of Union Pacific Railroad,* 2 S.T.B. 218 (1997).

If the notice contains false or misleading information, the exemption is void ab initio. Petitions to revoke the exemption under 49 U.S.C. 10502(d) may be filed at any time. The filing of a petition to revoke will not automatically stay the effectiveness of the exemption. Stay petitions must be filed no later than August 22, 2019 (at least seven days before the exemption becomes effective).

All pleadings, referring to Docket No. FD 36337, must be filed with the Surface Transportation Board either via e-filing or in writing addressed to 395 E Street SW, Washington, DC 20423–0001. In addition, a copy of each pleading must be served on Watco's representative, Karl Morell, Karl Morell & Associates, 440 1st Street NW, Suite 440, Washington, DC 20001.

According to Watco, this action is excluded from environmental review under 49 CFR 1105.6(c) and from historic preservation reporting requirements under 49 CFR 1105.8(b)(1).

Board decisions and notices are available at *www.stb.gov.*

Decided: August 12, 2019.

By the Board, Allison C. Davis, Director, Office of Proceedings.

Jeffrey Herzig,

Clearance Clerk.

[FR Doc. 2019–17551 Filed 8–14–19; 8:45 am]

BILLING CODE 4915–01–P

[1] In its verified notice, Watco states that it currently controls 39 Class III railroads, but this appears to be a misstatement, as the number of Class III carriers listed elsewhere in the notice adds to 38.

[2] Although Watco's verified notice indicates that the carriers it controls operate in 25 states, the notice lists 27 different states.

[3] The list of carriers on pages 4–5 of the verified notice does not include Ithaca Central Railroad, LLC, though that carrier is listed as one of the applicants on page 9.

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0094]

Deepwater Port License Application: Bluewater LLC; Extension of Scoping Period

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice.

SUMMARY: By **Federal Register** notice of Wednesday, July 3, 2019, titled *Deepwater Port License Application: Bluewater Texas Terminal LLC (Bluewater),* the U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), announced the intent to prepare an environmental impact statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) deepwater port license application. Publication of that notice began a 30-day scoping process, announced the date and location of a public scoping meeting as well as requested public participation to assist in the identification and determination of the environmental issues to be addressed in the EIS. This extension is due to delays in getting the application properly posted to the Federal docket. This **Federal Register** Notice announces the date of the extended scoping period.

DATES: Comments or related material on the Bluewater deepwater port license application must be received by August 30, 2019.

ADDRESSES: The public docket for the Bluewater deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Roddy Bachman, USCG or Yvette Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Roddy Bachman, U.S. Coast Guard, telephone: 202–372–1451, email: *Roddy.Bachman@uscg.mil* or Ms. Yvette Fields, Maritime Administration, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. You may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the extended scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

Public comment submissions should include:

- Docket number MARAD–2019–0094.

• Your name and address.

Submit comments or material using only one of the following methods:

• Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

• By mail to the Federal Docket Management Facility (MARAD–2019–0094), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.

• By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.

• By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Privacy Act

The electronic form of all comments received into the FDMS can be searched by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). The Department of Transportation Privacy Act Statement can be viewed in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70, pages 19477–78) or by visiting *http://www.regulations.gov.*

(Authority: 33 U.S.C. 1501, *et seq.,* 49 CFR 1.93(h)).

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.,

Secretary, Maritime Administration.

[FR Doc. 2019–17483 Filed 8–14–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

Quarterly Publication of Individuals, Who Have Chosen To Expatriate, as Required by Section 6039G

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice.

SUMMARY: This notice is provided in accordance with IRC section 6039G of the Health Insurance Portability and Accountability Act (HIPPA) of 1996, as amended. This listing contains the name of each individual losing United States citizenship (within the meaning of section 877(a) or 877A) with respect to whom the Secretary received information during the quarter ending June 30, 2019. For purposes of this listing, long-term residents, as defined in section 877(e)(2), are treated as if they were citizens of the United States who lost citizenship.

Last name	First name	Middle name/initials
ABE	HIDEHI	
ABE	KAZUE	
ABOTOMEY	SARAH	VICTORIA
ABUMOHOR	CRISTIAN	
ADACHI	HUBERT	TOMOHIRO
ADAM	SABINE	HELENE
AKAKI	MAYUMI	
AKONI	OLUWALOLOLA	BOLADALE
ALBRIGHT	DELMER	LEE
ALKAZEMI	BADER	FAISAL
ALKHABORI	KHADIJA	SALEEM JAWAD
ALLAN	ALEXANDER	MACMILLIAN
ALLEN	MICHAEL	JAMES
ALLISON	RALPH	ROBERT
ALLISON	RALPH	ROBERT
ALSCHULER	ZOE	JULIE
AMRIATI-LOEVAAS	KAREN	ELISE
ANDERSON	JAN	LOIS
ARROYABE	MIREN	EDITH
ARZE	LUIS	ELIAS
ASCARELLI	DIDIER	MARCEL
ATWOOD	HANNAH	LLOYD
AZUMANE	MINAMI	ELLEN
BACKUS	KENNETH	ALAN
BACKUS	KRISTI	NICOLE MURRAY
BAECHLE	STEFAN	
BAIRD	THOMAS	
BARFORD MANN	PATRICIA	STEVENS
BARNES	CHRISTOPHER	JOHN
BARRETT	EILEEN	SUSAN
BARTA	GABRIEL	STROMAN
BARTELS	RACHEL	MARIE PAULE
BARTHOLOMEW	MICHAEL	ANTHONY
BARTOLOMEU	BOGDAN.	
BATH	SIERRA JANE	TREFRY
BATLIWALA	NASLI	J.

Bluewater SPM Initial Mailout Package

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20592-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1451
Fax: (202) 372-8382
Email: Roddy.C.Bachman@uscg.mil

July 8, 2019

Dear Interested Party:

The U.S. Coast Guard (USCG) and the Maritime Administration (MARAD) announce their intent to prepare an Environmental Impact Statement (EIS) to assist in the evaluation of a Deepwater Port License Application for the Bluewater SPM Project submitted May 30, 2019 by Bluewater Texas Terminals, LLC (BWTT). The application proposes the construction, operation, and the decommissioning of an offshore crude oil deepwater port (DWP) export facility and an offshore terminal with associated inshore and onshore components. The DWP would be located in federal waters within the Outer Continental Shelf (OCS) Mustang Island Area, approximately 15 nautical miles (17.26 statute miles) from San Jose Island, Aransas County, Texas, in water depths of approximately 90 feet. The DWP would consist of two single point mooring (SPM) buoy systems, 56.48 miles of new pipeline infrastructure, and a booster station located on Harbor Island within Aransas, Nueces and San Patricio Counties, Texas.

The inshore component of the proposed Project consists of the infrastructure located between the western Redfish Bay mean high tide (MHT) line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. Infrastructure located within this component consists of approximately 7.15 statute miles of two (2) 30-inch diameter pipelines and an approximately 19-acre booster station located on Harbor Island (Harbor Island Booster Station). The inshore portion of the Project crosses three navigable waterways including the Gulf Intracoastal Waterway, the Aransas Pass Channel, and the Lydia Ann Channel. The pipelines associated with the inshore portion of the Project would cross portions of Texas State submerged lease tract 306 near the Lydia Ann Channel. The Harbor Island Booster Station would consist of the necessary operating and pumping infrastructure to support the transport of crude oil and operations of the DWP.

The onshore component of the Project includes approximately 22.2 statute miles of two (2) 30-inch diameter pipelines extending from the landward side of the MHT line of Redfish Bay to the planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines, two of which would be the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station.

An EIS will be prepared in accordance within the provisions of the Deepwater Port Act (DWPA) of 1974, as amended (33 United States Code [U.S.C.] 1501 *et seq*.); the National Environmental Policy Act (NEPA) (Section 102(2)(c)), as implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); Department of Transportation (DOT) 5610.1C (*Procedures for Considering Environmental Impacts*); USCG Environmental Planning Policy, COMDTINST 5090.1

and the Environmental Planning (EP) Implementing Procedures (IP); and other appropriate and applicable regulations.

Texas is the adjacent coastal state as defined in the DWPA. The Governor of the adjacent coastal state may approve, approve with conditions, or deny the application within 45 days following the final public hearings which follow the publication of the Final EIS. Following this, provided the Governor does not deny the application, the Maritime Administrator will use the EIS and other information to 1) to approve the application, 2) approve the application with conditions, or 3) deny the application.

The USCG and MARAD are now in the scoping period that precedes the preparation of the Draft EIS and we invite the public to submit comments relating to the scope of the EIS. As part of the scoping process, we will hold an informational open house and public meeting at the location listed below. The open house and public meeting are open to the public and all interested parties are encouraged to attend. Written and oral comments will be accepted at the open house and public meeting and comments may be made throughout the scoping process. Below is a schedule of the open house and scoping meeting along with the location of both events. Free parking is available at the hotel.

July 22, 2019 Event	**Time**
Informational Open House	4:00 PM – 6:00 PM
Public Scoping Meeting	6:00 PM – 8:00 PM
Omni Corpus Christi Hotel 900 North Shoreline Boulevard Corpus Christi, TX 78401 361-887-1600	

The enclosed Notice of Intent (NOI) to prepare an EIS published in the Federal Register initiates the ***30-day scoping period ending on August 2, 2019.*** The NOI includes a detailed description of the proposed project, additional scoping meeting logistics, and detailed instructions on submitting comments to the Federal Docket throughout the scoping period.

