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Acronyms and Abbreviations

µg/m³: microgram per cubic meter um: micrometer AAQS: Ambient Air Quality Standards AEGL-1: Acute Exposure Guideline Levels 1 ARU: Aromatics Recovery Unit ASIL: acceptable source impact level ATB: articulated tug barge BACT: best available control technology bbl: barrel BLM: Bureau of Land Management bpd: barrels per day CAR: Clean Air Rule **CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act CFR: Code of Federal Regulations CHP: combined heat and power CO₂: carbon dioxide CO_{2e}: carbon dioxide equivalent, standard unit CSB: U.S. Chemical Safety and Hazard Investigation Board CWA: Clean Water Act **DPS: Distinct Population Segment** Ecology: Washington State Department of Ecology EFH: essential fish habitat DOSH: Washington State Department of Labor and Industries, Division of Occupational Safety and Health EIS: Environmental Impact Statement ERU: emissions reduction unit GHG: greenhouse gas GNOME: General NOAA Operational Modeling Environment GRP: Geographic Response Plan IPaC: Information for Planning and Consultation km: kilometer LC₅₀: lethal concentration 50 LEPC: Skagit County Local Emergency Planning Committee LOAEL: Lowest Observed Adverse Effect Level MARPOL: International Convention for the Prevention of Pollution from Ships mg/L: milligrams per liter mph: miles per hour Monument: San Juan Islands National Monument MVEC: Marine Vapor Emissions Control NAAQS: National Ambient Air Quality Standards

NHT: Naphtha Hydrotreater NMFS: National Marine Fisheries Service NOAA: National Oceanic Atmospheric Administration NOAEL: No Observed Adverse Effect NO_x: nitrogen oxides NPDES: National Pollutant Discharge Elimination System NRHP: National Register of Historic Places NWCAA: Northwest Clean Air Agency OPA 90: Oil Pollution Act of 1990 ORNL: Oak Ridge National Laboratory OSCP: Oil Spill Contingency Plan PEL: permissible exposure limit PIC: person in charge $PM_{2.5}$: particulate matter less than 2.5 microns in diameter PM₁₀: particulate matter less than 10 microns in diameter ppb: parts per billion ppm: parts per million RCW: Revised Code of Washington refinery: Tesoro Anacortes Refinery SEPA: State Environmental Policy Act SO₂: sulfur dioxide SPCC: Spill Prevention, Control, and Countermeasures SPMT: self-propelled modular transporter SWPPP: Stormwater Pollution Prevention Plan TESC: temporary erosion and sediment control Tesoro: Tesoro Refining & Marketing Company LLC TWA: time weighted average USCG: United States Coast Guard USEPA: United States Environmental Protection Agency USFWS: U.S. Fish and Wildlife Service VOC: volatile organic compound VTRA: Vessel Traffic Risk Assessment WAC: Washington Administrative Code WDFW: Washington State Department of Fish and Wildlife WISHA: Washington Industrial Safety and Health Act WDNR: Washington State Department of Natural Resources

WSDOT: Washington State Department of Transportation WSF: Washington State Ferries WWTP: Wastewater Treatment Plant Page Intentionally Left Blank

1. PROJECT SUMMARY

This Final Environmental Impact Statement (Final EIS) was developed in response to public comments received on the Draft Environmental Impact Statement (Draft EIS) for the proposed Tesoro Anacortes Clean Products Upgrade, published March 23, 2017. Skagit County, as the lead agency, provided oversight for the preparation of this Final EIS in accordance with the State Environmental Policy Act (SEPA). Detailed information on the SEPA EIS process is available on the Washington State Department of Ecology (Ecology) website at: http://www.ecy.wa.gov/programs/sea/sepa.

Tesoro Refining & Marketing Company LLC (Tesoro's) objectives for the proposed project are to improve the Tesoro Anacortes Refinery's (refinery's) capability to deliver cleaner gasoline per U.S. Environmental Protection Agency (USEPA) requirements and to enable the refinery to produce mixed xylene feedstocks.

The USEPA has adopted new, more stringent fuel standards that require lowering the sulfur content in gasoline, which went into effect January 1, 2017. The proposed project would install upgrades at the refinery to comply with the upcoming federal fuel standards for reduced-sulfur gasoline in a manner that is economically viable for the operation of the refinery. These new fuel standards are referred to by the USEPA as "Tier 3" standards. The upgrades would lower the sulfur content in gasoline (resulting in cleaner fuel) and consequently reduce the amount of sulfur emissions from automobiles combusting this gasoline.

The proposed project would also enable the refinery to produce mixed xylenes feedstock which would diversify the refinery's product mix, achieving two objectives. First, it would increase the value of products produced by the refinery, increasing both employment and economic value. Second, a more diverse product mix increases the long-term economic viability and financial security of the refinery.

1.1. PROJECT DESCRIPTION

Tesoro is proposing to install new components and upgrade existing components at the refinery to produce cleaner burning gasoline and a new product, mixed xylenes. The majority of the proposed project additions and upgrades would occur within the already-developed areas of the refinery. There are five specific infrastructure additions and upgrades for the proposed project:

- Expand the Naphtha Hydrotreater (NHT) Unit to increase its processing capacity to further reduce the sulfur content in gasoline.
- Build a new Isomerization Unit to increase the amount of octane available to the refinery. Coupled with the NHT expansion, this provides more flexibility for gasoline production.
- Build a new Aromatics Recovery Unit (ARU) capable of producing 15,000 barrels per day (bpd) of mixed xylenes. Install a new steam boiler adjacent to the ARU to provide the additional process heat needed to operate the new ARU and steam to operate the expanded NHT.

- Build three new storage tanks on currently undeveloped land west of the refinery's existing tank storage area to hold reformate and mixed xylenes. Reformate is a high-octane liquid derived from refining crude oils and is commonly used in blending gasoline to get various octane ratings. In a process known as catalytic reforming, refiners distill partly refined crude oil and convert the distillate into reformate, a high-octane liquid (de Place and Stroming 2014; USEPA 1994). These additional tanks would expand the existing tank storage area and are referred to in this Final EIS as the New Tanks Area at the refinery.
- Build a new Marine Vapor Emissions Control (MVEC) System to capture vapors (so they are not emitted to the atmosphere) during product loading and unloading from marine vessels docked at the refinery wharf. The MVEC System consists of two physical components: the Dock Safety Unit located on the wharf and the Vapor Combustion Unit located onshore. While the MVEC System is being installed as part of this proposed project, it would also be used for other marine vessels, unrelated to xylenes transport, currently using the wharf.

The location of this new infrastructure is shown on Figure 1. A more detailed project description is in Draft EIS Chapter 2, Proposed Action and Alternatives.

Two off-property areas would be changed due to the proposed project. The first consists of refinements to North Texas Road near the refinery's southern Gate 10 entrance that would widen the gate area and one area of the road. The second off-property change is the addition of five marine vessels per month calling at the refinery wharf for shipping the new product (mixed xylenes) and receiving additional reformate for use in xylenes production.



Proposed Project Areas Tesoro Refinery Boundary



1,500 3,000 6,000 Feet



1.1.1. Construction Activities

The new proposed project infrastructure and upgrades are expected to be completed between 2017 and 2018. Construction would involve the following activities:

- Infrastructure placement and construction activities within the refinery footprint. This would include the NHT expansion, a new Isomerization Unit, which transforms hydrocarbons into higher-octane gasoline components for blending, a new ARU, a new steam boiler, new storage tanks, and new tie-ins to existing utilities and stormwater treatment systems.
- Installation of a Dock Safety Unit on the refinery wharf and a Vapor Combustion Unit within the existing refinery processing areas as part of the MVEC System.
- Installation of a 3-inch natural gas line from an existing natural gas line within the refinery to the end of Tesoro's causeway and wharf.
- Widening of the Gate 10 Access entrance to the refinery on North Texas Road and widening approximately 200 feet of the road to accommodate the heavy lift transport vehicles that would deliver the new process units.
- Increased vehicle traffic due to the presence of additional workers, delivery of site materials (10 to 50 truck trips per day), delivery of process units from the Port of Anacortes (52 deliveries), and import of fill material required for the New Tanks Area (70 trucks per day for 4 months).
- The addition of an average of 190 temporary construction workers for up to 19 months, with a peak number of approximately 270 temporary construction workers for up to 4 months.

1.1.2. Operations and Maintenance Phase Activities

Proposed project operations and maintenance activities that represent a change in existing refinery operations include the following activities:

- The addition of 20 permanent staff members to support the new activities. Use and/or storage of additional materials in new tanks on-site, including mixed xylenes, sulfolane (a solvent used to extract xylenes from petroleum feedstock), ammonia (required for the pollution control system on the new boiler), and reformate. Reformate is currently used at the refinery; however, the proposed project would require additional reformate storage capacity due to the increased volume of reformate use.
- Increased use of natural gas to operate new equipment.
- Increased vehicle traffic due to the additional workers as well as an increase in 50 truck trips per year to deliver chemicals (sulfolane, ammonia, and perchloroethylene) and other necessary supplies to the refinery. Perchloroethylene is currently in use at the refinery; however, the proposed project would require additional amounts.

• Increased marine vessel traffic to deliver additional reformate to the refinery and export xylenes from the refinery (60 additional vessels per year; approximately 5 per month). Twenty of the vessels would be used for exporting mixed xylenes; 40 vessels would be used to deliver additional reformate to the refinery. Reformate would be obtained from a variety of existing west coast sources; individual locations would vary depending on market conditions. The marine vessel transportation route from the refinery to the Pacific Ocean is shown on Figure 2.

Operation of the proposed project would not change the crude oil processing capacity of the refinery, the capability of the refinery to receive crude oil, or the method and number of crude oil deliveries.

1.2. NO ACTION ALTERNATIVE

As required by SEPA, the Draft EIS evaluated a no action alternative. Under the no action alternative, Tesoro would not proceed with the proposed project. The refinery would be unable to meet the upcoming federal Tier 3 standards for reduced-sulfur gasoline in sufficient quantity to remain economically competitive and would not produce a new product, mixed xylenes. In the short term, the refinery would continue to operate as it does today, likely in a reduced capacity. Additionally, the contribution of the proposed project in reducing sulfur emissions would not occur. The Tier 3 standards implementation is expected to result in major health improvements in the U.S. on a nationwide basis. By 2030, the Tier 3 standards implementation is predicted to prevent up to 2,000 premature deaths, avoid up to 2,200 hospital admissions, and eliminate 19,000 asthma attacks each year (Union of Concerned Scientists 2016).

1.3. CONTENTS OF FINAL EIS

This Final EIS includes a summary of the public comments received on the Draft EIS with responses, makes factual corrections to the Draft EIS, and provides additional analyses and information in response to public comments. Chapter 2 of this Final EIS describes the process utilized to organize, categorize, consider, and address the comments received during the comment period for the Draft EIS. Chapter 3 contains updated information and analyses. Chapter 4 presents the recommended mitigation measures for the proposed project. Chapter 5 describes the distribution and notification of availability of the Final EIS. Chapter 6 provides references to literature cited in the Final EIS. The appendices include the Draft EIS comments and responses, errata to the Draft EIS, and additional information provided by Tesoro that was requested by Skagit County to better address comments on the Draft EIS.

Based on the comments received and the additional analyses that have been conducted and documented in this Final EIS, there are no changes to the conclusions presented in the Draft EIS, and no new significant impacts have been identified.





2. COMMENTS AND RESPONSES

Stakeholders and citizens had the opportunity to review and provide input on the Draft EIS during a 45-day comment period, from March 23 to May 8, 2017. This chapter describes efforts to engage the public following publication of the Draft EIS and describes how comments were processed and considered during the preparation of this Final EIS. A response has been provided in this Final EIS for each substantive comment received during the Draft EIS comment period.

2.1. NOTIFICATION OF DRAFT EIS AVAILABILITY

Skagit County issued the Draft EIS on March 23, 2017. The Draft EIS was made available on the project website, at reading rooms throughout the region (primarily libraries), and at the public hearing held on April 17, 2017.

Skagit County notified key stakeholders, interested parties, agencies, and the general public of the Draft EIS comment period using a variety of communication tools. The following tools were used to announce the release of the Draft EIS and comment period:

- Email sent to 3,078 addresses
- Print and online ads placed in local papers (over 75,000 impressions)
- Notice posted on the Skagit County website
- Notice posted on the project website
- Printed mailer sent to approximately 2,200 addresses

2.2. OPPORTUNITIES TO PROVIDE COMMENTS ON THE DRAFT EIS

Skagit County invited comments through a variety of methods. Table 1 provides a count of the number of comments submitted during the Draft EIS comment period using each method.

Table 1: Number of Comments Received on Draft EIS by Method of Submission

Method of Submission	Number of Comments Submitted
Online open house comment form	57
Project website form	336
Verbal public comment session	66
Voicemail	20
Email	6,773
Written (letters and print comment forms)	492
TOTAL	7,744

2.2.1. Project Website and Online Open House

Skagit County hosted a website that provided an opportunity for people to learn more about the proposed project and submit Draft EIS comments online. The site was live throughout the Draft EIS comment period (March 23 to May 8, 2017) and beyond. The website received more than 2,654 visits from 1,544 users during the Draft EIS comment period.

Skagit County hosted an online open house that provided an opportunity for people to learn more about the proposed project, take notes on the same content that was on display at the in-person public hearing, and then submit their Draft EIS comments online. The site included links to fact sheets summarizing the findings of the Draft EIS chapters. These fact sheets were made available online in both English and Spanish. The online open house received more than 1,043 visits from 275 users during the Draft EIS comment period.

The Google Translate function was embedded in the website and online open house, allowing visitors to translate each web page to one of 90 languages. Information was also provided about Americans with Disabilities Act or visually impaired accommodations at the bottom of each web page. The website and online open house provided an option on each web page to sign up for project SEPA process updates from Skagit County.

2.2.2. Open House and Public Hearing

Skagit County hosted an open house on April 17, 2017, from 4:00 pm - 8:00 pm, at Anacortes High School. The open house included information about the proposed project; in addition, a public hearing held during the open house gave attendees an opportunity to provide verbal comments. One hundred and fifty people signed in at the open house meeting. It is noted that several attendees declined the opportunity to sign in.

The Draft EIS open house featured eight stations (matching the online open house) with printed information related to the SEPA process and proposed project. The printed information included fact sheets summarizing the findings of the Draft EIS in both English and Spanish. Skagit County and consultant staff were present at each station to answer questions and to encourage people to submit comments. Laptops were available at a comment station, allowing attendees to visit the project website, participate in the online open house, and submit comments online. Comment forms were also available for people to leave written comments. A meeting guide was provided at the sign-in table that included a description of the types of information available at the open house, an event map, details about the verbal public comment session, instructions for how to provide a written comment, and other options available to provide Draft EIS comments after the public hearing.

The public hearing was facilitated from 4:30 pm - 8:00 pm in a room separate from the concurrent open house. Sixty-six people provided verbal comments. A lottery system was used to select speakers. Each speaker was given up to 2 minutes to provide comments, which were documented by a court reporter for consideration, analysis, and response. Since time allowed, speakers were given the option to comment up to three times.

2.2.3. Other Methods for Providing Comments

In addition to the project website and open houses, Skagit County also accepted comments through the following methods:

- Voicemail. Voicemails were limited to 5 minutes and were transcribed for consideration, analysis, and response. A total of 20 voicemails were received.
- Email. Skagit County provided a dedicated email address for comments. In addition, Draft EIS comments received directly by Skagit County staff were reviewed and forwarded to this address for analysis and response. More than 6,700 comments were received by email.
- Written comments. Written comments were accepted at the open house, public hearing, a post office box set up for this SEPA process, or by hand delivery to Skagit County Planning and Development Services. A total of 492 written comments were received.

2.3. COMMENT ANALYSIS PROCESS

During the public comment period, a total of 7,744 Draft EIS comments were received through the various methods described in the previous section. All communications (e.g., a single email) were reviewed and analyzed to identify substantive comments on the Draft EIS.

The full text of all communications was reviewed and entered into a database for analysis. Analysts recorded the name and contact information of each commenter, the source of the communication, and other relevant details specific to each communication. Once all communications were entered into the database, analysts read each communication to identify and categorize comments. Many communications contained comments in multiple categories. Each comment was then assigned to a topic category for response.

Each unique communication was reviewed at least twice: once by the primary analyst, and then again by a second analyst for quality assurance and control. This process allowed for discrepancies or inconsistencies to be resolved.

2.4. COMMENTS AND RESPONSES

Each unique substantive comment received a response, which are provided in Appendix A, Draft EIS Comments and Responses. The tables in Appendix A contain the following information:

- The Commenter Index Table lists the commenters alphabetically by last name and provides the comment identification code(s) associated with the communication:
 - The identification code for comments specific to a chapter of the Draft EIS begins with "Ch".
 - The identification code for comments that do not correspond to a Draft EIS chapter begins with "Other".

- The Chapter Tables contain the comments and responses corresponding to a particular chapter in the Draft EIS.
- Comments not pertaining to a particular chapter are provided in the Other Comments Table.
- Some communications contained text that was repeated by multiple commenters (e.g., form letters). Analysts identified 14 of these form letters. Each form is responded to once in the Form Submissions Table. If a commenter added a substantive comment to one of the form submissions, the addition was categorized in one of the other comment response tables based on its topic.

3. UPDATED INFORMATION AND ANALYSES

This chapter makes factual corrections to the Draft EIS and provides updated information and analyses prepared in response to comments received on the Draft EIS and presented in Appendix A, Draft EIS Comments and Responses, of this Final EIS. Corrections to typographical errors in the Draft EIS are provided in Appendix B, Errata, of this Final EIS.

