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Analysis of Louisiana Oil Spills, the Louisiana Oil Spill Contingency Fund, and Future Oil Spill Response

Report Prepared in Response to Act 394 of the Louisiana Legislature on Behalf of the Interagency Council for the House Committee on Appropriations, the House Committee on Natural Resources, the Senate Committee on Finance, and the Senate Committee on Natural Resources.

LOUISIANA OIL SPILL COORDINATOR'S OFFICE

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EXECUTIVE SUMMARY

The Louisiana Legislature passed Act Number 394 in the 2013 Regular Session to amend and re-enact statutes defining the funding mechanism for the Louisiana Oil Spill Contingency Fund (the "Fund") and the Louisiana Oil Spill Coordinator's Office ("LOSCO"). This change increased the percent of crude oil moving through the state that was subject to the fee while lowering the amount of the fee on each barrel. In addition, the Act directed the Oil Spill Interagency Council to conduct a study of the Fund including the effects of recent and potential changes to the funding mechanism for the state's oil spill-related activities.

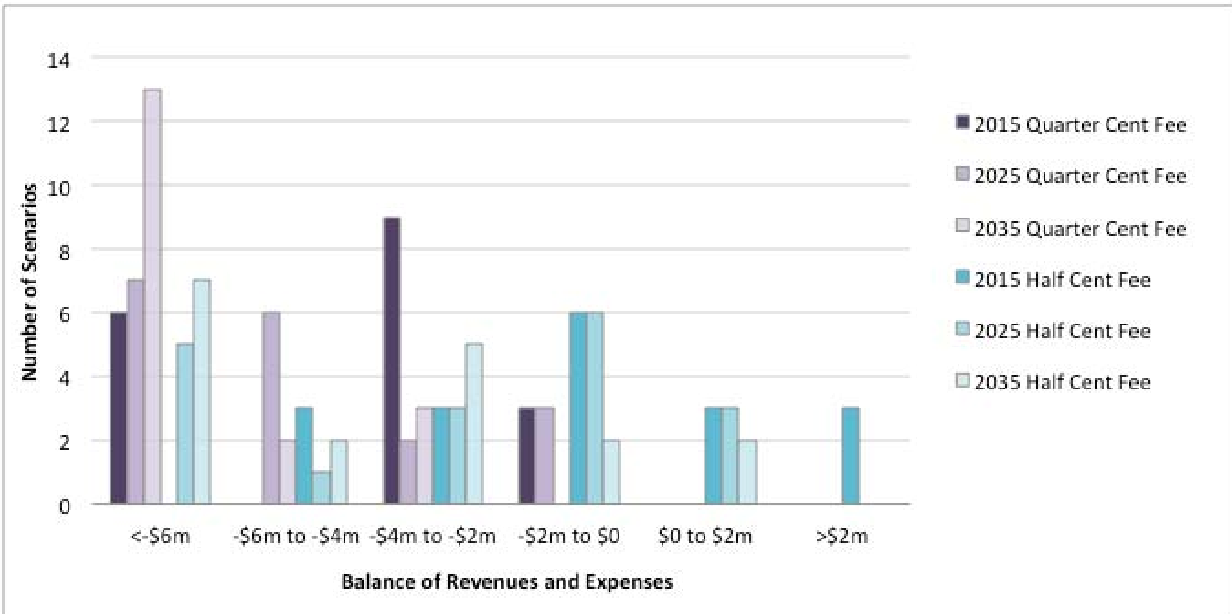
This report provides a review of the Fund including its uses, revenues, expenditures, and projected needs for oil spills in the future. To provide relevant context, the report starts with a broad picture of Louisiana's historic crude oil supply, which has fluctuated to meet the needs of Louisiana's refineries and, to a lesser extent, as Louisiana's role as a transportation hub has changed over time. Next, historic oil spill trends are reviewed using data on spill notifications from the National Response Center. These data show an increasing trend in the number of reported spills as well as total reported volume spilled. Additionally, this report provides a survey of the Fund and the historical oil spill related expenditures of the Louisiana Oil Spill Coordinator's Office and other state agencies as they relate to the Fund.

Three future scenarios of the state's crude oil disposition were developed to assess funding needs for several potential spill scenarios, with special consideration given to extreme spill events such as the *Deepwater Horizon* ("DWH") spill. Under each of the scenarios, the total volume of oil being utilized by Louisiana refineries is expected to grow. However, the scenarios differ in the amount of international and domestic imports coming to the state as well as the degree to which Louisiana may play an increasingly important role as a domestic transportation hub sending oil not used by Louisiana refineries to other states.

One of the primary purposes of this research is to determine whether or not the recently-modified fee mechanism, which assesses a quarter-cent per barrel fee on all crude oil received by a refinery for storage or processing, is adequate given anticipated spill volumes (a half-cent per barrel fee will be imposed from July 1, 2014 to December 31, 2015 and may be imposed under specified circumstances thereafter). For purposes of this analysis, "adequacy" is defined as the ability of Fund revenues generated by the fee to cover anticipated annual agency costs, excluding any other sources of funding or reimbursement such as specific direct agency assessments or National Pollution Funds Center reimbursements. This is a conservative definition and was chosen to assess the state's potential annual liability if no other funding sources are available. Thus, the adequacy analysis included in this report can be thought of as a form of "worst-case" scenario where Louisiana has no immediate financial recourse to fund its agency costs, except through the Fund and the annual fee revenues that are contributed to it.

In some regards the recent changes to the fee collection mechanism represent an improvement to the previous fee structure by broadening the fee base to cover a more significant portion of oil moving through the state and eliminating a fund cap above which no fees are collected. However, the new structure still appears to provide inadequate resources for the state to deal with a likely scenario of an increasing number of spills and volume of oil spilled. This report combines the three oil supply scenarios with a range of assumptions regarding spill probabilities and agency costs, which results in 18 scenarios projecting the Fund's adequacy into the future, as it relates to covering agency costs. A summary of the Fund's adequacy, which for purposes of this report, is the balance between revenues from the fee mechanism and agency costs associated with oil spills is provided in the figure below. The balance between revenues and expenses is shown as net revenues, or annual revenues minus annual expenses.

Summary Figure of Fund Adequacy Analysis



The figure above shows that under all scenarios, the Fund is projected to be inadequate with expected agency costs higher than fee revenues in future years based on the current quarter-cent fee. When comparing the balance of revenues and expenses in future years, it is clear that expenses will grow faster than revenues with more scenarios showing larger negative balances in 2025 than in 2015. The distribution of net revenues shifts even further to the left by 2035. If the fee were collected at the emergency rate of a half-cent per barrel, revenues fall more in line with anticipated expenses under some scenarios, with 6 of the 18 scenarios having zero or positive net revenue in 2015. However, as agency costs grow more rapidly than revenues, that balance shifts toward more negative net revenues in future years with only 2 of the 18 scenarios having an adequate Fund balance by 2035.

There are, admittedly, a number of uncertainties associated with the future crude oil supply disposition and oil spill outlooks included in this report. If the Legislature agrees, based upon the estimates provided, and its own findings, that there is a high likelihood of future Fund deficiencies, then there are a number of different policy options that could be followed to address those deficiencies including:

Option 1: Status Quo

Option 2: Increase Volumetric Fees

Option 3: Expand Volume Eligibility and Fees

Because of uncertainty with regard to how lasting some of the recent trends will be that underpin the results, a Status Quo option would not change the fee structure, but identify some other short-term source of funding to address any potential Fund shortfall. Given the expected gap between costs and revenues under many of the scenarios presented, Options 2 and 3 offer two approaches for increasing revenues by increasing the volumetric fee alone, or doing so in conjunction with a further expansion in eligible volumes to include oil transported through the state, but not delivered to a Louisiana refinery. Increasing the normal fee to one half cent brings revenues and expenses into balance for the more conservative scenarios while an even higher fee and/or an expansion of the oil supplies upon which the fee is assessed are necessary to balance revenues and expenses for many of the scenarios considered in this report.

Regardless of which policy option is chosen, there are a number of additional policy considerations that should be weighed in the context of any future changes to the statute. These additional policy considerations include:

(1) No revenue caps on Fund balances (as provided in Act 394).

(2) Implementation of a $17 million Fund balance floor (instead of $5 million) with a trigger mechanism that increases fees to provide ongoing floor support.

(3) Inflation indexing of the volumetric fee.

(4) A periodic review to update and follow-up on the results of this study and keep the Legislature, LOSCO, and other stakeholders apprised of any Fund challenges.

Finally, it is worth noting that the DWH spill was a historical anomaly, however other very large spills may occur in the future, even if those occurrences are infrequent. As such, the state may want to consider identifying additional resources needed to support that activity rather than relying on or modifying the Fund and its fee mechanism to support that activity.

ACKNOWLEDGMENTS

The authors wish to acknowledge the financial support of the Louisiana Oil Spill Coordinator’s Office. The authors also wish to recognize the staff assistance from the LSU Center for Energy Studies and the LSU Division of Economic Development.

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Section 1: Introduction

a. Study Purpose

During the course of the 2013 Regular Session, the Louisiana Legislature passed Act Number 394, designed to amend and re-enact the statutes defining the funding mechanism for the Louisiana Oil Spill Contingency Fund (hereafter "OSCF" or "the Fund") and the Louisiana Oil Spill Coordinator's Office ("LOSCO"). In addition, Act 394 directed the Oil Spill Interagency Council (hereafter "Interagency Council" or "the Council") to conduct a study of the Fund, its uses, revenues, and agency costs including:

- an assessment of the adequacy of the existing fee structure; identification of entities that might have the potential to create an oil spill that are currently not paying into the fund;
- an assessment of the levels of oil spill risk associated with various oil activities including exploration, production, and transportation activities;
- consideration of any disparity in the payment of fees that may exist;
- evaluation of the implications of an automatic adjustment to the fee based on the consumer price index;
- an appraisal of the future funding needs of the state of Louisiana to properly represent the state's interests related to the DWH disaster;
- a review of oil spill funding mechanisms employed by other countries, states, and political subdivisions; and an examination of other relevant issues as determined by the council.[1]

The purpose of this study is to provide the Louisiana Oil Spill Coordinator (hereinafter "Coordinator"), LOSCO, and the Council with research and information responsive to the Legislature's direction, which in turn will be transmitted to, and utilized by the House Committee on Appropriations, the House Committee on Natural Resources, the Senate Committee on Finance, and the Senate Committee on Natural Resources. This report starts with a broad picture of Louisiana's historic crude oil supply (or "crude oil disposition") as well as its historic oil spills in order to examine how

[1]Act No. 394, Section 4.A., 2013.

trends in each have evolved and changed over the past two decades. Additionally, this report provides a survey of the Fund and LOSCO's and other state agencies' oil spill related costs.

Future scenarios of the state's crude oil disposition were developed to assess funding needs for several potential spill scenarios, with special consideration given to extreme spill events such as the DWH spill, which spilled an unprecedented amount of crude oil into the Gulf of Mexico severely impacting Louisiana's coast. Based on a review of historical oil spill-related funding, the future spill scenarios were then used to assess potential funding needs for responding to oil spills. The results of these analyses are merged to offer options on regulatory and funding modifications the state may consider in order to defend against likely future incidents and less frequent, large-scale events like the DWH spill.

b. Oil Spill Data Utilized in the Report

Notifications of oil spills in the U.S. are collected by the National Response Center ("NRC"), which serves as a centralized U.S. government point of contact for reporting all radiological, oil, chemical, biological, and etiological pollution discharges. The NRC is managed by the U.S. Coast Guard which itself is part of the U.S. Department of Homeland Security.

The NRC database of oil spill notifications is based upon oil spill incident reports mandated by the National Response System, which is supported by several Congressional acts, including the Comprehensive Environmental Response, Compensation, and Liability Act, the Clean Water Act, the Clean Air Act, SARA Title III, and the Oil Pollution Act of 1990 ("OPA 1990").

Louisiana-specific oil spill information is collected by the Louisiana Department of Public Safety through the "Right-to-Know Unit" of the Office of State Police ("LSP") in accordance with the Oil Spill Prevention and Response Act ("OSPRA"). This study relied upon a combination of oil spill notification data provided by the NRC and LSP as well as estimated spill volumes for a number of more recent, events provided by LOSCO.

Only Louisiana-based oil spill notifications were selected from the primary NRC database. Offshore events, where an oil spill was reported as originating or migrating into Louisiana state waters, were also included in the analysis. NRC spill notifications with no volume information, zero-reported volumes or spills reported as “drops” or other volumes less than one US gallon, were excluded. Records identified as “Drill Reports” in the NRC database were also excluded from the analysis. Furthermore, a number of observations included “Referenced” reports that were later amended or modified. Where such instances could be identified, the final revised or amended report (and its associated spill volumes) was included in the data and the earlier “Referenced” reports were removed.

In total, 18,980 observations out of a total of 32,093 observations queried from the NRC database were omitted from this analysis based upon the aforementioned selection criteria. Of the omitted observations, over 18,000 were less than one gallon, had a reported volume of zero, or had an unknown amount that could not be updated using the LSP or LOSCO data. The LSP data were used to verify volumes of all spill notifications with a reported volume greater than 1,000 barrels (abbreviated as 1 MBbls) in either database though this verification process led to only a handful of changes. LOSCO provided information on 244 spills that led to changes for approximately 20 spill notifications in the NRC database. While these two alternate sources of data provided a way to verify information in the NRC database for oil spills with larger reported volumes, no attempt was made to verify details for the large number of notifications with smaller reported volumes. The data selected for this study starts in 1990, the year after the *Exxon Valdez* disaster and the year concurrent with the passage of OPA 1990.

c. Other Data Utilized in the Report

This report utilized data from a variety of other sources including the U.S. Department of Energy, Energy Information Administration (“EIA”), and the Louisiana

Department of Natural Resources ("LDNR"). Crude oil production information was collected from both the EIA and LDNR. Crude oil import and export statistics were calculated using a combination of information from EIA and LDNR. Refinery capacities, locations, utilization rates, and crude oil pricing data were collected from EIA. General economic information such as the Gross Domestic Product Price Index ("GDP-PI") and Consumer Price Index ("CPI") were collected from the U.S. Department of Commerce, Bureau of Economic Analysis and the U.S. Department of Labor, Bureau of Labor Statistics.

This report also utilized information provided by LOSCO to assist in understanding the performance and operations of LOSCO, the uses, potential uses, revenues and expenditures of the Fund, as well as the Fund sponsored support for the other state agencies involved with oil spills in Louisiana response.[2]

d. Report Organization

This report is organized into the following eight sections. Section 2 examines Louisiana's crude oil supply disposition trends with particular emphasis on how the movement of crude oil into, through, and out of the state has progressed. Section 3 examines historic Louisiana oil spills (based on NRC notifications) by particular type and cause, and examines how the frequency and size have evolved over the past two decades. Section 4 surveys LOSCO's, as well as other state agencies', oil spill response efforts with a primary focus on the agency costs associated with responding to spills. Additionally, this section surveys the annual changes in revenue collections, and overall balances associated with the Fund.

Section 5 develops a number of crude oil supply disposition forecasts that, in turn, influence a forecast of potential oil spill outcomes that has been provided in Section 6. Section 7 examines how each of these potential oil spill scenario outcomes

[2] Several state agencies are involved in oil spill response and recovery. They include the Louisiana Department of Wildlife and Fisheries, the Louisiana Department of Natural Resources, the Louisiana Department of Environmental Quality and the Coastal Protection and Restoration Authority. Collectively, they are referred to as the state's "Natural Resource Trustees" or simply the "Trustees."

impacts LOSCO and the potential financial liabilities that could be imposed on the Fund. Lastly, Section 8 presents conclusions and recommendations from this analysis.

Appendix A to this report provides a survey of how other states and countries regulate and fund their response to oil spills. Appendix B provides a review of available options for adjusting the fee to account for inflation. Appendix C gives a detailed account of oil spill notification trends, organized by type of spill.

Section 2: Louisiana Historic Crude Oil Disposition Trends

a. Introduction

Louisiana's "crude oil supply disposition" is a term used to describe the movement and flow of crude oil into, through, and out of the state. Crude oil supplies that move into the state are considered "imports" for purposes of defining the state's overall supply disposition. Crude oil produced both within the state and within federal offshore areas of the Outer Continental Shelf ("OCS") of the Gulf of Mexico ("GOM") comprises the state's internal "production" and represents the oil moving within the state to various refineries. Lastly, excess crude oil not used within the state is considered an "export" to other areas of the country. Figure 2.1 provides a schematic of these movements, and their respective estimated volumes for 2012.

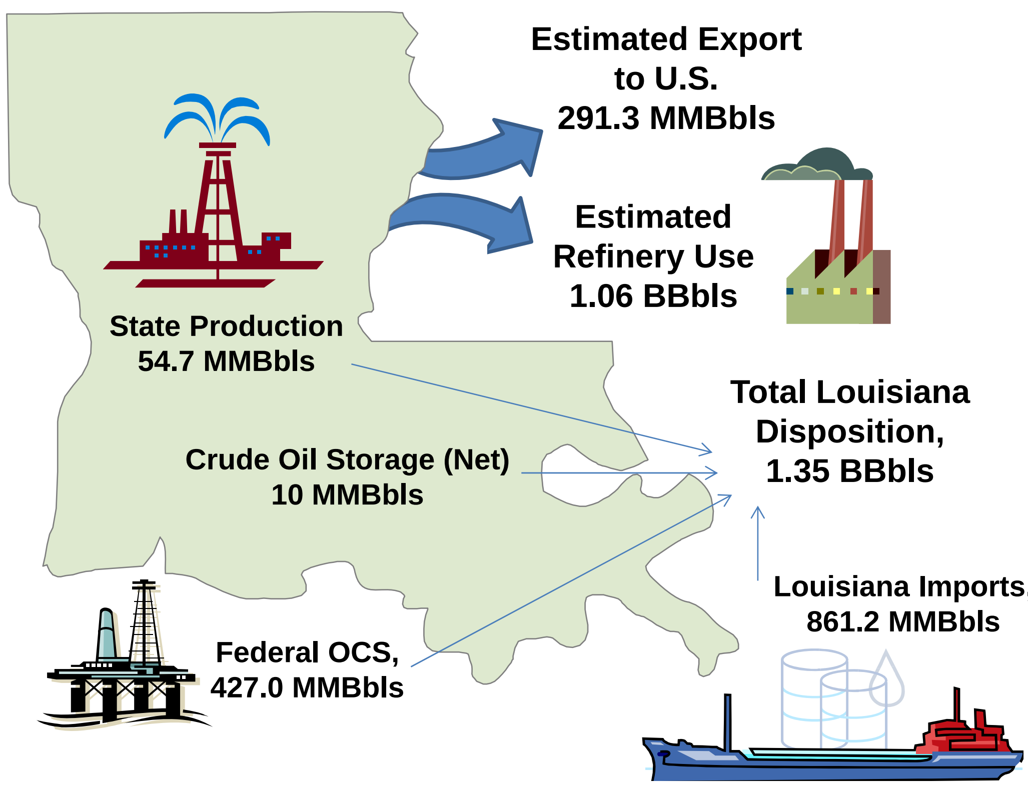

Figure 2.1: Estimated Louisiana Crude Oil Disposition, 2012

Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources. MMBbls = million barrels of oil; BBbls = billion barrels of oil.

The levels and relative components of Louisiana's oil supply are important determinants of oil spills and oil spill consequences. International oil imports, for instance, are brought into the state through marine vessels, which themselves are subject to a certain probability of an oil spill that can arise from accidental discharges or collisions with other marine vessels, objects, or obstructions. Domestic imports arriving in the state, as well as excess crude oil leaving the state, utilize a variety of different transport modes including pipelines, marine barges, larger marine vessels, and railway tank cars. All of these transportation modes have differing oil spill probabilities and oil spill consequences. Lastly, there are thousands of individual wells located throughout the state and the offshore areas of the GOM that can also lead to a number of different types of oil spills and oil spill consequences.

Louisiana's refineries are the primary end-users for the state's crude oil supply, converting it into a variety of "refined products" that include gasoline, diesel, heating oil, jet fuel, and other petroleum products. Figure 2.2 identifies the location and distillation capacities of Louisiana's 19 active refineries, 17 of which specifically refine crude oil,[3] for a combined total of 3.27 million barrels per day ("MMBbls/d") of distillation capacity.

Louisiana is home to 18 percent of total U.S. refining capacity, ranking second in total refinery capacity in the country. Louisiana's refineries utilize crude oil from its various different sources (i.e., imports, in-state and GOM production) and any excess crude oil not used by these refineries is either stored or exported to other states, particularly other refineries in the Midwestern U.S.

[3] Two refineries owned by Calumet Lubricants in North Louisiana refine byproducts produced by other in-state refineries for lubricant production purposes.