The Application and supporting materials, including comments, notices and communications, and eventually the Draft and Final EIS may be viewed at the Federal Docket Management Facility website: *http://www.regulations.gov* under docket number MARAD-2019-0094. Comments submitted to the docket receive the same consideration as those made or delivered at the public meetings. These documents are also available for viewing at the following libraries:

- La Retama Public Library, 805 Comanche Street, Corpus Christi, Texas 78401; (361) 826-7055
- Ingleside Public Library, 2775 Waco Street, Ingleside, Texas 78362; (361) 776-5355
- Ed & Hazel Richmond Public Library, 110 North Lamont Street, Aransas Pass, Texas 78336; (361) 758-2350
- Bell Whittington Public Library, 2400 Memorial Parkway, Portland, Texas 78374; (361) 777-4560
- Texas A&M University, Corpus Christi Mary & Jeff Bell Library/Federal Depository, 6300 Ocean Drive #5702, Corpus Christi, Texas 78412; (361) 825-2687
- Robert J. Kleberg Public Library, 220 North 4th Street, Kingsville, Texas 78363; (361) 592-6381
- Owen R. Hopkins Public Library, 3202 McKinzie Road, Corpus Christi, Texas 78410; (361) 826-2350

The Coast Guard and MARAD encourage you to submit comments and related materials regarding the proposed BWTT deepwater port license application. If you do so, please include your name, address, and the Bluewater SPM Project docket number (MARAD-2019-0094). You may submit your comments and materials by mail, hand delivery, fax, or electronic means to the Docket Management Facility. To make sure your comments and related materials are not entered more than once in the docket, please submit them by only one of the following means:

- Electronic (preferred to expedite processing): Through the Federal Docket Management website at *http://www.regulations.gov* under docket number MARAD-2019-0094;
- Mail: Docket Management Facility, Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, Attn: MARAD-2019-0094;
- Personal Delivery: To the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays;
- Fax: To the Docket Management Facility at (202) 493-2251.

To ensure your comments are considered, the Coast Guard and MARAD request that all comments be submitted by *August 2*, *2019*. Comments and material received from the public will become part of the official record (or docket) and will be available for inspection or copying at the Docket Management Facility between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also view the information, including this notice and comments, on the Internet at *http://www.regulations.gov* (Docket Number MARAD-2019-0094). An additional set of public meetings and opportunity to comment on the proposed Bluewater SPM Project and the EIS will be available when a Draft EIS is published. Those meetings and the availability of the Draft EIS will be announced in the future correspondence and federal register notice. Final public hearings will be conducted following publication of the Final EIS.

Finally, Golder Associates, Inc. is our 3rd party environmental contract environmental consultant assisting the Coast Guard and MARAD in the application NEPA review process and EIS preparation.

If you have questions about the deepwater port license application, you may contact Mr. Roddy Bachman, Coast Guard at (202) 372-1451 or Roddy.C.Bachman@uscg.mil, or Ms. Yvette Fields, Maritime Administration, at (202) 366-0926 or Yvette.Fields@dot.gov.

Sincerely,

R C Bachman

RODDY C. BACHMAN
Project Manager, Deepwater Ports
Vessel and Facility Operating Standards Division
U.S. Coast Guard

Encl: 1: Bluewater SPM Notice of Intent/Notice of Scoping
2: Project Map

Copy: Ms. Yvette Fields, MARAD
Federal Docket # MARAD-2019-0094

Bluewater SPM Notice of Intent/Notice of Scoping

3. Technical Assistance

As noted throughout the notice, recipients should review FTA's program circulars for general program guidance. FTA headquarters and regional staff will be pleased to answer questions and provide any technical assistance needed to apply for FTA program funds and manage grants. At its discretion, FTA may also use program oversight consultants to provide technical assistance to grantees on a case by case basis. This notice and the program guidance circulars identified in this document may be accessed on FTA's website: *www.transit.dot.gov.*

G. Grant Management

1. Grant Reporting

FTA grantees are required to report on their grants. It is critical to ensure reports demonstrate that reasonable progress is being made on projects. At a minimum, all awards require a Federal Financial Report (FFR) and a Milestone Progress Report (MPR) on an annual basis. Some reports are required quarterly depending on the recipient and the type of projects funded under the grant and FTA's risk-based reporting policy that went into effect on October 1, 2017. The requirements for these reports and other reporting requirements can be found in the latest version of FTA Circular 5010. FTA staff, auditors, and contractors rely on the information provided in the FFR and MPR to review and report on the status of both financial and project-level activities contained in the grant. It is critical that recipients provide accurate and complete information in these reports and submit them by the required due date. Failure to report and/or demonstrate reasonable progress on projects can result in suspension or premature closeout of a grant.

2. Inactive Grants and Grant Closeout

In FY 2019, FTA will continue to focus on identifying and working with recipients to close inactive grants. If appropriate, FTA will act to closeout and deobligate funds from these grants if reasonable progress is not made. The efficient use of funds will further FTA's fulfillment of its mission to provide efficient and effective public transportation systems for the nation.

In October 2018, FTA identified a list of grants that were awarded on or prior to September 30, 2015 that had not disbursed funds since September 30, 2017 or had never disbursed funds. FTA Regional Offices will contact grant recipients with grants that meet these criteria, to close the grant and deobligate any remaining funds unless the grantee can provide information that demonstrates projects funded by the grant remain active and there is a realistic schedule to expedite completion of the projects.

Issued in Washington, DC.

K. Jane Williams,

Acting Administrator.

[FR Doc. 2019–14248 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–57–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0094]

Deepwater Port License Application: Bluewater Texas Terminal LLC (Bluewater)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) Deepwater Port License Application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Corpus Christi, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Bluewater Deepwater Port License Application. The meeting will be held in Corpus Christi, Texas, on Monday, July 22, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Bluewater application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting in Corpus Christi, Texas will be held at the Omni Corpus Christi Hotel, 900 N Shoreline Boulevard, Corpus Christi, Texas, 78401, phone: (361) 887–1600, web address: *https://www.omnihotels.com/hotels/corpus-christi.* Parking is available at the venue.

The public docket for the Bluewater Deepwater Port License Application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Roddy Bachman, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Roddy Bachman, USCG, telephone: 202–372–1451, email: *Roddy.C.Bachman@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public

meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Bluewater Deepwater Port License Application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

Public comment submissions should include:

- Docket number MARAD–2019–0094.
- Your name and address.

Submit comments or material using only one of the following methods:

- Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.
- By mail to the Federal Docket Management Facility (MARAD–2019–0094), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.
- By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.
- By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed Bluewater deepwater port appears in the Bluewater Notice of Application, Wednesday, June 26, 2019 edition of the **Federal Register** (84 FR 30301). The ''Summary of the Application'' from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see **FOR FURTHER INFORMATION CONTACT**).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in ''Summary of the Application'' below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the ''no-action'' alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see **DATES**), and ends when USCG and MARAD have completed the following actions:

- Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case Bluewater, and other interested persons;
- Determines the actions, alternatives and impacts described in 40 CFR 1508.25;
- Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;
- Identifies other relevant permitting, environmental review and consultation requirements;
- Indicates the relationship between timing of the environmental review and other aspects of the application process; and
- At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft

EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in FOR FURTHER INFORMATION CONTACT). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

Bluewater is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico (GOM) to export domestically produced crude oil. The proposed project involves the design, engineering, and construction of a deepwater port, approximately 56.48 miles of pipeline infrastructure, and a booster station. The Bluewater deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses. During single vessel loading operations, the proposed project is capable of loading rates of up to approximately 80,000 barrels per hour (bph) and during simultaneous vessel loading operations, the proposed project is capable of loading rates of 40,000 bph. The facility is expected to service 16 Very Large Crude Carriers (VLCCs) per month.

For the purposes of this application, the proposed Bluewater project is described in three distinguishable segments by locality, to include the onshore components, the inshore components and the offshore components.

Onshore components associated with the proposed Bluewater project are defined as those components on the landward side of the western Redfish Bay Mean High Tide (MHT) line, located in San Patricio and Aransas Counties, Texas. The onshore project components include:

• Approximately 22.20 miles of two (2) new parallel 30-inch-diameter crude oil pipelines extending from a planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines compose the proposed pipeline infrastructure that will extend to the inshore pipeline which connects to the proposed Harbor Island Booster Station (Booster Station) described below.

Inshore components associated with the proposed Bluewater project are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the GOM. Inshore project components include:

• Approximately 7.15 miles of two (2) new 30-inch-diameter crude oil pipelines connecting to the onshore facility, an approximately 19-acre booster station and a connection to the offshore pipeline. The onshore pipeline would be located within San Patricio County, Texas and Nueces County, Texas and the Booster Station would be located on Harbor Island in Nueces County, Texas.

• The Booster Station will include approximately 19 acres of land with two (2) aboveground crude oil storage tanks, each with a total storage capacity of 181,000 barrels and two (2) 181,000-barrel water storage tanks. The purpose of water tanks is to allow for the clearing of the pipeline infrastructure. During clearing operations, water from the water storage tanks would be pumped through the pipelines and back to the Booster Station. The displaced crude oil would be placed in the two crude oil storage tanks.

• Additionally, the Booster Station will contain equipment and piping to provide interconnectivity with the crude oil supply network for the Bluewater project. This would include the installation of four (4) 5,500 horsepower electrically powered motors in a series electronically locked into operation as two booster pumping systems delivering approximately 11,000 horsepower to each of the two (2) 30-inch diameter pipelines. Further, the Booster Station would house the necessary infrastructure to support the transport of crude oil through the proposed pipeline infrastructure to the deepwater port for the loading of moored vessels to include a fire water tank, firewater pumps, stormwater runoff treatment plant and pumps, emergency generator, foam and water monitors and an operations office.

Offshore components associated with the proposed Bluewater project are defined as those components located seaward of the MHT line located at the interface of San Jose Island and the GOM. The offshore project components include:

• Approximately 27.13 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the shoreline crossing at the interface of San Jose Island to the offshore Bluewater deepwater port for crude oil delivery to Single Point Mooring (SPM) buoys.