In some cases, comments received on the Draft EIS required additional research, information from Tesoro, or analyses to prepare a response. In addition, analysts identified some information that needed to be updated since the Draft EIS was issued. The following sections of the Draft EIS have been updated with additional information or analyses in this Final EIS:

- Proposed Action and Regulatory Authority (all resources)
- Project Description (technology alternatives) (Draft EIS Section 2.9.1, Technology Alternatives Considered)
- Air Quality and Climate Change (Draft EIS Section 4.4, Potential Impacts on Air Quality and GHG)
- Terrestrial Vegetation and Wildlife (marine birds) (Draft EIS Table 6-6 and Draft EIS Section 6.5.2, Threatened and Endangered Species [State and Federal])
- Marine and Nearshore Resources (xylene toxicity to birds and aquatic species: Draft EIS Section 7.4.3.2, Marine Spills during Operations; impacts to Southern Resident killer whales: Draft EIS Sections 7.4.2, Impacts on Marine and Nearshore Resources from Marine Vessels and Operation, and 7.4.3, Impacts on Marine and Nearshore Resources from Marine Spills)
- Environmental Health (xylene exposures and cancer, short-term versus long-term exposures, refinery safety considerations: Draft EIS Section 9.6, Unplanned Events)
- Social and Economic Environment (emergency planning and response coordination with local services: Draft EIS Section 11.4, Public Services; costs and damages incurred during a spill and spill cleanup: Draft EIS Sections 11.5.2, Potential Impacts on Employment Income, and 11.6.2, Potential Impacts on Economic Resources: Tax Receipts)
- Cultural Resources (Draft EIS Sections 12.2.1, Study Area, and 12.3, Affected Environment)
- Marine Transportation (Draft EIS Sections 13.3, Vessel Traffic, 13.4, Vessel Safety, and 13.5, Marine Spills and Spill Response)

The sections below provide a summary of the comments on the resource area, followed by the additional analyses and/or corrections. Based on the analyses provided in this chapter, there are no changes to the conclusions presented in the Draft EIS, and no new significant impacts have been identified.

3.1. PROPOSED ACTION AND REGULATORY AUTHORITY

The Draft EIS described the location, project facilities, and construction and operations of the proposed action (see Draft EIS Chapter 2, Proposed Action and Alternatives).

Comments were received regarding the anticipated duration of project operations. The proposed project would be part of the larger operations of the Tesoro refinery. The proposed project is designed for a 20-year life. However, the facility could operate for a much longer period if components are replaced when needed. Maintenance activities during operation may include daily checks of tanks, pumps, piping, and instruments. The tanks and other new infrastructure would undergo routine inspections by experienced personnel. Permit requirements that apply to project operation would remain in place for the life of the proposed project.

Many comments were received regarding various regulations and requirements that could be applicable to the proposed project. Skagit County's role as the lead agency is to prepare this EIS to provide impartial discussion of environmental impacts and inform decision makers and the public. Skagit County is also responsible for issuing some of the permits required to implement the proposed project. As described in the Draft EIS, other federal, state, and local regulatory authorities are responsible for regulating or approving various aspects of the proposed project. Table 2 provides a summary of these government agencies with responsibilities related to the proposed project.

Topic/Agency	General Regulatory Responsibility	Regulatory Responsibility in Context of Proposed Project	Draft EIS Reference
Worker Health and Safety	y		•
Washington State Department of Labor and Industries, Division of Occupational Safety and Health	Occupational health and safety	The Division of Occupational Safety and Health (DOSH) regulates worker safety and is responsible for ensuring Tesoro maintains worker health records, informs workers of the potential hazards of chemical exposure, and provides training and personal protective equipment to prevent exposure. DOSH routinely inspects the refinery to ensure compliance with health and safety regulations. A required process safety management program, following Washington Industrial Safety and Health Act regulations, is in place for safe and reliable operations at the refinery.	Table 9-1 Appendix 2-A Section 2
Skagit County Local Emergency Planning Committee; mandated by the Emergency Planning and Community Right-to- Know Act of 1986 (40 CFR 355) under U.S. Environmental Protection Agency's jurisdiction.	Public reporting of storage and use of hazardous materials	The Washington State Department of Ecology (Ecology) ensures local jurisdictions (such as Skagit County) implement the Federal Emergency Planning and Right to Know regulations, which ensure communities have the information they need to plan for chemical emergencies. Such planning occurs through a Local Emergency Planning Committee (LEPC). The LEPC is a committee mandated by Title III of the federal Superfund Amendments and Reauthorization Act of 1986. Skagit County manages the local LEPC, which is comprised of representatives from industry, government, environmental groups and others. The LEPC receives information each year from businesses storing and/or using hazardous materials in excess of the thresholds established by the U.S. Environmental Protection Agency (USEPA) and this information is made available to support emergency management and response planning. Tesoro is a member of the Skagit County LEPC and provides the required hazardous materials information to the LEPC.	Table 9-1

Table 2: Summary of Responsible Agencies by Topic

Topic/Agency	General Regulatory	Regulatory Responsibility in Context of Proposed Project	Draft EIS		
	Responsibility		Kelerence		
Marine Vessel Transit and Marine Spills					
U.S. Coast Guard	Certification of safety and spill response plans, procedures, and equipment for marine vessels that transport dangerous materials to protect U.S. waters	The U.S. Coast Guard (USCG) is responsible for enforcing vessel safety requirements, including the safety requirements for the 60 vessels per year that would be calling at the refinery wharf due to the proposed project. The USCG also ensures that vessels carrying hazardous materials (like xylenes) have the proper certification to safely transport hazardous materials. Certification requirements are established by the International Convention of Safety of Life at Sea and the International Convention for the Prevention of Marine Pollution (MARPOL). Each individual tanker must have its own certificate, which specifies, among other requirements, the safety and spill mitigation equipment onboard the vessel. The USCG requires all arriving tankships to notify them 96 hours prior to arrival to provide time to verify vessel certificates. The USCG also approves facility oil spill response plans that might affect marine waters and serves as the Federal On Scene Coordinator for spill response activities in the coastal zone. USCG has certified the refinery's oil spill contingency plan (OSCP). The OSCP needs to be resubmitted with changes due to the proposed project and needs to be recertified by the USCG	Table 13-1 Section 13.4 Additional Information: Final EIS Sections 3.7.2 and 3.9		
U.S. Coast Guard Puget Sound Vessel Traffic Service	Maintaining safe conditions and traffic management for vessel transit and vessel anchorage in Puget Sound	and other agencies as noted in this table. The USCG would also ensure state and federal cleanup requirements are met, and all required regulations regarding cleanup are complied with. The USCG vessel traffic service maintains positive control of incoming and outgoing tankships and maintains navigational clearances to prevent collisions and provide safe passage. The USCG would control and regulate the vessel transits resulting from the proposed project. This includes enforcing safe distances from oncoming traffic, vessel speeds, other vessels, and navigational hazards. The USCG is also responsible for managing anchorage areas and regulating activities during anchorage to ensure compliance with safety regulations.	Section 13.3.1.1		
Canadian Coast Guard	Maintaining safe	In addition to having authority to enforce vessel safety, the USCG requires spill mitigation equipment and ensures spill cleanup is properly managed. The Canadian Coast Guard controls vessel traffic in Canadian waters and	Section 13 4 1 2		
	conditions and traffic management for vessel transit in Canadian waters to U.S. waters	coordinates hand-off of vessel traffic to USCG in vessel transits from Canadian waters to U.S. waters. The Canadian Coast Guard has similar authority with regards to safety for Canadian waters as described above for the USCG	50010113.1112		

Topic/Agency	General Regulatory Responsibility	Regulatory Responsibility in Context of Proposed Project	Draft EIS Reference
Washington State Department of Ecology	Planning for emergency response and providing response support for marine vessel emergencies	 Ecology prepares Geographic Response Plans (GRPs), which are included in the spill response plan for the state of Washington. The GRP covering the proposed project is the Northwest Area Contingency Plan. Tesoro is required by Ecology to make sure refinery-specific plans and actions would be appropriately coordinated with the wider area plans. No changes to the wider area plans are anticipated to be required by Ecology based on the proposed project. The GRPs are used in advance of a potential spill to predetermine sensitive resources at risk of injury from oil spills, such as eelgrass, and to help direct response actions related to sensitive resource protection during the initial hours of a response. Ecology also approves facility oil spill response plans. Ecology has approved the refinery's OSCP. The OSCP needs to be recertified by Ecology and other agencies as noted in this table. 	Section 13.4 Section 13.5.7
		Ecology is responsible for providing support to the USCG in the state of Washington for emergency response in marine waters that might be needed due to the proposed project's vessel traffic.	
Puget Sound Pilots Association, Board of Pilotage Commissioners	Safe operation of marine vessels in state waters	Proposed project vessels calling at the refinery (tankers and articulated tug barges) would be required to take on a pilot from the Puget Sound Pilots Association in accordance with The Washington State Pilotage Act (RCW 88.16170). The pilots are state licensed and familiar with local waters. The pilot station is at Ediz Hook in Port Angeles. For the vessels carrying xylenes, a tug escort is also required in addition to a special pilot.	Section 13.4.1.2
U.S. Coast Guard and State of Washington Board of Pilotage Commissioners	Tug escorts	During transits of the Salish Sea, tankships (including tankers and tug barges combinations such as articulated tug barges) are required to be operated by a licensed pilot with knowledge of the waters to be navigated in accordance with USCG regulations (46 CFR 15.812) and the Washington State Pilotage Act (RCW 88.16.180). In addition, all project-related tankers transporting petroleum-based materials including xylene and reformate would require tug escorts in accordance with the Pilotage Act (RCW 88.16.190).	Table 13-1 and Section 13.3

Topic/Agency	General Regulatory Responsibility	Regulatory Responsibility in Context of Proposed Project	Draft EIS Reference			
Geological Resources and Hazards						
Washington State Department of Natural Resources	Compliance with seismic- related construction and building codes	The Washington State Department of Natural Resources has the responsibility to enforce construction and building codes for components of the proposed project to comply with seismic requirements. The codes details seismic design requirements for buildings based on seismic ground motion.	Section 3.4			
Skagit County	Compliance with International Building Code seismic design standards	Skagit County is responsible for enforcing the International Building Code during construction and assembly of the proposed project's new infrastructure. The code details seismic design requirements for buildings based on seismic ground motion.	Table 3-1			
Air Quality			•			
Northwest Clean Air Agency	Compliance with state and local air emission standards	The Northwest Clean Air Agency (NWCAA) is responsible for enforcing state and local air quality limits through permitting (the Notice of Construction permit) and through post-construction air monitoring and inspections. The NWCAA would require Tesoro to install and operate pollution control devices for the proposed project. The NWCAA would determine the maximum air emissions that the proposed project could emit without exceeding air quality standards. NWCAA also is responsible for enforcing requirements related to odor emissions from the proposed project, and, if there are odor violations, to issue fines and ensure prevention measures are taken. Part of this enforcement is addressed through requiring that storage tanks have appropriate controls on openings to minimize emissions.	Section 4.1			
Washington State Department of Ecology	Compliance with state air emission standards for new stationary sources	 Ecology enforces state air quality limits through permitting of the new stationary emission sources of the proposed project (the Prevention of Significant Deterioration permit). The permit would be required for the proposed project because the refinery would emit particulate matter (PM_{2.5} and PM₁₀) above the "significant emission rates" established in the regulations. Ecology is responsible for monitoring greenhouse gas (GHG) emissions from facilities that emit over 25,000 metric tons per year or produce fuels that emit greater than 25,000 metric tons per year. Ecology has enacted the Clean Air Rule that assigns a GHG reduction pathway for all facilities that emit 70,000 metric tons per year. 	Section 4.1			

Topic/Agency	General Regulatory Responsibility	Regulatory Responsibility in Context of Proposed Project	Draft EIS Reference		
Freshwater/Surface Water Resources					
U.S. Army Corps of Engineers	Regulation of activities within waters of the U.S., including wetlands	The U.S. Army Corps of Engineers (USACE) is responsible for regulating activities within waters of the U.S., including wetlands.	Table 5-1 Section 5.5.1 Section 7.1.2		
Washington State Department of Ecology	Regulation of discharges to waters of the state	Ecology is responsible for enforcing pollution discharge limits for the proposed project. Discharges from the refinery to waters of the state, including the marine estuary, are managed in accordance with the refinery's National Pollutant Discharge Elimination System (NPDES) Industrial Wastewater Discharge Permit (Permit No. WA0000761) administered by Ecology. The existing NPDES permit would be modified to accommodate the new discharge sources for the proposed project and engineering controls for sulfolene. Ecology requires water samples of the refineries' discharges be analyzed regularly for compliance with water quality NPDES permit requirements.	Table 3-1 Table 5-1 Table 7-1		
Marine and Nearshore Re	esources				
National Marine Fisheries Service, an agency within the National Oceanic and Atmospheric Administration	Conserves, manages, and protects marine resources, including protection of marine species listed under the Magnuson-Stevens Fishery Conservation and Management Act, the Endangered Species Act, and the Marine Mammal Protection Act	The National Marine Fisheries Service (NMFS) is responsible for the management, conservation, and protection of the nation's marine resources. The agency regulates commercial and recreational ocean fishing and manages marine life and habitats in waters 3 to 200 nautical miles from a U.S. shore. As part of its mandate, NMFS is responsible for protecting marine species listed as threatened or endangered under the Endangered Species Act and shares responsibility with the U.S. Fish and Wildlife Service (USFWS) for protecting marine mammals, including orcas, within U.S. waters. NMFS is responsible for ensuring that marine mammals or other special status marine species are not harassed or harmed.	Table 7-1		
U.S. Fish and Wildlife Service	Protection of species listed under the Endangered Species Act	The USFWS shares protective responsibilities with NMFS for harassment of marine mammals within U.S. waters, including orcas, as well as for terrestrial and freshwater special status species protected under the Endangered Species Act.	Table 7-1		
U.S. Army Corps of Engineers	Regulation of activities within waters of the U.S.	As part of their permit review process, the USACE may consult with the USFWS and/or NMFS regarding threatened, endangered, or candidate species, their designated critical habitat, and marine mammals. The USACE also has jurisdiction over construction activities on the refinery's wharf system (Dock Safety Unit and natural gas line) and operation of the spud barge adjacent to the wharf and causeway.	Table 7-1		

Topic/Agency	General Regulatory Responsibility	Regulatory Responsibility in Context of Proposed Project	Draft EIS Reference	
Washington State Department of Ecology	Manages the statewide framework for managing, accessing, and protecting shorelines of the state	Ecology is responsible for ensuring compliance with the Shoreline Management Act. The shoreline permit for the proposed project, which would be issued by Skagit County, would be reviewed by Ecology for consistency with the Shoreline Management Act.	Table 7-1	
Washington State Department of Fish and Wildlife	Protection of state listed marine life	The Washington State Department of Fish and Wildlife (WDFW) is responsible for protecting state-listed marine life. WDFW protects marine life for the proposed project via issuance of hydraulic project approvals for the proposed projects' wharf construction activities – specifically installation of the gas line on the refinery wharf.	Table 7-1	
Skagit County	Protection of shorelines of the state	Wharf construction activities would also require a shoreline permit from Skagit County. The County's permit would specify the requirements for the proposed projects' construction work on the refinery wharf to be consistent with the Skagit County Shoreline Management Master Program and the Shoreline Management Act.	Table 7-1	
Spill Prevention (On-land and Marine)				
Washington State Department of Ecology	Review, approval, training, and certification for spill prevention plans and programs	Ecology requires the refinery to prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan and an Oil Spill Prevention Plan. The plans are regularly reviewed and certified as acceptable by Ecology and other agencies (USEPA and the USCG). Ecology is responsible for determining that Tesoro's plans are adequate and meet all regulatory requirements. These plans provide the detail on how the refinery prevents and responds to spills (land or water). Ecology would notify Tesoro if the plans require updating for the proposed project. Ecology also routinely inspects the refinery for compliance with Tesoro's approved prevention plans,	Section 2.7.6 Section 2.8.5 Appendix 2-A	
U.S. Environmental Protection Agency	Oversight of spill prevention, control, and countermeasures planning	USEPA certifies the refinery's spill prevention and response plans described above, including the requirement that a SPCC plan be prepared and certified by a professional engineer. USEPA supplies an approval letter as part of their certification of the plan, and has supplied such approval on the latest version of the refinery's plan. In addition, the OSCP would need to be resubmitted with changes due to the proposed project and would need to be recertified by the USEPA and other agencies as noted in this table.	Section 2.7.6 Section 2.8.5	
Washington State Department of Ecology	Protection of surface waters through stormwater and erosion management during construction	Ecology requires construction site operators to be covered by a Construction Stormwater General Permit. This requires that a Stormwater Pollution Prevention Plan and sediment, erosion, and pollution prevention control measures be developed for the proposed project.	Table 5-1 Appendix 2-A Appendix 2-B	

Topic/Agency	General Regulatory Responsibility	Regulatory Responsibility in Context of Proposed Project	Draft EIS Reference
U.S. Department of Transportation	Regulates the land transport of hazardous materials	The U.S. Department of Transportation establishes requirements for the packaging, labeling, and transportation of hazardous materials following federal safety requirements. The trucks bringing in commodity chemicals for the proposed project will be required to meet these requirements.	Section 9.6
Washington State Department of Transportation	Regulates land transport of hazardous materials	The Washington State Department of Transportation ensures compliance with the U.S. Department of Transportation in the state and maintains a hazardous response team that would respond to traffic accidents of hazardous materials.	Section 9.6

 $PM_{2.5}$ = particulate matter less than 2.5 microns in diameter; PM_{10} = particulate matter less than 10 microns in diameter; RCW = Revised Code of Washington;

3.2. TECHNOLOGY ALTERNATIVES

Tesoro considered a number of potential alternatives for the design of the proposed project, siting of proposed project components, and transport of products to and from the refinery. In some cases there were no alternatives identified. In other cases, the alternatives were eliminated from further analysis because they did not meet the objectives of the proposed project and/or one of the two alternatives criteria. A discussion of alternatives considered by Tesoro is included in Draft EIS Section 2.9, Alternatives Considered.