Refinery	Distillation Capacity Bbl/Day
Alon Refining Krotz Springs Inc.	80,000
Calcasieu Refining Co.	78,000
Calumet Lubricants Co. LP—Cotton Valley	13,020
Calumet Lubricants Co. LP—Princeton	8,300
Calumet Shreveport LLC	57,000
Chalmette Refining LLC	192,500
Citgo Petroleum Corp.	427,800
Excel Paralubes	0
ExxonMobil Refining & Supply Co.	502,500
Marathon Petroleum Co. LLC	522,000
Motiva Enterprises LLC—Convent	235,000
Motiva Enterprises LLC—Norco	233,500
Pelican Refining Company LLC	0
Phillips 66 Company—Belle Chasse	252,000
Phillips 66 Company—Westlake	239,400
Placid Refining Co.	57,000
Shell Oil Products US	45,000
Valero Energy Corporation	125,000
Valero Refining New Orleans LLC	205,000

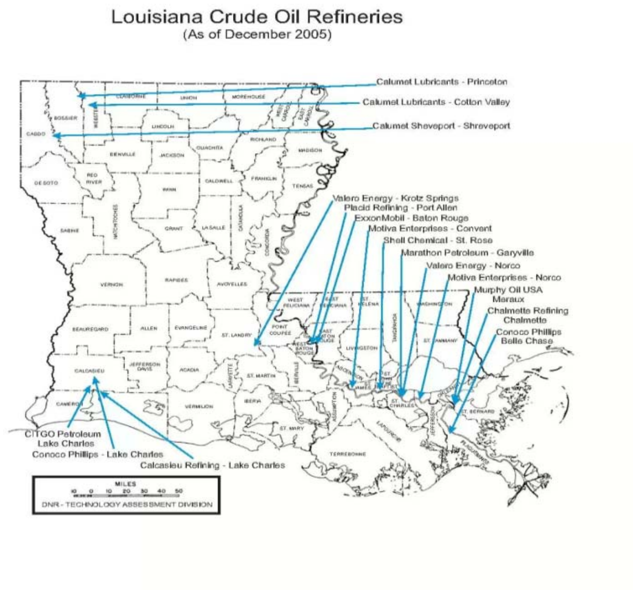

Figure 2.2: Louisiana Crude Oil Refineries and Capacity, 2012

Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources

Over the past 25 years, Louisiana has utilized, on average, anywhere from about 775 million barrels ("MMBbls") to 1.075 billion barrels ("BBbls") of crude oil per year, with volumes gradually increasing over time due to capacity creep. Including all sources and uses, total state crude oil supply reached its peak level in 2004 at 1,784 MMBbls. As shown in Figure 2.3, some 64 percent of Louisiana crude oil inputs have come from imports while some 35 percent come from Louisiana-based oil and gas production. Roughly 22 percent of the state's total crude oil disposition passes through the state, via various crude oil pipelines and other modes of transportation, to other U.S. refineries.

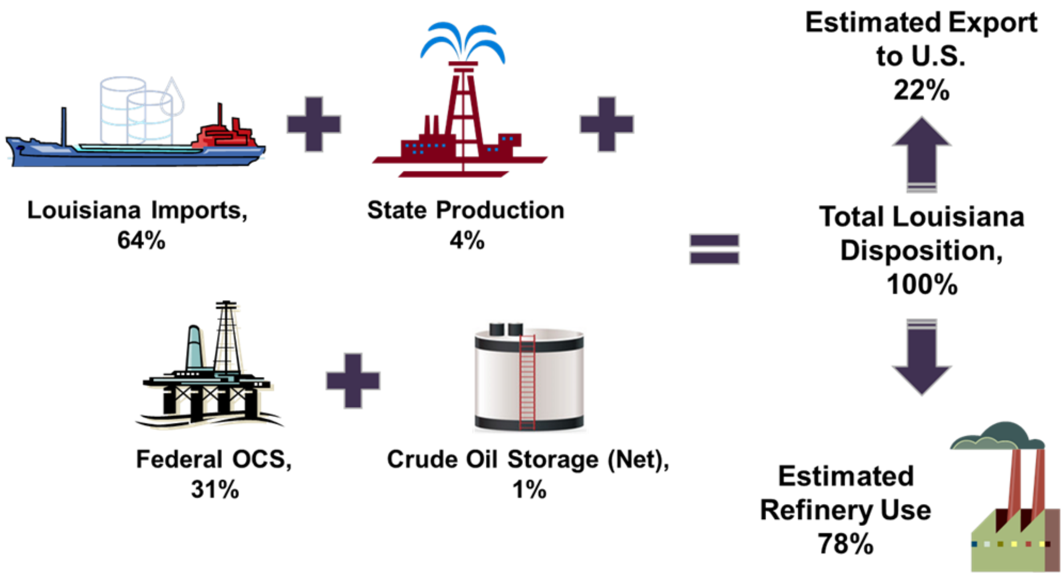

Figure 2.3: Estimated Louisiana Crude Oil Disposition Shares, 2012
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

b. Louisiana Crude Oil Imports

Most of Louisiana's crude oil supply comes from imported sources. Louisiana's imports have ranged from between 786 MMBbls to 1.23 BBbls per year over the past 25 years. Imports comprised as much as 75 percent of the state's total crude oil disposition in 1990. Those shares have decreased as Louisiana-based crude oil production began to increase throughout the 1990s. Figure 2.4 shows that total crude oil imports have averaged about 63 percent of the state's total crude oil disposition over the past five years, only slightly higher than the 25-year recorded low of 58 percent in 2009.

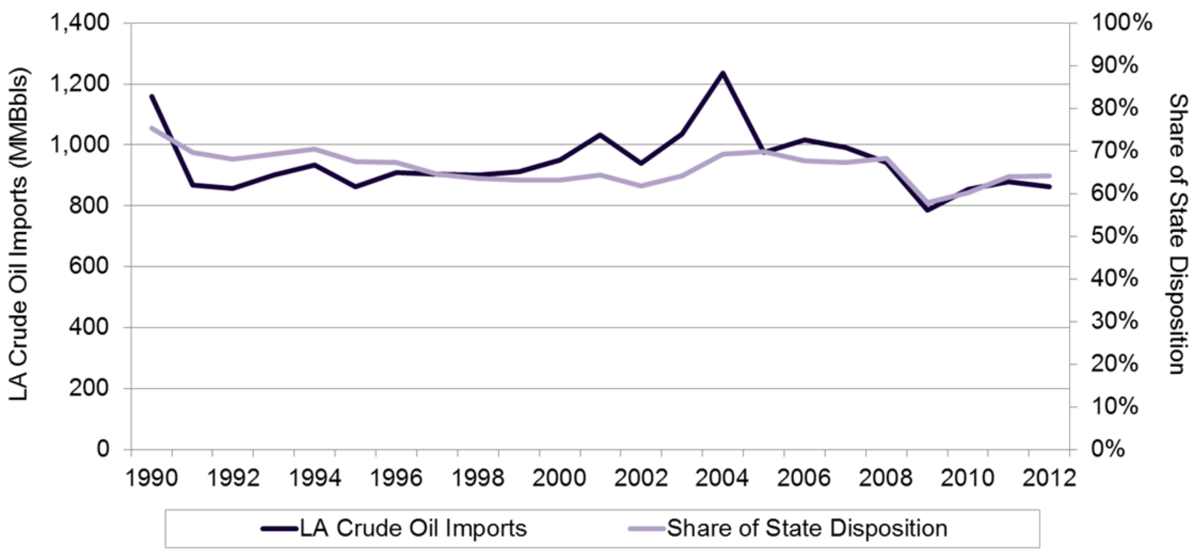

Figure 2.4: Estimated Louisiana Crude Oil Imports and Shares

Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

Louisiana's oil imports come from a variety of international and domestic sources. Historically, international imports have accounted for the overwhelming share (over 70 percent) of the state's crude oil imports. Most of these imports are marine-based, arriving at refineries directly through tankers, or indirectly from pipelines sourced to the Louisiana Offshore Oil Port ("LOOP"), one of the largest oil import facilities in the U.S.

LOOP is a crude oil import lightering facility that handles imported crude oil supplies for Louisiana refineries, as well as many other U.S. refineries. LOOP currently accounts for as much as six percent[4] of all U.S. crude oil imports and 12 percent of all crude oil imports into the Gulf Coast.[5] LOOP is the only U.S. port capable of offloading deep draft tankers.[6] Crude oil is offloaded offshore at a marine terminal shown in Figure

[4] LOOP receiving domestic oil cargoes. Bloomberg. September 20, 2012.
[5] U.S. Department of Energy, Energy Information Administration.
[6] U.S. Department of Energy, Energy Information Administration, State Energy Profiles.

2.5 and then moved to shore via the 48-inch diameter LOCAP pipeline that is connected to a primary onshore facility near Port Fourchon, Louisiana.[7]

Figure 2.5: Louisiana Offshore Oil Port
Source: Louisiana Offshore Oil Port

International oil imports, however, have decreased over the past eight years, particularly after 2009 when international imports fell by some 168 MMBbls (22 percent). International imports peaked in 2004 at 1.016 BBbls and, at that time, comprised 57 percent of Louisiana's total crude oil supplies. Figure 2.6 shows that as of 2012, international imports were down to one of their lowest levels (594 MMBbls) in recent history comprising 44 percent of total Louisiana oil supplies.

[7] America's Energy Corridor, Louisiana Serving the Nation's Energy Needs. Louisiana Department of Natural Resources, 2003.

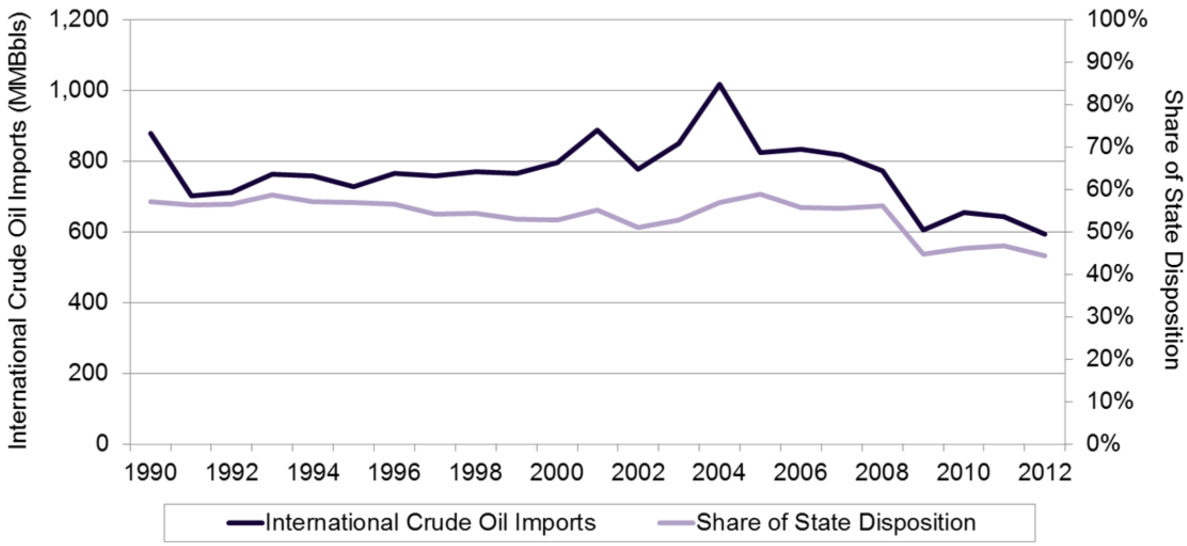

Figure 2.6: Estimated Louisiana International Crude Oil Imports and Shares
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

Historically, domestic imports (i.e., imports from other U.S. producing states) represented a small share of Louisiana's imports as well as its overall supply disposition. Figure 2.7 shows that these domestic crude oil imports are estimated to have reached a peak of 18 percent in 1990, and began to fall as a share of total volumes until reaching a low of some nine percent in 2001, and remaining at or below 12 percent of total until 2009.

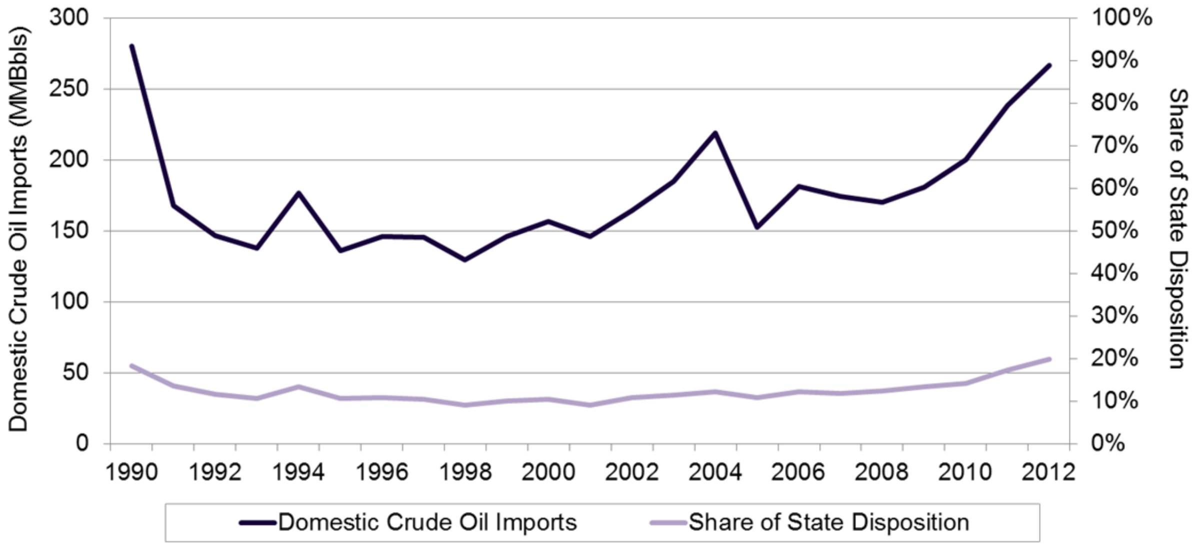

Figure 2.7: Estimated Louisiana Domestic Crude Oil Imports and Shares
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

Domestic imports are estimated to have grown steadily since the 2008-2009 recession at an average annual rate of 10 percent. In 2010, domestic imports accounted for as much as 14 percent of Louisiana's crude oil supply disposition, the second highest level in 25 years. In 2012, LA domestic imports set a new relative high, accounting for some 31 percent of the state's total crude oil imports and 20 percent of its total crude oil supply disposition. This recent trend is attributable to increased domestic production due to the expansion of shale plays rich in oil.

c. Louisiana Crude Oil Production

Louisiana's refineries were originally developed to process the prolific volumes of in-state production originating in the state and offshore in nearby waters. As the Gulf Coast basin matured, however, and production declines began to materialize, refineries were compelled to supplement their crude oil input requirements with international and domestic imports. Despite these declines, Louisiana production (combined in-state and offshore) is still an important component of the state's overall crude oil supplies.

Louisiana production is primarily moved across the state by pipeline, barge, and, to a lesser extent, trucks. Including in-state and offshore activity, Louisiana production accounts for some 36 percent of its in-state supply disposition down from a recent high of around 42 percent of total supply given what appears to be a considerable one time surge in offshore production prior to the last recession. Figure 2.8 shows that total state production shares of the state's total supply disposition, however, have fallen since the latter part of the last decade.

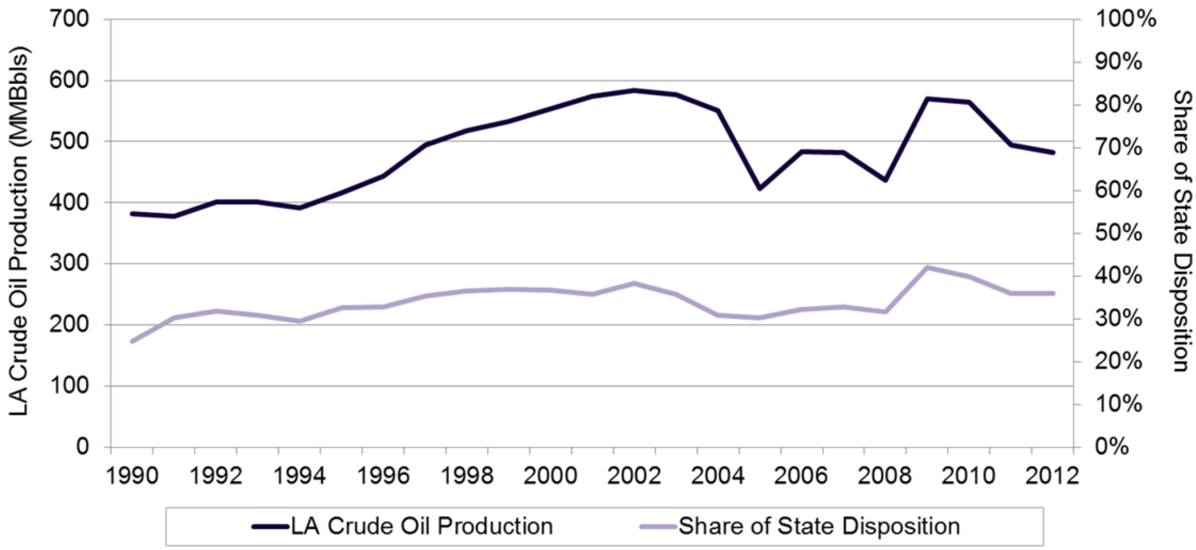

Figure 2.8: Louisiana Total Crude Oil Production and Shares
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

Figure 2.9 shows that Louisiana in-state production has been falling at an average annual rate of three percent over the past 25 years. The decline rate of in-state production has accelerated over the past 10 years by some 10 percent despite a recent pick up over the past three years. In 1991, in-state production accounted for 9.2 percent of all crude oil supplies; that contribution has been decreasing steadily since that time period despite seeing an increase in production between 2010 and 2012 of some 15 percent.

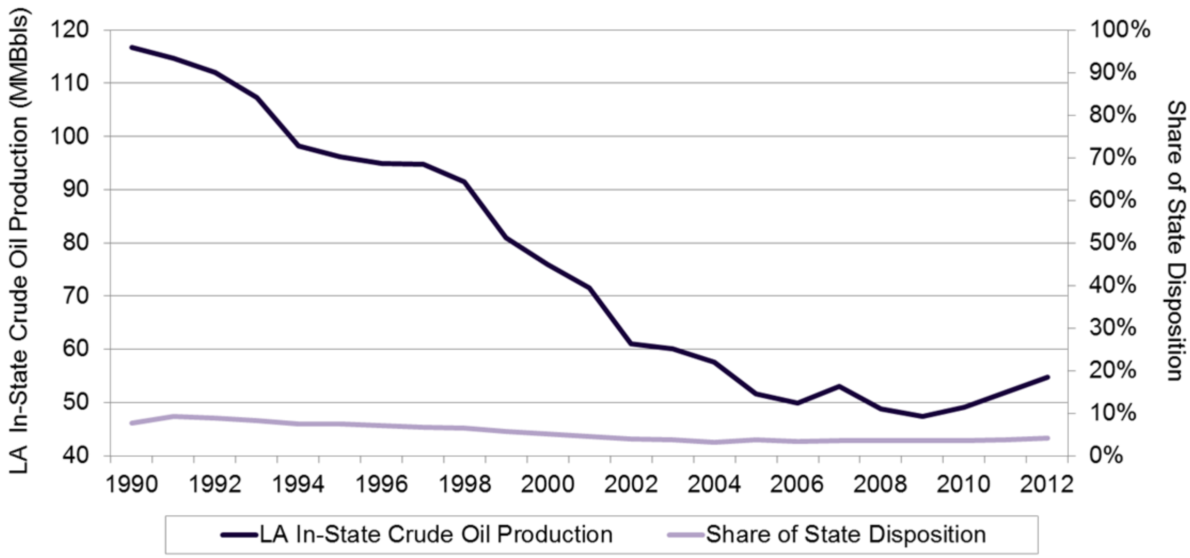

Figure 2.9: Louisiana In-State Crude Oil Production and Shares
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

Figure 2.10 shows that an increasing share of Louisiana's crude oil production comes from the federal OCS of the GOM. Historic offshore production hovered around 270 MMBbls per year between 1990 and 1994, prior to the Congressional passage of the Deepwater Royalty Relief Act of 1995.

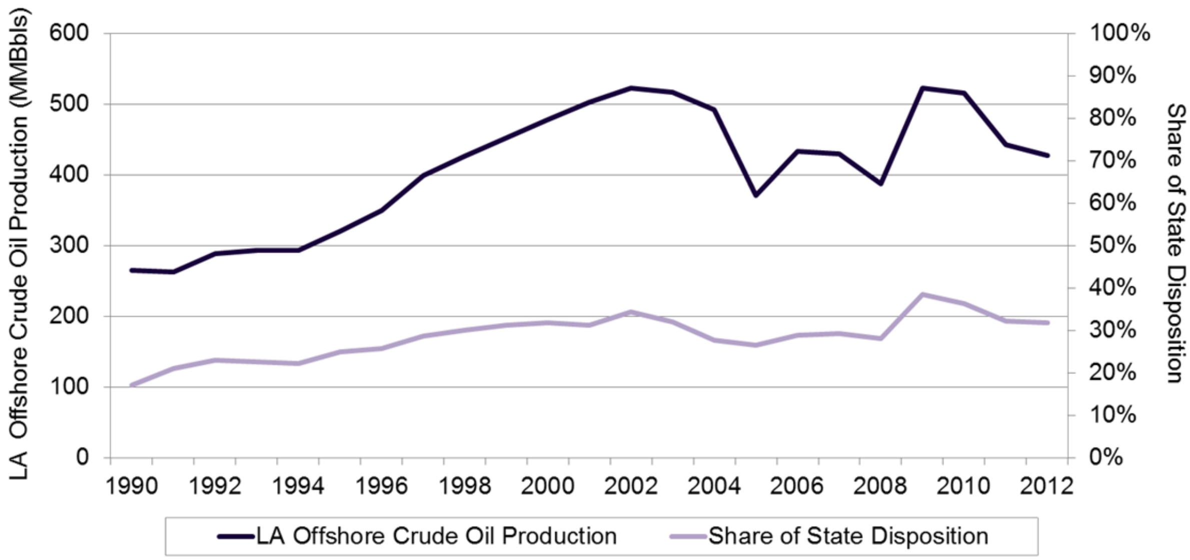

Figure 2.10: Louisiana OCS Crude Oil Production and Shares
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources.