• Two (2) SPMs in Outer Continental Shelf Matagorda Island Area TX4 lease blocks 698 and 699, approximately 15 nautical miles (17.26 statute miles) off the coast of San Patricio County, Texas in a water depth of approximately 89 feet.

• A catenary anchor leg mooring (CALM) system for each SPM buoy connected to a pipeline end manifold (PLEM) system, mooring hawsers, floating hoses, and sub-marine hoses to allow for the loading of crude oil to vessels moored at the proposed deepwater port. The SPM buoy system will be permanently moored with a symmetrically arranged six-leg anchor dual chain configuration extending to twelve (12) 72-inch-diameter pile anchors installed on the seafloor.

• Each of the proposed SPM buoy systems 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. Two floating hoses equipped with marine break-away couplings will be utilized for the transfer of crude oil from the SPM buoy systems to the moored vessel. Floating hoses will be equipped with strobe lights at 15-foot intervals for detection at night and low-light conditions.

Privacy Act

The electronic form of all comments received into the FDMS can be searched by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). The Department of Transportation Privacy Act Statement can be viewed in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70, pages 19477–78) or by visiting *http://www.regulations.gov.*

(Authority: 33 U.S.C. 1501, *et seq.;* 49 CFR 1.93(h))

Dated: June 27, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–14177 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0093]

Deepwater Port License Application: Texas GulfLink LLC

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Texas GulfLink LLC (Texas GulfLink) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 28.3 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 104 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via two single point mooring buoy systems.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Texas GulfLink deepwater port application. The meeting will be held in Lake Jackson, Texas on Wednesday, July 17, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Texas GulfLink deepwater port license application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting Lake Jackson, TX will take place in the Marriott Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the Texas GulfLink deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0093.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Patrick Clark, USCG or Yvette Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Patrick Clark, U.S. Coast Guard, telephone: 202–372–1358, email: *Patrick.W.Clark@uscg.mil* or Ms. Yvette Fields, Maritime Administration, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent, by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

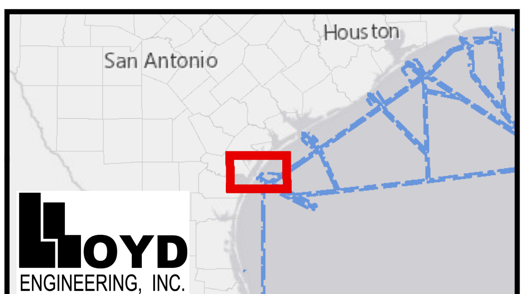
Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend an open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Texas GulfLink deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://*

Project Map



LLOYD ENGINEERING, INC.

Map Details

- SPM Buoy
- Onshore Pipeline
- Inshore Pipeline
- Offshore Pipeline
- Harbor Island Booster Station
- SPM Buoy ATBA and Safety Zones
- Navigational Fairways
- Navigation Channels
- Anchorage Areas

1 inch = 5 miles

0 2.5 5

Miles

N E S W

Coordinate System: NAD 1983 2011 StatePlane Texas South FIPS 4205 Ft US
Projection: Lambert Conformal Conic
Datum: NAD 1983 2011
Units: Foot US

Figure 2
Project Component Map

Bluewater SPM Project
Bluewater Texas Terminal LLC

Date: May 06, 2019

Local Correspondence

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20592-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1451
Fax: (202) 372-8382
Email: Roddy.C.Bachman@uscg.mil

July 8, 2019

Dear Interested Party:

The U.S. Coast Guard (USCG) and the Maritime Administration (MARAD) announce their intent to prepare an Environmental Impact Statement (EIS) to assist in the evaluation of a Deepwater Port License Application for the Bluewater SPM Project submitted May 30, 2019 by Bluewater Texas Terminals, LLC (BWTT). The application proposes the construction, operation, and the decommissioning of an offshore crude oil deepwater port (DWP) export facility and an offshore terminal with associated inshore and onshore components. The DWP would be located in federal waters within the Outer Continental Shelf (OCS) Mustang Island Area, approximately 15 nautical miles (17.26 statute miles) from San Jose Island, Aransas County, Texas, in water depths of approximately 90 feet. The DWP would consist of two single point mooring (SPM) buoy systems, 56.48 miles of new pipeline infrastructure, and a booster station located on Harbor Island within Aransas, Nueces and San Patricio Counties, Texas.

The inshore component of the proposed Project consists of the infrastructure located between the western Redfish Bay mean high tide (MHT) line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. Infrastructure located within this component consists of approximately 7.15 statute miles of two (2) 30-inch diameter pipelines and an approximately 19-acre booster station located on Harbor Island (Harbor Island Booster Station). The inshore portion of the Project crosses three navigable waterways including the Gulf Intracoastal Waterway, the Aransas Pass Channel, and the Lydia Ann Channel. The pipelines associated with the inshore portion of the Project would cross portions of Texas State submerged lease tract 306 near the Lydia Ann Channel. The Harbor Island Booster Station would consist of the necessary operating and pumping infrastructure to support the transport of crude oil and operations of the DWP.

The onshore component of the Project includes approximately 22.2 statute miles of two (2) 30-inch diameter pipelines extending from the landward side of the MHT line of Redfish Bay to the planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines, two of which would be the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station.

An EIS will be prepared in accordance within the provisions of the Deepwater Port Act (DWPA) of 1974, as amended (33 United States Code [U.S.C.] 1501 *et seq*.); the National Environmental Policy Act (NEPA) (Section 102(2)(c)), as implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); Department of Transportation (DOT) 5610.1C (*Procedures for Considering Environmental Impacts*); USCG Environmental Planning Policy, COMDTINST 5090.1

and the Environmental Planning (EP) Implementing Procedures (IP); and other appropriate and applicable regulations.

Texas is the adjacent coastal state as defined in the DWPA. The Governor of the adjacent coastal state may approve, approve with conditions, or deny the application within 45 days following the final public hearings which follow the publication of the Final EIS. Following this, provided the Governor does not deny the application, the Maritime Administrator will use the EIS and other information to 1) to approve the application, 2) approve the application with conditions, or 3) deny the application.

The USCG and MARAD are now in the scoping period that precedes the preparation of the Draft EIS and we invite the public to submit comments relating to the scope of the EIS. As part of the scoping process, we will hold an informational open house and public meeting at the location listed below. The open house and public meeting are open to the public and all interested parties are encouraged to attend. Written and oral comments will be accepted at the open house and public meeting and comments may be made throughout the scoping process. Below is a schedule of the open house and scoping meeting along with the location of both events. Free parking is available at the hotel.

July 22, 2019 Event	**Time**
Informational Open House	4:00 PM – 6:00 PM
Public Scoping Meeting	6:00 PM – 8:00 PM
Omni Corpus Christi Hotel 900 North Shoreline Boulevard Corpus Christi, TX 78401 361-887-1600	

The enclosed Notice of Intent (NOI) to prepare an EIS published in the Federal Register initiates the ***30-day scoping period ending on August 2, 2019.*** The NOI includes a detailed description of the proposed project, additional scoping meeting logistics, and detailed instructions on submitting comments to the Federal Docket throughout the scoping period.

The Application and supporting materials, including comments, notices and communications, and eventually the Draft and Final EIS may be viewed at the Federal Docket Management Facility website: *http://www.regulations.gov* under docket number MARAD-2019-0094. Comments submitted to the docket receive the same consideration as those made or delivered at the public meetings. These documents are also available for viewing at the following libraries:

- La Retama Public Library, 805 Comanche Street, Corpus Christi, Texas 78401; (361) 826-7055
- Ingleside Public Library, 2775 Waco Street, Ingleside, Texas 78362; (361) 776-5355
- Ed & Hazel Richmond Public Library, 110 North Lamont Street, Aransas Pass, Texas 78336; (361) 758-2350
- Bell Whittington Public Library, 2400 Memorial Parkway, Portland, Texas 78374; (361) 777-4560
- Texas A&M University, Corpus Christi Mary & Jeff Bell Library/Federal Depository, 6300 Ocean Drive #5702, Corpus Christi, Texas 78412; (361) 825-2687
- Robert J. Kleberg Public Library, 220 North 4th Street, Kingsville, Texas 78363; (361) 592-6381
- Owen R. Hopkins Public Library, 3202 McKinzie Road, Corpus Christi, Texas 78410; (361) 826-2350

The Coast Guard and MARAD encourage you to submit comments and related materials regarding the proposed BWTT deepwater port license application. If you do so, please include your name, address, and the Bluewater SPM Project docket number (MARAD-2019-0094). You may submit your comments and materials by mail, hand delivery, fax, or electronic means to the Docket Management Facility. To make sure your comments and related materials are not entered more than once in the docket, please submit them by only one of the following means:

- Electronic (preferred to expedite processing): Through the Federal Docket Management website at *http://www.regulations.gov* under docket number MARAD-2019-0094;
- Mail: Docket Management Facility, Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, Attn: MARAD-2019-0094;
- Personal Delivery: To the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays;
- Fax: To the Docket Management Facility at (202) 493-2251.

To ensure your comments are considered, the Coast Guard and MARAD request that all comments be submitted by *August 2*, *2019*. Comments and material received from the public will become part of the official record (or docket) and will be available for inspection or copying at the Docket Management Facility between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also view the information, including this notice and comments, on the Internet at *http://www.regulations.gov* (Docket Number MARAD-2019-0094). An additional set of public meetings and opportunity to comment on the proposed Bluewater SPM Project and the EIS will be available when a Draft EIS is published. Those meetings and the availability of the Draft EIS will be announced in the future correspondence and federal register notice. Final public hearings will be conducted following publication of the Final EIS.

Finally, Golder Associates, Inc. is our 3rd party environmental contract environmental consultant assisting the Coast Guard and MARAD in the application NEPA review process and EIS preparation.