Several commenters suggested specifically that cogeneration or combined heat and power (CHP) should have been selected as Best Available Control Technology (BACT) instead of a steam boiler for the proposed project. CHP is an approach to generating electric power and useful thermal energy from a single fuel source. Instead of purchasing electricity from the distribution grid and separately burning fuel in an on-site furnace or boiler to produce thermal energy, an industrial or commercial facility can use combined heat and power to provide both services in one, energy-efficient step (U.S. Department of Energy 2016).

The steam boiler identified for the proposed project is a heat recovery boiler that produces steam at the desired pressure for the process usage. Refinery process equipment must be operated at elevated pressures and temperatures to achieve the desired chemical reactions. Each individual process has its own temperature and pressure requirements.

The use of a CHP to produce additional power would decrease the steam pressure and require additional energy input or compression to raise the steam pressure back up to the level required by the refinery processes. Waste heat from the steam boiler would be directed to the heat recovery section of the boiler and used elsewhere within the refinery processes to potentially reduce combustion in other process heaters.

Further, a CHP system was not considered a viable alternative because it would require more energy to operate than a steam boiler and the refinery is already considered to be efficient from an energy balance standpoint. The refinery is in compliance with the Oil Refinery GHG Reasonably Available Control Technology Rule. To achieve compliance, Tesoro had to demonstrate that the refinery is ranked in the top 50 percentile of refineries with regards to energy efficiency due to their high reuse of waste heat.

Cogeneration is typically used at refineries where excess fuel gas is readily available. The Tesoro Anacortes Refinery does not have excess fuel gas available to use for cogeneration purposes. Currently, Tesoro purchases natural gas to supplement its fuel gas. Therefore, a cogeneration system is not a feasible alternative.

One commenter noted that storage tank design standards need to meet Ecology requirements for oils since Draft EIS Chapter 2, Proposed Action and Alternatives, indicates the new tanks may be used to store gasoline or gasoline blend stock. The storage tank design would meet Washington Administrative Code (WAC) 173-180-330 in addition to the other requirements noted in the Draft EIS. The storage tank design regulation provides the requirements for the

construction, secondary containment, and maintenance and inspection program. Storage tank air controls are also included in the Northwest Clean Air Agency (NWCAA) air permit.

3.3. AIR QUALITY AND CLIMATE CHANGE

The air quality and climate change analysis in the Draft EIS evaluated the potential impacts of the air emissions from the proposed project. The air quality impact analysis focused on two categories of pollutants: the criteria air pollutants and the toxic air pollutants potentially emitted by the proposed project. The climate change impact analysis focused on greenhouse gases (GHGs). GHGs are air pollutants that trap heat within the earth's atmosphere and contribute to climate change. Additional information on air quality analyses and cumulative impacts are provided in the Draft EIS Chapter 4, Air Quality and Climate Change.

In response to comments on the Draft EIS, this section provides additional analysis on the ambient impact analysis for sulfur dioxide (SO₂), ozone, GHG impacts and mitigation, ocean acidification, and potential air emissions impacts from spills. Specifically, this section discusses vessel unloading-related SO₂ emissions in combination with the proposed project operation's SO₂ emissions; and the refinery's GHG contributions. This section also provides additional detail on how the proposed project's carbon dioxide (CO₂) and SO₂ emissions may affect ocean acidification and analyzes the contribution of GHGs to the atmosphere in the event of a large-volume marine spill (worst-case or maximum most probable spill scenario in the Draft EIS).

Comments on the Draft EIS related to these topics include the following:

- SO₂ emissions from vessel unloading activities should be included in the proposed project emissions for impact significance determination.
- Meteorological data and monitoring station data selected for use in modeling did not reflect available Swinomish Indian Tribal Community data to determine potential total concentrations that affect tribal land in the ambient air quality analysis (see Section 3.8.1.1, Modeling Meteorological Data Selection and Tribal Land Impact).
- GHG emissions from vessel traffic beyond the international boundary should be included in GHG emissions.
- GHG emissions from conversion of xylene to plastics could be more than direct fuel combustion of xylenes.
- GHG emissions reductions from redirecting xylenes from fuels into chemical feedstocks need to be real, verifiable, additional, permanent, and enforceable.
- New GHG emissions from the proposed project should be mitigated. Other fuel suppliers could increase their supply to fill the market demand and no reduction in fuel GHG would be realized.
- Other projects in the state of Washington have mitigated GHG emissions under SEPA and included the mitigation requirement in state or local air permits.

- Increased ocean acidification due to CO₂ and SO₂ emissions from this project.
- Emissions from spills should not be considered as GHG emissions.

3.3.1. Sulfur Dioxide Emissions during Vessel Unloading

Sulfur dioxide emissions from the marine vessels during unloading were evaluated in the Draft EIS as part of the analysis of emissions due to increases in vessel traffic (see Draft EIS Table 4-12). The unloading emissions are assessed in addition to the proposed project SO₂ emissions, which were evaluated in a separate section of the Draft EIS (see Draft EIS Table 4-7). The Draft EIS considered impacts associated with all the proposed project sources of SO₂. Commenters noted that the emissions associated with vessel unloading were not included in the modeling Tesoro conducted to support their NWCAA air permit application. Since secondary emissions from a motor vehicle, train, or vessel, these emissions were not required to be included in the Prevention of Significant Deterioration Air Permit application and were not modeled with the new and modified refinery sources.

The combined sources from the March Point region contributed approximately 839 tons per year of SO_2 in 2011. The background hourly concentration at the Anacortes monitor (Site ID 53-057-0011) for the last 3 years of complete data (2013-2015) has averaged 14.1 micrograms per cubic meter (99th percentile value). The addition of another 39.6 tons per year SO_2 from the facility and 0.89 tons per year SO_2 from vessel unloading, would not result in a concentration that exceeds Ambient Air Quality Standards (AAQS). Therefore, SO_2 emissions would not result in a significant impact and there are no changes to the conclusions in the Draft EIS relevant to SO_2 emissions.

3.3.2. Spill GHG Emission Corrections

In the Draft EIS discussion of spill emissions (see Draft EIS Section 4.4.4.2, Impacts on Air Quality from Marine Spills from Vessels during Operations), GHG emissions were estimated from a worst-case spill event. The immediate emissions from spills would be either xylene or reformate products, depending on what material is spilled. These compounds are not listed GHG emissions so there would be no immediate release of GHG emissions. However, GHG compounds could evolve from the interaction of ultraviolet energy and xylene or reformate compounds over time and the Draft EIS was conservative and estimated that complete conversion would occur.

This impact would not be similar to a forest fire as previously described in Draft EIS Section 4.4.4.2, Impacts on Air Quality from Marine Spills from Vessels During Operations, because it would take longer for xylene or reformate compounds to eventually convert to GHG compounds when compared to GHGs generated during a forest fire. Therefore, the conclusions of the Draft EIS are more likely to overestimate the potential impact of a spill on air quality. The conclusion that a worst-case scenario spill could be potentially significant due to air toxic compounds is unchanged, but GHG emissions from spills of any size would not result in a significant impact.

3.3.3. GHG Emissions from Transportation and Conversion of Xylene

Many comments were received regarding the extent of analysis of GHG emissions in the Draft EIS. The proposed project would result in the Tesoro refinery extracting xylenes that already exist in reformate to make mixed xylenes (a petrochemical feedstock) for an international market instead of making liquid transportation fuels (gasoline) for the U.S. West Coast market. In total, the project would redirect reformate to make 15,000 bpd of mixed xylene products. Approximately 5,200 bpd of the 15,000 bpd total would be redirected from the Washington/Oregon gasoline market, with the remainder being redirected from the California market (see Draft EIS Section 4.4.6, Impacts on Air Quality and GHG from Fuels Conversion to Xylenes). This redirection from the gasoline market to instead produce mixed xylenes is unlikely to have a substantial impact on either of those markets. The global mixed xylenes market is between 1 and 1.5 million barrels per day (ICIS 2016, ICIS 2017). The West Coast gasoline market is approximately 1.5 million barrels per day. A single project redirecting 15,000 bpd between these two markets is unlikely to impact prices enough to alter demand and consumption. Nonetheless, if the proposed project is approved, then the Tesoro refinery would have a modified role in those two markets (i.e., it would replace some of its transportation fuels production with petrochemical production), resulting in a different overall downstream emissions profile for products produced at the refinery.

This different emissions profile comes from a combination of factors. First, the mixed xylenes have higher emissions associated with their transportation to market in Asia than if they were delivered to the local gasoline market. Second, these transport emissions would be lower than transport emissions for existing sources of mixed xylene imports to the Asian market (primarily the U.S. Gulf Coast). Currently, the U.S. is a net exporter of mixed xylenes, supplying approximately 18.5 billion barrels per day (approximately 25 percent of the Asian demand [Platts 2013]). To the extent the proposed project impacts the global market, it could displace 15,000 bpd of current xylene exports from the U.S. Gulf Coast (see Figure 3).

As depicted on Figure 3, shipping xylenes from Washington State to Asia is a shorter transport distance than from the Gulf Coast to Asia, resulting in lower GHG emissions because less vessel fuel is burned during transport. In addition, the emissions from transforming mixed xylenes into plastics products are lower than if mixed xylenes were burned as a component of liquid transport fuel. The emissions associated with converting 15,000 bpd of mixed xylenes to plastics are approximately 1.3 to 2.1 million metric tons per year, whereas the emissions from burning those mixed xylenes as a component of gasoline would be approximately 3 million metric tons per year.

Table 3 provides a comparison of the difference in annual emissions associated with redirecting 15,000 bpd of mixed xylenes from the domestic gasoline market to the Asian plastics market. The xylene combustion emissions represent a comparison of the two potential pathways for the mixed xylenes, but do not reflect state of Washington-specific transportation sector emissions.



Figure 3: Mixed Xylenes U.S. Shipping Routes Comparison

Table 3: GHG Emissions Comparison for Transportation and Conversion versus
Combustion in Local Market

Starting Location and Product Type	Transportation (CO ₂ e metric tons per year) ^a	Conversion to Products (CO ₂ e metric tons per year) ^{b,c}	Total Emissions (CO ₂ e metric tons per year)	Combustion of Xylenes as Fuels (CO ₂ e metric tons per year) ^d	Annual Decrease in Emissions Due to Converting Xylenes to Products (CO ₂ e metric tons per year)
Shipping from Washington and transforming xylenes to polyester	290,860	1,291,916	1,582,776	2,963,844	(1,381,068)
Shipping from Texas and transforming xylenes to polyester	546,816	1,291,916	1,838,732	2,963,844	(1,125,112)
Shipping from Washington and transforming xylenes to plastic ^e	Shipping from Washington and ransforming 290,860 cylenes to blastic ^e		2,438,089	2,963,844	(525,755)

Starting Location and Product Type	Transportation (CO ₂ e metric tons per year) ^a	Conversion to Products (CO ₂ e metric tons per year) ^{b,c}	Total Emissions (CO ₂ e metric tons per year)	Combustion of Xylenes as Fuels (CO ₂ e metric tons per year) ^d	Annual Decrease in Emissions Due to Converting Xylenes to Products (CO ₂ e metric tons per year)
Shipping from Texas and transforming xylenes to plastic ^e	546,816	2,147,229	2,694,045	2,963,844	(269,799)

Sources: USEPA 2015; IPCC 2016; Plastics Europe 2008; 40 CFR § 98, Table MM-1

 $CO_2e = carbon dioxide equivalent$

^a Emission factors from USEPA Climate Leadership November 2015 Emission Factors - Table 9 Product Transport Waterbourne Craft – kilogram per ton-mile

^b Emission factors from Intergovernmental Panel on Climate Change Emissions Factor Database CO₂ Emission Factor EF

214034 - For Ethylene Production - other feedstock; CH4 EF 214035 - For Ethylene Production; no N₂O EF provided

^c Emission factors from Environmental Product Declaration of European Plastics Manufacturers - For PET Bottle Grade - 2008. Global Warming Potential factor listed in output parameters

^d Emission factors from USEPA Table MM-1 Part 98, Default factors for petroleum products and natural gas liquids CARBOB - CO_2 equivalents per barrel

^e Plastic type is polyethylene terephthalate, used to make plastic drinking bottles.

In general, using mixed xylenes in plastics production has lower end-use GHG emissions than burning it as gasoline. Shipping mixed xylenes to Asia from Washington has lower transport emissions than shipping them from the U.S. Gulf Coast. The combustion GHG emissions did not include shipping the fuel to terminals or gas stations, so it is a conservatively low number for the comparison. This comparison demonstrates that with respect to minimizing GHG emissions, transporting mixed xylenes from Washington for conversion to products is preferable to shipping mixed xylenes from the other U.S. markets. Even with the change in the GHG footprint of the product, the project would have a minor impact on either the larger fuels market or the larger mixed xylenes market.

3.3.4. Washington GHG Emissions Impact and Mitigation

Under the Washington Clean Air Rule (CAR) (WAC 173-442) and GHG Reporting rule (WAC 173-441), entities report separately their stationary emissions and the emissions associated with the petroleum products they produce or import. Tesoro would report (and be regulated) as both a stationary source and petroleum product producer. Therefore, both GHG emissions from the facility and their produced petroleum products will be included in Tesoro's baseline GHG emissions. If operation of the proposed project results in Tesoro reporting less GHG emissions as a petroleum product producer due to increased exports, then that could result in Tesoro reporting a net reduction in GHG emissions. Tesoro could have a reduction in reported emissions even if overall state of Washington transportation sector emissions do not change. Tesoro may generate emissions reduction units (ERUs) that could later be used for CAR compliance. Ecology has commented that they will make a determination with respect to CAR compliance at a later date (Ecology 2017).

From a SEPA perspective, there are increases in direct and indirect GHG emissions due to the proposed project that were reported in Draft EIS Section 4.4.2.2, Impacts on GHG Emissions. Direct increases in GHG emissions from the proposed project would result from the operation of the new boiler, MVEC, and increased process heater usage. Indirect reductions of GHG emissions would result from a portion of fuel production being used to produce xylene for export instead of being combusted in the local fuels market. In contrast to how GHG emissions and reductions are accounted for under CAR (whereby Tesoro may be able to obtain ERUs from reported reductions in GHG emissions by exporting a higher percentage of their petroleum products), this change in production may not result in an overall net reduction of GHG emissions statewide. It is anticipated that the demand for transport fuel supply in the state of Washington would remain relatively similar. Consequently, there would still be similar GHG emissions from combustion of transport fuel supplied by other sources to meet demand state-wide. However, those sources are unrelated to the proposed project and these market fluctuations will be addressed by Ecology under the CAR. While Tesoro's proposed project may result in an increase in direct GHG emissions from the operation of proposed new combustion sources, under the CAR, Tesoro may be able to offset any potential impacts by obtaining ERUs for the reduction of GHG emissions associated with the facility's reduction in product supply. Therefore, the conclusions with respect to GHG emissions in the Draft EIS remain unchanged.

In response to comments on the Draft EIS, Tesoro voluntarily committed to making a monetary contribution to the NWCAA's grant program, which funds local environmental projects. The value of the monetary contribution will be negotiated between Tesoro, NWCAA, Ecology, and Skagit County.

3.3.5. Ocean Acidification Due To Effects of Increased SO₂ Emissions

Ocean acidification has been a global concern for some time, primarily due to global CO₂ emissions. Seawater chemistry could be affected by emissions of acid gases such as SO₂. Losses to fisheries and shellfish beds have resulted from the acidification of ocean waters (Washington State Blue Ribbon Panel on Ocean Acidification 2012). In 2007, USEPA started the reduction of sulfur in marine fuel by lowering the fuel standard to a maximum of 500 parts per million (ppm) sulfur by weight. In 2014, the USEPA enacted the final level of marine fuel sulfur standard at a maximum of 15 ppm sulfur by weight for fuel producers. With the recent requirements for low-sulfur marine fuels from the International Marine Organization, ocean transport fuel sulfur standards have gone from 15,000 ppm sulfur to 1,000 ppm sulfur in Emission Control Areas, which includes the U.S. The global open-ocean transport reductions are not fully in effect until 2020, but the ocean transport sulfur content has been reduced from 35,000 ppm sulfur to 5,000 ppm sulfur.

Typically, vessels used within U.S. Emission Control Areas have used marine fuels that meet the USEPA marine fuel standard. SO₂ emissions from marine vessels have been significantly reduced over the past few years. The vessels entering and operating within Puget Sound have reduced SO₂ emissions 14 percent between 2005 and 2011 due to the marine fuel sulfur standard reductions (13,600 tons per year in 2005 to 11,700 tons per year in 2011 [Puget Sound Maritime Forum 2012].) The recent USEPA marine fuel standard reduces sulfur in marine fuel by

97 percent and the International Maritime Organization standard reduces sulfur by 90 percent, so additional reductions are expected.

The new SO₂ emissions from the vessel traffic associated with the proposed project (see Draft EIS Table 4-12) and the additional facility SO₂ emissions (see Draft EIS Table 4-7) would not contribute significantly to ocean acidification.

3.4. TERRESTRIAL PLANTS AND WILDLIFE – MARINE BIRDS

The terrestrial plants and wildlife analysis evaluated potential impacts from the proposed project on plants and animals that predominantly live on land, including shorebirds, marine birds, and other waterfowl that use both terrestrial and aquatic habitat (see Draft EIS Chapter 6, Terrestrial Vegetation and Wildlife).

Three bird species were identified in comments suggesting additional information should be provided in this Final EIS. These three additional species are addressed in this section:

- Additional analysis for the marbled murrelet (*Brachyramphus marmoratus*) to address the recent change in state listing status from threatened to endangered
- Addition of the sandhill crane (*Antigone canadensis*) to the Final EIS based on information received from commenters that indicates the species may occur in the vicinity of the proposed project
- Additional discussion on the potential for inhalation effects to herons at the March Point Heronry in the event of a mixed xylenes spill at the refinery wharf

3.4.1. Marbled Murrelet

The marbled murrelet (*Brachyramphus marmoratus*) periodic species status review was completed by the Washington Department of Fish and Wildlife in October 2016 (WDFW 2017). The department recommended that the species' status change from state-threatened to state-endangered. The Washington Fish and Wildlife Commission adopted the recommendation in January 2017; therefore the correct current listing for the marbled murrelet is state-endangered (WDFW 2017). Table 4 below presents updated information on the marbled murrelet including additional information regarding species occurrence in the proposed project vicinity.