Offshore oil production increased to over 320 MMBbls in 1995 and surged to as much as 522 MMBbls by 2002. Louisiana offshore crude oil production fell considerably during 2002-2008, a period marked by considerable production disruptions from several uncharacteristically destructive tropical seasons. Offshore crude oil production increased to 522 MMBbls in 2009, the year prior to the DWH spill. Louisiana's offshore crude oil production fell by as much as 18 percent in one year since the 2009-2010 time period.

d. Louisiana Crude Oil Storage

Crude oil stocks at refineries, tank farms, and pipelines account for about one to two percent of Louisiana's total crude oil supply. This storage serves an important role in helping to smooth out gaps in the timing of supply deliveries and demand requirements. In addition, the Strategic Petroleum Reserve ("SPR") has significant facilities in Louisiana and expansions or reductions in capacity can lead to increasing flows of oil to or from the state over time. The net change in crude oil storage supplies during any given year can help to meet refinery oil needs. Year-end crude oil refinery stocks from 1993 to 2012 (data not available for 1990-1992) ranged from 14.9 MMBbls in 2006 (the year after Hurricane Katrina) to 20.3 MMBbls in 2001. Monthly oil stocks generally vary by two to four million barrels over the course of each year with the lowest monthly figure recorded at 14.4 MMBbls (April 2009) and the highest at 22.9 MMBbls (May 2002).

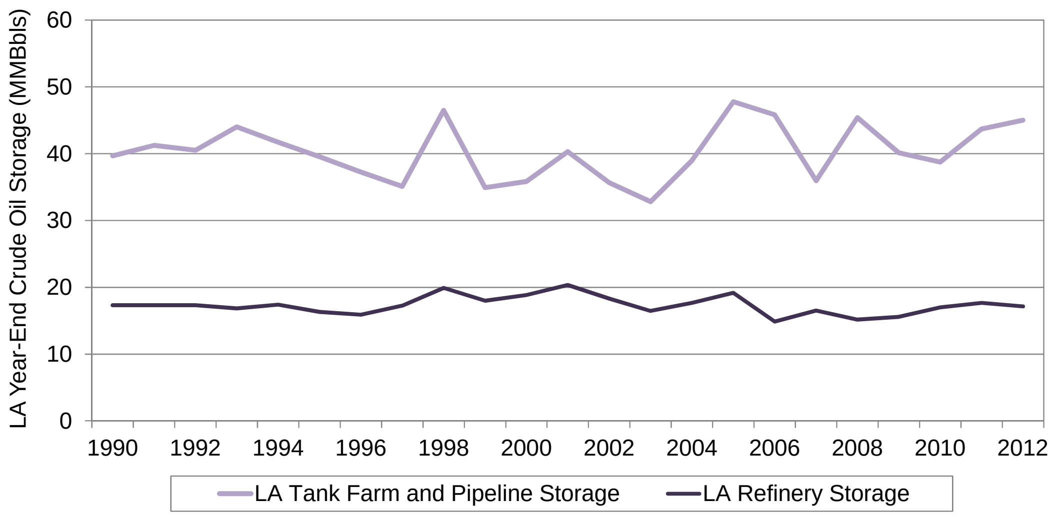

Figure 2.11: Louisiana Crude Oil Refinery and Tank Farm/Pipeline Storage
Source: U.S. Department of Energy, Energy Information Administration

Figure 2.11 shows that tank farm and pipeline crude oil stocks at year end from 1990 to 2012 varied widely, from an estimated 32.8 MMBbls in 2003 to 47.8 MMBbls in 2005. As shown in Figure 2.11 tank farm/pipeline crude oil storage trends were more volatile than refinery storage trends, with peak years coinciding in some but not all cases. Tank farm/pipeline year-end totals ended at higher levels in 2012 compared with 1990 while refinery storage levels were slightly lower in 2012.

e. Louisiana Crude Oil Exports

Louisiana does not use all of the crude oil that enters state boundaries. A meaningful share passes through the state to other regions of the country. These transitory volumes of crude oil are moved out of the state through a wide range of transport modes that include pipelines, marine vessels, and railcars. One of the primary reasons for this transitory crude oil movement is that Louisiana serves as a regional crude oil storage and distribution hub. Some 52 percent of all U.S. oil imports enter the GOM region[8] and, as noted earlier, LOOP alone accounts for six percent of all U.S. oil imports.

Most of Louisiana's crude oil exports are moved out of the state via large crude oil pipelines. The GOM region moved 354 MMBbls of crude oil via pipeline to other U.S. regions.[9] Figure 2.12 identifies the major crude oil pipelines located throughout the U.S. and how those are interconnected with various petroleum refineries.

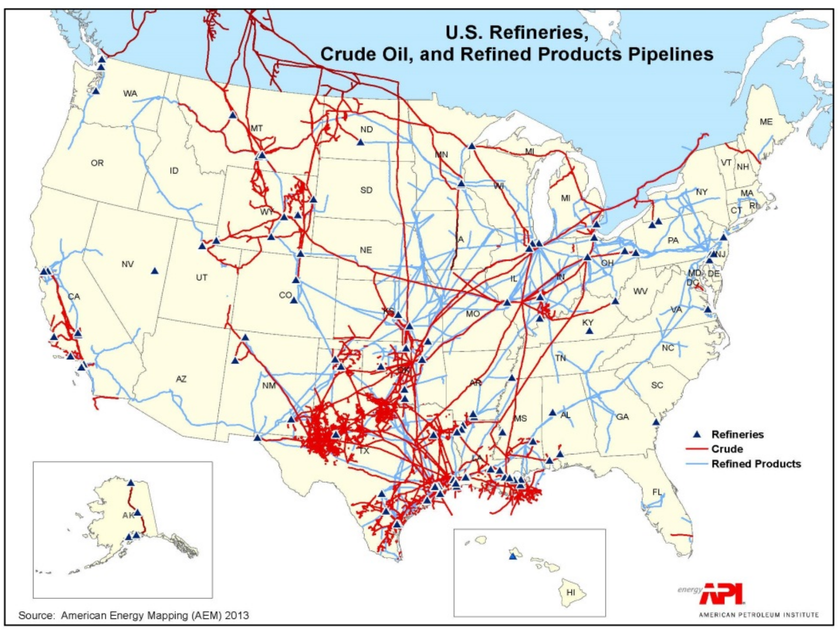

Figure 2.12: U.S. Crude Oil Pipelines and Refineries
Source: American Petroleum Institute.

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8 U.S. Department of Energy, Energy Information Administration.
9 U.S. Department of Energy, Energy Information Administration.

Louisiana moves a considerable volume of oil within the state as well as into the upper Midwest and as far north as Canada via various crude pipelines that include the Capline system (terminating in Patoka, Illinois); the ExxonMobil Pipeline Northline system; and the Red Stick Pipeline (running between St. James and Bayou Choctaw).

Production from the offshore OCS is also delivered to Louisiana refineries and storage facilities via an extensive array of offshore crude oil pipelines. Figure 2.13 identifies the major locations for many of these offshore lines and their integration in the broader onshore pipeline transportation and storage network.

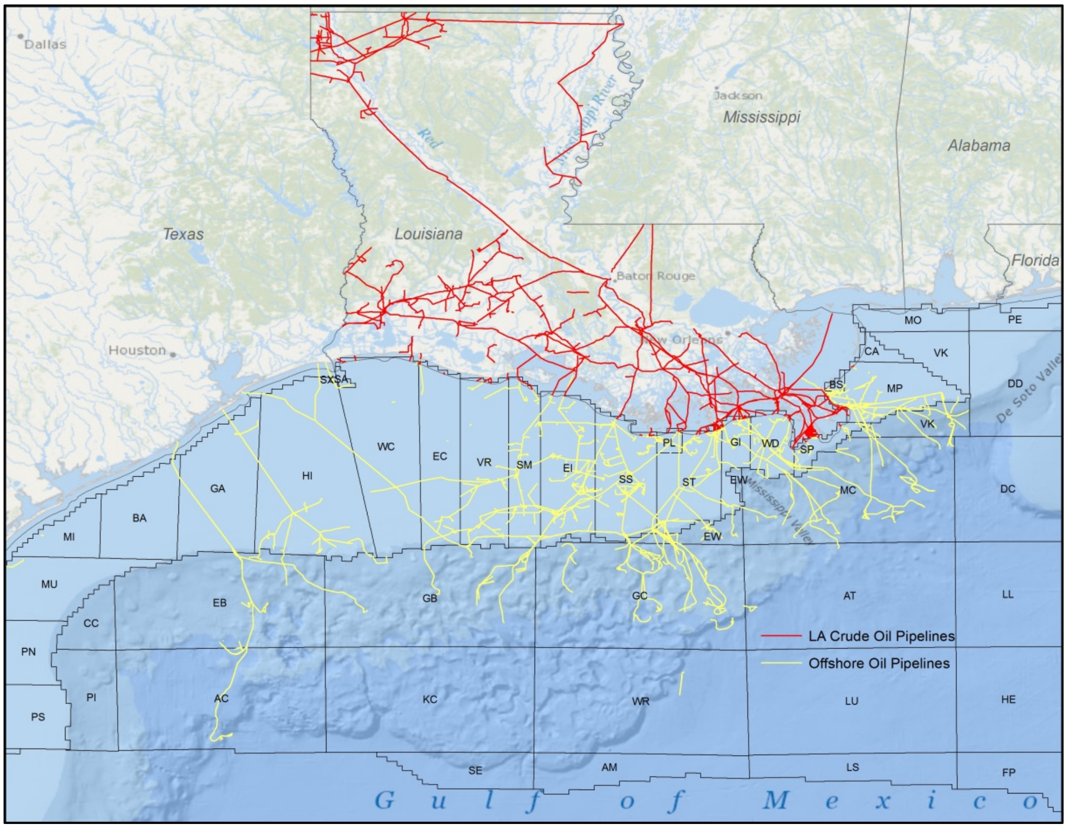

Figure 2.13: Offshore Crude Oil Pipelines and Termination Points
Source: U.S. Department of the Interior, Bureau of Ocean Energy Management.

There are two important pipeline and storage systems that move oil both through the state and between refineries and other pipeline systems located within the state that include the St. James storage terminal and the Houma to Houston ("Ho-Ho") Pipeline

System. The St. James facility has eight breakout tanks with over 2.6 MMBbls of storage across 140 acres.

Figure 2.14 shows the location of the St. James storage terminal facility and its interconnected crude oil pipelines. An important supply source for this facility is the Clovelly station that serves as the onshore station for LOOP and is interconnected to the St. James terminal via the 48-inch LOCAP pipeline that can move between 1.7 MMBbls/d and 2.4 MMBbls/d of crude oil.[10]

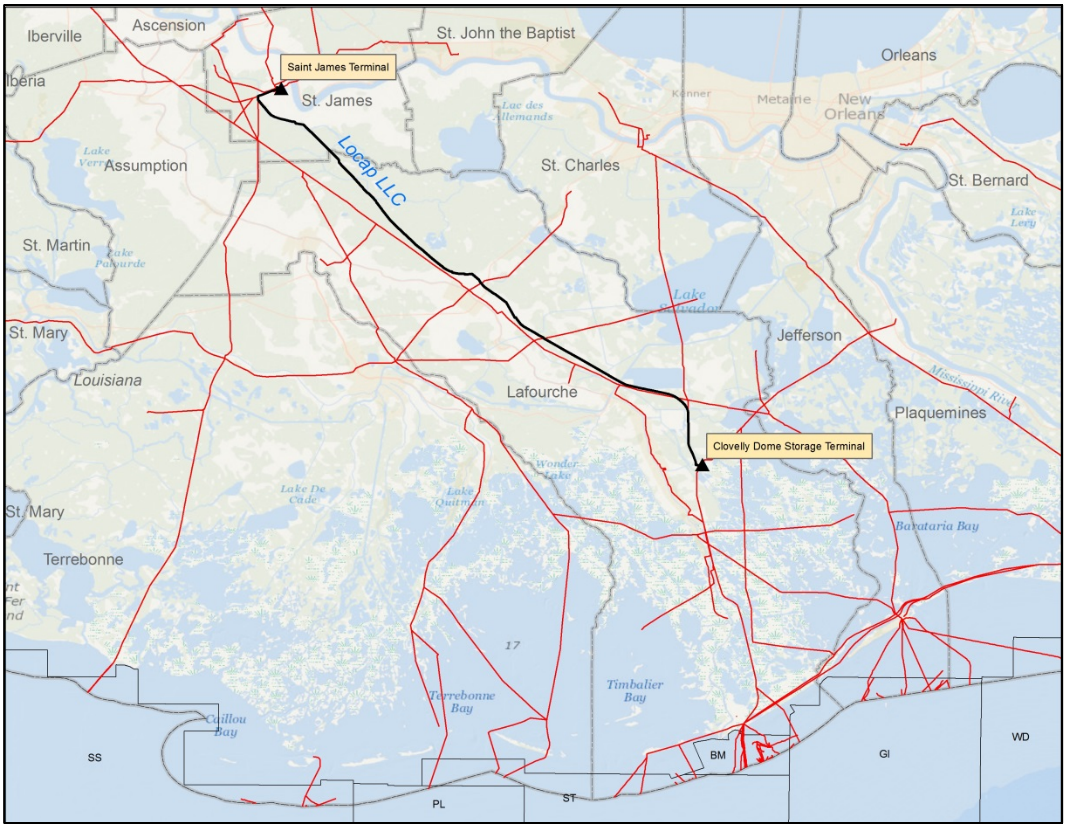

Figure 2.14: St. James Crude Oil Terminal and Associated Pipelines
Source: PennWell MAPSearch, PennWell Corporation.

[10] Pipeline Management Services, LOOP LLC. http://www.loopllc.com/Services/Pipeline-Management

The Ho-Ho system, shown in Figure 2.15, moves crude oil from Houma to refineries located in the greater Houston area. The system has over 325 MBbls/d of transport capacity and includes an 18-inch spur line, consisting of 260 MBbls/d of transport capacity that can move crude oil from Houma into the St. James terminal.[11] Recently, Shell Oil Company, the owner of the Ho-Ho system, reported that it is planning to increase capacity by 125 MBbls/d and to complete the reversal of the pipeline flow from Houston to Houma.[12]

Figure 2.15: The Houma to Houston (Ho-Ho) Pipeline System
Source: Shell Oil Company

Louisiana's domestic exports have ranged from a high of over 800 MMBbls in 2004 to a low of around 291 MMBbls in 2012. Louisiana's domestic exports have fallen at an average annual rate of some three percent since 1990. From 1991 to 2005, Louisiana retained about 60 percent of its total supply disposition in the state and exported the remaining 40 percent.

[11] Gulf of Mexico Onshore Crude System Network. Shell Pipeline Company LP.
[12] Limited Supplemental Open Season on Phase 4 of the reversed Ho-Ho Pipeline. Shell Pipeline Company LP. News Release. August 29, 2013.

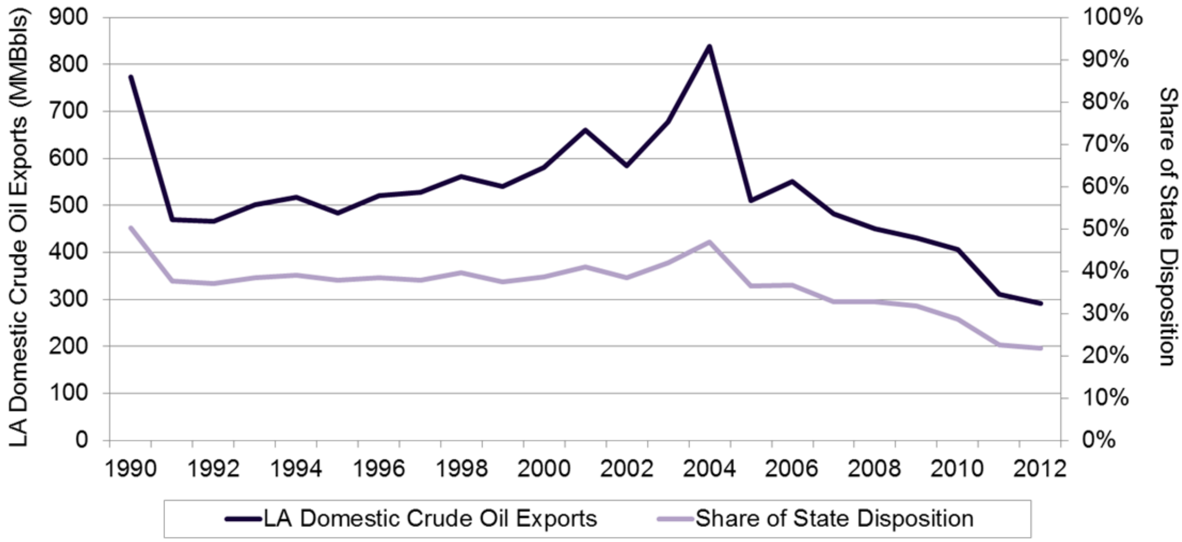

Figure 2.16: Louisiana Domestic Crude Oil Exports and Shares
Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources

Exports fell to 36 percent of total disposition in 2005, the year of Hurricane Katrina, and have continued to fall through 2012. Figure 2.16 shows that Louisiana crude exports comprise 22 percent of the state's total crude oil disposition: a level lower than any over the past 25 years.

f. Summary and Conclusions

As noted earlier, Louisiana's crude oil supplies come from a variety of domestic and international sources and the composition of those supplies have changed over time. The total volume of crude oil moving into and out of the state has changed based on Louisiana refinery needs, and to a lesser extent, the needs of refineries in other parts of the country. Figure 2.17 provides a chart showing these trends over the past two decades.

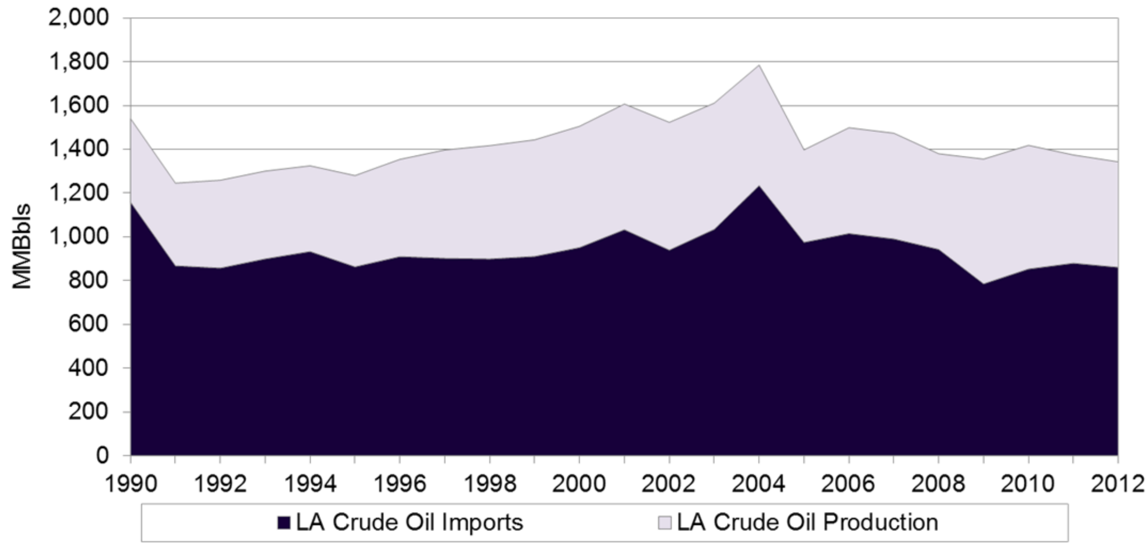

Figure 2.17: Louisiana Crude Oil Supplies

Source: U.S. Department of Energy, Energy Information Administration; Louisiana Department of Natural Resources

In 1990, about 1.5 BBbls of crude oil was moved into, around, and out of the state. Those levels dropped to between 1.2 BBbls and 1.4 BBbls until 2000. Louisiana's crude oil supplies increased to between 1.5 BBbls and 1.8 BBbls (a recent period peak) up to 2004, the year prior to Hurricane Katrina. Louisiana crude oil supplies have remained between 1.3 BBbls and 1.5 BBbls up to the present. Total in-state crude oil supply has fallen by as much as 25 percent from its 2004 peak. While in-state production accounts for 15 percent of the reduction, 85 percent of this reduction comes entirely from international imports.