If you have questions about the deepwater port license application, you may contact Mr. Roddy Bachman, Coast Guard at (202) 372-1451 or Roddy.C.Bachman@uscg.mil, or Ms. Yvette Fields, Maritime Administration, at (202) 366-0926 or Yvette.Fields@dot.gov.

Sincerely,

R C Bachman

RODDY C. BACHMAN
Project Manager, Deepwater Ports
Vessel and Facility Operating Standards Division
U.S. Coast Guard

Encl: 1: Bluewater SPM Notice of Intent/Notice of Scoping
2: Project Map

Copy: Ms. Yvette Fields, MARAD
Federal Docket # MARAD-2019-0094

Bluewater SPM Notice of Intent/Notice of Scoping

3. Technical Assistance

As noted throughout the notice, recipients should review FTA's program circulars for general program guidance. FTA headquarters and regional staff will be pleased to answer questions and provide any technical assistance needed to apply for FTA program funds and manage grants. At its discretion, FTA may also use program oversight consultants to provide technical assistance to grantees on a case by case basis. This notice and the program guidance circulars identified in this document may be accessed on FTA's website: *www.transit.dot.gov.*

G. Grant Management

1. Grant Reporting

FTA grantees are required to report on their grants. It is critical to ensure reports demonstrate that reasonable progress is being made on projects. At a minimum, all awards require a Federal Financial Report (FFR) and a Milestone Progress Report (MPR) on an annual basis. Some reports are required quarterly depending on the recipient and the type of projects funded under the grant and FTA's risk-based reporting policy that went into effect on October 1, 2017. The requirements for these reports and other reporting requirements can be found in the latest version of FTA Circular 5010. FTA staff, auditors, and contractors rely on the information provided in the FFR and MPR to review and report on the status of both financial and project-level activities contained in the grant. It is critical that recipients provide accurate and complete information in these reports and submit them by the required due date. Failure to report and/or demonstrate reasonable progress on projects can result in suspension or premature closeout of a grant.

2. Inactive Grants and Grant Closeout

In FY 2019, FTA will continue to focus on identifying and working with recipients to close inactive grants. If appropriate, FTA will act to closeout and deobligate funds from these grants if reasonable progress is not made. The efficient use of funds will further FTA's fulfillment of its mission to provide efficient and effective public transportation systems for the nation.

In October 2018, FTA identified a list of grants that were awarded on or prior to September 30, 2015 that had not disbursed funds since September 30, 2017 or had never disbursed funds. FTA Regional Offices will contact grant recipients with grants that meet these criteria, to close the grant and deobligate any remaining funds unless the grantee can provide information that demonstrates projects funded by the grant remain active and there is a realistic schedule to expedite completion of the projects.

Issued in Washington, DC.

K. Jane Williams,

Acting Administrator.

[FR Doc. 2019–14248 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–57–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0094]

Deepwater Port License Application: Bluewater Texas Terminal LLC (Bluewater)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) Deepwater Port License Application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Corpus Christi, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Bluewater Deepwater Port License Application. The meeting will be held in Corpus Christi, Texas, on Monday, July 22, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Bluewater application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting in Corpus Christi, Texas will be held at the Omni Corpus Christi Hotel, 900 N Shoreline Boulevard, Corpus Christi, Texas, 78401, phone: (361) 887–1600, web address: *https://www.omnihotels.com/hotels/corpus-christi.* Parking is available at the venue.

The public docket for the Bluewater Deepwater Port License Application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Roddy Bachman, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Roddy Bachman, USCG, telephone: 202–372–1451, email: *Roddy.C.Bachman@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public

meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Bluewater Deepwater Port License Application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

Public comment submissions should include:

• Docket number MARAD–2019–0094.

• Your name and address.

Submit comments or material using only one of the following methods:

• Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

• By mail to the Federal Docket Management Facility (MARAD–2019–0094), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.

• By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.

• By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed Bluewater deepwater port appears in the Bluewater Notice of Application, Wednesday, June 26, 2019 edition of the **Federal Register** (84 FR 30301). The ''Summary of the Application'' from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see **FOR FURTHER INFORMATION CONTACT**).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in ''Summary of the Application'' below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the ''no-action'' alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see **DATES**), and ends when USCG and MARAD have completed the following actions:

• Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case Bluewater, and other interested persons;

• Determines the actions, alternatives and impacts described in 40 CFR 1508.25;

• Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;

• Identifies other relevant permitting, environmental review and consultation requirements;

• Indicates the relationship between timing of the environmental review and other aspects of the application process; and

• At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft

EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in FOR FURTHER INFORMATION CONTACT). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

Bluewater is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico (GOM) to export domestically produced crude oil. The proposed project involves the design, engineering, and construction of a deepwater port, approximately 56.48 miles of pipeline infrastructure, and a booster station. The Bluewater deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses. During single vessel loading operations, the proposed project is capable of loading rates of up to approximately 80,000 barrels per hour (bph) and during simultaneous vessel loading operations, the proposed project is capable of loading rates of 40,000 bph. The facility is expected to service 16 Very Large Crude Carriers (VLCCs) per month.

For the purposes of this application, the proposed Bluewater project is described in three distinguishable segments by locality, to include the onshore components, the inshore components and the offshore components.

Onshore components associated with the proposed Bluewater project are defined as those components on the landward side of the western Redfish Bay Mean High Tide (MHT) line, located in San Patricio and Aransas Counties, Texas. The onshore project components include:

• Approximately 22.20 miles of two (2) new parallel 30-inch-diameter crude oil pipelines extending from a planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines compose the proposed pipeline infrastructure that will extend to the inshore pipeline which connects to the proposed Harbor Island Booster Station (Booster Station) described below.

Inshore components associated with the proposed Bluewater project are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the GOM. Inshore project components include:

• Approximately 7.15 miles of two (2) new 30-inch-diameter crude oil pipelines connecting to the onshore facility, an approximately 19-acre booster station and a connection to the offshore pipeline. The onshore pipeline would be located within San Patricio County, Texas and Nueces County, Texas and the Booster Station would be located on Harbor Island in Nueces County, Texas.

• The Booster Station will include approximately 19 acres of land with two (2) aboveground crude oil storage tanks, each with a total storage capacity of 181,000 barrels and two (2) 181,000-barrel water storage tanks. The purpose of water tanks is to allow for the clearing of the pipeline infrastructure. During clearing operations, water from the water storage tanks would be pumped through the pipelines and back to the Booster Station. The displaced crude oil would be placed in the two crude oil storage tanks.

• Additionally, the Booster Station will contain equipment and piping to provide interconnectivity with the crude oil supply network for the Bluewater project. This would include the installation of four (4) 5,500 horsepower electrically powered motors in a series electronically locked into operation as two booster pumping systems delivering approximately 11,000 horsepower to each of the two (2) 30-inch diameter pipelines. Further, the Booster Station would house the necessary infrastructure to support the transport of crude oil through the proposed pipeline infrastructure to the deepwater port for the loading of moored vessels to include a fire water tank, firewater pumps, stormwater runoff treatment plant and pumps, emergency generator, foam and water monitors and an operations office.

Offshore components associated with the proposed Bluewater project are defined as those components located seaward of the MHT line located at the interface of San Jose Island and the GOM. The offshore project components include:

• Approximately 27.13 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the shoreline crossing at the interface of San Jose Island to the offshore Bluewater deepwater port for crude oil delivery to Single Point Mooring (SPM) buoys.

• Two (2) SPMs in Outer Continental Shelf Matagorda Island Area TX4 lease blocks 698 and 699, approximately 15 nautical miles (17.26 statute miles) off the coast of San Patricio County, Texas in a water depth of approximately 89 feet.

• A catenary anchor leg mooring (CALM) system for each SPM buoy connected to a pipeline end manifold (PLEM) system, mooring hawsers, floating hoses, and sub-marine hoses to allow for the loading of crude oil to vessels moored at the proposed deepwater port. The SPM buoy system will be permanently moored with a symmetrically arranged six-leg anchor dual chain configuration extending to twelve (12) 72-inch-diameter pile anchors installed on the seafloor.

• Each of the proposed SPM buoy systems 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. Two floating hoses equipped with marine break-away couplings will be utilized for the transfer of crude oil from the SPM buoy systems to the moored vessel. Floating hoses will be equipped with strobe lights at 15-foot intervals for detection at night and low-light conditions.

Privacy Act

The electronic form of all comments received into the FDMS can be searched by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). The Department of Transportation Privacy Act Statement can be viewed in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70, pages 19477–78) or by visiting *http://www.regulations.gov.*

(Authority: 33 U.S.C. 1501, *et seq.;* 49 CFR 1.93(h))

Dated: June 27, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–14177 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0093]

Deepwater Port License Application: Texas GulfLink LLC

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Texas GulfLink LLC (Texas GulfLink) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 28.3 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 104 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via two single point mooring buoy systems.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Texas GulfLink deepwater port application. The meeting will be held in Lake Jackson, Texas on Wednesday, July 17, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Texas GulfLink deepwater port license application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting Lake Jackson, TX will take place in the Marriott Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the Texas GulfLink deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0093.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Patrick Clark, USCG or Yvette Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Patrick Clark, U.S. Coast Guard, telephone: 202–372–1358, email: *Patrick.W.Clark@uscg.mil* or Ms. Yvette Fields, Maritime Administration, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent, by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend an open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Texas GulfLink deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://*

Project Map

LLOYD ENGINEERING, INC.