Table 4: Revisions to	Draft EIS Table 6-6
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Common Name	Scientific Name	Federal Status	State Status	Source	Species Information	Occurrence		
Marine Birds								
Marbled Murrelet	Brachyramphus marmoratus	Federal Threatened	State Endangered	IPaC	The marbled murrelet forages in the marine environment, usually within approximately 1 to 5 miles from shore (Desimone 2016). The diet predominantly consists of fish (Desimone 2016). The species breeds from April to mid-September up to 55 miles from the ocean (Desimone 2016). The species does not nest in colonies (Desimone 2016). In 2013, the U.S. population was estimated at approximately 20,000 individuals in the U.S., including 4,400 individuals in Puget Sound and Strait of Juan de Fuca. Annual aerial surveys from 1992 through 1999 (Nysewander et al. 2005) consistently observed one to two marbled murrelets in Fidalgo Bay. The IPaC database identified critical habitat for the species near the study area; however, the critical habitat is not located within the study area.	The species is known to occur within the study area, in Fidalgo Bay. Manns (2017) documents species presence along the marine vessel transportation route in Guemes Channel and San Juan Islands. Additionally, areas along the northern Olympic Peninsula serve as foraging habitat for marbled murrelet (Manns 2017). The study area does not contain suitable terrestrial nesting habitat for the species.		
Other Spe	Other Species							
Sandhill Crane	Antigone canadensis	Migratory	State Endangered	Stinson 2017; Manns 2017	Sandhill cranes were listed in Washington as state- endangered in 1981 (Stinson 2017). Three subspecies of sandhill crane occur in Washington. The Canadian sandhill cranes (<i>A. c. rowani</i>) that migrate through western Washington breed in British Columbia and Alaska (Stinson 2017, Ivey et al. 2005). Sandhill cranes are opportunistic feeders and will consume prey such as roots, berries, invertebrates, lizards, and snakes (Stinson 2017). Sandhill cranes form life-long breeding pairs, begin breeding at age three, and nesting success improves with age (Stinson 2017).	Manns (2017) documented occurrence of sandhill crane during migration in the upland habitat near March Point Road in 2016.		

Note: IpaC = Information for Planning and Consultation. Species identified through the U.S. Fish and Wildlife Service IPaC tool (USFWS 2017)

Commenters noted that the Washington State Department of Natural Resources (WDNR) has a long-term conservation strategy for the marbled murrelet (WDNR and USFWS 2016). The portions of the WDNR report relevant to the proposed project are those that relate to marine conditions. The WDNR report states that challenges facing marbled murrelets in their marine environments include finding food and avoiding predators. These challenges are often related to ocean conditions (e.g., pollution degrading prey availability and algal blooms). Anthropogenic risks that may also affect marbled murrelets at sea include direct mortality from pollution, oil spills, fishing gear, and marine vessel traffic (WDNR and USFWS 2016). Climate change is also attributed to driving marbled murrelet population dynamics and affecting the terrestrial and marine habitats of this species (Piatt et al. 2007; USFWS 2009). While marine habitat challenges have contributed to population declines in marbled murrelets, scientists are still working to document these occurrences (WDNR and USFWS 2016). Marine distribution of marbled murrelets during the breeding season is correlated with the proximity of inland nesting habitat (Piatt et al. 2007; Raphael et al. 2016; WDNR and USFWS 2016).

The Draft EIS concluded that if a large-volume marine spill (worst-case or maximum most probable spill scenario in the Draft EIS) were to occur, impacts to the marbled murrelet would be less than significant because: 1) the study area does not provide nesting habitat for the species, and 2) the products spilled (xylenes and reformate) do not bioaccumulate and would not affect prey abundance due to the rapid evaporation of these products from the environment. Therefore, there are no changes to the conclusions of the Draft EIS.

3.4.2. Sandhill Crane

Three subspecies of sandhill crane (*Antigone canadensis*) occur in Washington: Greater (*A. c. tabida*), Canadian (*A. c. rowani*), and Lesser (*A. c. canadensis*). Populations of sandhill cranes vary in breeding range and timing and routes of migration (Ivey et al. 2005; Johnson et al. 2005; Petrula and Rothe 2005; Stinson 2017). Pacific flyway Canadian sandhill cranes are state-listed endangered in Washington and the study area is within the species' distribution. Recent reports document sightings of sandhill cranes in the upland habitat at March Point near March Point Road during migration (Manns 2017).

Sandhill cranes would primarily be found occupying upland habitat during periods of migration and would not be found within marine waters. Given the low likelihood of a large-scale spill (worst-case or maximum most probable spill scenario in the Draft EIS) and that the species would not be found using the marine resources, the sandhill crane would not be subject to direct impacts during a spill event. Contaminants are considered unlikely to bioaccumulate and would not result in direct impacts on the species' foraging resources. Therefore, the impact of the proposed project on the sandhill crane would be *less than significant*. The toxicity of xylene and reformate and potential impacts that apply to marine birds, including the sandhill crane, are further discussed in Section 3.5.2, Toxicity of Xylenes to Marine Birds and Aquatic Life.

3.4.3. March Point Heronry

Public comments were received regarding the potential for air emissions from a spill to reach the upland great blue heron colonies on March Point. As discussed in Draft EIS Chapter 6, Terrestrial Vegetation and Wildlife, the heronry is outside the proposed project study area and, as these birds nest in upland areas away from the shoreline and xylenes do not biocumulate in prey food. Air emissions from a spill of mixed xylenes at the refinery wharf could theoretically reach the heronry, which is southwest of the refinery. No studies on the inhalation of mixed xylenes in birds were identified in the literature (see Section 3.5.2, Toxicity of Xylenes to Marine Birds and Aquatic Life). As described in Draft EIS Appendix 13-A, Fate and Behavior Analysis in the Marine Environment: Reformate and Mixed Xylenes, mixed xylenes or reformate would degrade relatively rapidly, degrading in the atmosphere to harmless components within 14 to 26 hours. The degradation would be expected to be more rapid if there were winds. In the absence of winds, degradation may take relatively longer but the dispersal would be more limited. Under either scenario, accounting for the rate of natural degradation in the environment and the fact that these chemicals are heavier than air, a marine spill of either reformate or mixed xylenes at the most proximate location (the wharf) would not be expected to affect or result in exposure of herons at the March Point Heronry. Further, the activities associated with the spill response would be expected to discourage wildlife from using these areas, thus further reducing the potential for exposure of marine birds to the spilled material. Therefore, the impact of the proposed project on the March Point Heronry would be *less than significant*.

3.5. MARINE AND NEARSHORE RESOURCES

The marine and nearshore resources analysis evaluated potential impacts of the proposed project on resources that occur in saltwater systems that are not significantly diluted by freshwater runoff. The impact analysis for marine and nearshore resources included marine vegetation, marine plants, shellfish, fish, marine mammals, and their habitats (see Draft EIS Chapter 7, Marine and Nearshore Resources).

Comments on the Draft EIS discussed in this section relate to potential impacts to the Southern Resident killer whale (*Orcinus orca*) populations, the uncertainties surrounding estimating toxicity to birds and aquatic species in the marine environment, and the exclusion of the loggerhead sea turtle.

3.5.1. Southern Resident Killer Whales

Comments on the Draft EIS expressed that the potential significance of impacts on the Southern Resident killer whale populations are underestimated or overestimated (depending on the comment). Determination of potential impacts were based on an analysis of the potential impacts of the proposed project, the SEPA guidance for assessing potential impacts and the criteria established for this project (see Draft EIS Chapter 7, Marine and Nearshore Resources, and Draft EIS Appendix 1-B, Impact Criteria Tables) and measures that would be implemented as part of the proposed project to protect marine mammals.
The study area for Southern Resident killer whale and marine mammals was not expanded for analysis in this Final EIS beyond the area evaluated in the Draft EIS. SEPA requires the consideration of environmental impacts that are likely, not merely speculative (WAC 197-11-060(4)(a)). The lack of information and uncertainty about the routes of vessels and destinations of the mixed xylenes would require significant assumptions resulting in a speculative analysis that would not result in useful information for agency officials.

Affected environment information for Southern Resident killer whales in the Draft EIS was primarily based on the Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*) published by the National Marine Fisheries Service (NMFS) in 2008 (NMFS 2008). However, the Southern Resident killer whale was recently included in the Species in the Spotlight program initiated by the NMFS in 2016. The program identifies eight species that are considered among the most at risk of extinction and supports existing partnerships and fosters new collaboration (NMFS 2016).

Analysis of the potential impacts of the proposed project on Southern Resident killer whales in the Draft EIS was based on the most recent Technical Guidance for assessing the effects of anthropogenic sound on marine mammal hearing (NOAA 2016). The Technical Guidance includes a summary of permanent threshold shift onset acoustic thresholds for five marine mammal hearing groups (low-frequency cetaceans, mid-frequency cetaceans, high-frequency cetaceans, Phocid Pinnipeds [underwater], and Otarrid Pinnipeds [underwater]. Southern Resident killer whales are grouped under mid-frequency cetaceans and the acoustic thresholds of mid-frequency cetaceans is 198 decibels cumulative sound exposure level for non-impulsive sources such as large marine vessels. However, this threshold applies to marine mammal hearing sensitivity (injury thresholds) and does not apply to behavioral responses that affect feeding and social interactions.

Additional information from the NMFS used for the impact analysis identifies the potential for large vessels to affect Southern Resident killer whales at long distances. However, noise from small, fast-moving vessels in close proximity to the whales and targeting the whale's movements was identified as the primary concern for the species (NMFS 2010). In general, large vessels, such as tankers, cargo ships, and ferries use predictable straight paths and are slow moving, which is recognized by the NMFS to reduce the risk of vessel strikes to whales (NMFS 2010). In addition, large vessels do not specifically target the whale's movements. Available data show that on average these types of vessels comprise 6 percent or less of the total vessels within 0.5 mile of Southern Resident killer whale.

A recent publication from the University of Washington (Wasser et al. 2017) conducted research on stress hormone levels and pregnancy rates in orca whales from 2008 to 2014 in the study area of the EIS. The study specifically focused on the Southern Resident killer whale population. Temporal patterns in the stress hormone profiles of the Southern Resident killer whales suggested seasonal timing and overall strength of Chinook salmon runs in the Colombia and Fraser Rivers were primary driving factors for observed periods of stress in the orca whale population. Nutritional stress was shown to be associated with a reduction of successful pregnancies for orca whales, which ultimately impairs the potential for recovery of the endangered population. Data was also collected every half hour for the number and type of marine vessels within 0.5 mile of the Southern Resident killer whales for the duration of the study. The study found that stress hormone levels were correlated with the abundance and availability of Fraser River Chinook salmon instead of marine vessel traffic. Exposure to toxins and disturbance from marine vessel traffic were identified as having potential cumulative effects. However, the publication concluded that a reduction in the preferred prey (threatened and endangered Chinook salmon) appears to be the primary factor for the historic and ongoing decline of orca whales.

Noise from operation of marine vessels associated with the proposed project has the potential to disturb behavior of pinnipeds and whales within 5 miles of the marine vessels. However, due to the short duration of disturbance and the information provided above from the NMFS, marine vessel operation is unlikely to impact behavior of marine wildlife to an extent that would reduce the viability of a population of a marine wildlife species. As indicated in the Draft EIS, the increase of five marine vessels per month (60 vessels per year or 5 vessels per month) is equivalent to a 0.1 to 2.2 percent increase in large marine vessel traffic along these transportation routes, which would not be considered a significant increase in marine vessel traffic over current levels. Therefore, the determination of less than significant impacts from the Draft EIS.

The Canadian National Energy Board report (NEB 2016) was accounted for in assessing potential impacts; however, it was not solely the basis for determining potential impacts from the proposed project. It is acknowledged that the volume of marine vessel traffic attributable to the Trans Mountain Expansion Project is much greater than the amount that the Draft EIS attributes to the proposed project. However, the proposed project vessel traffic would still overlap with the Trans Mountain vessels within the Salish Sea near the Strait of Juan de Fuca, which is encompassed by the Southern Resident killer whale critical habitat. Due to the status of the Southern Resident killer whale as a federally endangered species (and one of eight spotlight species), cumulative impacts to the species were considered potentially significant in the Draft EIS.

The primary concern for cumulative impacts to the Southern Resident killer whale, based on available information, is the sound from small, fast-moving vessels moving in close proximity to the whales and targeting the whales (NMFS 2010). While small, fast-moving vessels are not part of the proposed project, due to the status of the Southern Resident killer whale as a federally endangered species, and one of eight Spotlight species, there is a potential for cumulative impacts due to the proposed project. This additional analysis confirms the conclusions of the Draft EIS—increases in vessel traffic could contribute to cumulative impacts.

3.5.2. Toxicity of Xylenes to Marine Birds and Aquatic Life

The analysis of the impacts to marine birds and aquatic life in the event of a spill included in the Draft EIS was based on the following toxicity assumptions:

- Toxicity assumptions for marine birds, marine mammals, and sea turtles:
 - Xylenes and reformate present on the surface of the water at thickness levels greater than 0.1 micrometer (µm) before any toxic effects were considered likely.
 - Foraging of prey exposed to xylenes or reformate would not be an important source of exposure to birds as the products do not bioaccumulate and are rapidly metabolized.
- Toxicity assumptions for fish: dissolved water concentrations greater than acute water quality criteria.

Some comments were received that indicated



Source: Jus-Rite Engineering Inc. 2012

the approach used to analyze impacts in the Draft EIS might overestimate toxicity, while other comments stated that toxicity could be underestimated. There are uncertainties in assessing toxicity because of the limited scientific studies that characterize the hazards of acute exposure to mixed xylenes and reformate in a dynamic marine environment where exposure could occur via inhalation, ingestion, contact with surface slicks, and dissolved concentrations in the water column. These uncertainties are discussed in more detail below.

No studies were identified that assessed the acute toxicity of inhalation or ingestion of xylene or reformate in birds. Therefore, it is uncertain if lethal or sub-lethal effects would occur in the first 36 hours following a spill when the chemicals could be present in a slick on the water surface at a thickness level greater than 0.1 µm and undergoing the volatilization process. During the volatilization process, chemicals with vapor pressures greater than atmospheric pressure will vaporize into the ambient air. For a spill, 99.5 percent of all products would be gone in 60 hours (less than 3 days); however most significant volatilization will have occurred during the first day of the spill. Due to the limited data, the impacts to marine birds in the event of a large-volume unplanned spill (worst-case or maximum most probable spill scenarios in the Draft EIS) were conservatively estimated to be *potentially significant* for those birds that are likely to be present in the study area (see Draft EIS Section 6.4.3.3, Spills to the Marine Environment during Operations).

As discussed in Draft EIS Sections 6.4.3.3, Spills to the Marine Environment during Operations, and 7.4.3.2, Marine Spills during Operations, a slick thickness of 0.1 μ m (one order of magnitude less than the literature toxicity threshold of 1 μ m) was selected as the conservative threshold for potential impacts. The toxicity threshold of 1 μ m slick thickness was the minimum cutoff used in the biological effects model used by the National Oceanic Atmospheric Administration (NOAA) in their assessments of black oil (French-McCay 2009; French-

McCay et al. 2002; French-McCay et al. 2004). The Draft EIS acknowledged that this slick threshold is a conservative estimate of toxicity for mixed xylenes and reformate since the NOAA model threshold is based on oil, which does have some volatile components but also has many other toxic components in the mixture that are not found in mixed xylenes and reformate. Additionally, many of the adverse effects from oil slicks are attributed to the persistent, highly toxic, high molecular weight compounds; none of these components are present in mixed xylenes and reformate, as noted in Draft EIS Chapter 13, Marine Transportation. Therefore, impacts to birds, marine mammals, and turtles based on the 0.1 μ m threshold are very conservative estimates since 0.1 μ m is a much lower threshold than literature-based effects and because those literature-based effects were attributed to a mixture of chemicals with higher toxicity and persistence than xylenes and reformate.

There are also uncertainties in the analysis on impacts to fish due to dissolved concentrations of xylene in the water column. Fish impact thresholds were conservatively estimated using the lethal concentration 50 (LC₅₀) of 2.6 milligrams per liter (mg/L) for the freshwater rainbow trout (*Salmo gairdneri*) from Galassi et al. (1988). This effect concentration is based on experiments with only one isomer of xylene, p-xylene. The other xylene isomers have been reported to have higher fish toxicity thresholds. Thus, mixed xylenes are likely to have an LC₅₀ that is higher than 2.6 mg/L due to the varying composition of xylene isomers. Furthermore, the experiment conducted on rainbow trout that resulted in a 2.6 mg/L effect value was performed under closed conditions in a laboratory, which is different from the dynamic nature of actual offshore conditions. Another experiment that used moving water to estimate effects to rainbow trout found the fish to be affected at 17.3 mg/L xylenes (Walsh et al. 1977). Consequently, the varying test results and evidence of no fish mortality in the event of a spill suggests that a threshold of 2.6 mg/L is likely an overly conservative threshold for effects. The uncertainties surrounding estimating the concentration in the water column are discussed below in Section 3.9.2, Spill Modeling.

The Draft EIS took a conservative approach in estimating toxicity, as described above. Therefore, the conclusions of the Draft EIS are more likely to overestimate than underestimate the toxicity of a spill. However, the conclusions that a large-volume spill (worst-case or maximum most probable spill scenario in the Draft EIS) could be *potentially significant* for marine birds (non-lethal toxicity), and also *potentially significant* for special-status fish and marine mammals, are deemed appropriate given the uncertainties in the toxicity data and the unknowns in the location and volume of any spill event.