Section 3: Oil Spill Trends

a. Total Oil Spill Notifications and Reported Volumes

Oil spills are intentional or unintentional acts or omissions by which harmful quantities of oil are spilled, leaked, pumped, poured, emitted, or dumped into or on coastal waters of the state or at any other place where, unless controlled or removed, they may drain, seep, run or otherwise enter coastal waters of the state. Figure 3.1 examines the historic trend in Louisiana reported oil spill volumes and spill notifications since 1990.

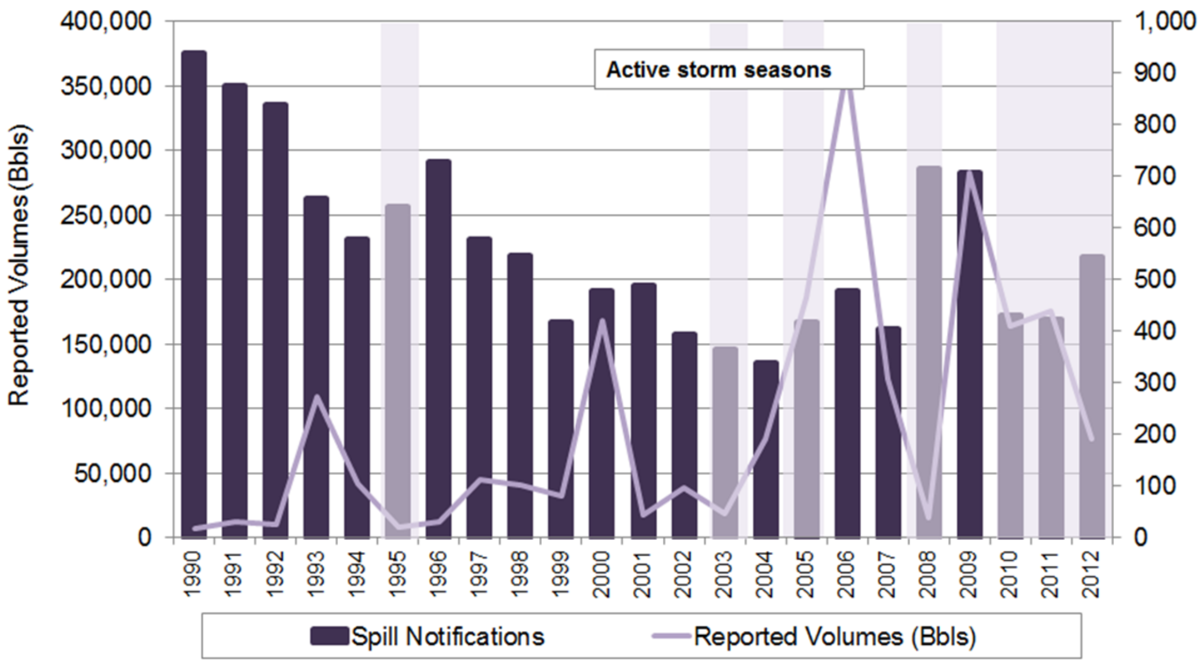

Figure 3.1: Louisiana Oil Spill Notifications and Reported Volumes
Source: NRC, LSP and LOSCO data

Volumes included in Figure 3.1 are those reported to the NRC and are based largely upon initial reports and initially-anticipated spill volumes, not final reported (or verified) volumes. Only rarely are these NRC-reported spills updated, and even when those revisions do occur, they may not (and usually do not) include any final spill volume estimates. Moreover, because the data capture reports or notifications rather than an objective measure of spills over time, the data are subject to reporting bias that may cause systematic differences between the NRC data and actual oil spills, which could change over time. Therefore, spill volumes were cross-referenced in both the LSP hazardous materials incident database and LOSCO records of updated spill volumes for events with large reported volumes in any of the three sources. Despite this effort to enhance the NRC data, the information examined from the NRC needs to be reviewed with some caution since data are simply not based upon final reported spill volumes.

The frequencies (or number of spill occurrences or "spill notifications") are the number of oil spills reported to the NRC in any given year.[13] Figure 3.1 presents oil spill volumes on the left-hand axis and oil spill frequencies (or number of spill notifications) on the right-hand axis. All data and discussion in this section exclude spill volumes associated with the DWH spill due to the unique nature of that spill. The impact of the DWH spill, and its implications for future oil spill response and funding, will be considered separately later in this report.

Setting aside limitations of the notification data, two distinct trends are noticeable in Figure 3.1: the first spans a period from 1990-2004, while the second covers a period ranging from 2005-2012. Prior to 2004, the number of oil spill notifications decreased considerably from a 1990 high of over 900 spills in that year to a level of around 340 in 2004, representing a 64 percent drop over this entire period of time. This change is equivalent to an average decline in the number of oil spill notifications of four percent on an annual basis.

However, the general decline in the number of spills per year ended in 2005, the year in which considerable extreme tropical activity began in the Gulf. Notifications increased from about 340 spills per year in 2004, to 480 by 2006, and were above 700 for both 2008 and 2009. Interestingly, while spill notifications were generally up during this period of heightened tropical activity, these spill notifications are not highly

[13] Section 1(b) discusses the various sources of data about oil spills used in this report. This section also discusses all adjustments and exclusions associated with the underlying NRC data.

correlated with the specific year in which the activity occurred. There are also instances, particularly during the course of a major storm event, when a spill caused by natural phenomena is not found and reported until months later, a delay that may lead to increased notifications in the following year. While spill notifications have generally fallen since 2010,[14] there was a moderate increase in spill notifications in 2012.

The trends in reported oil spill volumes are similar to the oil spill notification frequency trends discussed above. Two trends appear to materialize from the reported spill volume information included in Figure 3.1 with the structural “break” in these trends also occurring, generally, in the 2004 time period. Reported oil spill volumes increased from around 76 MBbls in 2004 to almost 365 MBbls in 2006. Reported spill volumes have decreased since 2006, to about 77 MBbls in 2012. Again, while volumes appear to increase and spike more frequently during time periods that experience considerable tropical activity, the spill volume spikes are not perfectly aligned with the years in which tropical activity occurred.

b. Average Spill Notifications and Reported Volumes

Figure 3.2 examines the historic trend in average reported spill sizes and the frequency of spill notifications over the past 20 years. The average reported size of a spill is measured on the left-hand side of the chart while the number of spill notifications in any given year is measured on the right-hand side of the chart as before. As noted earlier, spill notification frequencies fell throughout the period 1990-2004, only to increase again in the post-2004 time period. While the number of oil spill notifications has increased since 2004, they are generally lower than they were during the 1990-1998 period.

[14] The NRC data indicates several spill notifications in the Mississippi Canyon area during 2010, likely associated with the DWH. Spill volumes associated with the DWH were reported as zero to the NRC and have not been included in this analysis.

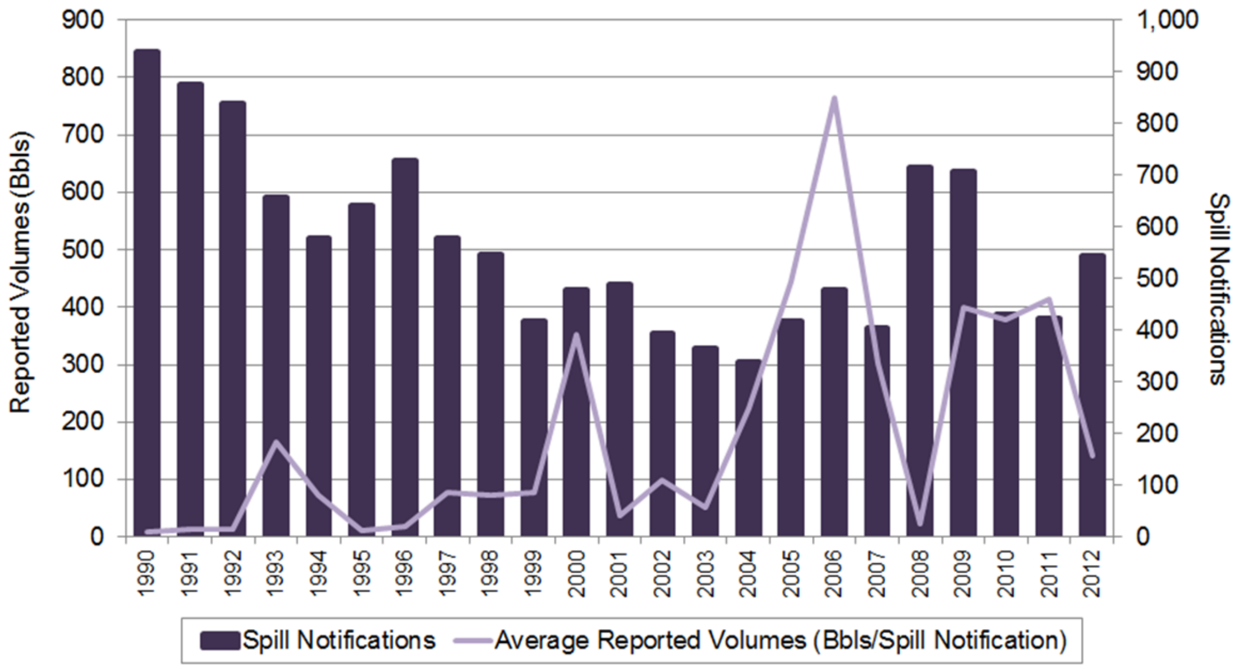

Figure 3.2: Louisiana Oil Spill Notifications and Average Reported Volumes
Source: NRC, LSP and LOSCO data

The average reported volume of a Louisiana oil spill notification is considerably higher over the past several years than it has been since the mid-1990s, despite the fact that the large volume spill associated with the DWH spill is not included in the analysis. Prior to 2004, the average reported size of an oil spill in Louisiana was under 100 Bbls with the exception of two upticks in average spill volumes in 1993 and 2000. Average reported spill volumes increased dramatically starting in 2004 with an increase from 50 Bbls per spill in 2003 to over 220 Bbls per spill in 2004. By 2006, the average reported size of a Louisiana oil spill was approximately 760 Bbls. Over the most recent five years, oil spills have averaged about 270 Bbls per spill.

A comparison of volatility in spill volume between the 1990-2004 and 2005-2012 time periods can be measured by each period's respective coefficient of variation ("CV").[15] The CV is calculated using individually-reported oil spill notification-level data, which provides a direct comparison of volatility in spill volumes between the two time periods. The CV for spill volumes for the period 1999 to 2004 is 22.8 while the CV for spill volumes for the period 2005 to 2012 is 48.8. These statistics show more than twice as much volatility in the more recent time period as in the earlier time period.

c. Louisiana Oil Spill Notifications by Type of Spill

Oil spills can also be categorized by their type. The NRC categorizes spills into nine different categories that include: platforms; fixed; vessels; unknown sheen; pipeline; railroad; mobile; aircraft; and storage tank.[16] Spills associated with platforms, fixed sources, vessels, and pipelines are the more common types of oil spills and can be classified as "frequent" oil spill types while the remaining categories can be considered "infrequent" oil spill types given their low occurrence and much smaller size.

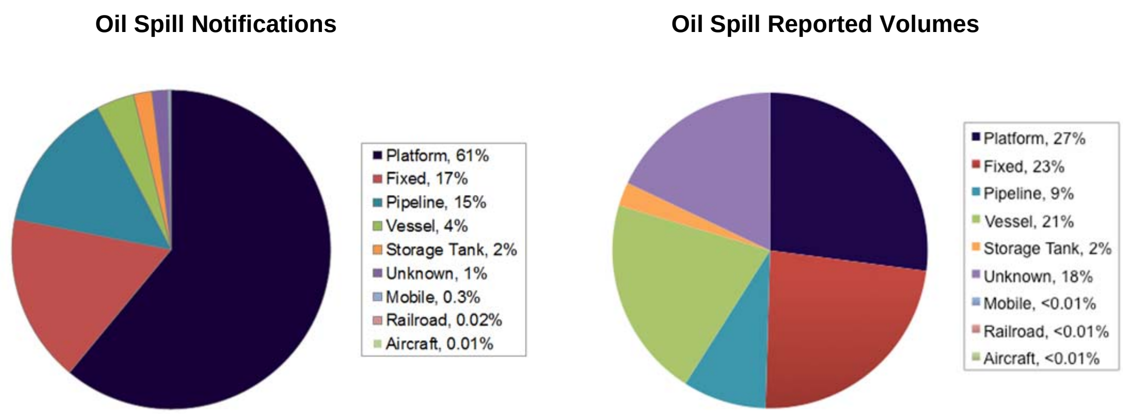

Figure 3.3: Louisiana Oil Spill Notifications and Reported Volumes by Type (1990-2012)

Source: NRC, LSP and LOSCO data

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[15] A CV is defined as the ratio of the standard deviation of a particular series to its mean and can often be thought of as a measure of unitized risk since the measure of variability (the standard deviation) is standardized by its mean. Generally, a higher CV indicates a more volatile series than lower-valued CV. A CV greater than one defines a series that has a standard deviation that is greater than its mean, and vice versa.

[16] Fixed spills are those associated with non-mobile, onshore locations.

Figure 3.3 charts the share of cumulative total reported volumes and spill notifications by type over the past 20 years. Over the past 20 years, platforms represent a significantly higher portion of the number of spill notifications (61 percent), followed by fixed (17 percent) and pipeline (15 percent). Reported spill volumes are distributed in a manner somewhat comparable to spill notification frequencies. Platform notifications, for instance, comprise the largest share of reported oil spill volumes (27 percent) followed closely by fixed notifications (23 percent). Vessel notifications comprise the third largest spill type (21 percent) and unknown sheen notifications are fourth (18 percent) with other spill type notifications each representing only a small share of total notifications.

Figure 3.4 shows the share of reported oil spill volumes and spill notifications by type that have occurred over the past five years (2008-2012) as opposed to the full sample time period. Over the past five years, platform-related oil spill notifications comprise around 66 percent, followed by fixed location-based spill notifications and pipeline-related spill notifications (14 percent each). Vessel-related spill notifications account for a distant fourth ranking at three percent of all spill notification types. Platforms, however, account for a larger share of the reported volume over the past five years than they did over the full sample period. For instance, Figure 3.4 shows platform-related spills account for 31 percent of all reported volume over the past five years, compared to a broader sample period share of only 27 percent. Similarly, vessel related notifications have a larger reported volume in recent years at 27 percent, compared to 21 percent for the full period. Sheens of unknown source make up a much larger share of reported volumes in recent years at 32 percent. For a more detailed review of oil spill notification trends organized by type of spill, please see Appendix C.

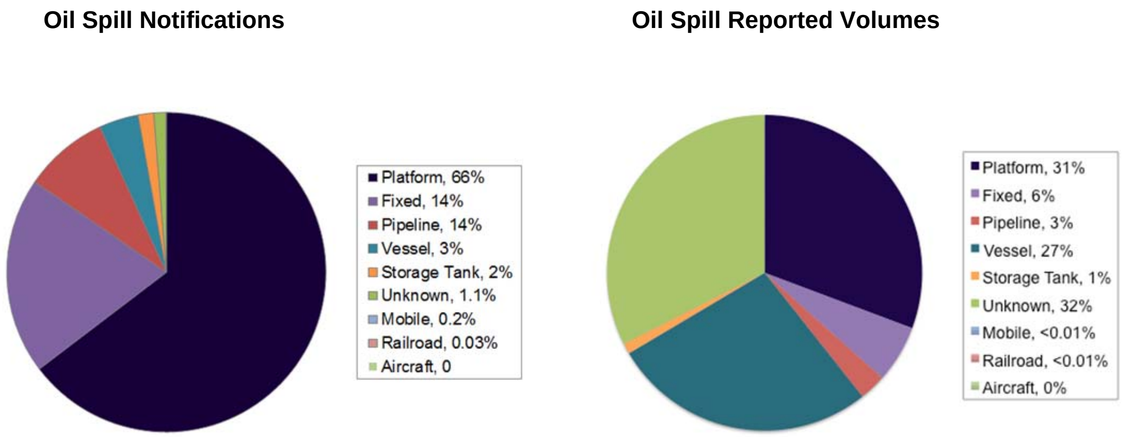

Figure 3.4: Recent Louisiana Oil Spill Notifications and Reported Volumes by Type (2008-2012)

Source: NRC, LSP and LOSCO data

d. Summary and Conclusions

A number of important conclusions can be reasoned from the historic trends in Louisiana oil spill notifications including:

- Louisiana oil spill frequencies (based on the annual number of spill notifications) have generally increased since 2004.
- The reported volumes of oil spilled in Louisiana have generally increased.
- The average size of a Louisiana oil spill, as reported in the NRC notification, has increased.
- Large Louisiana oil spills (notification of a spill volume in excess of 2,000 Bbls) are increasing in both frequency and reported volumes.
- Platform-related oil spills account for a large majority of Louisiana's oil spill notifications and reported volumes.
- Platform-related oil spills are (a) growing in absolute number and reported volume, (b) increasing as a share of total Louisiana oil spill notifications, and (c) growing in terms of their average reported size.

Keeping in mind limitations of the underlying data, these trends offer useful insights into the likely future spill response demands of LOSCO and other Louisiana state agencies. These trends will be re-visited later in the consideration of how important changes in Louisiana's crude oil supplies could aggravate what appear to be already concerning trends.

Section 4: Historic Trends in Contingency Fund Finance & Agency Costs

a. Overview

Like many coastal states, the Louisiana Legislature developed comprehensive oil spill legislation[17] in the early 1990s in the aftermath of the *Exxon Valdez* disaster in Prince William Sound, Alaska. Included within this legislation was the creation of LOSCO, as well as the Fund, in 1991. LOSCO's mission is to exercise the powers and duties set forth in OSPRA, which include[18] providing a coordinated response effort for all appropriate state agencies in the event of an unauthorized or threatened discharge of oil, providing clear delineation for state coordinated response efforts in relation to jurisdictional authorities and use of state and federal funds for removal costs under various federal laws, and administering the Fund to provide for funding these activities. As such, LOSCO works very closely with other natural resource and environmental regulatory agencies such as the Department of Natural Resources, the Department of Environmental Quality ("DEQ"), the Department of Wildlife and Fisheries ("DWF"), the Department of Health and Hospitals, and the Coastal Protection and Restoration Authority ("CPRA"), among others.

LOSCO's main functions include:

- Ensuring effective oil spill response and cleanup
- Restoring public resources
- Oil spill prevention
- Research and innovation
- State agency coordination

The operations of LOSCO, as well as some of the state's other oil spill response efforts, are financed through the Fund. Originally, the Fund was financed through a two

[17] The Louisiana Legislature enacted the Oil Spill Prevention and Response Act (OSPRA), which can be found at La. R.S. 30:2451 *et seq.*

[18] This list is not intended to capture all powers and duties of LOSCO. For a comprehensive list of these powers and duties, see La. R.S. 30:2456.

cent per barrel fee assessed on all crude oil transferred to or from vessels at a Louisiana-based marine terminal.[19] Until now, this financing mechanism has not changed outside of adjustments to the fund ceiling and floor that determine when the fee is collected. With the passage and enactment of Act 394 during the Louisiana Legislature's 2013 session, the Fund will be financed through a fee of 1/4 cent per barrel on all crude oil received by a Louisiana refinery for storage or processing. This new fee is to become effective on July 1, 2014.[20]

Every year, LOSCO submits an operating budget, through the Department of Public Safety ("DPS"), to perform its responsibilities toward fulfilling its mission and to fund a limited number of support activities performed by other agencies that work closely with LOSCO on a regular basis. The Legislature, in turn, either approves or modifies LOSCO's budget request, and appropriates monies to support the approved annual budget, which is paid from the Fund, not from the state's general revenues.

From the Fund's inception in 1991, minimum and maximum limits have been imposed on the balance in the Fund. Once the Fund reached one of these limits, fee collection was triggered, and turned on or off (depending on which was reached). In 1991, the initial maximum balance was $15 million (i.e., the cap) and the initial minimum balance was $8 million (i.e., the floor). The floor and cap, and ultimately the balance of the Fund, have changed over the years with legislative modifications. In 1995 the legislature reduced the maximum balance to $10 million and maintained the minimum balance of $8 million; in 2003 the legislature reduced the maximum balance to $7 million and decreased the minimum balance to $5 million. These modifications caused the overall Fund balance to fluctuate at times with no clear connection to the anticipated demands. Ultimately, these modifications, and limitations, on the Fund contributed to a very low balance prior to the DWH spill. In 2010, the legislature modified the Fund balance again, removing the maximum balance and cap of the Fund, but only during

[19] La. R.S. 30:2486 (effective until June 30, 2014).
[20] La. R.S. 30:2485.A. (effective July 1, 2014).

emergencies or declared disasters. Act 394 of the 2013 legislative session removed the Fund balance cap, as well as the minimum and maximum balances associated with the fee triggers. The only trigger that now remains is a trigger to increase the fee from one-quarter of a cent to one-half of a cent if certain parameters (as outlined in La. R.S. 30:2485) are met.

b. Oil Spill Contingency Fund Resources

Figure 4.1 provides a chart examining financial resources available from the Fund from 1992 to 2009, prior to the DWH spill. The figures presented in this chart represent the combined total of all fees and other revenues collected in any given year along with any carry-over prior year financial balances, which themselves are calculated as the difference between prior year revenues and agency expenses.