Map Details

- SPM Buoy
- Onshore Pipeline
- Inshore Pipeline
- Offshore Pipeline
- Harbor Island Booster Station
- SPM Buoy ATBA and Safety Zones
- Navigational Fairways
- Navigation Channels
- Anchorage Areas

1 inch = 5 miles

0 2.5 5
Miles

N E S W

Coordinate System: NAD 1983 2011 StatePlane Texas South FIPS 4205 Ft US
Projection: Lambert Conformal Conic
Datum: NAD 1983 2011
Units: Foot US

Figure 2
Project Component Map

Bluewater SPM Project
Bluewater Texas Terminal LLC

Date: May 06, 2019

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20592-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1451
Fax: (202) 372-8382
Email: Roddy.C.Bachman@uscg.mil

August 20, 2019

Dear Interested Party:

The U.S. Coast Guard (USCG) and the Maritime Administration (MARAD) announced their intent to prepare an Environmental Impact Statement (EIS) to assist in the evaluation of a Deepwater Port License Application for the Bluewater SPM Project by Bluewater Texas Terminals, LLC (BWTT) on July 3, 2019 in the Federal Register. The application proposes the construction, operation, and the decommissioning of an offshore crude oil deepwater port (DWP) export facility and an offshore terminal with associated inshore and onshore components. The DWP would be located in federal waters within the Outer Continental Shelf (OCS) Mustang Island Area, approximately 15 nautical miles (17.26 statute miles) from San Jose Island, Aransas County, Texas, in water depths of approximately 90 feet. The DWP would consist of two single point mooring (SPM) buoy systems, 56.48 miles of new pipeline infrastructure, and a booster station located on Harbor Island within Aransas, Nueces and San Patricio Counties, Texas.

A letter with maps to inform you of the Bluewater SPM Project and the public scoping period (original package enclosed) was sent in the beginning of July 2019, soon after the July 3, 2019 Federal Register notice was published to inform the public of the intent to prepare an EIS. Publication of that notice began a 30-day scoping process, announced the date and location of public scoping meetings, as well as requested public participation to assist in the identification and determination of the environmental issues to be addressed in the EIS. The scoping comment period for the Bluewater SPM Project is being extended to ***August 30, 2019*** (Federal Register extension notice enclosed) due to delays in getting the application properly posted to the Federal docket. In addition, there were returned mailings due to incorrect addresses from the original mailout. Since corrected addresses were recently received, the USCG and MARAD is sending out this second letter to inform the public of the scoping period extension and to ensure that those interested parties potentially affected by the Project have been contacted.

The USCG and MARAD are in the scoping period that precedes the preparation of the Draft EIS and we invite the public to submit comments relating to the scope of the EIS. The Application and supporting materials, including comments, notices and communications, and eventually the Draft and Final EIS may be viewed at the Federal Docket Management Facility website: *http://www.regulations.gov* under docket number MARAD-2019-0094. These documents are also available for viewing at the following libraries:

- La Retama Public Library, 805 Comanche Street, Corpus Christi, Texas 78401; (361) 826-7055
- Ingleside Public Library, 2775 Waco Street, Ingleside, Texas 78362; (361) 776-5355
- Ed & Hazel Richmond Public Library, 110 North Lamont Street, Aransas Pass, Texas 78336; (361) 758-2350
- Bell Whittington Public Library, 2400 Memorial Parkway, Portland, Texas 78374; (361) 777-4560
- Texas A&M University, Corpus Christi Mary & Jeff Bell Library/Federal Depository, 6300 Ocean Drive #5702, Corpus Christi, Texas 78412; (361) 825-2687
- Robert J. Kleberg Public Library, 220 North 4th Street, Kingsville, Texas 78363; (361) 592-6381
- Owen R. Hopkins Public Library, 3202 McKinzie Road, Corpus Christi, Texas 78410; (361) 826-2350

The Coast Guard and MARAD encourage you to submit comments and related materials regarding the proposed BWTT deepwater port license application. If you do so, please include your name, address, and the Bluewater SPM Project docket number (MARAD-2019-0094). You may submit your comments and materials by mail, hand delivery, fax, or electronic means to the Docket Management Facility. To make sure your comments and related materials are not entered more than once in the docket, please submit them by only one of the following means:

- Electronic (preferred to expedite processing): Through the Federal Docket Management website at *http://www.regulations.gov* under docket number MARAD-2019-0094;
- Mail: Docket Management Facility, Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, Attn: MARAD-2019-0094;
- Personal Delivery: To the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays;
- Fax: To the Docket Management Facility at (202) 493-2251.

To ensure your comments are considered, the Coast Guard and MARAD request that all comments be submitted by ***August 30, 2019***. Comments and material received from the public will become part of the official record (or docket) and will be available for inspection or copying at the Docket Management Facility between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also view the information, including this notice and comments, on the Internet at *http://www.regulations.gov* (Docket Number MARAD-2019-0094). An additional set of public meetings and opportunity to comment on the proposed Bluewater SPM Project and the EIS will be available when a Draft EIS is published. Those meetings and the availability of the Draft EIS will be announced in the future correspondence and federal register notice. Final public hearings will be conducted following publication of the Final EIS.

Finally, Golder Associates, Inc. is our 3rd party environmental contract environmental consultant assisting the Coast Guard and MARAD in the application NEPA review process and EIS preparation.

If you have questions about the deepwater port license application, you may contact Mr. Roddy Bachman, Coast Guard at (202) 372-1451 or Roddy.C.Bachman@uscg.mil, or Ms. Yvette Fields, Maritime Administration, at (202) 366-0926 or Yvette.Fields@dot.gov.

Sincerely,

R C Bachman

RODDY C. BACHMAN
Project Manager, Deepwater Ports
Vessel and Facility Operating Standards Division
U.S. Coast Guard

Encl: 1: Federal Register Notice for Extension of Scoping Period
2: Initial Mailout Package

Copy: Ms. Yvette Fields, MARAD
Federal Docket # MARAD-2019-0094

Bluewater SPM Notice for Extension of Scoping Period

The earliest this transaction may be consummated is August 29, 2019, the effective date of the exemption (30 days after the verified notice was filed).

Watco states that it currently controls, indirectly, 38 Class III rail carriers [1] and one Class II rail carrier, collectively operating in 27 states.[2] For a complete list of these rail carriers and the states in which they operate, see Watco's notice of exemption filed on July 30, 2019.[3] The notice is available at *www.stb.gov.*

Watco represents that: (1) The rail line to be operated by SOFR does not connect with any lines of any other Watco-controlled rail carriers; (2) the proposed continuance in control of SOFR is not part of a series of anticipated transactions that would connect the Line with the rail lines of any other railroad in the Watco corporate family; and (3) the transaction does not involve a Class I rail carrier. The proposed transaction is, therefore, exempt from the prior approval requirements of 49 U.S.C. 11323. *See* 49 CFR 1180.2(d)(2).

Under 49 U.S.C. 10502(g), the Board may not use its exemption authority to relieve a rail carrier of its statutory obligation to protect the interests of its employees. Because the transaction involves control of one Class II and one or more Class III rail carriers, the transaction is subject to the labor protection requirements of 49 U.S.C. 11326(b) and *Wisconsin Central, Ltd.—Acquisition Exemption—Lines of Union Pacific Railroad,* 2 S.T.B. 218 (1997).

If the notice contains false or misleading information, the exemption is void ab initio. Petitions to revoke the exemption under 49 U.S.C. 10502(d) may be filed at any time. The filing of a petition to revoke will not automatically stay the effectiveness of the exemption. Stay petitions must be filed no later than August 22, 2019 (at least seven days before the exemption becomes effective).

All pleadings, referring to Docket No. FD 36337, must be filed with the Surface Transportation Board either via e-filing or in writing addressed to 395 E Street SW, Washington, DC 20423–0001. In addition, a copy of each pleading must be served on Watco's representative, Karl Morell, Karl Morell & Associates, 440 1st Street NW, Suite 440, Washington, DC 20001.

According to Watco, this action is excluded from environmental review under 49 CFR 1105.6(c) and from historic preservation reporting requirements under 49 CFR 1105.8(b)(1).

Board decisions and notices are available at *www.stb.gov.*

Decided: August 12, 2019.

By the Board, Allison C. Davis, Director, Office of Proceedings.

Jeffrey Herzig,

Clearance Clerk.

[FR Doc. 2019–17551 Filed 8–14–19; 8:45 am]

BILLING CODE 4915–01–P

[1] In its verified notice, Watco states that it currently controls 39 Class III railroads, but this appears to be a misstatement, as the number of Class III carriers listed elsewhere in the notice adds to 38.

[2] Although Watco's verified notice indicates that the carriers it controls operate in 25 states, the notice lists 27 different states.

[3] The list of carriers on pages 4–5 of the verified notice does not include Ithaca Central Railroad, LLC, though that carrier is listed as one of the applicants on page 9.

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0094]

Deepwater Port License Application: Bluewater LLC; Extension of Scoping Period

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice.

SUMMARY: By **Federal Register** notice of Wednesday, July 3, 2019, titled *Deepwater Port License Application: Bluewater Texas Terminal LLC (Bluewater),* the U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), announced the intent to prepare an environmental impact statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) deepwater port license application. Publication of that notice began a 30-day scoping process, announced the date and location of a public scoping meeting as well as requested public participation to assist in the identification and determination of the environmental issues to be addressed in the EIS. This extension is due to delays in getting the application properly posted to the Federal docket. This **Federal Register** Notice announces the date of the extended scoping period.

DATES: Comments or related material on the Bluewater deepwater port license application must be received by August 30, 2019.

ADDRESSES: The public docket for the Bluewater deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Roddy Bachman, USCG or Yvette Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Roddy Bachman, U.S. Coast Guard, telephone: 202–372–1451, email: *Roddy.Bachman@uscg.mil* or Ms. Yvette Fields, Maritime Administration, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. You may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the extended scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

Public comment submissions should include:

- Docket number MARAD–2019–0094.

• Your name and address.