3.5.3. Loggerhead Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*) was the only sea turtle species included in the Draft EIS (see Draft EIS Section 7.3.3.9, Sea Turtles). Commenters reported that the loggerhead sea turtle (*Caretta caretta*) may also occur at the western limit of the study area. Consequently, the loggerhead sea turtle Northern Pacific Distinct Population Segment (DPS) is included in this Final EIS (see Table 5). The entire loggerhead sea turtle population was initially listed as threatened under the federal Endangered Species Act in 1978 and as threatened under state of Washington law in 1990 (WAC 232-12-011). In 2011, the Northern Pacific DPS was recognized

and listed as endangered under the Endangered Species Act (Sato 2016). The Northern Pacific DPS of loggerhead sea turtles have nesting sites in Japan and are found primarily in pelagic waters off the west coast of Mexico, Southern California, and Hawaii. They also make rare appearances on the outer coast of Washington (Witherington 2002; NMFS and USFWS 1998). Within these areas, loggerhead sea turtles are found in a range of habitats, including pelagic waters, bays, lagoons, estuaries, and in general are found foraging in coastal waters associated with continental shelves (Dodd 1988; Sato 2016; Plotkin 2003). Foraging behavior is omnivorous and includes all life stages of invertebrates and some jellyfish (NMFS and USFWS 1998).

	Federal Listing		State Listing			
Species	Endangered Species Act	Critical Habitat within Study Area	Species of ConcernEFH withinStudy Area		Occurrence in Study Area	
Loggerhead sea turtle Caretta caretta	Endangered	No	Threatened	NA	Species sightings are rare, but occur at the western limit of the study area; may be uncommon visitors to other parts of the study area.	

Table 5: Revisions to Draft EIS Table 7-11

EFH = essential fish habitat; NA = not applicable

The toxicity of xylene and reformate and potential impacts due to construction and operation of the proposed project with regard to sea turtles are discussed in Draft EIS Sections 7.4.1, Impacts on Marine and Nearshore Resources from Construction, and 7.4.2, Impacts on Marine and Nearshore Resources from Marine Vessels and Operation, respectively. Due to similar abundance in the study area and the life history characteristics of leatherback and loggerhead sea turtles, this analysis in the Draft EIS would also apply to loggerhead sea turtles. Therefore, based on the analysis of potential impacts to leatherback sea turtles in the Draft EIS, the impact of the proposed project on the loggerhead sea turtle would also be *less than significant*.

3.6. Environmental Health

The environmental health analysis evaluated the environmental conditions that could impact human health for workers at the refinery or people in communities near the proposed project. The environmental health impact analysis considered exposure to air emissions, increases in terrestrial vehicle traffic and noise, and spills (see Draft EIS Chapter 9, Environmental Health). Comments were received on the Draft EIS regarding the following issues:

- Cancer risk associated with xylenes
- Differences in short-term versus long-term air quality and human health effects
- Requests for additional information regarding the status of the Tesoro refinery's progress in implementing U.S. Chemical Safety and Hazard Investigation Board (CSB) recommendations based on the investigation and findings of the 2010 explosion

These issues are discussed below.

3.6.1. Cancer and Xylenes

Several comments were received regarding the potential carcinogenic nature of xylenes. Neither USEPA nor the state of Washington regulates xylenes as a human carcinogen. All regulatory air quality standards for short-term and long-term exposure to xylenes are based on non-cancer health effects. The Draft EIS evaluated health risks based on these standards.

According to the USEPA, "data are inadequate for an assessment of the carcinogenic potential of xylenes" (USEPA 1999). Available studies on the ability of xylenes to cause carcinogenic responses in laboratory animals have been inconclusive, and evaluations of genotoxic¹ effects of xylenes have consistently given negative results (USEPA 1999; USEPA 2002). However, despite the regulatory agencies' current determination, some chemical manufacturers have listed xylenes as "possibly carcinogenic to humans" on their material safety data sheets (CITGO 2015). This designation is based on limited evidence of xylenes' carcinogenic effects in laboratory animals.

While no studies currently demonstrate a causal link between xylenes and cancer for humans, there is some scientific literature indicating further study may be warranted. A group of researchers from the Oak Ridge National Laboratory (ORNL) reviewed publicly available datasets and identified a potential relationship between patients with lung cancer and xylene exposure (ORNL 2015). The ORNL researchers concluded that the data do not confirm that xylene causes cancer; however the data do support the need for a "carefully designed longitudinal cohort study" (ORNL 2015).

The impacts to human health in the event of a worst-case or maximum most probable spill scenario were identified as *potentially significant* based on potential health effects from short-term exposures and the potential for acceptable source impact levels (ASILs) to be exceeded for up to 24 hours after a large-volume spill (see Draft EIS Section 9.6.2.1, Toxicity Information). This impact assessment finding would not change if xylenes are considered a potential human carcinogen. Large-volume spills are potentially a health hazard to people, and adequate prevention and response measures as described in the Draft EIS are required.

3.6.2. Short-term vs Long-term Exposures

Several public comments questioned the applicability of using ASILs as a threshold to assess potential health effects in the event of a spill, noting that ASILs are protective of long-term exposures rather than a short-term spill event. Cancer and other types of health effects are related to how much chemical exposure occurs and the length of time of the exposure. In other words, health effects can vary depending on whether the exposure occurs once (such as a spill event), or occurs regularly over a lifetime. The risk of a health effect generally increases in proportion to the "dose" of chemical received. The dose is understood as the total amount of a chemical (the concentration) deposited in the body and is typically calculated taking into consideration: 1) the amount of chemical a person is exposed to, 2) the frequency they are exposed (e.g., one time, or

¹ Genotoxicity refers to the property of a specific agent (radiation or chemical substances) to damage genetic information in a cell, thereby causing mutations or cancer.

once per week, or every day), and 3) the duration of the exposure (TEF 2015; USEPA 2005). Depending on the chemical and the toxic effect, it can be safe to breathe a higher concentration of a chemical for a short period of time, while longer-term exposures generally need to be at lower concentrations to protect health. Another consideration is the exposed population.

Workers, who are assumed to be a healthy adult population, can safely breathe higher concentrations of a chemical than the general population, which includes sensitive sub-populations, such as those with chronic illnesses, children, and the elderly.

Table 6 illustrates three different concentration limits based on different exposed populations (general public and workers) and either short-term or long-term exposure time periods for the four hazardous air pollutants that would be emitted in the event of a spill of xylenes or reformate. These three different concentration categories are as follows:

1. The ASILs are protective of the general public inhaling a chemical every day for a lifetime. In other words, the general public, including

The Dose – Response Relationship

A fundamental principle of toxicology is that the dose determines the severity of the effect. This relationship is referred to as the dose-response, and means that lower doses have less of an effect. For most chemicals there is a threshold below which no adverse health effects are seen. This threshold is called the NOAEL (or No Observed Adverse Effect [or response] Level). The other important point on a dose response curve is the LOAEL (or Lowest Observed Adverse Effect Level). These two points are especially important when establishing the safe levels of chemicals.



sensitive groups like children, could breathe the chemical at the ASIL concentration every day without adverse health effects. This is the value used in the Draft EIS to assess exposure risks in the event of a spill.

- 2. The USEPA AEGL-1s (or Acute Exposure Guideline Levels 1) are protective of the general public if the exposure period is 8 hours or less.
- 3. For workers, the Washington Industrial Safety and Health Act (WISHA) has established permissible exposure limits (PELs)² that assume daily exposures during a work shift over the

² WISHA PEL is for an 8-hour work day; however the level is based on a lifetime exposure risk for workers.

course of a lifetime. These values assume that workers would not have adverse health effects if exposed to chemicals at levels equal to or below the PEL during the course of a work day.

Table 6: Air Concentration Limits for Hazardous Pollutants in Mixed Xylenes and	nd
Reformate	

Hazardous Air Pollutants in Mixed	ASILs		AEGL-1		WISHA PELs TWA	
Xylenes and Reformate	ррт	μg/m ³	ррт	μg/m ³	ppm	μg/m ³
Xylenes	0.0509	221	130	564,450	100	434,190
Ethylbenzene	0.00009	0.4	33	143,290	100	434,220
Toluene	1.33	5,000	67	252,490	100	376,850
Isopropylbenzene						
(cumene)	0.08137	400	50	245,800	none	none

 μ g/m³ = micrograms per cubic meter; AEGL-1 = Acute Exposure Guideline Levels 1; ASIL = acceptable source impact level; PEL = permissible exposure limit; ppm = parts per million; TWA = time weighted average; WISHA = Washington Industrial Safety and Health Act

Note. A spill of xylenes would contain xylenes and ethylbenzene. A spill of reformate would contain all four of the listed chemicals.

As shown in Table 6, if the exposure is 8 hours or less, much higher concentrations of chemical are safe to breathe than if the exposure was regular and long-term. The Draft EIS concluded that health effects in the event of a spill were potentially significant because the ASILs could be exceeded for up to 24 hours. Use of the ASILs as a threshold for assessing spill impacts is a very conservative approach because an individual could breathe xylenes and other hazardous air pollutants at concentrations much higher than their respective ASILs for a short time without adverse effects. For workers involved in spill cleanup, the PELs would be the applicable concentrations that workers could breathe without respiratory protection.

Some commenters were concerned that xylenes were odorless and therefore, they would not know if an exposure was occurring. Xylenes have an odor and can be smelled at a concentration of about 1 ppm (ATSDR 2017). Because the "odor threshold" of 1 ppm is well below the PEL and the AEGL-1, the chemical can be smelled at a level that is not harmful for a short exposure, allowing people to move upwind.

The 1,000-barrel (bbl) xylenes spill in the Mississippi in April 2003 (discussed further in Draft EIS Section 9.6.2.4, Impacts on Health from Spill Response) found most measured xylene concentrations were below the PEL of 100 ppm immediately following the spill, when concentrations would be expected to be at their highest. Xylenes were not detected in the air approximately 8 hours after the spill event (NOAA 2003). This spill event information confirms the potential for high concentrations, potentially above short-term limits as well as long-term limits, for a short time after a spill event.

The Draft EIS took a conservative approach, as described above, to estimating the potential for an adverse human health effect in the event of a spill. However, the conclusions that a large volume spill (worst-case or maximum most probable spill scenario in the Draft EIS) could be *potentially significant* for humans appear appropriate given the unknowns in the location and volume of any spill event.

3.6.3. Safety Considerations

The public commented on Tesoro's safety record, and specifically requested additional information on the status of the CSB recommendations that were made to address the 2010 heat exchanger explosion. Commenters expressed interest in CSB recommendations that Tesoro document, implement, and survey its safety culture program. Based on these comments, Tesoro provided information about their safety culture program and the status of CSB recommendations (Tesoro 2017a):

- Documentation and implementation of a Safety Culture Program:
 - CSB recommendation remains open.
 - Elements developed and implemented by Tesoro include establishment of a Process Safety Council (2015 and 2016), survey of refinery safety culture, and completion of a process safety workshop by operations and maintenance personnel.
 - Safety culture survey results will be used for further program development.
 - Employee engagement on survey results and program is planned (June and July 2017).
- Safety culture surveys:
 - CSB recommendation is complete.
 - Employees and contractors were surveyed across refining locations (August 2016).
 - Surveys incorporated questions developed as a part of Tesoro's Golden Eagle refinery survey under the Contra Costa County Industrial Safety Ordinance.
 - Subsequent safety survey was developed by the refinery's Process Safety Council (October and November 2016).
- Communicating safety learning to workforce:
 - Internal database tracks all safety incidents and shares information about serious incidents immediately across Tesoro locations.
 - "Safety Flash" communications are developed in response to serious incidents within about a week and shared with workforce at mandatory monthly safety meetings and through Tesoro's internal website.

3.7. SOCIAL AND ECONOMIC ENVIRONMENT

The social and economic analysis evaluated how the proposed project might affect social or economic conditions in local communities. The analysis assessed whether the proposed project would affect housing, public services available in communities, and economic activity, as well as jobs or other livelihoods that may have socioeconomic and/or cultural importance (see Draft EIS Chapter 11, Social and Economic Environment).

Comments were received on the Draft EIS regarding the way in which Tesoro coordinates emergency response activities with the local community and requesting additional information on who pays for spill cleanup. These issues are discussed below.

3.7.1. Emergency Response Planning and Coordination with Local Services

Tesoro's training and planning for emergencies involves the local communities and local emergency services, as discussed in Draft EIS Sections 11.4, Public Services, and 9.6, Unplanned Events. Based on comments on this topic, Tesoro has provided additional information about their community planning and training activities. This information is included in Appendix C, Additional Information Provided by Applicant, and is summarized below.

- Annual spill drill participation and observation with many members of community organizations participating in the exercise, including:
 - Skagit County Department of Emergency Management
 - Representatives from the Swinomish Indian Tribal Community and Samish Tribe
 - Island Oil Spill Association
 - Washington State Department of Fish and Wildlife
 - Anacortes Police
 - Mount Vernon Police
 - Skagit County Sheriff
- Member of the March Point Community Awareness Emergency Response Group, a joint industry and local agency group (including representatives from local hospitals), preparing emergency response plans for use by community leaders
- Mutual Aid Agreements with other refineries in the state of Washington as well as local fire departments
- Sponsor of specialized training for local municipal emergency responders
- Anacortes Community Tesoro Advisory Group, an independent advisory group of community residents that interface between the local community and Tesoro management
- Community Investment into Emergency Response and Preparedness, a grant program funded by Tesoro that provides financial support to various local emergency response organizations, such as Skagit 911, several local fire districts and associations, local American Red Cross groups, and the Anacortes Police
- Member of the Local Emergency Planning Committee, which is part of a federal and state regulatory program to ensure local emergency response plans are developed, updated yearly, and fully address local hazards

3.7.2. Cleanup Costs in the Event of a Spill

Several comments on the Draft EIS raised the question of who would pay for the cleanup in the event of a spill. Costs associated with cleaning up spills and paying damages to those that have been harmed by a spill are covered under federal regulations. If the responsible party (the "spiller") cannot pay, there is a federal fund available to pay all costs, including compensation for damages. The responsibilities are apportioned in the following manner:

- Tesoro is responsible for accidents at the refinery or refinery wharf.
- The independent vessel owner that is transporting xylene or reformate is responsible for cleaning up spills to marine waters once the vessel leaves Tesoro's wharf.

The federal regulations that govern xylene spills are twofold. Xylene has characteristics very similar to many oil products, which are regulated under the Clean Water Act (CWA), as amended by the Oil Pollution Act of 1990 (OPA 90). Xylene and reformate, when they are suspended in fuels or oils, are regulated under OPA 90. Xylene manufactured by the refinery is regulated under the CWA as amended by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The equivalent state-level regulations for OPA 90 and CERCLA are WAC 173-181 and WAC 173-340, respectively. Parties responsible for a spill would be subject to both federal and state regulations.

Xylene spills must be reported for any amount at or above 100 pounds (40 Code of Federal Regulations [CFR] 117.3). Xylene is designated a hazardous substance under 40 CFR 116. Both CWA amendments (OPA 90 and CERCLA) require a party deemed responsible for spilling those products into navigable waters of the U.S. to incur the costs of its removal and provide compensation for associated damages (33 United States Code § 2702).

OPA 90 and CERCLA both contain government-administered trust funds to address cleanup costs in the event that a responsible party is unable to do so. The U.S. Coast Guard (USCG) is responsible for administering those funds in the coastal environment (see Draft EIS Table 13-1 and Final EIS Table 2 for additional information). OPA 90 and CERCLA also have a provision for compensating those harmed by a spill or spill cleanup. Injury, destruction, or loss affecting natural resources and real or personal property may result in damages that are compensable under OPA 90. Costs associated with providing incremental public services during or after removal activities may also be compensated.

3.8. CULTURAL RESOURCES

The Draft EIS evaluated how the proposed project might affect resources that are listed or are potentially eligible for listing in the National Register of Historic Places (NRHP). This includes archaeological sites, buildings, structures, and districts; sites listed in the Washington Heritage Register; traditional cultural properties, cultural landscapes; and cemeteries and burial sites, which may involve additional protections under state and federal laws. Archaeological resources can be prehistoric, historic, or both, and are found at the ground surface or below ground surface. Prehistoric archaeological sites are generally considered to have been occupied before the arrival of European Americans and historic archaeological sites are considered to have been occupied

after the arrival of European Americans. Buildings and structures are collectively referred to here as "architectural resources" or the "built environment," and are typically associated with resources that date after European American contact with Native American groups (see Draft EIS Chapter 12, Cultural Resources).

The impact analysis methodology in Draft EIS Chapter 1, Introduction, and Draft EIS Appendix 1-B, Impact Criteria Tables, was applied uniformly across all resource areas, including cultural resources.

3.8.1. Tribal Resources

Comments on the Draft EIS were provided by the Swinomish Indian Tribal Community, the Tulalip Tribes, and Suquamish Tribe.

The Tulalip Tribes and Suquamish Tribe commented that the Draft EIS did not acknowledge that the project and marine transportation route is located within each tribe's usual and accustomed areas. Additionally, the increase in marine vessel traffic could result in cumulative impacts on commercial and tribal fisheries.