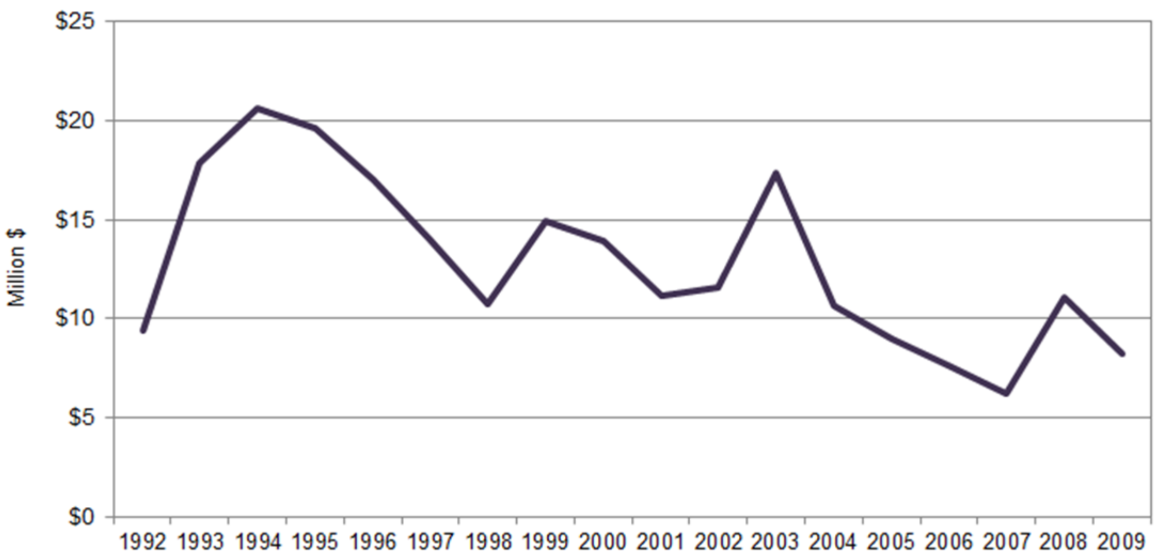

Figure 4.1: Pre-DWH Oil Spill Contingency Fund Available Financial Resources (1992-2009)

Source: Treasury and Authors' Calculations

The Fund's total annual resources available are an important measure since they represent the financial resources upon which the state can draw upon to respond immediately to the environmental threats posed by oil spills in any given year. Figure 4.1 graphs the resources available to the state to promptly respond to an oil spill since the Fund's creation. Historically, annual fee revenues (i.e., revenues collected from the annual two cent per barrel fee) are comprised of the revenues collected from marine transport entities moving oil to a Louisiana port or terminal. However, in addition to this fee, the Fund can receive reimbursements from the National Pollution Funds Center ("NPFC") for reimbursable expenses associated with specific incidents as well as monies from responsible parties to reimburse for response, assessment, restoration or monitoring costs associated with an incident. These additional sources of revenue are usually paid after expenses have been incurred on a particular incident. These monies reimburse the state and its respective agencies for agency-specific costs associated with oil spills.

While the state, in theory, has access to reimbursement from the NPFC or the responsible party(ies), there are several important reasons why those sources cannot be relied on too heavily for the state's spill-related activities. First, because spills continue to occur, the state must maintain a sufficient balance in the Fund to be prepared to respond to multiple spills at any given time. Second, even though the state may receive reimbursements or other associated revenue, there is a lag associated with the costs incurred and the reimbursements or other revenues such that the state must have sufficient resources available to promptly respond to an incident, which includes funding response and assessment activities up front. Third, reimbursements and other revenues are often uncertain because activities deemed necessary by the state may not always be approved for reimbursement and the amount of any settlement- or litigation-related revenues from responsible parties typically cannot be determined in advance at times when the state must undertake response and assessment activities.

Looking at the pre-DWH time period, historical data reflect a general pattern of state-funded activity as well as minor reimbursements by the NPFC and responsible parties. Because of the lag between when costs associated with responding to a spill are incurred and when reimbursement dollars may be received, historical data do not exactly match the timing of spills with the timing of costs related to those specific spills. While it is true that most spill notifications require state action for a relatively short period of time, there are incidents that will likely require a significant level of effort by LOSCO and other Fund-supported state agencies for many years after the initial incident notification. Unfortunately, data matching effort and costs to individual incidents are not readily available outside of a relatively small number of more recent events. Thus, available resources in the Fund are used as the best indicator of the state's ability to fund activities associated with oil spills.

Figure 4.1 shows that throughout the 1990s, the Fund's available resources varied by as much as 100 percent. In 1992, the first full year of the Fund, total resources available amounted to $9.4 million. The Fund peaked in 1994 at $20.6 million, and then decreased each year thereafter until hitting a low of $10.7 million at the end of the decade. The Fund hovered between $10 million and $17 million during the better part of the past decade before falling to a historic low of $6.2 million in 2007, three years before the DWH spill. The Fund resources fluctuated prior to 2010, and in 2009, there was a total of only $8.2 million in financial resources available to respond to the DWH spill. In fact, the 2009 Fund resources, totaling $8.2 million, represents one of the three lowest balances on record during the Fund's history.

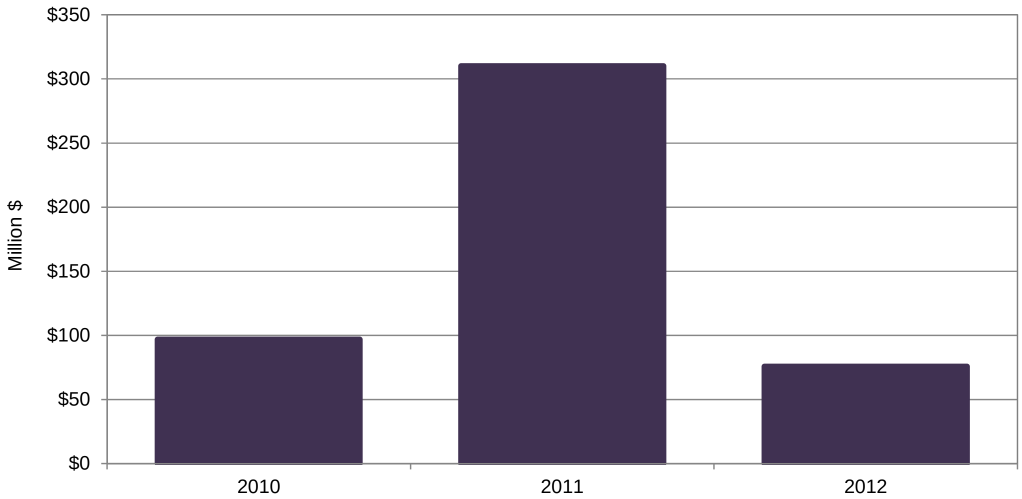

Figure 4.2: Post-DWH OSCF, Financial Resources Available (2010-2012)
Source: Treasury and Authors' Calculations

Figure 4.2 shows the Fund's annual resources available during the years of, and after, the DWH spill. Resources during this period averaged over $160 million compared to a pre-DWH average of $12.8 million. The overwhelming bulk of these resources, however, came from funds provided directly by the NPFC or BP, the responsible party, to the DWH spill, and will be discussed in greater detail later in this section of the report. This is also true for the most recent year (2012) where the Fund balance appears to be relatively large (over $50 million). The majority of the Fund balance in all three years in Figure 4.2 represents dollars encumbered to DWH-related activities. Available resources for non-DWH spill-related activities are estimated to only be around $2.5 million annually in this period.

c. Oil Spill Contingency Fund Fee Revenue

Another important consideration in reviewing the funding mechanism for supporting the state's activities associated with oil spills is the timing of deposits to the Fund. As discussed previously, for most years of the Fund's existence, there has been a cap and floor that determined when the fee should be collected. When the Fund balance went above the cap, collection was suspended. Collection resumed when the Fund balance fell below the floor.

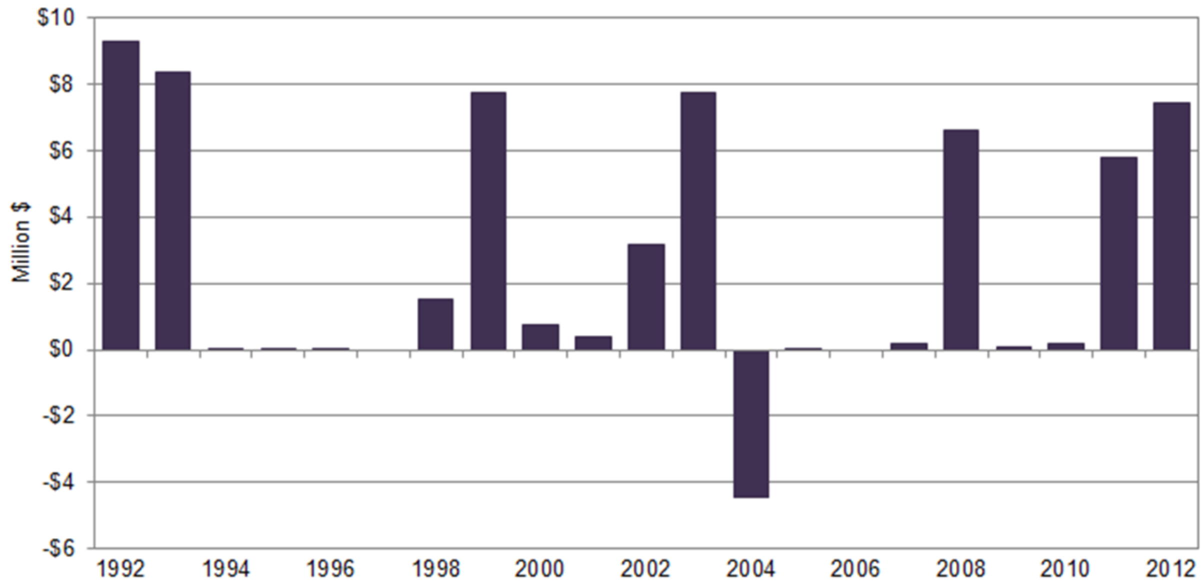

Figure 4.3: Oil Spill Contingency Fund Fee Revenue (1992-2012)
Source: Treasury

As can be seen in Figure 4.3, this fee structure led to sporadic collections that had little to no association with spill response activity. The historic patterns of fee revenue show large collections until the Fund balance reached the statutory cap; followed by periods of very little or no fees collected until the Fund balance fell to the relevant floor. The negative balance indicated for 2004 is a bit of an anomaly and represents a year in which Fund revenues were reduced due to the retroactive implementation of a legislatively-established fee revenue cap. Thus, in 2004, regular annual expenses, coupled with the required one-time fee revenue-reimbursement, resulted in a negative balance for that year.

d. Agency Oil Spill Costs

Figure 4.4 shows the historic trends in LOSCO and state agency-related costs.[21] These "agency costs" were below $275,000 in LOSCO's first year and grew to $560,000 in the second year following LOSCO's creation. Those costs increased to around $3.5 million per year during 1995-1996, before increasing again to around $5.3 million between 1997 and 1999. Pre-DWH agency costs peaked in 1998 at $5.7 million and generally fell to a level of $2-3 million per year until 2010.

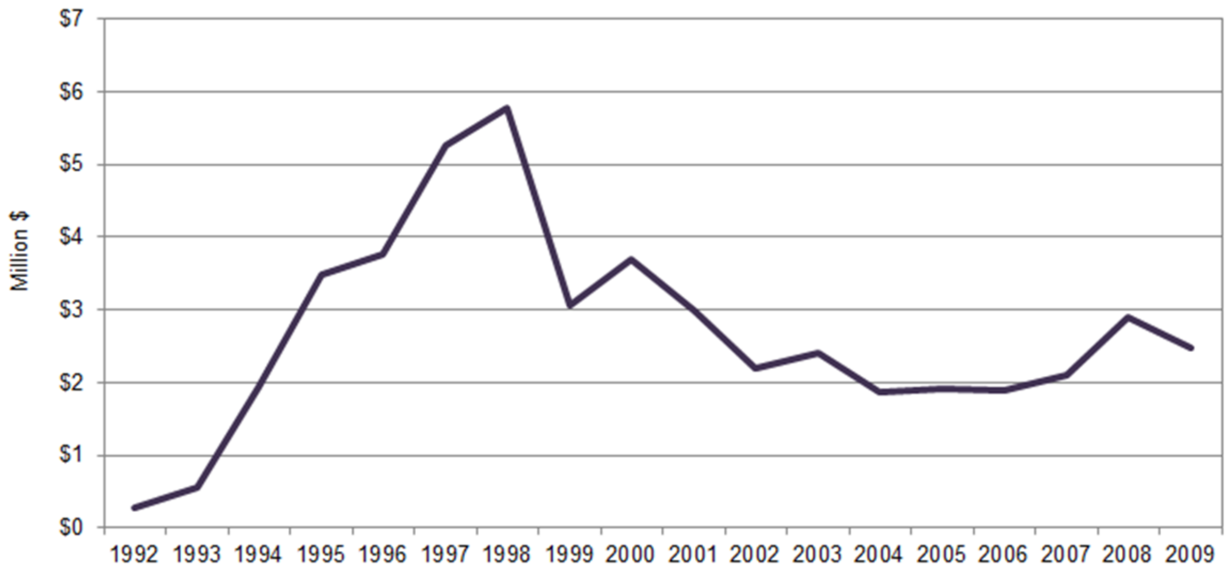

Figure 4.4: Pre-DWH Agency Costs (1992-2009)
Source: Treasury

[21] LOSCO administers a smaller amount of funds that are passed along to other state agencies to support their overall oil spill coordination costs. Historically, these agencies have included those supporting response, environmental, natural resource, and coastal activities. Hereafter, these costs, including those for LOSCO, will be referred to generally as "agency costs."

Figure 4.5 shows the recent historic agency cost trends during and after the DWH spill. These costs peaked at around $300 million in 2011, bearing in mind the earlier-reference to funds being encumbered to DWH-related activities. Over the period 2010 to 2012, direct agency costs from the Fund total approximately $337.5 million. However, agency costs associated with any direct assessments to responsible parties from the DWH spill should in no way be interpreted as the total agency costs associated with the spill for a range of reasons that are numerous, beyond the scope of this research, and likely imbued in pending litigation.

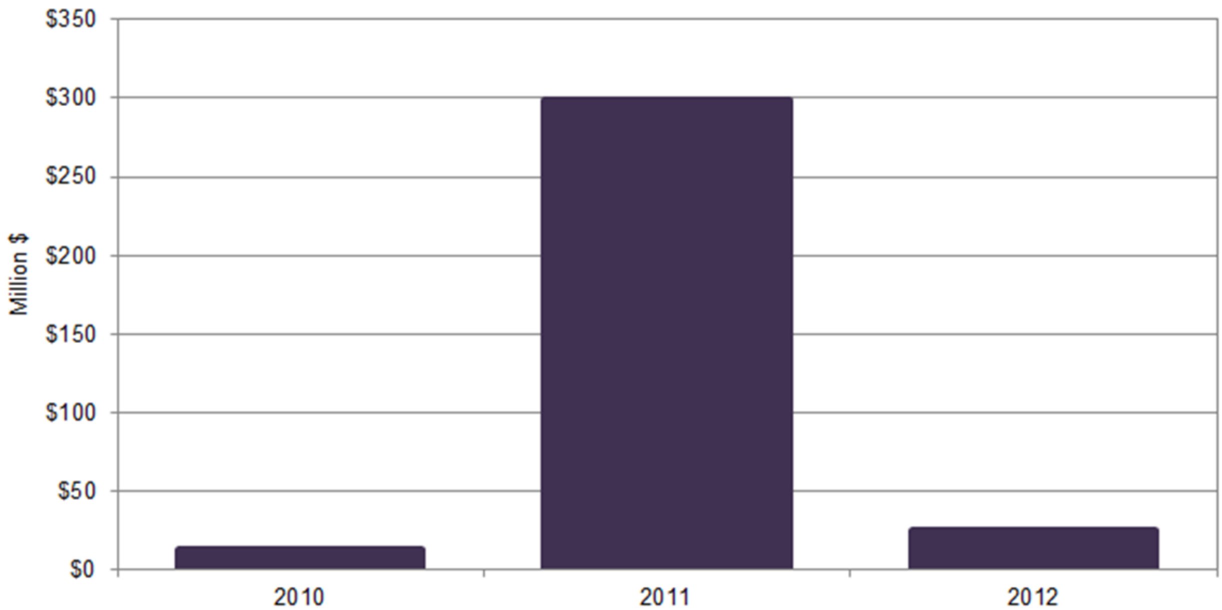

Figure 4.5: Post-DWH Agency Costs (2010-2012)
Source: Treasury

e. Revenues, Costs, and Oil Spills

Before comparing financial information with spill notifications, it is important to acknowledge that spill notification data have been summarized according to a calendar year because many of the market indicators used to project spills are available only on a calendar year basis. This does not align with the fiscal data, which are reported on a fiscal year basis (1 July – 30 June). While costs associated with each spill are generally tracked over time, detailed information for all oil spills is not available. Because of the limited ability to exactly match spill notifications and their associated costs, the relationship between spill notifications and financial information is always considered over a period of multiple years to identify more stable patterns that will be less subject to bias created by this misalignment. In addition, two separate analyses are carried out to test sensitivity of results to the timing of spill notification and financial data.

The first comparison matches spill notifications in one calendar year to financial information from the fiscal year ending in June of that year. In this comparison, spill-related information will tend to lag behind financial information to some extent. This timing is useful for thinking about preparedness and the availability of financial resources when events occur. The second comparison uses spill data from the calendar year that includes the first half of the fiscal year (e.g. spill notification for calendar year ending 2011 with fiscal year 2012 financial data). In this second comparison, referred to as "lagged" comparison due to the one-year difference between spill notification and finance data, the spill data tends to lag behind the finance data. This second comparison likely reflects more closely the timing of notifications and the actual costs that are related to those notifications.

Figure 4.6 compares pre-DWH Fund resources available (Revenue) against the historic total reported volume of reported Louisiana oil spills on an annual basis by directly matching calendar year data to fiscal year data (e.g. CY 2009 to FY 2009). The chart shows no correlation between Fund revenues and oil spills. In many years, oil spill notifications made to the NRC increased while revenues supposedly collected to support the recovery of the costs for those spills decreased.

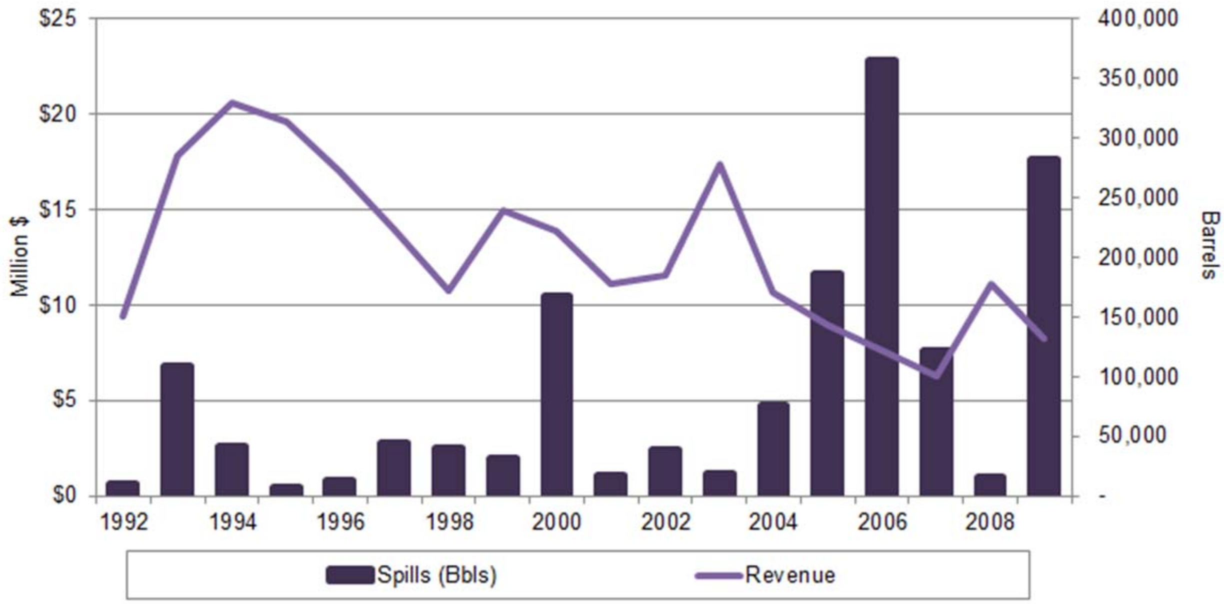

Figure 4.6: Pre-DWH Fund Financial Resources Available and Reported Oil Spill Volumes (1992-2009)
Source: Treasury, NRC, and Authors' Calculations

Figure 4.7 examines agency costs on a standardized basis as dollars per barrel spilled as reported in NRC incident reports. In other words, agency costs are divided by total barrels reported spilled per year, to develop a simple rough measure of the overall total annual agency cost per spill. Total agency costs per barrel-spilled are quite variable and range from a low of $3.72/Bbl-spilled (1993) to a high of almost $600/Bbl-spilled (1995) in the pre-DWH period. The average agency cost per barrel of oil spilled for the entire pre-DWH period is $130.35/Bbl-spilled.