Submit comments or material using only one of the following methods:

• Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

• By mail to the Federal Docket Management Facility (MARAD–2019–0094), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.

• By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.

• By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Privacy Act

The electronic form of all comments received into the FDMS can be searched by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). The Department of Transportation Privacy Act Statement can be viewed in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70, pages 19477–78) or by visiting *http://www.regulations.gov.*

(Authority: 33 U.S.C. 1501, *et seq.,* 49 CFR 1.93(h)).

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.,

Secretary, Maritime Administration.

[FR Doc. 2019–17483 Filed 8–14–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

Quarterly Publication of Individuals, Who Have Chosen To Expatriate, as Required by Section 6039G

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice.

SUMMARY: This notice is provided in accordance with IRC section 6039G of the Health Insurance Portability and Accountability Act (HIPPA) of 1996, as amended. This listing contains the name of each individual losing United States citizenship (within the meaning of section 877(a) or 877A) with respect to whom the Secretary received information during the quarter ending June 30, 2019. For purposes of this listing, long-term residents, as defined in section 877(e)(2), are treated as if they were citizens of the United States who lost citizenship.

Last name	First name	Middle name/initials
ABE	HIDEHI	
ABE	KAZUE	
ABOTOMEY	SARAH	VICTORIA
ABUMOHOR	CRISTIAN	
ADACHI	HUBERT	TOMOHIRO
ADAM	SABINE	HELENE
AKAKI	MAYUMI	
AKONI	OLUWALOLOLA	BOLADALE
ALBRIGHT	DELMER	LEE
ALKAZEMI	BADER	FAISAL
ALKHABORI	KHADIJA	SALEEM JAWAD
ALLAN	ALEXANDER	MACMILLIAN
ALLEN	MICHAEL	JAMES
ALLISON	RALPH	ROBERT
ALLISON	RALPH	ROBERT
ALSCHULER	ZOE	JULIE
AMRIATI-LOEVAAS	KAREN	ELISE
ANDERSON	JAN	LOIS
ARROYABE	MIREN	EDITH
ARZE	LUIS	ELIAS
ASCARELLI	DIDIER	MARCEL
ATWOOD	HANNAH	LLOYD
AZUMANE	MINAMI	ELLEN
BACKUS	KENNETH	ALAN
BACKUS	KRISTI	NICOLE MURRAY
BAECHLE	STEFAN	
BAIRD	THOMAS	
BARFORD MANN	PATRICIA	STEVENS
BARNES	CHRISTOPHER	JOHN
BARRETT	EILEEN	SUSAN
BARTA	GABRIEL	STROMAN
BARTELS	RACHEL	MARIE PAULE
BARTHOLOMEW	MICHAEL	ANTHONY
BARTOLOMEU	BOGDAN.	
BATH	SIERRA JANE	TREFRY
BATLIWALA	NASLI	J.

Bluewater SPM Initial Mailout Package

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

2703 Martin Luther King Jr. Ave. SE
Washington, DC 20592-7509
Staff Symbol: CG-OES-2
Phone: (202) 372-1451
Fax: (202) 372-8382
Email: Roddy.C.Bachman@uscg.mil

July 8, 2019

Dear Interested Party:

The U.S. Coast Guard (USCG) and the Maritime Administration (MARAD) announce their intent to prepare an Environmental Impact Statement (EIS) to assist in the evaluation of a Deepwater Port License Application for the Bluewater SPM Project submitted May 30, 2019 by Bluewater Texas Terminals, LLC (BWTT). The application proposes the construction, operation, and the decommissioning of an offshore crude oil deepwater port (DWP) export facility and an offshore terminal with associated inshore and onshore components. The DWP would be located in federal waters within the Outer Continental Shelf (OCS) Mustang Island Area, approximately 15 nautical miles (17.26 statute miles) from San Jose Island, Aransas County, Texas, in water depths of approximately 90 feet. The DWP would consist of two single point mooring (SPM) buoy systems, 56.48 miles of new pipeline infrastructure, and a booster station located on Harbor Island within Aransas, Nueces and San Patricio Counties, Texas.

The inshore component of the proposed Project consists of the infrastructure located between the western Redfish Bay mean high tide (MHT) line and the MHT line located at the interface of San Jose Island and the Gulf of Mexico. Infrastructure located within this component consists of approximately 7.15 statute miles of two (2) 30-inch diameter pipelines and an approximately 19-acre booster station located on Harbor Island (Harbor Island Booster Station). The inshore portion of the Project crosses three navigable waterways including the Gulf Intracoastal Waterway, the Aransas Pass Channel, and the Lydia Ann Channel. The pipelines associated with the inshore portion of the Project would cross portions of Texas State submerged lease tract 306 near the Lydia Ann Channel. The Harbor Island Booster Station would consist of the necessary operating and pumping infrastructure to support the transport of crude oil and operations of the DWP.

The onshore component of the Project includes approximately 22.2 statute miles of two (2) 30-inch diameter pipelines extending from the landward side of the MHT line of Redfish Bay to the planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines, two of which would be the proposed pipeline infrastructure extending to the proposed Harbor Island Booster Station.

An EIS will be prepared in accordance within the provisions of the Deepwater Port Act (DWPA) of 1974, as amended (33 United States Code [U.S.C.] 1501 *et seq*.); the National Environmental Policy Act (NEPA) (Section 102(2)(c)), as implemented by the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508); Department of Transportation (DOT) 5610.1C (*Procedures for Considering Environmental Impacts*); USCG Environmental Planning Policy, COMDTINST 5090.1

and the Environmental Planning (EP) Implementing Procedures (IP); and other appropriate and applicable regulations.

Texas is the adjacent coastal state as defined in the DWPA. The Governor of the adjacent coastal state may approve, approve with conditions, or deny the application within 45 days following the final public hearings which follow the publication of the Final EIS. Following this, provided the Governor does not deny the application, the Maritime Administrator will use the EIS and other information to 1) to approve the application, 2) approve the application with conditions, or 3) deny the application.

The USCG and MARAD are now in the scoping period that precedes the preparation of the Draft EIS and we invite the public to submit comments relating to the scope of the EIS. As part of the scoping process, we will hold an informational open house and public meeting at the location listed below. The open house and public meeting are open to the public and all interested parties are encouraged to attend. Written and oral comments will be accepted at the open house and public meeting and comments may be made throughout the scoping process. Below is a schedule of the open house and scoping meeting along with the location of both events. Free parking is available at the hotel.

July 22, 2019 Event	Time
Informational Open House	4:00 PM – 6:00 PM
Public Scoping Meeting	6:00 PM – 8:00 PM
Omni Corpus Christi Hotel 900 North Shoreline Boulevard Corpus Christi, TX 78401 361-887-1600	

The enclosed Notice of Intent (NOI) to prepare an EIS published in the Federal Register initiates the ***30-day scoping period ending on August 2, 2019.*** The NOI includes a detailed description of the proposed project, additional scoping meeting logistics, and detailed instructions on submitting comments to the Federal Docket throughout the scoping period.

The Application and supporting materials, including comments, notices and communications, and eventually the Draft and Final EIS may be viewed at the Federal Docket Management Facility website: *http://www.regulations.gov* under docket number MARAD-2019-0094. Comments submitted to the docket receive the same consideration as those made or delivered at the public meetings. These documents are also available for viewing at the following libraries:

- La Retama Public Library, 805 Comanche Street, Corpus Christi, Texas 78401; (361) 826-7055
- Ingleside Public Library, 2775 Waco Street, Ingleside, Texas 78362; (361) 776-5355
- Ed & Hazel Richmond Public Library, 110 North Lamont Street, Aransas Pass, Texas 78336; (361) 758-2350
- Bell Whittington Public Library, 2400 Memorial Parkway, Portland, Texas 78374; (361) 777-4560
- Texas A&M University, Corpus Christi Mary & Jeff Bell Library/Federal Depository, 6300 Ocean Drive #5702, Corpus Christi, Texas 78412; (361) 825-2687
- Robert J. Kleberg Public Library, 220 North 4th Street, Kingsville, Texas 78363; (361) 592-6381
- Owen R. Hopkins Public Library, 3202 McKinzie Road, Corpus Christi, Texas 78410; (361) 826-2350

The Coast Guard and MARAD encourage you to submit comments and related materials regarding the proposed BWTT deepwater port license application. If you do so, please include your name, address, and the Bluewater SPM Project docket number (MARAD-2019-0094). You may submit your comments and materials by mail, hand delivery, fax, or electronic means to the Docket Management Facility. To make sure your comments and related materials are not entered more than once in the docket, please submit them by only one of the following means:

- Electronic (preferred to expedite processing): Through the Federal Docket Management website at *http://www.regulations.gov* under docket number MARAD-2019-0094;
- Mail: Docket Management Facility, Department of Transportation, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue, SE, Washington, DC 20590-0001, Attn: MARAD-2019-0094;
- Personal Delivery: To the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays;
- Fax: To the Docket Management Facility at (202) 493-2251.

To ensure your comments are considered, the Coast Guard and MARAD request that all comments be submitted by *August 2*, *2019*. Comments and material received from the public will become part of the official record (or docket) and will be available for inspection or copying at the Docket Management Facility between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. You may also view the information, including this notice and comments, on the Internet at *http://www.regulations.gov* (Docket Number MARAD-2019-0094). An additional set of public meetings and opportunity to comment on the proposed Bluewater SPM Project and the EIS will be available when a Draft EIS is published. Those meetings and the availability of the Draft EIS will be announced in the future correspondence and federal register notice. Final public hearings will be conducted following publication of the Final EIS.

Finally, Golder Associates, Inc. is our 3rd party environmental contract environmental consultant assisting the Coast Guard and MARAD in the application NEPA review process and EIS preparation.