The Swinomish Indian Tribal Community provided a detailed comment letter that included three appendices regarding 1) air quality on tribal lands, 2) cultural resources on March Point, and 3) vessel traffic. The County's initial review of tribal resources is contained within multiple chapters of the Draft EIS, including Chapters 11 and 12. For ease of reference, all comments relating to tribal resources are addressed in this section. Specifically, air quality and cultural resources on March Point are addressed in Sections 3.8.1.1, Modeling Meteorological Data Selection and Tribal Land Impact, and 3.8.1.3, Point Elliott Treaty Signatories and Treaty Rights, below. Comments about the vessel traffic analysis in the Draft EIS included impacts on tribal fisheries outside the immediate project area, including Vendovi anchoring and bunkering areas, and comments on spill modeling. Additional analysis of marine vessel anchorage in the Vendovi area and on potential vessel fishing impacts is provided in Sections 3.8.1.4, Marine Vessel Anchorages, and 3.8.1.5, Direct Impacts of Vessel Use, Spills, and Access to Fisheries. Comments related to spill modeling and spill likelihood are addressed in Section 3.9, Marine Transportation, in addition to the responses provided in Appendix A, Draft EIS Comments and Responses. This additional analysis did not result in changes to the findings of the Draft EIS. Based on comments regarding the archaeological assessment of the New Tanks Area and the potential for buried cultural resources to be present. Skagit County included mitigation measures as described in Section 3.8.1.2, Archaeological Study, and Chapter 4, Mitigation, of this Final EIS.

3.8.1.1. Modeling Meteorological Data Selection and Tribal Land Impact

The Swinomish Indian Tribal Community operates air quality monitors within the project vicinity. It was suggested that data from these monitors should have been used to analyze potential air quality impacts to tribal lands. For ambient air quality impact assessment areas (using AAQS) and ASIL, a 50-kilometer (km) (31 miles) study area was assessed that encompasses the full air dispersion modeling domain. This region also covers the extent of the

Swinomish Indian Tribal Community lands near the proposed project. The Draft EIS determined that air quality impacts to tribal lands would be less than significant. Draft EIS Figure 4-1 shows a smaller modeled domain within the 50-km (31 miles) study area, referred to as an area of influence. This smaller area is where the model predicts the highest concentrations of chemicals from the proposed project's operations. Within this smaller area of influence, having the highest predicted concentrations, the pollutant concentrations are considered less than significant. Draft EIS Tables 4-8, 4-9, and 4-10 (see Draft EIS Section 4.4.2.1, Impacts on Air Quality) all demonstrate concentrations less than the AAQS and ASIL.

The Bartholomew Road Station ambient air quality background monitor was selected for $PM_{2.5}^3$ analysis as it best represents the ambient background concentrations near the proposed project. This station is closer to the proposed project than the Swinomish Indian Tribal Community's air quality monitoring station and is closer to other sources of pollution in the area that would result in the highest potential emissions. For other pollutants, an approved Ecology model was used to provide background concentrations.

The air quality modeling from a potential spill scenario identified conditions in which the spilled material would spread out the quickest and therefore modeled a conservative area around the proposed project potentially affected by the spill. Further, the air quality dispersion modeling conservatively assessed real-world wind conditions based on the 2010 to 2014 meteorological data. During this meteorological data timeframe, the wind blew from the northwest quadrant roughly 18 percent of the time, resulting in the potential high impacts around and on Swinomish Indian Tribal Community land. Therefore, the Draft EIS adequately analyzed scenarios in which the spilled material could impact Swinomish Indian Tribal Community lands.

The criteria pollutants regulated under the AAQS include ozone, which is produced in the lowest part of the atmosphere (the troposphere) by precursor pollutant emissions of nitrogen oxides (NOx) and volatile organic compounds (VOCs). Air quality impacts to ozone are anticipated to be less than significant for the proposed project.

The ambient monitor in La Conner (AQS Site ID: 53-057-0020), operated by the Swinomish Indian Tribal Community, has the most recent 3 years (2012-2014) of data that meet USEPA completeness criteria for ozone and its precursors from the three monitors in the area. The 2012-2014 data demonstrate compliance with the 8-hour ozone National AAQS (NAAQS) at 48 parts per billion (ppb). This leaves 22 ppb of room between the recently updated 70 ppb standard and the current background concentration.

The proposed project would reduce facility VOC emissions by 327 tons per year and the new NOx emissions increase would be 37 tons per year, which is below the Significant Emissions Rate for NOx. Therefore, no ozone modeling was required by the agencies. The NOx emissions for the combined March Point facilities were 2,993 tons per year in 2011. The proposed project's NOx emissions represent a 1.2 percent increase in the area.

³ Particulate matter less than 2.5 microns in diameter

The VOC emissions for the combined March Point facilities were 1,098 tons per year in 2011. The proposed project's VOC reduction would contribute a 29.8 percent reduction in the area. Therefore, the proposed project's net ozone precursors would be a reduction over current levels, would not cause any exceedances of the ozone NAAQS on Swinomish Indian Tribal Community land, and has a less than significant impact based on the methodology described in Draft EIS Section 4.2.2, Methodology.

Toxic air pollutants were modeled for the entire 50-km (31 miles) study area, which includes Swinomish Indian Tribal Community lands. The Draft EIS concluded that toxic air pollutants impacts would also be less than significant for the entire study area (see Draft EIS Table 4-10). Overall, analysts reviewed the air monitoring locations used in the Draft EIS and determined that the locations used were adequate and in some cases would be considered conservative in terms of evaluating impacts to tribal lands because the locations used were closer to the source of pollutants than the Swinomish Indian Tribal Community's air quality monitors. Therefore, the project emissions would not result in a significant impact to the Swinomish Indian Tribal Community lands and there are no changes to conclusions in the Draft EIS.

3.8.1.2. Archaeological Study

The archaeological technical memorandum for the project reports that the geotechnical borings in the New Tanks Area identified up to 7 feet of modern fill overlying native soils. Therefore, the archaeological investigation of the New Tanks Area consisted of mechanically excavating six trenches measuring approximately 4 feet by 10 feet to a depth of 8 feet below ground surface to identify potential archaeological resources below the modern fill within the native soils. Safety restrictions prevented the archaeologist from working in the trenches. Given the dimension of the trenches it would have been difficult to observe the wall profile from outside the trenches so the excavated spoil piles were examined for the presence of cultural resources.

The proposed project would include grading of up to 25 feet. In the tank construction area, grading would consist of excavations of about 14 to 25 feet (greatest along the east side of the New Tanks Area), as well as fills of up to about 14 to 22 feet (greatest along the west side of the tanks/perimeter access road).

Based on this information and in response to comments, a mitigation measure has been added to this Final EIS requiring Tesoro to prepare and implement an Archaeological Monitoring Plan during construction. This plan is included in the mitigation for the proposed project described in Chapter 4, Mitigation, of this Final EIS.

The New Tanks Area has the potential to contain archaeological sites below modern fill. Therefore, focused monitoring of the removal of modern fill during construction in this area will be undertaken. Monitoring would be performed by Tesoro's archaeologist. Additionally, the Swinomish Indian Tribal Community would have the option of providing a Tribal Archeologist to perform monitoring. Archaeological monitoring would entail having an archaeologist(s) present during ground disturbing activities that may intersect native soils to observe subsurface conditions. Monitoring would be used to identify potential buried surfaces, archaeological material, features such as hearths or midden material, or strata that may contain cultural materials. Monitoring would proceed until it is determined that cultural resources are not likely to be impacted by construction or are not present. The continuation of monitoring depends upon factors such as the stratigraphy of the deposits, spatial distribution of native soils across the New Tanks Area, and presence of cultural materials. Upon completion of monitoring, a report will be prepared addressing the methods employed and the results of the work. If cultural resources are identified during monitoring, the report will also include a cultural context for interpreting the finds, including discussion of tribal ethno-history, prepared in accordance with Washington State Standards for Cultural Resources Reporting (DAHP 2015).

3.8.1.3. Point Elliott Treaty Signatories and Treaty Rights

The Draft EIS listed the Duwamish Tribe, Suquamish Tribe, Snoqualmie Tribe, Snohomish Tribe of Indians, Lummi Nation, [Upper] Skagit Tribe, Swinomish Tribe, and others as signatories to the Point Elliott Treaty (see Draft EIS Chapter 11, Social and Economic Environment, and Draft EIS Table 11-1). Additional tribes that were signatories to the Point Elliott Treaty include the Stillaguamish Tribe, Skokomish Tribe, and Samish Tribe (Treaty of Point Elliott Treaty 1855).

3.8.1.4. Marine Vessel Anchorages

Commenters requested that the study area be expanded to include the Vendovi Island anchorage. The anchorage area is outside the proposed project shipping lane and would not be impacted by a spill in the shipping lane. If a vessel cannot dock at a marine terminal because the capacity of the marine terminal is full, it is possible that a vessel may need to anchor at a nearby anchorage location and act as a floating storage unit. For the proposed project, anchorage could be done with full reformate vessels (ATBs), if there is a delay in reformate transfer at the refinery wharf. Tankers would be filled with xylenes at the refinery wharf and a tanker would not need to wait for wharf access in a "full" capacity. Since floating storage in a tank ship is substantially more expensive than land storage, cargo transfers would be completed as quickly as possible when chartering a tank or ATB vessel service. When vessels are at anchorage, future orders for ship services are delayed for cost-saving reasons. Accordingly, the use of the Vendovi Island anchorage by full reformate vessels associated with the proposed project is unlikely. Thus, the proposed project will not likely increase demand for or use of anchorages.

Commenters also raised issues about bunkering activities at nearby anchorages. The USCG manages anchorage areas and regulates the activities within anchorage areas, which includes bunkering. Consequently, expanding the vessel traffic study area to include the Vendovi Island anchorage area would not change the conclusions of the Draft EIS that anchorages would not be significantly impacted by the proposed project activities (see Draft EIS Section 13.3, Vessel Traffic).

Proposed rulemaking by the USCG (82 Federal Register 10313, February 10, 2017) would establish new anchorage areas throughout Puget Sound, including some near the marine vessel transportation route, and would require all large vessels over 200 feet in length (including tankers and ATBs) to anchor only in designated anchorage areas. Current regulations do not include this requirement for any vessel. According to the background information provided by the USCG Captain of the Port Sector Puget Sound regarding the proposed rule listed above, these new anchorage areas are already in use informally by the USCG Vessel Traffic Service in conjunction with the support of the maritime community. The USCG stated that these informal anchorage areas have "improved the safety of maritime traffic" within the Salish Sea (82 Federal Register 10313). The USCG now seeks to formalize the establishment of these anchorages areas, which currently do not appear on nautical charts, are not referenced in the Coast Pilot (a formal navigational publication used by mariners), and are not subject to certain regulations that would allow USCG enforcement authority. The informal Vendovi Island anchorage area has been in use for many years. According to the USCG, the Vendovi Island anchorage area is one of several informal anchorage areas that it seeks to formalize in regulations. By doing so, the USCG states that these additional regulations would provide mariners with more accurate nautical charts and allow the USCG to impose additional regulations to manage those areas to increase safety. By further codifying these anchorage areas, the USCG states that it would "improve the safety of all Puget Sound waterway users" (82 Federal Register 10313).

While the effects of this proposed rule on vessel traffic, safety, and spill likelihood cannot be predicted, this rule would likely improve the ability to track and manage tanker anchorage activity and increase safety in those areas.

3.8.1.5. Direct Impacts of Vessel Use, Spills, and Access to Fisheries

Comments received on the Draft EIS indicated concerns about potential impacts resulting from increased marine vessel use, spills, and reduced access to tribal usual and accustomed areas. In general, the 120 total movements per year associated with the proposed project represent approximately two to three vessel movements per week throughout operation. Changes in vessel traffic itself are not necessarily proportional to changes in spill likelihood. The spill risk estimates in the Final Vessel Traffic Risk Assessment (VTRA; Merrick and Van Dorp 2017) (the "VTRA II", as cited in the comment), are incorporated into Draft EIS Section 13.5, Marine Spills and Spill Response. These estimates incorporate the increased vessel traffic, along with other factors, such as improved tanker design and navigation safety protocols in assessing potential spill risk. As stated in Draft EIS Section 13.4.2.2, Impacts on Vessel Safety from Operations and Maintenance, the protections provided by the vessel traffic management systems (described in Draft EIS Section 13.4.1.2, Waterway Management) would minimize project-related vessel safety risks, inclusive of marine accidents and marine casualty events.

Such activity is unlikely to significantly alter marine vessel traffic patterns and schedules.

Moreover, tribal activities and resources are directly related to elements of the environment that the County assessed in the Draft EIS and in this Final EIS. Impacts to marine resources from potential loss or changes to habitat or changes to water quality are directly relevant to tribal fishing activities that rely on those marine resources. As explained in the Draft EIS this Final EIS, potential impacts associated with the proposed project to marine resources will be less than significant. Consequently, based on the information the County has analyzed, which includes all the information provided by commenters, the proposed project is not expected to result in activities that would significantly reduce access to traditional fisheries Additionally, the County lacks sufficient information to support a finding of probable significant adverse impacts to tribal fishing rights. The County recognizes that additional information on tribal resources may become available through a formal consultation between the U.S. Army Corps of Engineers and the Tribes.

In response to the comments provided by the Tribes, Tesoro has offered the following voluntary commitments:

- Tesoro will donate up to three spill response trailers equipped with spill response equipment to be staged for deployment in the event of a spill. Tesoro is offering one of the trailers to each of the three Tribes that provided comments on the Draft EIS (Swinomish Indian Tribal Community, Suquamish Tribe, and Tulalip Tribes). It is envisioned that each tribe will manage their own response trailer and Tesoro will provide training on deployment strategies.
- Tesoro will also provide training to the tribes on the most accurate methods for monitoring vessel traffic between Neah Bay and the Tesoro Anacortes Refinery.

3.8.1.6. Cumulative Impacts

With respect to potential cumulative impacts to marine resources, as noted above, potential loss or changes to habitat or water quality are directly relevant to tribal fishing activities that rely on those marine resources. Based on the information the County has analyzed, including information provided by commenters, this additional information did not result in changes to the findings of the Draft EIS, and the potential cumulative impacts associated with the proposed project to marine resources will be less than significant. After reviewing the comments provided on the Draft EIS, the analysis performed based on the methodology described in Draft EIS Section 1.7, Methodology, and discussed here and in Appendix A of this Final EIS indicates that conclusions reached in the Draft EIS have not changed.

3.8.2. San Juan Islands National Monument and San Juan Island National Historic Park

Comments were also provided about potential impacts to the San Juan Islands National Monument and the San Juan Island National Historic Park. Potential impacts to these areas are discussed in additional detail below.

3.8.2.1. San Juan Islands National Monument

The study area assessed in Draft EIS Chapter 10, Land Use and Shoreline Use, included several islands and features that are part of the Monument, including: Fauntleroy Rock, Dot Island, Reads Bay Island, Lopez Pass, Cape St. Mary, Chadwick Hill, Watmough Bay, Point Colville, Davis Bay Island, Richardson Island, two unnamed rocks/islands, Richardson Rock, Mackaye Harbor Rocks, Outer Bay Rocks, Iceberg Point, Iceberg Point Rocks, and Reservation Bay Rocks. Additional information is presented here regarding the cultural importance of the Monument in response to comments received on the Draft EIS.

The Monument was designated on March 25, 2013 (Proclamation 8947), to "maintain their historical and cultural significance and enhance their unique and varied natural and scientific resources." The Bureau of Land Management (BLM) co-manages the Monument with the USCG. Of the 1,000 acres of land within the Monument, about 300 acres are managed by the USCG; however the USCG will eventually relinquish the 300 acres to e BLM. To date, BLM has not developed a Resource Management Plan to guide the management of this Monument (BLM 2016).

The Proclamation states that historic and cultural values are among the resources for which the Monument was established. The Monument's cultural values include:

- Archaeological sites, buildings, structures, and places with historical and/or cultural values
- Properties associated with traditional use for fishing, hunting, gathering, and other activities by Native American tribes who continue to utilize and value the lands and resources in the Salish Sea region
- Cultural landscapes, including coastal grasslands and meadows that contain culturally important plant species

The BLM has inventoried a portion of the Monument for cultural resources and documented 21 cultural sites associated with Native American habitation and European American settlement and use. Most of the sites have not been evaluated for their NRHP eligibility. However, Patos Light Station is listed in the NRHP and Turn Point Light Station is eligible for listing in the NRHP.

The BLM (2016) may use the following indicators to assess potential impacts on cultural resources, which they would outline in a Resource Management Plan:

- The extent to which values that contribute to or diminish the significance of cultural resources are affected
- The extent to which the availability of cultural resources for appropriate uses such as access to Native American spiritual sites or areas of traditional religious or cultural importance would be affected
- The extent to which the cultural resource setting (such as visual and audible factors), where it is relevant to the historic value or importance of cultural resources, would be affected

No direct project impacts on these cultural sites are anticipated since they are far-removed from the refinery and the marine transportation route and since the proposed project is not expected to affect any of the historic and cultural values for which the Monument was established.

3.8.2.2. San Juan Island National Historical Park

Congress established San Juan Island National Historical Park on September 9, 1966, to commemorate a period of U.S. history between 1830 and 1860 when land disputes over national boundaries were common in Puget Sound. The park encompasses about 1,752 acres, is located within the boundaries of the San Juan Islands National Monument, and preserves the NRHP-listed sites of the American and English camps. Most of the original structures of these camps dating between 1859 and 1872 have disappeared (NPS 2007).

American, British, and Canadian citizens had property claims on San Juan Island. In 1859, a dispute over an American settler's shooting of a pig owned by a Hudson's Bay Company officer started the "Pig War." A joint military occupation of San Juan Island lasted for 12 years beginning in 1859. The British Royal Navy occupied the British Camp on the north end of the island and the American Army occupied the American Camp on the south end of the island. In 1871, the Treaty of Washington was signed and the San Juan Islands became American possessions (NPS 2016).

The park also contains important pre-contact archaeological sites. Evidence of the first inhabitants of San Juan Island was documented by the National Park Service on a bluff above American Camp and dates to between 7,000 and 9,000 years ago. Archaeologists have suggested that permanent occupation of the island began between 1,500 and 2,500 years ago. At the time of European contact, the native people were members of Central Coast Salish tribes (NPS 2012).

The Draft EIS discusses resources within the Salish Sea that could be impacted by the proposed project, including the San Juan Islands National Monument, in Draft EIS Section 10.4.1, Affected Environment, and analyzes potential impacts to those resources in Draft EIS Section 10.4.2, Potential Impacts on Recreation.