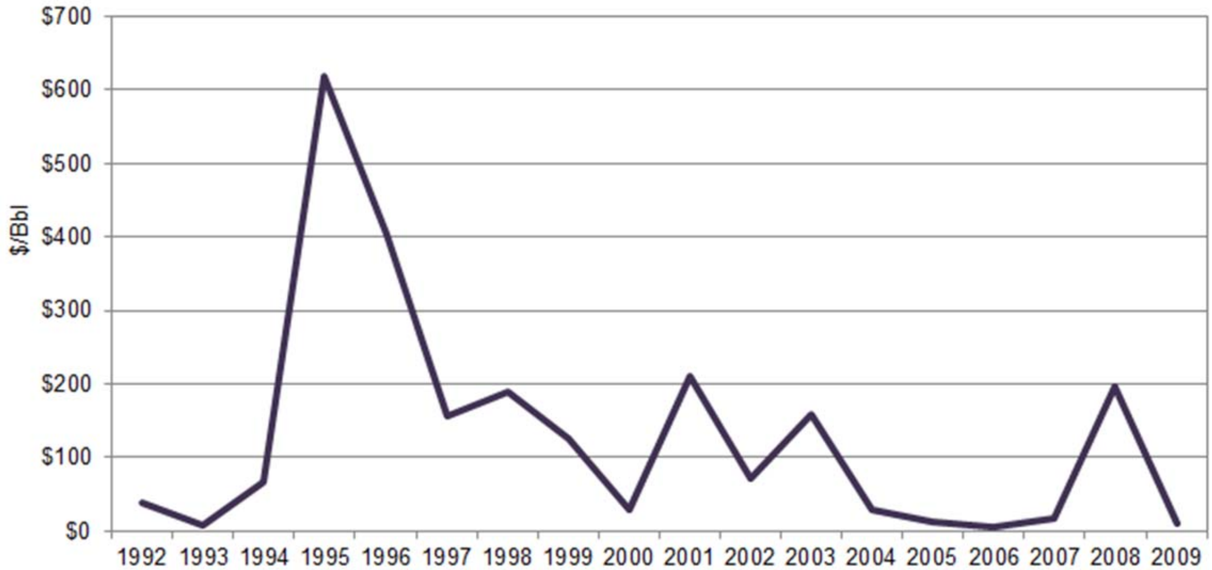

Figure 4.7: Pre-DWH Agency Costs per Reported Barrel Spilled (1992-2009)
Source: Treasury; NRC

Figure 4.8 provides a chart associated with the standardized agency cost per barrel of oil spilled for the post-DWH spill period. These costs are exceptionally variable given the lag in reimbursements relative to the year in which the spills and costs incurred actually transpired. This creates a bit of a mismatch on ascertaining the true agency cost per barrel of oil spilled that will be explored in greater detail in the following two charts. Regardless, on average, agency costs rose to $690.06/Bbl-spilled during this period; much higher than the pre-DWH sample period average of $130.35/Bbl-spilled or the full sample period (inclusive of the DWH response years) of $210.31/Bbl-spilled.

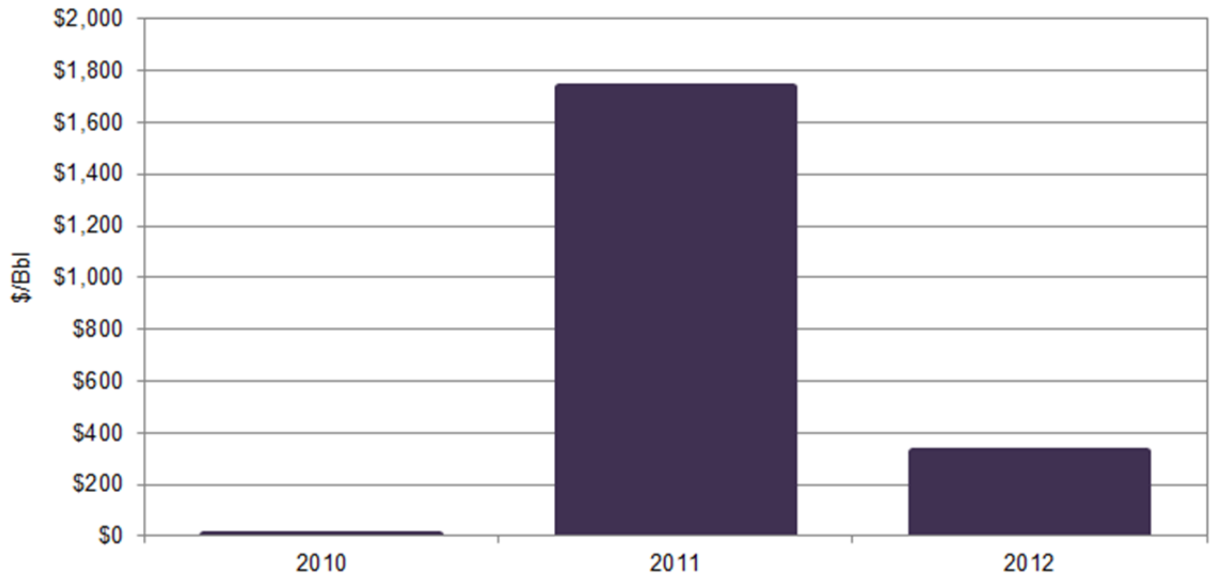

Figure 4.8: Post-DWH Agency Costs Per Reported Barrel Spilled (2010-2012)
Source: Treasury; NRC

Figure 4.9 provides a similar evaluation of annual agency costs per barrel of oil spilled on a "lagged basis." Here, current year costs are divided by prior year spills in order to get a better "average" measure of costs and spills (i.e., the cost per Bbl-spilled). As noted earlier, agency costs are not instantaneous with spills and likely carry over for a number of months if not years. The use of a simple one-year lag attempts to correct for these potential cost carry-overs and will likely offer a more realistic measure of the "average cost" (cost per Bbl-spilled) of responding to a spill.

This analysis shows a slightly less variable trend although the low still hovers around $5.76/Bbl-spilled on a lagged basis (2007) with a high of $479.62/Bbl-spilled on a lagged basis (1996). The average pre-DWH lagged agency cost per spill is estimated to be $111.47/Bbl-spilled, slightly lower than the $130.35/Bbl-spilled estimated for the non-lagged values of the pre-DWH sample. However, excluding the extreme outlier years (1995 and 1996), the average pre-DWH agency cost per barrel of oil reported spilled is $83.13. The chart also reveals a pattern of considerably lower agency costs per barrel spilled in the years leading up to the DWH spill than was true for the period 1992-2004. For the five years leading up to the DWH spill, agency costs averaged only $44.61 per barrel reported spilled.

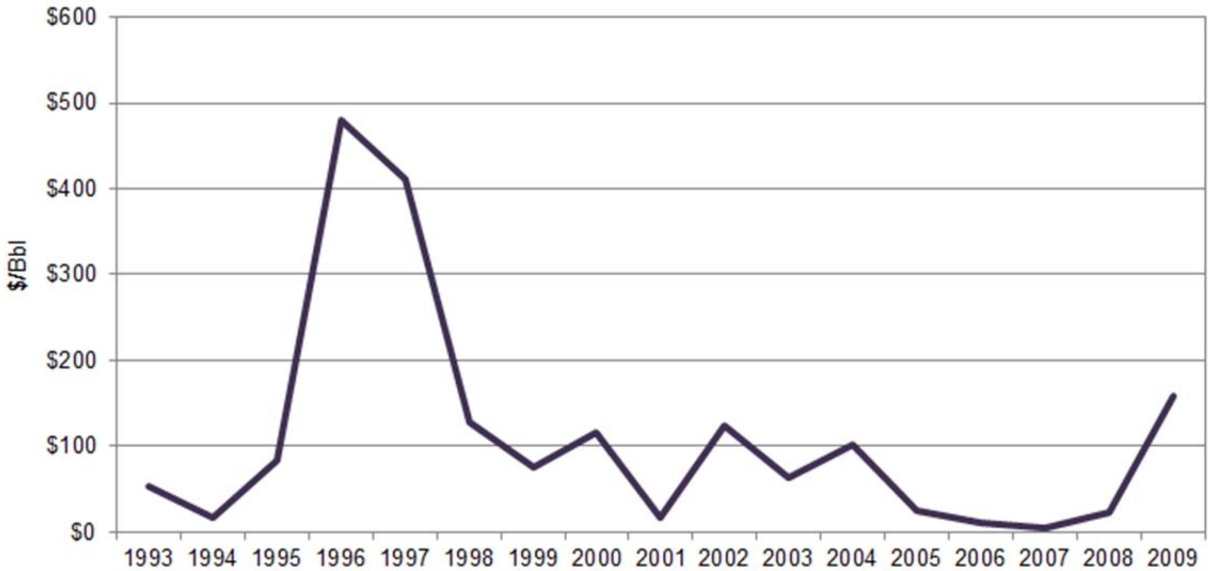

Figure 4.9: Lagged Pre-DWH Agency Costs Per Reported Barrel Spilled (1993-2009)

Source: Treasury; NRC

Figure 4.10 shows the lagged post-DWH agency cost per barrel-spilled revealing a much less volatile trend than the non-lagged values shown in Figure 4.8. Estimated agency costs per spill on a lagged basis range from around $46/Bbl-spilled to a high of $146/Bbl-spilled; averaging $86.54/Bbl-spilled. However, because these post-DWH figures are not easily separated into DWH-only expenditures and those related to other spills, these amounts are not used in projecting the future non-DWH related agency expenditures. There are expected to be significant costs beyond 2012 associated with the DWH spill implying that the use of pre-DWH cost figures provides a very conservative measure of expense requirements.

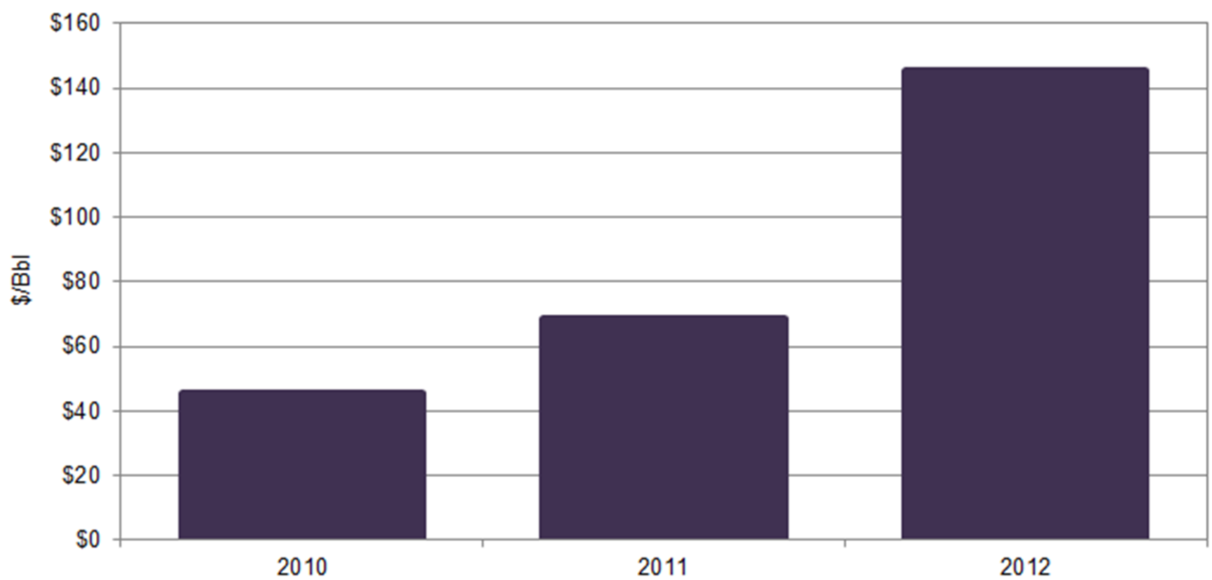

Figure 4.10: Lagged Post-DWH Agency Costs Per Reported Barrel Spilled (2010-2012)
Source: Treasury; NRC

f. Summary and Conclusions

Historically, fund resources have tended to move in directions that are (1) volatile; (2) uncertain; and (3) have no correlation with the amount of oil spilled in the state, which in turn, has no correlation to the amount of state activity required. Historically, this has shifted the risk of responding to potential spills, including the costs incurred, at least in the near term, away from those potentially causing the spills to those required to coordinate, respond, assess, potentially restore and monitor effects of the spill (i.e., Louisiana state agencies).

However, recent modifications to the funding mechanisms should help alleviate some of this risk since (1) the prior practice of utilizing revenue caps and floors has been eliminated and (2) revenue collections are now extended to all transportation sources moving oil to a Louisiana refinery. Both legislative modifications should lead to more stable revenues in the Fund. These two modifications do not directly address appropriate Fund balances, which is a topic that will be explored in the following section.

The standardized costs associated with a state agency's efforts vary. Lagged values of the average agency costs per spill seem to be the more appropriate measures since they are (a) more stable and (b) tend to match costs and spills on a basis consistent with most accounting matching principles. Yet even the lagged values show considerable variation across years. This study, however, needs to utilize an average cost number in order to assess LOSCO's likely response costs, and Fund liabilities, under several future oil spill scenarios that will be discussed in more detail in a subsequent section. While the probability of a spill like the DWH is hopefully small, the possibility of such an event occurring in the future cannot be dismissed. Further, as shown earlier in Section 3 of this report, oil spills have increased in both number and size since 2004 and the trend may reasonably continue given the nature of expected changes in the flow of oil moving into, through, and out of the state.

The period immediately before the DWH spill provides the most recent measure of a typical level of expenditures. Therefore, the average expenditure per barrel of $44.61 from the five-year period just before DWH (2005-2009) is used to develop estimates of future agency expenditures assuming that the future level of agency activity will be in line with that prior to DWH. However, those years may not represent a target level of activity if the cost per barrel reported spilled was dragged down by an uptick in spill notifications that was not met with a corresponding upward adjustment to the budgeted level of expenditures. Therefore, an alternative cost per barrel spilled of

$83.13, based on the full historical time period, but excluding the extreme outlier years (1995 and 1996), is also used to assess the future balance of fee revenue and project agency expenditures.

Section 5: Forecasting Louisiana's Oil Supply Disposition

a. Introduction

The future outlook for Louisiana oil spills will be determined in large part by the size and disposition of the crude oil that moves into, through, and out of the state. One of the primary determinants of the state's crude oil movement rests with the anticipated needs of state's refineries. The greater the demand for crude oil by these refineries, the larger the amount of crude oil likely to be moving into and through the state, which in turn, will likely influence the nature, frequency, and size of potential oil spills. Thus, the first step in forecasting future potential oil spills is estimating the total level, and source, of crude oil that will be utilized by Louisiana's refining industry.

b. Louisiana's Historic Refining Capacity and Utilization

Louisiana's refinery demand for crude oil is a function of the total refining capacity that is operational in any given year and the utilization of that capacity as it changes over time. Figure 5.1 shows the historic trends in the state's operational capacity since 1990. Operational distillation capacity has generally increased over the past 23 years at an average rate of about two percent per year.

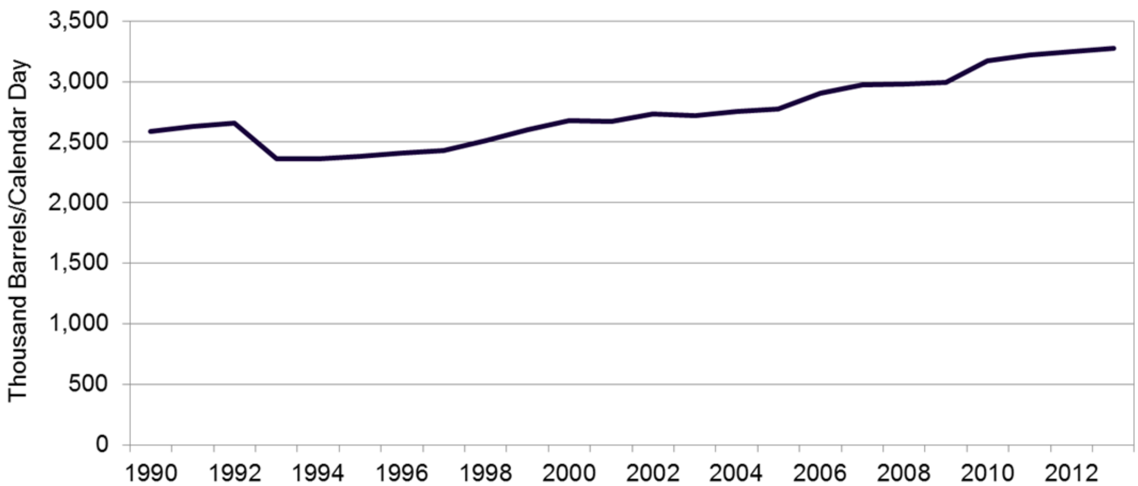

Figure 5.1: Historic Louisiana Refinery Distillation Capacity
Source: U.S. Energy Information Administration

These refinery distillation capacity increases have occurred despite the fact that no new refineries have been constructed in Louisiana since 1977. Increases in refining capacity have come exclusively from either (a) capacity expansions at existing refineries and/or (b) efficiency gains at existing refineries. The endogenous changes to existing refinery capabilities are often referred to as “capacity creep” since, as apparent from Figure 5.1, total refinery capacity tends to “creep” upwards over time to meet the demand for new refined products.

Refinery operators invest in capacity expansions and/or efficiency improvements up to the point where the long run marginal profitability of making the expansion or efficiency investment is maximized. For instance, 2010 saw one of the largest increases in Louisiana refinery capacity (some six percent) as the sizable capacity increases at the Marathon refinery in Garyville, Louisiana came on line. In the very short run, refining capacity is relatively fixed, and its utilization can often be a function of various different market factors. Periods that experience relatively high growth in the demand for refined products often result in very high refinery utilization, whereas lower periods of refined product demand can often see refineries ramping down their overall utilizations.[22]

[22] There are also a variety of operational factors that influence refinery-specific utilization that can include planned and unplanned outages and maintenance as well as other deliverability constraints that may arise in downstream refined product markets. Exogenous events such as changes in the economy, or hurricanes or other weather-related events can also impact refinery operations and utilizations.

Figure 5.2 provides an estimate of Louisiana refineries' utilization over the past twenty years. The trends show the cyclical nature of capacity utilization rates over time. For instance, recessionary years such as 1991-1992, 2000-2001, and 2008-2009 saw utilizations rates decrease given reductions in refined products associated with the economic contraction in those periods. High levels of refined product demand often see high utilization rates as refineries ramp up production to meet increasing market requirements.

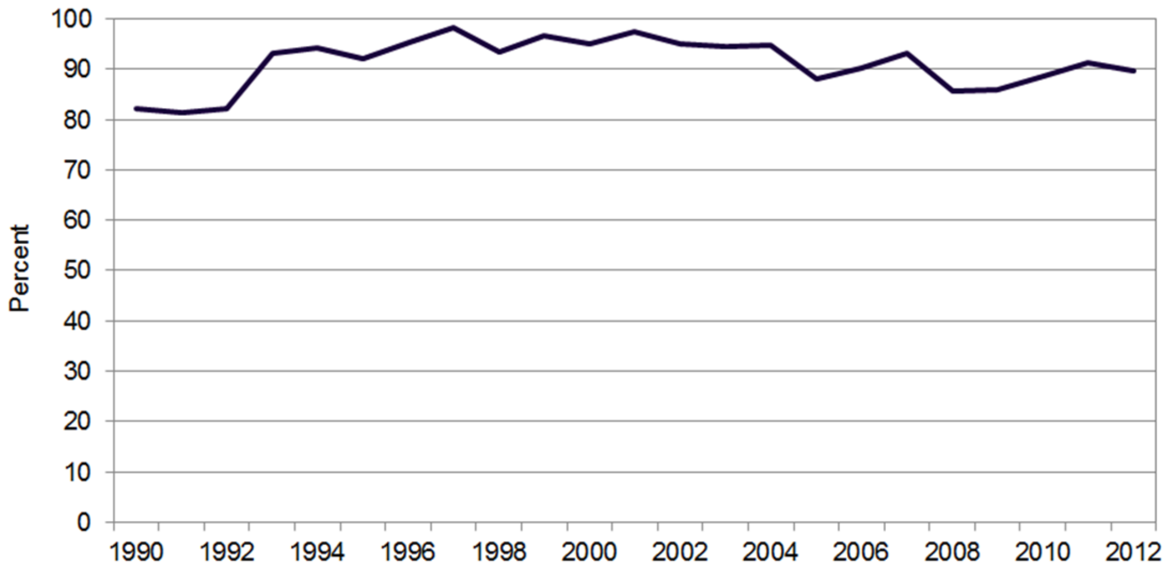

Figure 5.2: Estimated Historic Gulf Coast PADD Refinery Utilization

Source: U.S. Energy Information Administration, PADD is Petroleum Administration for Defense Districts. The Gulf Coast PADD is one of 5 Districts in the US.

c. Forecasting Louisiana's Refining Capacity Growth and Utilization

Most forecasts are based upon some level of historic information to condition future outlooks. The use of past experience to forecast future Louisiana refinery capacity additions seems well-placed given the stability of the past relationships in historic capacity growth. The base level capacity forecast developed here is based upon a long-run average annual capacity creep growth rate of 0.96 percent to forecast future Louisiana refinery capacity. This estimate was chosen as a conservative level since it (a) is much lower than a five-year trend that includes more recent refinery capacity additions not likely to occur again in the near future and (b) is one actually lower than both the 10- and 15-year averages. A lower growth level is also consistent with most independent forecasts that anticipate that refined product growth will be limited in the future given changes in automobile efficiency standards as well as increases in the use of hybrids and alternative fuel vehicles.