If you have questions about the deepwater port license application, you may contact Mr. Roddy Bachman, Coast Guard at (202) 372-1451 or Roddy.C.Bachman@uscg.mil, or Ms. Yvette Fields, Maritime Administration, at (202) 366-0926 or Yvette.Fields@dot.gov.

Sincerely,

R C Bachman

RODDY C. BACHMAN
Project Manager, Deepwater Ports
Vessel and Facility Operating Standards Division
U.S. Coast Guard

Encl: 1: Bluewater SPM Notice of Intent/Notice of Scoping
2: Project Map

Copy: Ms. Yvette Fields, MARAD
Federal Docket # MARAD-2019-0094

Bluewater SPM Notice of Intent/Notice of Scoping

3. Technical Assistance

As noted throughout the notice, recipients should review FTA's program circulars for general program guidance. FTA headquarters and regional staff will be pleased to answer questions and provide any technical assistance needed to apply for FTA program funds and manage grants. At its discretion, FTA may also use program oversight consultants to provide technical assistance to grantees on a case by case basis. This notice and the program guidance circulars identified in this document may be accessed on FTA's website: *www.transit.dot.gov.*

G. Grant Management

1. Grant Reporting

FTA grantees are required to report on their grants. It is critical to ensure reports demonstrate that reasonable progress is being made on projects. At a minimum, all awards require a Federal Financial Report (FFR) and a Milestone Progress Report (MPR) on an annual basis. Some reports are required quarterly depending on the recipient and the type of projects funded under the grant and FTA's risk-based reporting policy that went into effect on October 1, 2017. The requirements for these reports and other reporting requirements can be found in the latest version of FTA Circular 5010. FTA staff, auditors, and contractors rely on the information provided in the FFR and MPR to review and report on the status of both financial and project-level activities contained in the grant. It is critical that recipients provide accurate and complete information in these reports and submit them by the required due date. Failure to report and/or demonstrate reasonable progress on projects can result in suspension or premature closeout of a grant.

2. Inactive Grants and Grant Closeout

In FY 2019, FTA will continue to focus on identifying and working with recipients to close inactive grants. If appropriate, FTA will act to closeout and deobligate funds from these grants if reasonable progress is not made. The efficient use of funds will further FTA's fulfillment of its mission to provide efficient and effective public transportation systems for the nation.

In October 2018, FTA identified a list of grants that were awarded on or prior to September 30, 2015 that had not disbursed funds since September 30, 2017 or had never disbursed funds. FTA Regional Offices will contact grant recipients with grants that meet these criteria, to close the grant and deobligate any remaining funds unless the grantee can provide information that demonstrates projects funded by the grant remain active and there is a realistic schedule to expedite completion of the projects.

Issued in Washington, DC.

K. Jane Williams,

Acting Administrator.

[FR Doc. 2019–14248 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–57–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0094]

Deepwater Port License Application: Bluewater Texas Terminal LLC (Bluewater)

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Bluewater Texas Terminal LLC (Bluewater) Deepwater Port License Application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 15 nautical miles off the coast of San Patricio County, Texas in a water depth of approximately 89 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via a single point mooring buoy system.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate, and announces an informational open house and public meeting in Corpus Christi, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Bluewater Deepwater Port License Application. The meeting will be held in Corpus Christi, Texas, on Monday, July 22, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Bluewater application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting in Corpus Christi, Texas will be held at the Omni Corpus Christi Hotel, 900 N Shoreline Boulevard, Corpus Christi, Texas, 78401, phone: (361) 887–1600, web address: *https://www.omnihotels.com/hotels/corpus-christi.* Parking is available at the venue.

The public docket for the Bluewater Deepwater Port License Application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Roddy Bachman, USCG, or Ms. Yvette M. Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Roddy Bachman, USCG, telephone: 202–372–1451, email: *Roddy.C.Bachman@uscg.mil,* or Ms. Yvette M. Fields, MARAD, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public

meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

Speaker registrations will be available at the door. Speakers at the public scoping meeting will be recognized in the following order: Elected officials, public agencies, individuals or groups in the sign-up order and then anyone else who wishes to speak.

In order to allow everyone a chance to speak at a public meeting, we may limit speaker time, extend the meeting hours, or both. You must identify yourself, and any organization you represent by name. Your remarks will be recorded and/or transcribed for inclusion in the public docket.

You may submit written material at the public meeting, either in place of, or in addition to, speaking. Written material should include your name and address and will be included in the public docket.

Public docket materials will be made available to the public on the Federal Docket Management Facility website (see **ADDRESSES**).

Our public meeting location is wheelchair-accessible and compliant with the Americans with Disabilities Act. If you plan to attend the open house or public meeting and need special assistance such as sign language interpretation, non-English language translator services or other reasonable accommodation, please notify the USCG or MARAD (see **FOR FURTHER INFORMATION CONTACT**) at least 5 business days in advance of the public meeting. Include your contact information as well as information about your specific needs.

Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Bluewater Deepwater Port License Application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.

Public comment submissions should include:

- Docket number MARAD–2019–0094.
- Your name and address.

Submit comments or material using only one of the following methods:

- Electronically (preferred for processing) to the Federal Docket Management System (FDMS) website: *http://www.regulations.gov* under docket number MARAD–2019–0094.
- By mail to the Federal Docket Management Facility (MARAD–2019–0094), U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590–0001.
- By personal delivery to the room and address listed above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays.
- By fax to the Federal Docket Management Facility at 202–493–2251.

Faxed, mailed or hand delivered submissions must be unbound, no larger than 8½ by 11 inches and suitable for copying and electronic scanning. The format of electronic submissions should also be no larger than 8½ by 11 inches. If you mail your submission and want to know when it reaches the Federal Docket Management Facility, please include a stamped, self-addressed postcard or envelope.

Regardless of the method used for submitting comments, all submissions will be posted, without change, to the FDMS website (*http://www.regulations.gov*) and will include any personal information you provide. Therefore, submitting this information to the docket makes it public. You may wish to read the Privacy and Use Notice that is available on the FDMS website and the Department of Transportation Privacy Act Notice that appeared in the **Federal Register** on April 11, 2000 (65 FR 19477), see Privacy Act. You may view docket submissions at the Federal Docket Management Facility or electronically on the FDMS website.

Background

Information about deepwater ports, the statutes, and regulations governing their licensing, including the application review process, and the receipt of the current application for the proposed Bluewater deepwater port appears in the Bluewater Notice of Application, Wednesday, June 26, 2019 edition of the **Federal Register** (84 FR 30301). The ''Summary of the Application'' from that publication is reprinted below for your convenience.

Consideration of a deepwater port license application includes review of the proposed deepwater port's impact on the natural and human environment. For the proposed deepwater port, USCG and MARAD are the co-lead Federal agencies for determining the scope of this review, and in this case, it has been determined that review must include preparation of an EIS. This NOI is required by 40 CFR 1501.7. It briefly describes the proposed action, possible alternatives and our proposed scoping process. You can address any questions about the proposed action, the scoping process or the EIS to the USCG or MARAD project managers identified in this notice (see **FOR FURTHER INFORMATION CONTACT**).

Proposed Action and Alternatives

The proposed action requiring environmental review is the Federal licensing of the proposed deepwater port described in ''Summary of the Application'' below. The alternatives to licensing the proposed port are: (1) Licensing with conditions (including conditions designed to mitigate environmental impact), (2) evaluation of deepwater port and onshore site/pipeline route alternatives or (3) denying the application, which for purposes of environmental review is the ''no-action'' alternative.

Scoping Process

Public scoping is an early and open process for identifying and determining the scope of issues to be addressed in the EIS. Scoping begins with this notice, continues through the public comment period (see **DATES**), and ends when USCG and MARAD have completed the following actions:

- Invites the participation of Federal, state, and local agencies, any affected Indian tribe, the applicant, in this case Bluewater, and other interested persons;
- Determines the actions, alternatives and impacts described in 40 CFR 1508.25;
- Identifies and eliminates from detailed study, those issues that are not significant or that have been covered elsewhere;
- Identifies other relevant permitting, environmental review and consultation requirements;
- Indicates the relationship between timing of the environmental review and other aspects of the application process; and
- At its discretion, exercises the options provided in 40 CFR 1501.7(b).

Once the scoping process is complete, USCG and MARAD will prepare a draft

EIS. When complete, MARAD will publish a **Federal Register** notice announcing public availability of the Draft EIS. (If you want that notice to be sent to you, please contact the USCG or MARAD project manager identified in FOR FURTHER INFORMATION CONTACT). You will have an opportunity to review and comment on the Draft EIS. The USCG, MARAD and other appropriate cooperating agencies will consider the received comments and then prepare the Final EIS. As with the Draft EIS, we will announce the availability of the Final EIS and give you an opportunity for review and comment. The Act requires a final public hearing to be held in the Adjacent Coastal State. Its purpose is to receive comments on matters related to whether or not an operating license should be issued. The final public hearing will be held after the Final EIS is made available for public review and comment.

Summary of the Application

Bluewater is proposing to construct, own, and operate a deepwater port terminal in the Gulf of Mexico (GOM) to export domestically produced crude oil. The proposed project involves the design, engineering, and construction of a deepwater port, approximately 56.48 miles of pipeline infrastructure, and a booster station. The Bluewater deepwater port would allow for up to two (2) very large crude carriers (VLCCs) or other crude oil carriers to moor at single point mooring (SPM) buoys and connect with the deepwater port via floating connecting crude oil hoses. During single vessel loading operations, the proposed project is capable of loading rates of up to approximately 80,000 barrels per hour (bph) and during simultaneous vessel loading operations, the proposed project is capable of loading rates of 40,000 bph. The facility is expected to service 16 Very Large Crude Carriers (VLCCs) per month.

For the purposes of this application, the proposed Bluewater project is described in three distinguishable segments by locality, to include the onshore components, the inshore components and the offshore components.