3.9. MARINE TRANSPORTATION

The marine transportation analysis covered vessel traffic changes due to the proposed project. The impact analysis focused on whether traffic increases would affect vessel safety and on the potential for a spill of xylene or reformates (see Draft EIS Chapter 13, Marine Transportation). The area evaluated was the marine transportation corridor from the refinery wharf to the Pacific Ocean, shown on Figure 2 of this Final EIS.

Comments on the Draft EIS were received regarding the assumptions around vessel types and vessel traffic, and questions about the spill modeling, spill likelihood, and spill response information. Additional information on these topics is provided below.

3.9.1. Vessel Types and Traffic

3.9.1.1. Recreational Boating

Comments were received requesting more information on how a spill might impact recreational boating. The information presented here expands on the baseline recreational boating discussion in Draft EIS Section 10.4.1.2, Recreational Activities. According to a 2007 Washington boating survey, 35 percent of boaters in the state boated in Puget Sound and 8 percent boated in the Strait of Juan de Fuca (Duda et al. 2007). This includes all types of motorboats, personal watercraft, sailboats, and canoes/kayaks. In 2016, there were 17,567 vessels registered in Skagit, Island, San Juan, and Clallam Counties—the counties that include the marine vessel transportation route (WSDOL 2017).

As stated in the Draft EIS Section 10.4.1.2, Recreational Activities, recreational boating is a popular activity in the study area. Data on the recreational use of specific waterways are not available, although the number of registered vessels and marinas suggests that such activity is

common along the marine vessel transportation route. Because the additional vessel traffic due to the proposed project is only a small percent increase in large commercial vessel traffic, it is not anticipated to adversely impact recreational boat use in the area.

3.9.1.2. Vessel Type

Commenters requested additional information be added describing the vessels that the proposed project would add, specifically that not all the additional vessels of the 60 total vessels per year would be tankers. The descriptions of the three types of proposed project vessels presented in Draft EIS Section 13.3.2.2, Impacts on Vessel Traffic from Operations, have been revised as described below. The remainder of this chapter presents additional information relevant to comments received, and summarizes some information already contained in the Draft EIS.

- Tankers: Tankships (as defined in 46 CFR 2.10-25 [see Draft EIS Table 13-1]) with their own power source that carry petroleum-based products. Tankers for the proposed project would transport mixed xylenes product from the refinery after being loaded at the refinery and exported to global markets, and would constitute approximately 30 percent of the vessels that call at the proposed project (CH2M Hill et al. 2016). Tankers have a capacity of 330,000 bbl (CH2M Hill et al. 2016). Only 30 percent of the vessels that call at the refinery wharf due to the proposed project would be tankships (about 18 to 20 vessels per year).
- Tug-barges, including: a tank barge (as defined in 46 CFR 2.10-25 [see Draft EIS Table 13-1]) tethered to and propelled by a dedicated tug. ATBs are a specific type of tug-barge combination (Tradewinds 2017). ATBs would be used to transport reformate to the refinery from Pacific Northwest sources and would constitute approximately 70 percent of the vessels that would call at refinery wharf due to the proposed project (about 40 to 42 vessels per year [Tesoro 2017b]). ATBs have a capacity of approximately 180,000 bbl (Tesoro 2017b).
- Assist tugs: Assist tugs would provide maneuvering assistance to tankships during transit and during mooring and unmooring operations. These vessel types and sizes are comparable to those currently found in waterways within the study area.

As noted above, less than one-third (30 percent) of the vessels anticipated to be used for the proposed project would be tank vessels with the internal cargo capacity to carry volumes of mixed xylenes of 330,000 bbl – the volume used in the worst-case spill modeling scenario. All tank vessels with these cargo capacities have been built to stringent international maritime engineering standards. The International Convention for the Prevention of Pollution from Ships, also known as MARPOL, Annex I (Chapter 4.A.20) (International Maritime Organization 1974) requires these vessels to be constructed with double hulls and double bottoms. These regulations would also be applicable to the barge portions of the second type of vessel identified above, the ATB. In compliance with the requirements of international maritime law, both the tank vessels and ATBs would have state-of-the-art navigation warning systems know as Automatic Identification Systems. These systems are a direct interface with USCG and Canadian vessel traffic avoidance control systems in the Salish Sea. Both tank vessels and ATBs are required by USCG regulations in 46 CFR 15.812, to have a federal licensed pilot on board during transits of

the Salish Sea. The USCG-licensed pilots are familiar with the unique geography and local operations of the Puget Sound and Salish Sea. Finally, in concert with USCG waterways management, an emergency response towing vessel (the "rescue tug") is stationed in Neah Bay, staffed continuously, and available 24 hours a day, 7 days a week to assist any vessel that has failed or reduced navigation capabilities. In addition, both the refinery and the independent marine vessels contract with oil spill response contractors who could respond to an emergency towing situation.

Navigational factors that are present within the Salish Sea designed to mitigate vessel-related incidents from tank vessels and ATBs in addition to what was included in Draft EIS Chapter 13, Marine Transportation, are the use of closed-circuit TV monitoring of critical passages.

3.9.1.3. Impacts on Ferries

Commenters requested information on how the proposed project might affect Washington ferry routes. Additional information on the ferry routes that could be impacted in the event of a marine spill, and the analysis of those impacts, are provided below.

Three Washington commercial ferry routes cross the marine vessel transportation route, as described in Table 7.

		Weekday Daily	
		Scheduled	Marine Vessel Transportation
Route	Operator	Trips	Route Waterbodies Crossed
Anacortes/San Juan	WSDOT	46	Guemes Channel, Rosario Strait
Islands/Sidney, B.C.			
Victoria Clipper (Seattle to	Victoria Clipper	14	Strait of Juan de Fuca
Victoria, B.C.)			
Black Ball Ferry (Port Angeles	Coho Ferry	8	Strait of Juan de Fuca
to Victoria, B.C.)			

 Table 7: Ferry Routes Crossing the Marine Vessel Transportation Route

Sources: WSDOT 2017; Clipper Vacations 2017; Black Ball Ferry Line 2017

If a spill were to occur along or near one of Washington State's ferry routes, ferry operations could be delayed or temporarily halted. Other spill scenarios would result in smaller blockages. As discussed in the Draft EIS Section 13.5.6, Spill Likelihood, such events would be extremely unlikely to occur. Further, Washington State Ferries (WSF), which is responsible for operating the ferry services that coincide with the marine vessel transportation route for the proposed project, has an established safety plan that includes the following components (WSF 2003):

- Adoption of a fleet-wide Safety Management System (international and domestic routes) to provide a means to enhance the safety culture throughout the organization and systematize the process for continuous improvement
- A centralized operations center, including automated dispatch support system, to ensure trained and qualified crewmembers

- A WSF emergency operations center to ensure a means to respond in a responsible manner in the event of an incident
- A safety systems manager and a Safety Coordination Team that utilizes a matrix management concept to oversee WSF's safety systems

These systems are in place to both ensure the safe operations of the ferry system as well as to be prepared to maintain ferry services in the event of an emergency.

The Draft EIS indicates that there could be significant, although temporary, impacts to vessel traffic in the event of a worst-case spill event; however, ferries were not specifically addressed in the Draft EIS. While it is true that access to some portions of ferry routes could be affected in the event of a worst-case spill, these impacts would be temporary and the WSF emergency operations center would be expected to work with the USCG to restore or re-route ferries to maintain and restore standard ferry service as soon as possible. Delays in ferry service could occur, but even these delays would be expected to be short in duration. Given that any impacts to ferry service are expected to be short-term even in the event of a worst-case spill, and accounting for WSF's safety and emergency protocols that are in place to maintain and restore ferry service in the event of an emergency, the potential impacts of a worst-case spill on ferry traffic would be *less than significant*.

3.9.1.4. Clarification of Marine Vessel Traffic Analysis

Commenters requested additional clarification of the statement in Draft EIS Section 13.3.2.2, Impacts on Vessel Traffic from Spills and Spill Response, that "there is no meaningful difference between tankships and the other large vessels."

The full statement in Draft EIS Section 13.3.2.2, with emphasis added in bold, is as follows: "in terms of **impacts on marine vessel traffic**, as defined in Section 13.2.2, and **not including** vessel safety or spill impacts, there is no meaningful difference between tankships and the other large vessels included in Tables 13-4 and 13-9." This statement applies *only* to the analysis of the number of vessels, as compared to the carrying capacity of the affected waterways. It *does not* apply to the analysis of vessel safety (i.e., the likelihood of a marine casualty event, as evaluated in Draft EIS Section 13.4, Vessel Safety), and *does not* apply to the analysis of changes in the risk of spills of xylenes and reformates associated with the proposed project, as evaluated in Draft EIS Section 13.5, Marine Spills and Spill Response.

Commenters questioned whether a tanker carrying 330,000 bbl of xylene or reformates would weigh 40,000 deadweight ton, the minimum threshold above which state law requires tug escorts. Tug barge combinations such as ATBs are below the weight threshold and do not require tug escort.

As stated in Final EIS Section 3.9.1.2, Vessel Type, tankships, including tankers, tug-barge, and ATBs carrying xylenes and reformates would require Puget Sound licensed pilots within the study area in accordance with the Washington State Pilotage Act, regardless of tonnage.

The VTRA (Merrick and Van Dorp 2017) refers to the "Tacoma Anacortes Upgrade" as a component of the US232 What If scenario. We assume that this is an error on the part of the VTRA authors, and that the VTRA meant to include the "Tesoro Anacortes Upgrade" in the US232 What If scenario. As such, the text in Draft EIS Section 13.5.6, Spill Likelihood, is incorrect, and should be revised as follows:

The VTRA did not evaluate how spill likelihoods would change solely with the addition of project-related marine vessel traffic (i.e., 120 total vessel movements per year carrying xylenes and/or reformate); however the VTRA did evaluate a scenario that included the proposed project (inadvertently described as the "Tacoma Anacortes Upgrade"), along with several other potential projects, generating 232 additional tanker and ATB trips from U.S. ports.

3.9.2. Spill Modeling

Commenters questioned several aspects of spill modeling:

- Why vessel fuels were not included in the modeling
- Whether spill modeling results would be different under non-instantaneous or more adverse weather conditions
- Uncertainties related to the use of the General NOAA Operational Modeling Environment (GNOME) and Automated Data Inquiry for Oil Spills (ADIOS2) models
- Assumptions about the modeled thickness layers of product on top of the water
- Estimations of dissolved concentrations in the water column

These topics are further discussed below.

3.9.2.1. Vessel Fuels

In the event of a worst-case, or maximum most probable spill discharge, fuel from the vessel could be leaked along with the xylenes or reformate product. Analysis of fuel spills was not included in this study because vessel fuel spills are not a unique feature of this proposed project. Vessel fuel spills have already been modeled in detail in previous risk assessments performed in the Salish Sea for Ecology (French-McCay et al. 2005) and the range of scenarios modeled would account for any new marine vessel traffic associated with the proposed project. Therefore, there would be no changes in analysis or risk assessment results due to the proposed project. The fuel volumes modeled in the previous studies were based on oil tanker cargo presently traversing the Salish Sea and the proposed project would not significantly increase the fuel volumes that were modeled. Note that the fuel volumes required for the transport of xylenes and reformate would be 30 to 50 times less than those in tankers. Since analysis of fuel spills was not included in this study because vessel fuel spills are not a unique feature of this proposed project, there are no changes to the conclusions in the Draft EIS regarding spill risk or spill response.

3.9.2.2. Non-Instantaneous Spills

The three spill scenarios evaluated by Tesoro, as described in Draft EIS Section 13.5.3, Spill Scenarios and Regulatory Requirements, each describe an instantaneous spill. In an instantaneous spill event, the entire volume of the xylene or reformate would be released immediately to the environment. These release rates were considered to be worst-case compared to a gradual release of the same volume, whereby the contents of the xylene are more gradually released to the environment. During a gradual release scenario, there is a reduction in the concentrations of the material spilled (xylene or reformate) on the water surface and the material spilled that is dissolved in the water beneath the surface slick. In other words, if all the mass was released at once, the concentrations in the environment would reach a maximum. Although the impacts associated with a gradual release would naturally persist longer depending on the assumed duration of the release, the persistence estimated by the instantaneous release modeling indicated that concentrations return to sub-toxic levels within 24 to 36 hours. Assuming the gradual release scenario would likely last less than a day before the release was noticed and halted, the increased duration would result in a less concentrated injury lasting 36 to 48 hours. The overall conclusion of the impact assessment would be the same as those presented in the Draft EIS, since the instantaneous spill event has already accounted for potential exposure to higher, or worst-case, concentrations of the spilled material. A gradual release scenario would also afford responders a greater chance to stop or better contain the spill than from an instantaneous release, thereby potentially reducing the total amount released.

3.9.2.3. Adverse Weather Conditions

Modeling was performed to simulate the trajectory or dispersal of spilled material for three different wind conditions: winter, summer, and an annual average. Adverse weather conditions were considered and tested in GNOME for the analysis. "Adverse weather conditions" imply conditions during a storm event, with corresponding high wind speeds over 25 miles per hour (mph) and corresponding conditions such as precipitation and heavy wave action. Several test simulations of spill releases under high wind speed conditions were examined during the development of the Draft EIS prior to Tesoro performing the modeling exercise. It was determined from examination of these test runs that adverse conditions greatly reduced the impact from the spills due to the close proximity of shorelines at the dock and throughout the ship channel in the Salish Sea. The presence of adverse weather conditions/high wind speeds rapidly directed the spill onto only a narrow length of shoreline locations and greatly reduced the potential distribution and associated impacts to both the water surface and shorelines affected by contact with the spill. High wind speeds would also accelerate the process of evaporation, the primary process by which the mixed xylenes and reformate would be removed from the aquatic and terrestrial environments. The no-wind scenario was also considered but it was determined that the absence of any wind reduced the motion of the spill trajectory, and thereby also reduced the amount of shorelines and water surface locations contacted by the spill, so this scenario may underestimate the distribution of xylene or reformate in the event of a spill. Worst cases (with respect to the total area affected by a spill event) were observed with some wind speeds, specifically in instances where the winds provided motion to carry a spill further than it would be carried by the currents and dispersion alone, and with some wind direction variability that resulted in the spreading the spill into a variety of locations, without limiting the trajectory to a narrow range of areas associated with strong winds. Therefore, the modeling results presented in the Draft EIS, Chapter 13, Marine Transportation, have greater potential impacts than would be expected under more adverse weather condition scenarios and are still considered to be a conservative approach to assessing potential impacts.

3.9.2.4. Spill Modeling Uncertainties

Commenters requested quantitative modeling and analysis to further characterize uncertainties. The GNOME model provides a means to characterize uncertainty in predictions by calculation of a "Minimum Regret Solution" trajectory. NOAA's GNOME user's manual (NOAA 2002) describes the Minimum Regret Solution trajectory as an area in which there is "a roughly 90 percent probability that the spilled oil will not extend beyond." The modeler provides an Uncertainty Value to adjust the degree of randomness in the Minimum Regret Solution; the larger the value, the greater the amount of randomness. Output of the Minimum Regret Solution trajectory was provided by Tesoro's spill modeling report (see Appendix G of the spill modeling report provided in Draft EIS Appendix 13-A, Fate and Behavior Analysis in the Marine Environment: Reformate and Mixed Xylenes) where estimated "best guess" spill trajectory locations (black dots) are plotted with the Minimum Regret Solution trajectory locations (red dots) such that 90 percent of the spilled material would be contained within the spilled trajectory location area.

However, care should be taken when interpreting GNOME's uncertainty output. If interpreted literally, it could over-represent the potential extent of a spill event. The uncertainty feature is typically used by spill responders to add "noise" to the model output, extending the size or area of the trajectory predictions (or the area of the spill) to include a larger region of possible locations where the spill might travel considering, for example, that the forecasted winds may be 5 mph from the north when in fact they will be 7 mph from the northeast. To help responders prepare for possible locations where a spill may reach land, the uncertainty analysis offers a margin of safety. For simulations intended to estimate the actual size of a spill, this uncertainty estimator feature can be misconstrued to imply that a given spill event would cover a larger area than might occur in a real-world spill event. For example, a spill trajectory prediction may show a 1-mile wide region or area affected by a spill event. Application of a "95 percent Uncertainty Value" would add an additional 0.25 miles to the east and 0.25 miles to the west to indicate that theoretically, there is a 95 percent likelihood that the actual spill may travel somewhere within the 1.5 mile zone. There is a 90 percent likelihood that this 95 percent uncertainty Minimum Regret Solution region is accurate. However, the modeled results are not meant to imply that the actual event would spread a total of 1.5 miles. Interpreting the results in this manner could result in conservative estimates of the area potentially affected by a spill event. This approach was taken in the Draft EIS, and consequently, the modeled results are expected to be conservative.

The uncertainty analysis is also inherently limited in its inability to produce results in terms of thickness. The thickness analysis clarifies the impact assessment by filtering the output to remove modeled estimates of mass that are small beyond a safe threshold of being capable of causing injury.

Inclusion of the region of uncertainty would imply an area at risk of injury larger than the actual spill size would be, and potentially inclusive of spilled mass too small to be meaningful to an injury. Although the uncertainty analysis would illustrate potential locations where the actual spill location would be shifted, indicating the spill area may contact somewhat more or less water surface and shorelines, the overall conclusions of the spill impacts would be the same. Consequently, additional quantitative modeling and analysis to further characterize uncertainties would not change findings presented in the Draft EIS.

3.9.2.5. Estimation of Spill Thickness

The model results from GNOME provide output in the form of "splots"—which are dots that represent the spatial distribution of the spilled mass. Each splot represents the same amount of mass or amount of spilled material. The interpretation of the model output for the assessment of potential adverse effects on birds and marine wildlife contacting the surface slick is overly conservative if one does not account for the spill thickness floating on the water surface. GNOME output can display the apparent presence of a spill through splot diagrams, even when the mass per unit area could result in a slick so thin as to cause negligible effects, and correspondingly no impact. Therefore a thickness threshold was applied using the GNOME Analyst tool to generate contours representing locations where the spilled materials would have enough mass to be visible, yet below injury criteria. These contours can then be used to represent both visible and above injury threshold criteria.