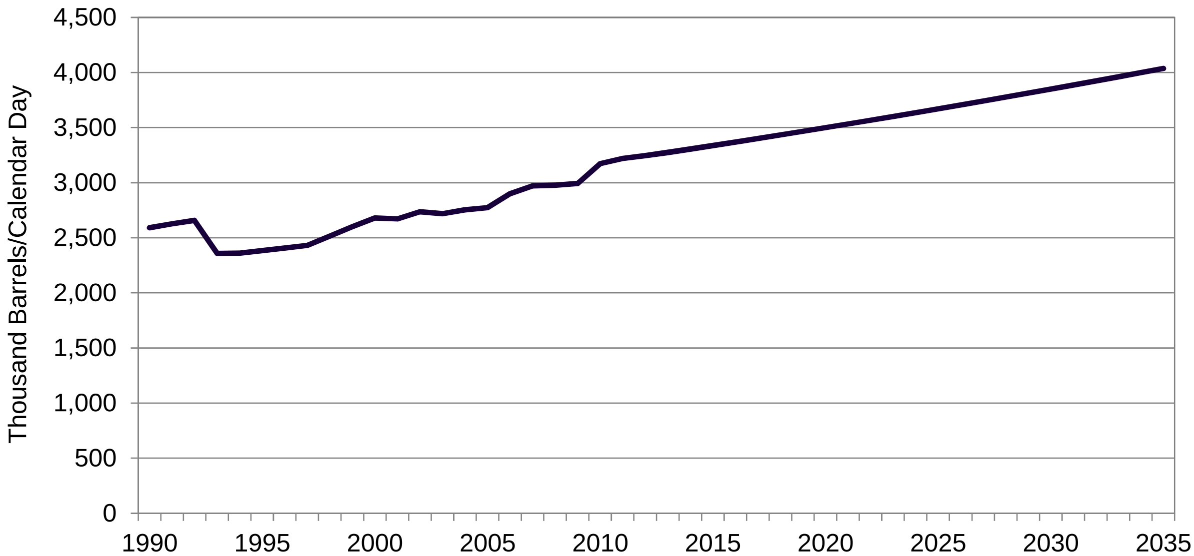

Figure 5.3: Historic and Forecast Louisiana Refinery Distillation Capacity
Source: U.S. Energy Information Administration, Authors' Construct

The forecast for the utilization for the projected Louisiana refinery capacity was developed in much the same manner as the capacity forecast itself. A long-run average utilization rate was estimated and applied to the estimated capacity increase in each year. The long-run average utilization rate of 91 percent is conservative and likely to lead to relatively moderate refinery crude oil requirements over the next decade. Figure 5.4 presents the historic and forecast annual refinery crude oil requirements based upon projected long run average capacity utilization rate.

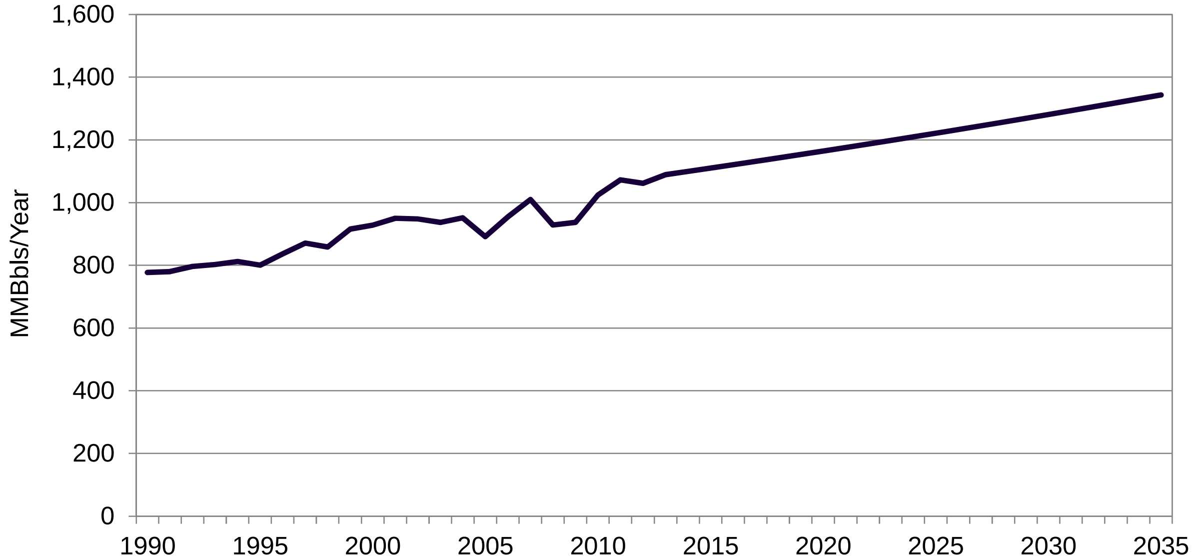

Figure 5.4: Historic and Forecast Louisiana Refinery Crude Oil Requirements
Source: U.S. Energy Information Administration, Authors' Construct

d. Potential Louisiana Supply Disposition Scenarios

The next step in the process of ultimately projecting Louisiana oil spills is to determine where the crude oil supply is going to come from in order to meet these projected refinery requirements. A scenario-based approach for future Louisiana oil spill sources has been utilized instead of a large multi-equation system approach. Recall that Louisiana's crude oil supply disposition is comprised of (a) imports into the state, (b) in-state and offshore production, and (c) exports of crude oil out of the state. Imports are comprised of foreign as well as domestic sources of crude oil. Production includes in-state, onshore production and state and federal offshore production. Exports are the movements of crude oil to other states.

Three different and credible oil supply disposition scenarios have been utilized in this analysis and include:

- Scenario 1: Business as usual scenario
- Scenario 2: Increased import, constant export and production scenario
- Scenario 3: Increased import and export, constant production scenario

Each of these scenarios will be discussed in greater detail below.

Scenario 1: Business as usual scenario

The first scenario utilized to allocate the state's projected crude oil supply requirements can be characterized as a "business as usual" or "BAU" projection. The BAU scenario, shown in Figure 5.5, assumes that Louisiana crude oil production remains constant in absolute terms. In-state production is assumed to continue its downward historic decline, but that decline is assumed to be offset by increasing production from the deepwater areas of the federal OCS. On balance, crude oil production will remain the same, although a significantly increasing share of this production will come from offshore, platform-based production. A constant level of production also means that, given slightly increasing refinery requirements over time, total Louisiana production, as a share of state crude oil supply, will decrease. Over time, more of the state's refinery requirements will have to be met with imports from other areas either internationally, domestically, or both.

The BAU scenario assumes that imports will grow in both relative and absolute terms in order to make up for the state's expanding refinery requirements. The BAU scenario assumes that both international and domestic imports will increase in both absolute and relative terms as compared with the state's overall projected supply disposition. The BAU scenario assumes that the current 2012 relative shares of international to domestic imports will remain the same through the forecast period.

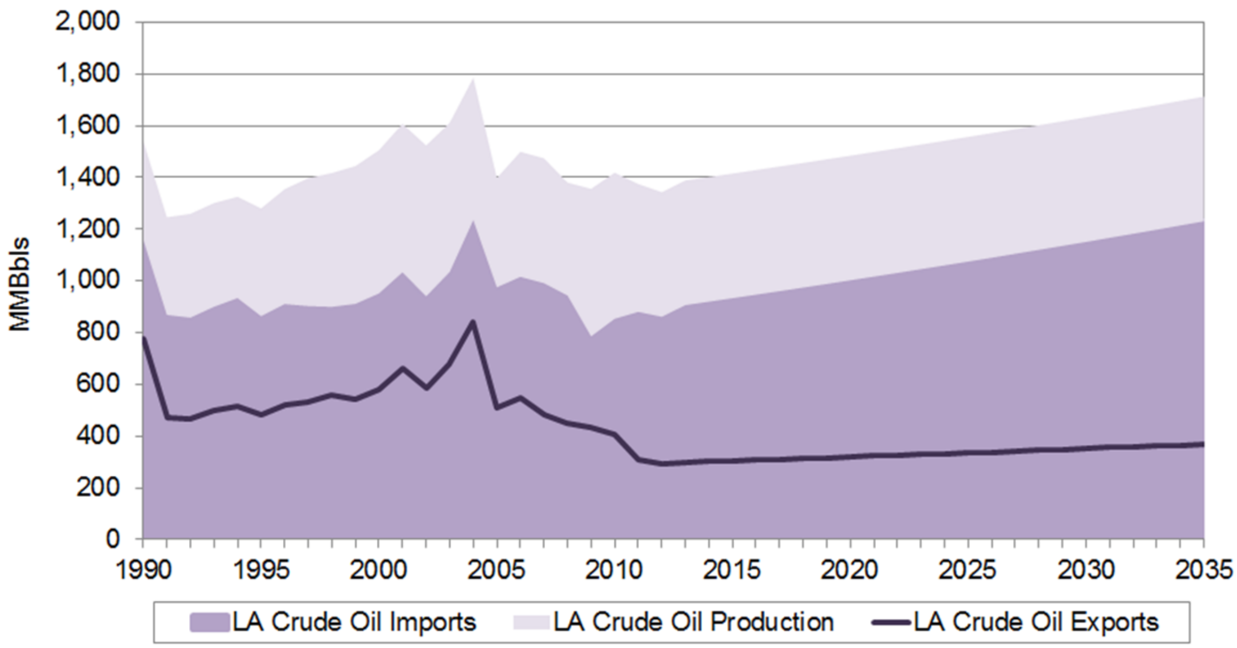

Figure 5.5: Projected Louisiana Crude Oil Supply Disposition (Scenario 1, BAU Forecast)

The BAU scenario also assumes that exports will hold a constant share of the projected supply disposition at 21.5 percent. Thus, in absolute terms, exports will likely grow as the supply disposition of the state increases to meet the assumed slightly growing refinery requirements but will not grow to a level that exceeds its current relative position in the state's overall supply disposition. Figure 5.5 charts the Scenario 1 projection for each of Louisiana's major supply disposition components to 2035.

Scenario 2: Increased imports, constant exports and production

Scenario 2 assumes an expanded domestic import outlook for future Louisiana crude oil supplies. This scenario is based upon an assumption that U.S. based unconventional crude oil production continues its prolific growth and ultimately squeezes out all foreign imports as the U.S. becomes close to self-sufficient in its crude oil requirements. This scenario is a simple modification of the total Scenario 1 outlook since it does not assume any significant increase in crude oil suppliers overall, but instead assumes that there is a shift in where these future crude oil supplies originate.

Scenario 2 assumes increasingly less international imports, which are primarily delivered to Louisiana via marine-based vessels, and instead assumes supplies come from other U.S. states via a variety of different transport modes that include pipelines, vessels, and railways.

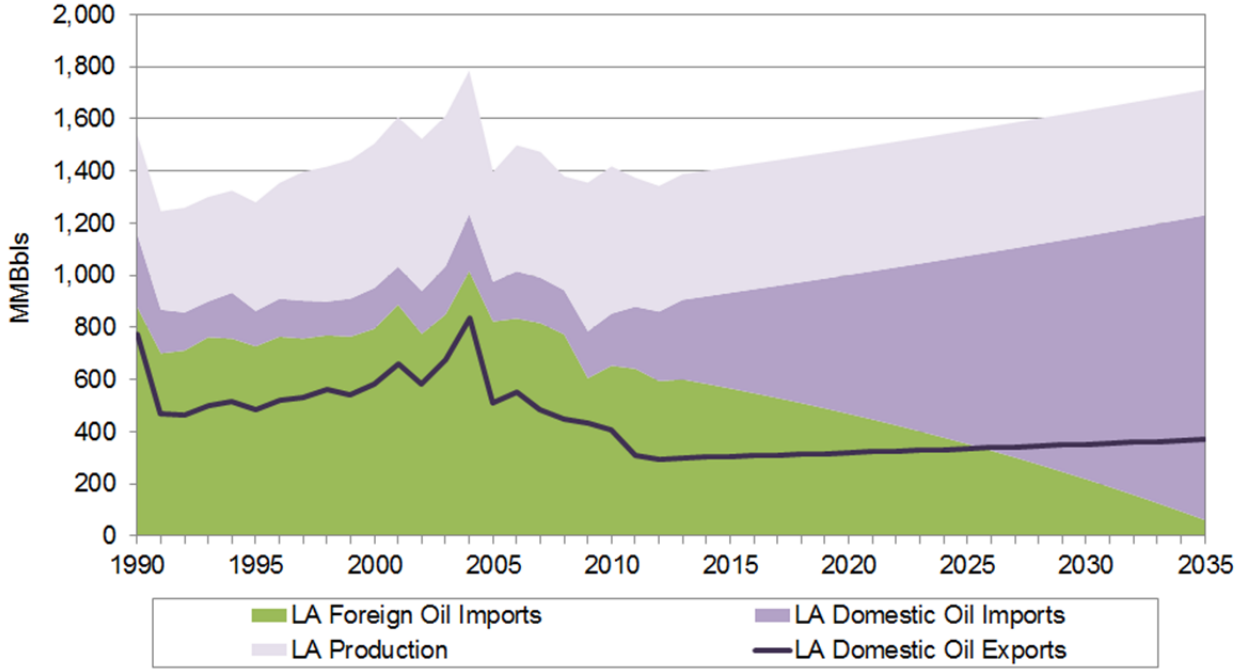

Figure 5.6: Projected Louisiana Crude Oil Supply Disposition (Scenario 2: Domestic Import Growth)

Figure 5.6 charts the Scenario 2 crude oil disposition by each major supply component. The total area of the chart (representing the total volumes) is the same as the chart provided in Figure 5.5 (for Scenario 1). The difference is the relative shares of the supply components. The most noticeable differences is the decrease in international crude oil imports from their current level to one that is less than five percent of Louisiana's total crude oil supply disposition by the year 2035.

Scenario 3: Increased imports and exports, constant production

The Scenario 3 crude oil disposition forecast builds off the assumptions included in Scenario 2. The Scenario 3 forecast continues the assumption that Louisiana crude oil production, in total, will remain flat but that a significantly increasing share of this production will come from offshore areas as opposed to onshore production. Further, Scenario 3 also assumes that a significantly increasing share of the state's projected refinery requirements will come from domestic imports. The only significant difference between the Scenario 2 supply forecast and Scenario 3 rests with the assumptions concerning the relative size of the state's crude oil exports.

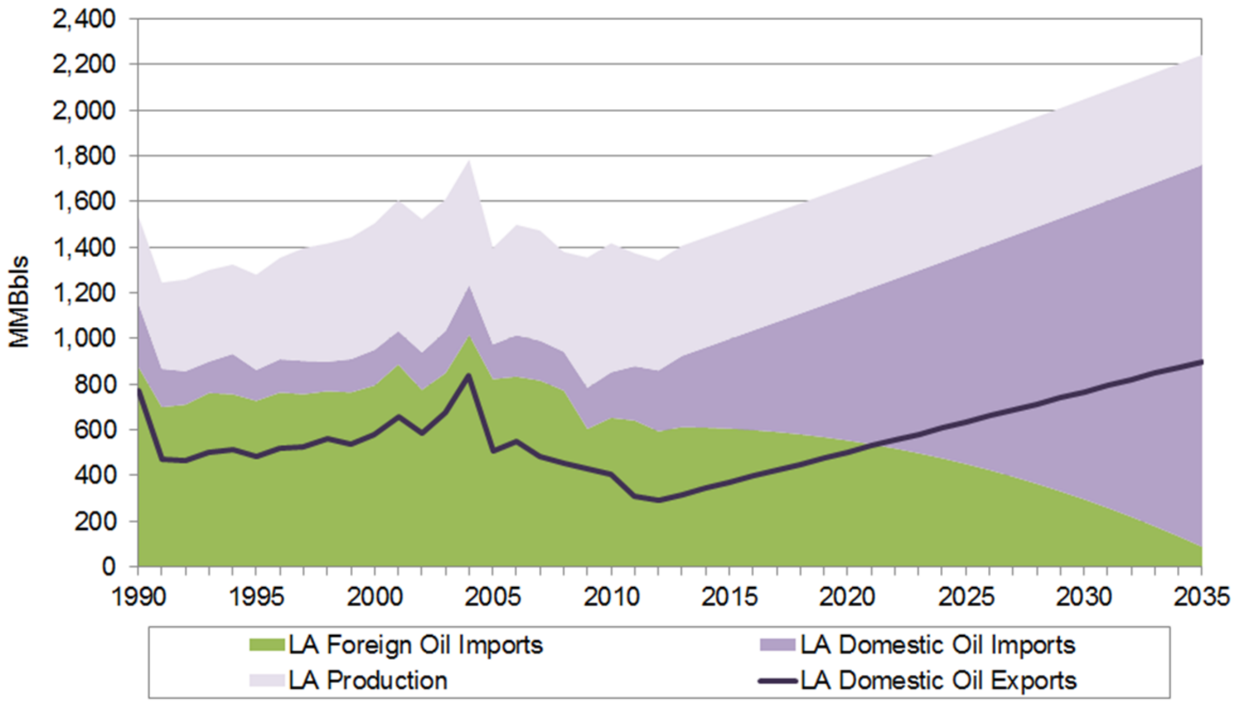

Figure 5.7: Scenario 3 Projected Louisiana Crude Oil Supply Disposition (Increased Domestic Imports, Increased International Exports)

The Scenario 3 supply forecast assumes that Louisiana will play an increasingly important role in transporting, storing, and exporting the newly discovered U.S. unconventional crude oil reserves located throughout the country. Scenario 3 is based upon an assumption that Louisiana will be an important location for both domestic and international exports of crude oil. Scenario 3 assumes that Louisiana's export shares will gradually increase from its current level of 22 percent to a total of 40 percent of the state's projected crude oil disposition. While this may appear to be a large relative export share, the percentage is not unreasonable in relative terms since it is consistent with those export shares observed in 1990.

Scenario 3 has a certain degree of controversy since it assumes that Louisiana will make international exports of crude oil, which currently, are prohibited under U.S. law.[23] However, there has been increasing debate over the past year about whether such a law should be changed given recent forecasts that anticipate the U.S. being self-sufficient in crude oil production and potentially a net exporter of crude oil by 2020.[24] Scenario 3 is developed to explore what a policy change of this nature would have on Louisiana oil spill projections.

Figure 5.7 shows that total crude oil moving through Louisiana will need to increase in order to accommodate the assumed increased export volumes. Thus, the Scenario 3 forecast differs from those provided in Scenarios 1 and 2 since those earlier scenarios focus on a redistribution of supply rather than a significantly increasing level of supply over time. In other words, the Scenario 1 and 2 forecasts both increase at the same rate given by the state's refinery requirements. While the supply sources to meet these refinery requirements differ between the two scenarios, the other level of crude oil supplies do not. These scenarios (1 and 2) are developed primarily to ascertain how the estimated total annual spill volumes could change given a change in supply source, and ultimately, their modes of transportation. All three of these scenarios are used as inputs projecting potential spill frequencies and volumes, which are discussed and provided in the subsequent section of this report.

[23] Energy Policy and Conservation Act of 1975 (EPCA; Pub.L. 94-163, 89 Stat. 871, enacted December 22, 1975.

[24] Daniel Gilbert. 2013. Exxon Presses for Exports, U.S.'s Largest Energy Producer Says North America Has Abundant, Long-Lasting Fuel Supplies. Wall Street Journal. December 11, 2013; Jim Snyder and Mark Drajem. 2013. Oil Industry May Invoke Trade Law to Challenge Export Ban. Bloomberg. Available at: http://www.bloomberg.com/news/2013-11-06/oil-industry-may-invoke-trade-law-to-challenge-export-ban.html; Ed Crooks. US export ban has oil producers over barrel. FT.com. November 2013. Available at: http://www.ft.com/cms/s/0/58d048d6-2530-11e3-b349-00144feab7de.html#axzz2nHm4vO7i; and Patti Domm. 2013. Ship, baby, ship! Calls come for US to export oil. Available at: http://www.cnbc.com/id/101087815.

e. Summary and Conclusions

Three separate supply disposition scenarios have been developed to ascertain (a) how changes in total crude oil supply disposition impacts anticipated oil spills and (b) how differing supply scenarios, and their underlying modes of transportation, can influence total spills. This section of the report focuses primarily upon the various supply disposition scenarios and their underlying rationale.

Scenario 1 assumes that refinery capacity requirements grow at long run average of 0.96 percent, utilization averages at long run average of 91 percent. Production is assumed to be constant over time. Offshore (OCS) production increases to offset on-shore production. Imports are assumed to grow to (a) gradually increasing annual refinery requirements and (b) to offset flat Louisiana crude oil production growth. Exports are assumed to be constant on percent (at 2012 levels) of total supply disposition basis.