Onshore components associated with the proposed Bluewater project are defined as those components on the landward side of the western Redfish Bay Mean High Tide (MHT) line, located in San Patricio and Aransas Counties, Texas. The onshore project components include:

- Approximately 22.20 miles of two (2) new parallel 30-inch-diameter crude oil pipelines extending from a planned multi-use terminal located south of the City of Taft in San Patricio County, Texas. The planned multi-use terminal will consist of multiple inbound and outbound crude oil pipelines. Two of those outbound pipelines compose the proposed pipeline infrastructure that will extend to the inshore pipeline which connects to the proposed Harbor Island Booster Station (Booster Station) described below.

Inshore components associated with the proposed Bluewater project are defined as those components located between the western Redfish Bay MHT line and the MHT line located at the interface of San Jose Island and the GOM. Inshore project components include:

- Approximately 7.15 miles of two (2) new 30-inch-diameter crude oil pipelines connecting to the onshore facility, an approximately 19-acre booster station and a connection to the offshore pipeline. The onshore pipeline would be located within San Patricio County, Texas and Nueces County, Texas and the Booster Station would be located on Harbor Island in Nueces County, Texas.
- The Booster Station will include approximately 19 acres of land with two (2) aboveground crude oil storage tanks, each with a total storage capacity of 181,000 barrels and two (2) 181,000-barrel water storage tanks. The purpose of water tanks is to allow for the clearing of the pipeline infrastructure. During clearing operations, water from the water storage tanks would be pumped through the pipelines and back to the Booster Station. The displaced crude oil would be placed in the two crude oil storage tanks.
- Additionally, the Booster Station will contain equipment and piping to provide interconnectivity with the crude oil supply network for the Bluewater project. This would include the installation of four (4) 5,500 horsepower electrically powered motors in a series electronically locked into operation as two booster pumping systems delivering approximately 11,000 horsepower to each of the two (2) 30-inch diameter pipelines. Further, the Booster Station would house the necessary infrastructure to support the transport of crude oil through the proposed pipeline infrastructure to the deepwater port for the loading of moored vessels to include a fire water tank, firewater pumps, stormwater runoff treatment plant and pumps, emergency generator, foam and water monitors and an operations office.

Offshore components associated with the proposed Bluewater project are defined as those components located seaward of the MHT line located at the interface of San Jose Island and the GOM. The offshore project components include:

- Approximately 27.13 miles of two (2) new 30-inch-diameter crude oil pipelines extending from the shoreline crossing at the interface of San Jose Island to the offshore Bluewater deepwater port for crude oil delivery to Single Point Mooring (SPM) buoys.
- Two (2) SPMs in Outer Continental Shelf Matagorda Island Area TX4 lease blocks 698 and 699, approximately 15 nautical miles (17.26 statute miles) off the coast of San Patricio County, Texas in a water depth of approximately 89 feet.
- A catenary anchor leg mooring (CALM) system for each SPM buoy connected to a pipeline end manifold (PLEM) system, mooring hawsers, floating hoses, and sub-marine hoses to allow for the loading of crude oil to vessels moored at the proposed deepwater port. The SPM buoy system will be permanently moored with a symmetrically arranged six-leg anchor dual chain configuration extending to twelve (12) 72-inch-diameter pile anchors installed on the seafloor.
- Each of the proposed SPM buoy systems 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. Two floating hoses equipped with marine break-away couplings will be utilized for the transfer of crude oil from the SPM buoy systems to the moored vessel. Floating hoses will be equipped with strobe lights at 15-foot intervals for detection at night and low-light conditions.

Privacy Act

The electronic form of all comments received into the FDMS can be searched by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). The Department of Transportation Privacy Act Statement can be viewed in the **Federal Register** published on April 11, 2000 (Volume 65, Number 70, pages 19477–78) or by visiting *http://www.regulations.gov.*

(Authority: 33 U.S.C. 1501, *et seq.;* 49 CFR 1.93(h))

Dated: June 27, 2019.

By Order of the Maritime Administrator.

T. Mitchell Hudson, Jr.

Secretary, Maritime Administration.

[FR Doc. 2019–14177 Filed 7–2–19; 8:45 am]

BILLING CODE 4910–81–P

DEPARTMENT OF TRANSPORTATION

Maritime Administration

[Docket No. MARAD–2019–0093]

Deepwater Port License Application: Texas GulfLink LLC

AGENCY: Maritime Administration, Department of Transportation.

ACTION: Notice of intent; notice of public meeting; request for comments.

SUMMARY: The U.S. Coast Guard (USCG), in coordination with the Maritime Administration (MARAD), will prepare an environmental impact statement (EIS) as part of the environmental review of the Texas GulfLink LLC (Texas GulfLink) deepwater port license application. The application proposes the ownership, construction, operation and eventual decommissioning of an offshore oil export deepwater port that would be located in Federal waters approximately 28.3 nautical miles off the coast of Brazoria County, Texas in a water depth of approximately 104 feet. The deepwater port would allow for the loading of Very Large Crude Carriers (VLCCs) and other sized crude oil cargo carriers via two single point mooring buoy systems.

This Notice of Intent (NOI) requests public participation in the scoping process, provides information on how to participate and announces an informational open house and public meeting in Lake Jackson, Texas. Pursuant to the criteria provided in the Deepwater Port Act of 1974, as amended, (the Act), Texas is the designated Adjacent Coastal State for this application.

DATES: There will be one public scoping meeting held in connection with the Texas GulfLink deepwater port application. The meeting will be held in Lake Jackson, Texas on Wednesday, July 17, 2019, from 6:00 p.m. to 8:00 p.m. The public meeting will be preceded by an informational open house from 4:00 p.m. to 6:00 p.m.

The public meeting may end later than the stated time, depending on the number of persons wishing to speak. Additionally, materials submitted in response to this request for comments on the Texas GulfLink deepwater port license application must reach the Federal Docket Management Facility as detailed below by Wednesday, July 31, 2019.

ADDRESSES: The open house and public meeting Lake Jackson, TX will take place in the Marriott Courtyard Lake Jackson, 159 State Highway 288, Lake Jackson, Texas 77566, phone: (979) 297–7300, web address: *https://www.marriott.com/hotels/travel/ljncy-courtyard-lake-jackson/.* Free parking is available at the venue.

The public docket for the Texas GulfLink deepwater port license application is maintained by the U.S. Department of Transportation, Docket Management Facility, West Building, Ground Floor, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC 20590. The license application is available for viewing at the *Regulations.gov* website: *http://www.regulations.gov* under docket number MARAD–2019–0093.

We encourage you to submit comments electronically through the Federal eRulemaking Portal at *http://www.regulations.gov.* If you submit your comments electronically, it is not necessary to also submit a hard copy. If you cannot submit material using *http://www.regulations.gov,* please contact either Mr. Patrick Clark, USCG or Yvette Fields, MARAD, as listed in the following **FOR FURTHER INFORMATION CONTACT** section of this document, which also provides alternate instructions for submitting written comments. Additionally, if you go to the online docket and sign up for email alerts, you will be notified when comments are posted. Anonymous comments will be accepted. All comments received will be posted without change to *http://www.regulations.gov* and will include any personal information you have provided. The Federal Docket Management Facility's telephone number is 202–366–9317 or 202–366–9826, the fax number is 202–493–2251.

FOR FURTHER INFORMATION CONTACT: Mr. Patrick Clark, U.S. Coast Guard, telephone: 202–372–1358, email: *Patrick.W.Clark@uscg.mil* or Ms. Yvette Fields, Maritime Administration, telephone: 202–366–0926, email: *Yvette.Fields@dot.gov.* For questions regarding viewing the Docket, call Docket Operations, telephone: 202–366–9317 or 202–366–9826.

SUPPLEMENTARY INFORMATION:

Public Meeting and Open House

We encourage you to attend the informational open house and public meeting to learn about, and comment on, the proposed deepwater port. You will have the opportunity to submit comments on the scope and significance of the issues related to the proposed deepwater port that should be addressed in the EIS.

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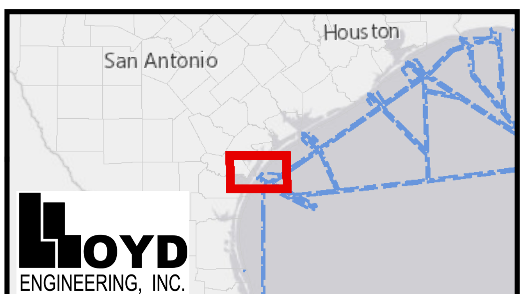
Request for Comments

We request public comment on this proposal. The comments may relate to, but are not limited to, the environmental impact of the proposed action. All comments will be accepted. The public meeting is not the only opportunity you have to comment on the Texas GulfLink deepwater port license application. In addition to, or in place of, attending a meeting, you may submit comments directly to the Federal Docket Management Facility during the public comment period (see **DATES**). We will consider all comments and material received during the 30-day scoping period.

The license application, comments and associated documentation, as well as the draft and final EISs (when published), are available for viewing at the Federal Docket Management System (FDMS) website: *http://*

Project Map



Map Details

- SPM Buoy
- Onshore Pipeline
- Inshore Pipeline
- Offshore Pipeline
- Harbor Island Booster Station
- SPM Buoy ATBA and Safety Zones
- Navigational Fairways
- Navigation Channels
- Anchorage Areas

1 inch = 5 miles

0 2.5 5
Miles

N W E S

Coordinate System: NAD 1983 2011 StatePlane Texas South FIPS 4205 Ft US
Projection: Lambert Conformal Conic
Datum: NAD 1983 2011
Units: Foot US

Figure 2
Project Component Map

Bluewater SPM Project
Bluewater Texas Terminal LLC

Date: May 06, 2019