While the thickness threshold application removes the overly conservative nature of the GNOME analysis, the threshold criteria selected were still considered conservative since the values were derived from oil spills with thick viscous oils. The threshold criteria for xylene or reformate would not be expected to be the same as what the modeling results indicate; therefore, the modeling results likely depict a larger area where xylene or reformate thickness would exceed injury threshold criteria. Thresholds that would be more representative of xylene or reformate were not available in published research; instead, published research on thickness thresholds focused on impacts of heavy oils was used for the GNOME analysis. However, these studies focus on the impacts that heavy oils have on feather structure, which affects a bird's ability to regulate its body temperature. Lighter hydrocarbons like mixed xylenes and reformate will not behave like a viscous heavy oil in this manner. While xylene and reformate still can carry a risk of being ingested by birds preening their feathers or mammals cleaning their fur, it is expected that the animals would need to be exposed to higher concentrations to reach a risk threshold compared to scenarios where risk thresholds would be reached through dermal exposure (i.e., through situations where birds feathers are exposed to the heavy oils).

The GNOME Analyst tool converts the GNOME model's output of "best estimate" splot locations at selected times into contours of oil density (i.e., thickness) by algorithms that examine the spatial distribution of the splots. The sum of the splots' mass is divided over a designated area of water (mass per unit area) and then is divided by the chemical density (mass per volume), resulting in thickness. Although gasoline was used as a surrogate chemical within the GNOME modeling performed by Tesoro (an assumption that primarily functions to allow a rapid evaporation close to xylene), the densities of mixed xylenes and reformate (and not gasoline) were used for the GNOME Analyst thickness calculations.

In summary, inclusion of the thickness thresholds improves the estimation of the areas impacted by spills of mixed xylenes and reformate, but does so in a conservative manner.

3.9.2.6. Estimation of Dissolved Concentrations

Mixed xylenes (including monoaromatic compounds like ethylbenzene) are well documented as compounds that do not easily dissolve in water, and the fraction that does solubilize does not persist in surface waters for more than a few days due to its tendency to evaporate readily. Sources that corroborate these properties include the Agency for Toxic Substances and Disease Registry (ATSDR 2017), the National Institute for Occupational Safety and Health (NIOSH 2017), Occupational Safety and Health Administration (OSHA 2017), and the USEPA (USEPA 2017).

There are few historical large xylene spills to use for reference. One occurred in the U.S. on the Mississippi River on April 25, 2003. The M/V Bow Lion released approximately 42,000 gallons of xylene close to 2:00 AM. But by 10:00 AM, eight hours later, all values were below detection limits (NOAA 2003).

Complex three-dimensional modeling could be performed to re-examine the spills dissolution into the water column. However, such an effort would most likely arrive at the same conclusion for the assessment of impacts proposed in the Draft EIS: though there is low solubility in the chemicals examined, the high-volume spills would likely generate high concentrations at or close to the solubility limit in the top 1 to 3 meters of the water column. This plume of high concentrations is unlikely to persist for more than a few days before volatilization removes it from the water column into the air, where it will ultimately degrade. With concentrations likely above the threshold concentrations for aquatic organisms during this time, the extra precision of advanced complex modeling would rely on evaporation algorithms similar if not identical to those used in ADIOS2, resulting in the same determination for the duration of the aquatic exposure. Therefore, additional quantitative modeling is not recommended.

3.9.3. Spill Likelihood

The Draft EIS used Ecology's VTRA (Merrick and Van Dorp 2017) as part of the analysis assessing the likelihood of an increased spill risk due to the proposed project. The Draft EIS relied on the Draft VTRA; a subsequent review of the Final VTRA found no changes in the VTRA data and analysis cited in the Draft EIS. The VTRA report did not specifically address the proposed project, but did look at a number of future scenarios based on potential general

increases in vessel traffic from multiple potential sources. The proposed project's vessel traffic increase of 2.2 percent of all vessels upon Puget Sound's vessel traffic annually was compared to the spill likelihood predictions in the VTRA report based on the VTRA's future traffic scenarios. The proposed project's increase in vessels does not represent a significant increase in spill risk above the spill risks currently present. These risks are further minimized by improved traffic flow mentioned in the Draft EIS. This is consistent with the conclusions of the VTRA based on information provided for the scenarios that were analyzed. The clarification that the VTRA did not specifically analyze the proposed project's scenario also applies to the cumulative impacts of the overall increased risk of a spill in the Salish Sea (see Draft EIS Section 13.6, Cumulative Impacts from Marine Transportation). The cumulative impact analysis outlined in the VTRA therefore depicts an accurate assessment of spill risk associated with the scenarios outline in the proposed project.

3.9.4. Spill Response

Commenters requested additional information on how the USCG and USEPA ensure that vessels are following the regulations and activities required for spill response once a vessel leaves the refinery wharf. There are substantial regulatory requirements dealing with spill response readiness and equipment required by MARPOL and the CWA as amended by OPA 90 and CERCLA. The details of the USCG and USEPA requirements are specified in 33 CFR 154 Subpart F and 40 CFR 112 Subpart D; these regulations are described in Draft EIS Table 13-1. These requirements are regularly checked by USCG and USEPA compliance inspections. The following is a brief summary of some of these requirements:

- Tesoro must maintain approved Facility Response Contingency Plans designed to have under contract oil spill response organizations with resources and equipment designed to respond and clean up a worst-case scenario discharge.
- Each tank vessel and ATB must maintain a USCG approved Vessel Response Contingency Plan designed to have under contract oil spill response organizations (OSROs) with resources and equipment designed to respond and clean up a worst-case scenario discharge.
- Tesoro, tank vessels, and ATBs must maintain a triennial oil spill readiness and preparedness training program composed of quarterly drills and annual large-scale exercises designed to regularly mobilize spill response equipment and test and train Tesoro, vessel, and contracted spill responders.
- Tesoro must have immediately deployed spill containment boom surrounding the vessel.
- Tesoro must have immediately available additional spill containment and spill removal equipment staged near Tesoro that can be deployed by trained personnel within one hour of discharge.
- Tesoro, tank vessels, and ATBs must have USCG-approved xylene transfer procedures controlled by specially trained "persons in charge" (PIC) of vessel and facility dock transfer operations.

- Tesoro must perform tests on emergency shut down equipment using the specified shut down procedures before beginning any transfer of xylene.
- Tesoro and tank vessel PICs must make a mandatory pre-briefed transfer conference between the vessel PIC and facility PIC using a USCG-approved oil spill prevention mitigation checklist coordinating the specifics of each transfer. This checklist is called a Declaration of Inspection.
- Tesoro and tank vessel personnel must provide immediate small volume fixed containment areas around the transfer connection areas on both the vessel and facility.
- Tesoro must annually hydrostatically test all hoses and transfer piping to 1.5 times the maximum allowable working pressure allowed for those hoses and piping.
- Tesoro and ATBs must check before each transfer the interface of installed facility/vessel overfill alarms that activate at 90 percent of the capacity of the vessel tank. At a 95 percent tank capacity, a second alarm is required that also automatically shuts down Tesoro's transfer equipment.
- Tesoro must have each transfer pressure sensor, pressure and vacuum relief valve annually checked and certified.
- Tesoro must have in their approved Facility Response Contingency Plan specific pre-planned spill response strategies designed to protect those geographic areas around Tesoro that may be impacted by the facility's worst-case-scenario discharge. These critical protection areas that include public water intake locations, endangered species of plants and wildlife, and critical shorelines to protect are identified by the Federal Oil Spill Area Contingency Plan.
- Tesoro may only contract as a spill responder with USCG-certified oil spill response organizations that are rated to respond to the worst-case-scenario discharge.
- Tesoro contracted oil spill responders must have special Occupational Safety and Health Administration emergency response operations training designated in 29 CFR 1910.

For further information on other requirements, please refer to 33 CFR 154 Subpart F and 40 CFR 112 Subpart D.

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4. MITIGATION

The proposed project was designed to minimize many potential impacts and includes best management practices (such as pollution prevention plans to protect surface water during construction) to avoid or minimize impacts. These designs and control features were included in Draft EIS Table ES-2 and are noted in the "Key Planned Prevention and Minimization Measures from Draft EIS" column in Table 8 below. For two resources, air quality and climate change and cultural resources, additional mitigation measures and voluntary commitments by Tesoro have been included in this Final EIS and provided in the "Additional Proposed Mitigations Measures" column.

Table 8: Proposed Mitigation Measures

Resource	Key Planned Prevention and Minimization Measures from Draft EIS ^a	Additional Proposed Mitigation Measures from Final FIS		
Draft EIS Chapter 3. Ge				
Geologic Resources	Implementation of appropriate erosion control best management practices in accordance with permitting requirements would keep soil within construction boundaries, such as covering stockpiled soils, setting clearing limits, and installing temporary silt barriers around construction areas. Measures to promote slope stability, particularly in the New Tanks Area, would be implemented including stabilizing steep slopes with asphalt binder or temporary seeding and following applicable grading and building requirements. Exposed soil surfaces and unprotected steep slopes would be stabilized by paving or seeding surfaces following construction activities.	None		
Draft EIS Chapter 4, Air	r Quality and Climate Change			
Air Quality and Climate Change	BACT selections for the new boiler were ultra-low NOx burners with Selective Catalytic Reduction to minimize nitrogen oxides emissions, Catalytic Oxidizer to minimize carbon monoxide and volatile organic compounds emissions, and the use of natural gas or treated fuel gas as a fuel and good combustion technology to minimize GHG and sulfur dioxide emissions. The Marine Vapor Emission Control System is being installed as BACT to minimize volatile organic	Implement GHG voluntary commitment negotiated among NWCAA, Ecology, and Skagit County		
	compounds emissions from loading and unloading vessels at the refinery wharf. The technology selected minimizes the formation of NO_x emissions, and the use of natural gas as a fuel and good combustion technology to minimize GHG, carbon monoxide, and sulfur dioxide emissions.			
	The new storage tanks have BACT selected as dual seal floating roofs to minimize volatile organic compounds emissions.			
	For new piping and pump components, the BACT selected is low emission rate leak detection and repair.			
Draft EIS Chapter 5, Freshwater Resources				
Freshwater Resources (surface water, groundwater, and wetlands)	Stormwater during construction would be managed in accordance with the construction SWPPP and TESC Plan. Drainage ditches would be designed to guard against erosion. Stormwater and wastewater within developed areas would be routed to the on-site WWTP, preventing sediment or spilled materials from reaching freshwater resources, in accordance with NPDES permit. Tanks will have containment berms around them able to contain the entire contents of the tank in the event of a leak or breach. Regular inspections of piping, tanks, and tank containment infrastructure would eccur. Proposed project components were designed to be outside of floodplain cross.	None		

Resource	Key Planned Prevention and Minimization Measures from Draft EIS ^a	Additional Proposed Mitigation Measures from Final EIS		
Draft EIS Chapter 6, Te	rrestrial Vegetation and Wildlife	·		
Terrestrial Vegetation and Wildlife	Implementation of a Weed Management Plan with direction from the Skagit County Noxious Weed Control Board; dust reduction measures such as wetting and covering exposed soil; and approved work windows for in-water work to reduce impacts on important prey species of marine birds; implementation of fire control measures.	None		
Draft EIS Chapter 7, Ma	rine and Nearshore Resources			
Marine and Nearshore Resources	Construction: Work at the refinery wharf and causeway would take place in approved fish window to minimize disruption to spawning fish.	None		
	Operations: Stormwater and wastewater discharged at approved outfalls in accordance with NPDES permit requirement, a survey for the presence of surf smelt eggs adjacent to the wharf and causeway prior to beginning construction and adherence to work windows if discovered, directing ballast water from marine vessels to the WWTP for treatment prior to discharge.			
Draft EIS Chapter 9, En	vironmental Health	•		
Energy and Natural Resources	The high-efficiency boiler would utilize energy conservation features to maximize energy recovery and minimize natural gas consumption, such as combustion air pre-heat and feedwater pre-heat.	None		
Air Emissions	Prevention/mitigation measures to reduce air emissions are listed under air quality.	None		
Traffic Safety	Truck traffic would use roads designated for truck use by the city of Anacortes. Actions to ensure safety during SPMT hauls include: Transport permits would be required from the city of Anacortes and Skagit County and a Superload Transport Permit would be required from the WSDOT for the SPMT heavy haul moves from the Port of Anacortes to the refinery. Moves of prefabricated proposed project components would travel at slow speeds and moves are planned to occur at night to minimize disruptions along the marine vessel transportation route.	None		
Noise	Mufflers will be installed on construction equipment.	None		
Draft EIS Chapter 10, Land and Shoreline Use				
Land Use	Tesoro maintains 100-yard public safety and security exclusion zone around the refinery wharf and causeway, implementation of vessel traffic and safety measures described below.	None		
Recreation	Use of materials and paint for the proposed project infrastructure with characteristics (i.e., color and texture) similar to that of existing refinery infrastructure, to reduce contrast between new and existing structures.	None		
Visual/ Aesthetics	New lighting for the proposed project would match the existing type of the lighting at the refinery, which would reduce contrast between existing and new lighting during nighttime hours. Directional lighting techniques and shrouds would be used to minimize light overcasting and glare.	None		

Resource	Key Planned Prevention and Minimization Measures from Draft EIS ^a	Additional Proposed Mitigation Measures from Final EIS			
Draft EIS Chapter 11, Social and Economic Environment					
Housing	None	None			
Public Services	Tesoro's own, on-site firefighting resources and mutual aid agreements with industrial neighbors.	None			
Economics	Federal Regulation OPA 90 requires a party deemed responsible for releasing oil into navigable waters of the U.S. to incur the costs of its removal and provide compensation for associated damages (33 United States Code § 2702).	None			
Draft EIS Chapter 12, C	ultural Resources				
Cultural Resources	Implementation of the Unanticipated Discoveries Plan during construction.	Implementation of additional archaeological survey once native soils have been reached in the New Tanks Area to identify potential buried surfaces, archaeological materials, features such as hearths, or strata that may contain cultural materials. The Swinomish Indian Tribal Community would have the option of providing a tribal archeologist to perform monitoring during construction. Voluntary commitment to donate up to three spill response equipment trailers to Swinomish Indian Tribal Community			
		Suquamish Tribe, and Tulalip Tribes. It is envisioned that each tribe will manage their own response trailer and Tesoro will provide training on deployment strategies.			

Resource	Key Planned Prevention and Minimization Measures from Draft EIS ^a	Additional Proposed Mitigation Measures from Final EIS
		Tesoro will also provide training to the tribes on the most accurate methods for monitoring vessel traffic between Neah Bay and the Tesoro Anacortes Refinery.
Draft EIS Chapter 13, M	larine Transportation	
Vessel Traffic and Safety	Use of tug escorts and licensed pilots within the study area; use of traffic separation schemes; use of safety zones that restrict or prohibit vessel traffic in sensitive areas; specific tank ship security zones where a 500-yard zone in all directions is established around a tank ship (whether stationary or moving). Use of vessel designed with multiple independent cargo oil tanks rather than one single large tank, double hulls, and modern navigation systems.	None
Marine Spills	Spill prevention measures include a robust wharf management program to address transfer operations at the refinery wharf to help prevent spills. Implementation of the Dock Manual, SPCC plan, and OSCP. Annual updates (at a minimum) to the OSCP. The OSCP plan is written in conjunction with other plans including the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR 300), the Northwest Area Contingency Plan (NWAC 2017/Region 10 RRT), and the Washington Statewide Master Oil and Hazardous Substance Spill Contingency Plan (RCW 90.56).	None

BACT = Best Available Control Technology; EIS = Environmental Impact Statement; GHG = greenhouse gases; NOx = nitrogen oxides; NPDES = National Pollutant Discharge Elimination System; OPA 90 = Oil Pollution Act of 1990; OSCP = Oil Spill Contingency Plan; SPCC = Spill Prevention, Control, and Countermeasures; SPMT = self-propelled modular transporter; SWPPP = Stormwater Pollution Prevention Plan; TESC = temporary erosion and sediment control; WSDOT = Washington State Department of Transportation; WWTP = Wastewater Treatment Plant

^a The controls listed that apply to marine vessel transportation are not specific to the proposed project, but are regulatory requirements that apply to all vessel traffic in the marine vessel transportation study area.

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5. DISTRIBUTION LIST

The Final EIS was issued on July 10, 2017. This chapter describes how interested parties and those who commented on the Draft EIS were notified of its availability, and provides information about how they may access the Final EIS.

The applicant, Tesoro Refining & Marketing Company LLC, Department of Ecology, and the lead agency received printed copies of the Final EIS. The following people were notified of the availability of the Final EIS via email:

- Agencies, tribes, and organizations who were on the distribution list for the Draft EIS (see Draft EIS Section 15.1, Table Draft Notification List)
- Individuals who provided their email address prior to the release of the Final EIS
- Individuals on Skagit County's mailing list

Individuals who only provided a mailing address (with no email address) were sent a post card notifying of the Final EIS. Individuals who commented on the Draft EIS, but did not provide an email or mailing address were not notified. These comments and responses can be found in Appendix A, Draft EIS Comments and Responses.

Printed copies of the Final EIS were made available at the same public reading rooms used for the Draft EIS. Draft EIS Section 15.2, Public Reading Rooms, provides a list of the public reading room locations.

The Final EIS is available for download at the project website: http://TesoroAnacortesEIS.com. To obtain a printed copy or a USB drive with an electronic copy of the Final EIS (for the cost of production and shipping), follow the instructions provided at http://TesoroAnacortesEIS.com

To request materials in alternate formats, follow the instructions at http://TesoroAnacortesEIS.com.

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