Scenario 1 is designed to reflect a “business as usual” outlook based upon current crude oil disposition trends. Continued refinery growth will result in gradually increasing in-state crude oil volumes which in turn, will have implications for total spills. Increasing offshore production will have implications for platform-based spills. Increasing imports will have implications for both vessel as well as pipeline and railway related spills. Exports will be constant in relative terms, but growing in absolute terms likely impacting pipeline and railway-related spills.

Scenario 2 also assumes that refinery capacity requirements grow at long run average of 0.96 percent, and that these refineries run at an annual average utilization of 91 percent. Louisiana-based production is assumed to be constant over time with offshore production growing relative to on-shore production. Domestic imports are assumed to increase while international imports are assumed to fall and ultimately bottom-out at around five percent of the state’s total supply disposition. Scenario 2 assumes that domestic imports, from unconventional production across the country, will offset international imports and actually increase to meet in-state refinery requirements. Exports are assumed to be constant on percent of total supply disposition basis.

Scenario 2 is designed to modify the “business as usual” outlook discussed earlier for Scenario 1. The purpose of this scenario is to ascertain how increasing domestic imports change potential spills. Like Scenario 1, continued refinery growth will result in gradually increasing in-state crude oil volumes which, in turn, will have implications for total spills. Increasing offshore production will have implications for platform-based spills much as it will in Scenario 1. Increasing domestic imports will have implications for both vessel as well as pipeline and railway-related spills, with a slightly higher emphasis on pipeline related spills relative to vessels. Exports will be constant in relative terms, but growing in absolute terms likely continuing to impact pipeline and railway-related spills much as are assumed for Scenario 1. As mentioned earlier, the overall total supply in Scenario 2 does not differ from Scenario 1; instead, the primary difference in these two scenarios rests with the composition of supply moving into the state, not its total level.

Scenario 3 expands the prior two scenario-based forecasts. Scenario 3, while similar in many respects to the other two scenarios, has an important difference in export assumptions. Scenario 3 assumes that Louisiana will become an increasingly important hub for the movement of domestic crude oil production to other states and refineries in the U.S. as well as international export to other countries, which is currently not allowed by U.S. law, but is being debated as a potential policy change in the near future. The purpose of Scenario 3 is to ascertain how total increases in supply, and increases in domestic and international exports, impact Louisiana spill probabilities.

Section 6: Louisiana's Potential Oil Spill Outlook

a. Introduction

Prior sections of this report have discussed historic patterns of oil spill notifications and the state's supply disposition as well as the supply disposition outlook. These historic patterns reveal a clear and significant connection between the supply disposition and oil spill notifications. Unfortunately the use of spill notifications can be limited, as was discussed earlier in Section 3, since the NRC does not collect actual spill specific information nor does it verify or do any post-spill measurement. Nevertheless, the historical patterns of spill notifications serve as the best proxy for spills for the purpose of projecting future demands on the state's spill response and restoration efforts. The relationship between crude oil supply and spill notifications, which will be referenced in this section simply as spills, is based upon the fact that certain crude oil supply sources have unique spill probabilities. As noted in Section 3, most of the state's oil spills (in terms of both frequencies and volumes) are associated with platforms. Thus, an anticipated increase in offshore crude oil production, holding other factors constant, will likely lead to an increase in oil spills from platforms.

Louisiana's potential oil spill outlook, therefore, is based upon the oil spill supply scenarios discussed in Section 5. These oil spill projections are based almost entirely on the nature of each of those supply dispositions. Thus, a change in the nature of each scenario's disposition will likely have an impact on potential oil spill outcomes. Hence, the reason this section is referred to as one encompassing "potential" oil spill outlooks: the potential is being based entirely on (a) the supply disposition assumptions under investigation and (b) a number of longer-run trends.

The outlook for Louisiana oil spills is based upon two different sets of analyses. The first set of analyses examines the long-term trends in both Louisiana oil spill frequencies and volumes to ascertain key elements driving those trends. Because of the rapid pace of change and the inherent issues in the NRC data on spill notifications, the analysis also considers how recent years may differ from long run trends in order to arrive at a reasonable weighting between long-run trends and more recent trends. The second set of analyses identifies spill probabilities for each type of spill and applies a weighted average of short and long run spill probabilities on the various future supply disposition scenarios identified in Section 5. Each supply scenario leads to differing potential oil spill outcomes which are dependent upon the composition of the supply scenario. Thus, the final oil spill projections and outlooks are based upon a combined analysis of both the longer-run trends and the changing nature of the state's crude oil supply disposition.

The long-run analysis is based upon a wide range of statistical models tested against historic oil spill data outlined in Section 4. The statistical modeling analysis identified a number of longer-run trends in Louisiana oil spills. The first clear trend is a significant difference in the rate of growth between large-scale oil spills (those greater than 2,000 Bbls per spill) and those of much smaller volumes (less than 2,000 Bbls per spill). Thus, the long-run trend analysis of Louisiana oil spills has been separated between "large scale" and "small scale" spills. Note that the extremely large size of the DWH spill puts that event in a class of its own considered "extreme" and is therefore excluded from the general review of large-scale spills.

The second important trend identified in the initial statistical analysis was that large-scale spills tend to exhibit a relatively random component that appears to have little dependence on the state's overall crude oil supply disposition, or any other available measure of Louisiana oil industry activity. Among the smaller volume spill sample, a number of distinct and meaningful statistic trends were evident that will be discussed in greater detail below.

b. Small-Scale Oil Spill Trends and Projections

The first step in the small-scale oil spill statistical analysis was to identify potential models across the various different NRC-defined oil spill types (i.e., platform-related, fixed, vessel-related, etc.). Platform-related spills have accounted for approximately 60 percent of all small-scale spills. This relatively large concentration of spills allows for a separate platform-specific statistical specification and analysis over time.

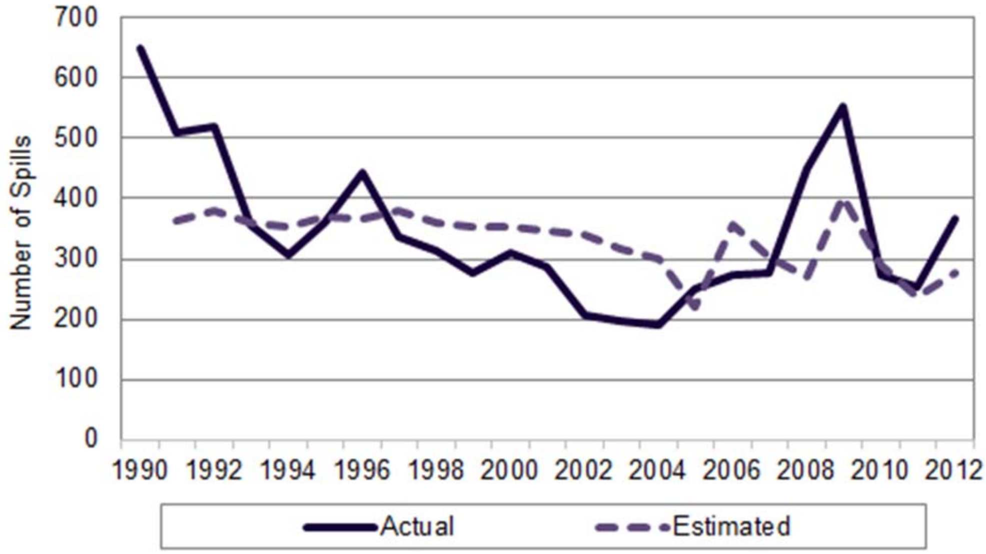

Figure 6.1: Small-Scale (less than 2,000 Bbls) Platform-Related Spills and Trend

Figure 6.1 shows the historic frequency (number) of small-scale platform-related oil spills as well as the trend line from the statistically-estimated model (dotted line). This statistical model estimated the relationship between the change in oil spill frequencies, historic changes in Louisiana offshore production (both in-state and OCS), and a generalized time trend. The statistical results indicate two important and offsetting trends associated with small-scale platform-related oil spills. The base statistical trend is a generally decreasing number of small-volume platform-related oil spills over time. However, as expected, the data show a positive relationship between changes in production and the number of spills. Production changes were modest and positive in the late 1990s and spills show a modest increase relative to the time trend during that time. Starting in 2005, production exhibits significant fluctuations with a large decline that year followed by alternating periods of growth and decline that align fairly well with the number of small-scale oil platform-related oil spills. Comparing the relative sizes of the negative time trend and the potential impact of changes in production under the scenarios in Section 5 suggests that future increases in production will be large enough to lead to a total increase in the number of small-scale platform-related spills.

The cause of this decreasing time trend cannot be directly identified but could likely be the result of a number of different factors that could include increasing regulatory requirements as well as improved performance of the platform operators themselves. Note, however, that these statistical models show a long run decrease in platform-related spill incidents (number of spills), not volumes. A separate model is needed to determine the long run trends in small-scale platform-related oil spill volumes.

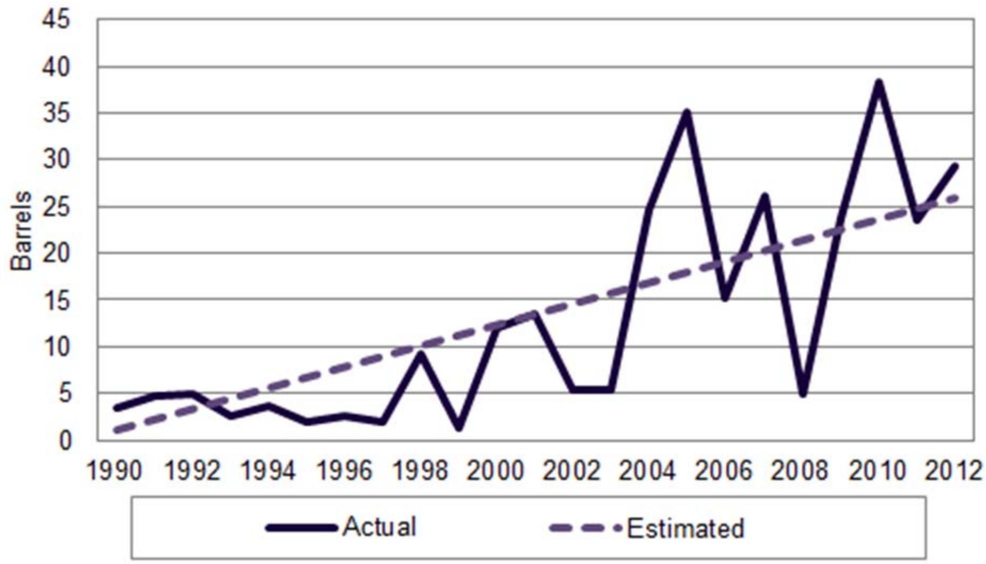

Figure 6.2: Historic Small-Scale (less than 2,000 Bbls) Platform-Related Spill Average Volumes (Bbls per Spill) and Trend

Figure 6.2 provides the results from a separate statistical model used to project small-scale platform-related average spill volumes (spill volumes per incident). The dominant feature of the model of spill volumes is a highly significant time trend. The results from the volumetric platform spill model differ considerably, however, from the one estimating platform-related spill incidents, since the average spill volume model, as shown in Figure 6.2, predicts a dominant increasing trend in average oil spill volumes over time, under BAU assumptions regarding offshore production. The estimated increase in projected average spill volumes will be an important component of the overall oil spill forecast given the predominant role platform-related spills play in the overall number of spills.

The magnitude of the linear time trend is driven up significantly by the post-2004 increase in average spill volumes in this historic trend noted earlier in Section 4. Unfortunately, the simple linear trend does not provide a specific explanation for these increasing spill volumes; the trend simply identifies a change in the reported size of spills over time. The result, however, may have an intuitive explanation given the increased emphasis on deepwater drilling and production on the OCS. Deepwater production wells, as opposed to shallow water wells, tend to have much higher average production rates than smaller producing wells on the OCS. Thus, the reason for the higher average spill volumes could be dependent more upon the increasing production rate of new, larger deepwater wells than on operator performance, although changes in operator performance cannot be ruled out either.

None of the other spill types of Louisiana small-scale oil spills (i.e., pipelines, vessels, rail, fixed, etc.) were large enough, individually, to develop a unique spill-type-specific statistical model; there were simply not enough spill observations within any of these spill type categories to produce a robust or meaningful statistical model on either a frequency or volumetric basis. A composite model of all non-platform small-scale spills was, therefore, developed to examine the longer run trends in these smaller scale spills and spill volumes. The statistical models used for these non-platform spill types are similar in nature to the ones developed for small-scale platform-related spills: however, total spills are modeled as a function of total crude oil production rather than just offshore production as was the case for the platform-based small-scale spill models.

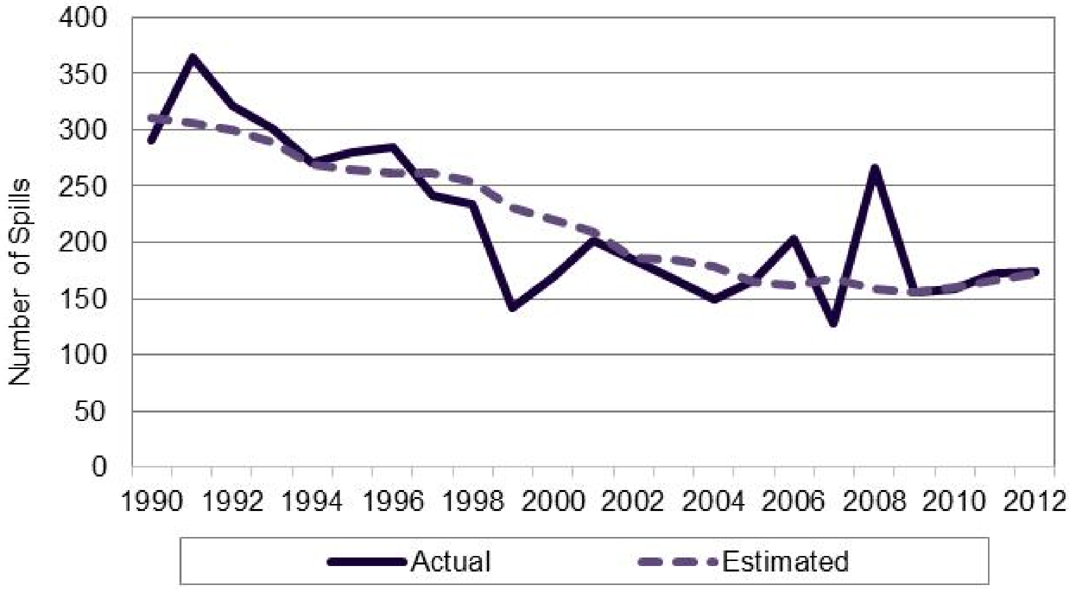

Figure 6.3: Historic Small-Scale (less than 2,000 Bbls) Non-Platform-Related Spill Incidents and Trend

The results for the non-platform-related small spill model yielded results that are similar in nature to the platform-based models on both a frequency and volumetric basis. For instance, Figure 6.3 shows a declining trend over time in all non-platform-related small-scale spills, which appears to be driven by a significant decline in Louisiana in-state production.[25] Because the level of in-state production has a large influence on non-platform related spills, continuing declining levels of in-state production under the supply disposition scenarios of Section 5 can be expected to lead to a continuing decline in the number of non-platform related spills in the future.

[25] See Figure 2.9.

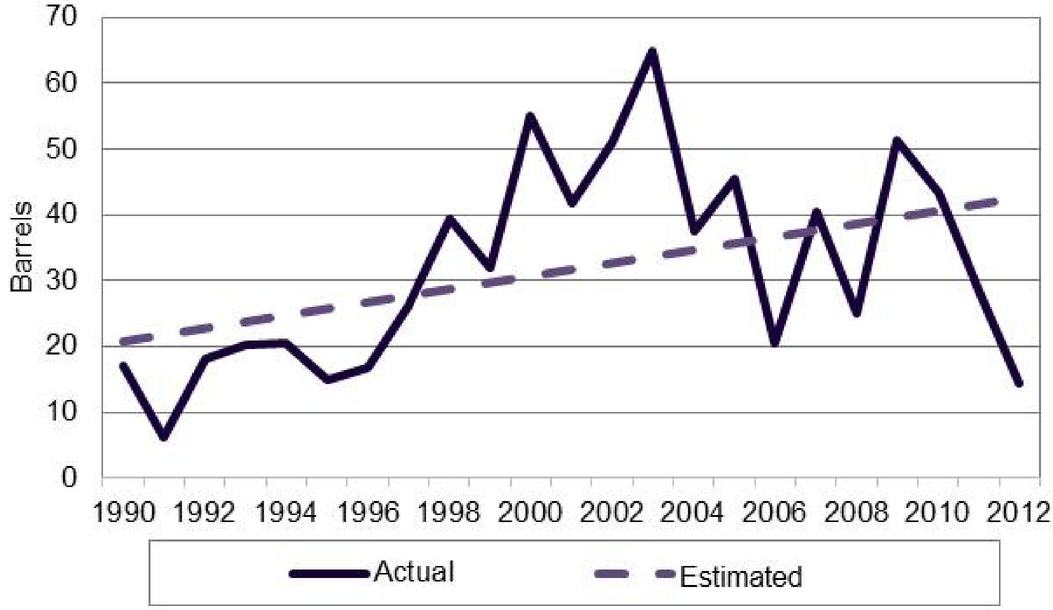

Figure 6.4: Historic Small-Scale (less than 2,000 Bbls) Non-Platform-Related Average Spill Volumes (Bbls per Spill) and Trend

Figure 6.4 plots the historic small-scale non-platform-related spill volumes as well as the trend of the model of best fit. As with platform-related spills, the dominant trend in the historic data is one of increasing volumes over time, despite the fact that those spills are decreasing in number over time. While these spills have been larger on average than platform-related spills among all small-scale spills, the level of growth over time is not quite as high as was seen for platform-related spills.

c. Large Scale Oil Spill Trends and Projections

As noted earlier, large-scale spills (those greater than 2,000 Bbls) were modeled separately given the dominant impact they have on trends in the spill notification data. While these spills comprise, as a group, only one percent of all spill notifications across the sample period, they make up approximately 90 percent of the reported volumes in the NRC database. It should also be emphasized that DWH was excluded from these models given the unique nature of the spill. Further, it is important to note that the 2,000 barrel level separating “large-scale” oil spill incidents from “small-scale” incidents is an empirical artifact. This volumetric break-point does not translate directly into any “large” or “small” effort by LOSCO or the trustee agencies. The segmentation is done merely to look for differences between the frequency and volume of larger and smaller spill notifications.

Historic large-scale spills were subjected to a wide range of alternative statistical model specifications that explored the relationship between these large spills and other measures of crude oil industry activity. None of the models were able to produce a clear, statistically significant relationship between specific types of oil and gas activity and the occurrence of large-scale spills given what appears to be an inherent randomness in the way large-scale oil spills occur in Louisiana (at least when considering the relatively low frequency of these events over the study period). However, a simple time trend was highly significant indicating an increase in the number of large-scale spills over time as shown in Figure 6.5.

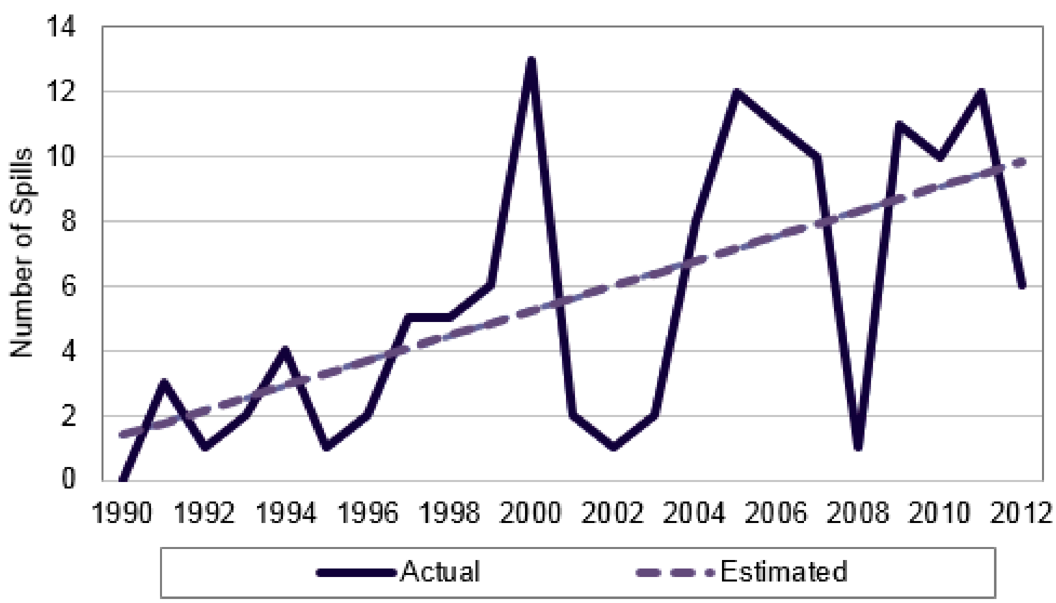

Figure 6.5: Historic Large-Scale (greater than 2,000 Bbls) Oil Spill Incidents and Trend

Figure 6.6 provides the historical large-scale average spill volume as well as historic trend. As with the smaller spill types, there is an unambiguous trend towards larger volumes per spill.

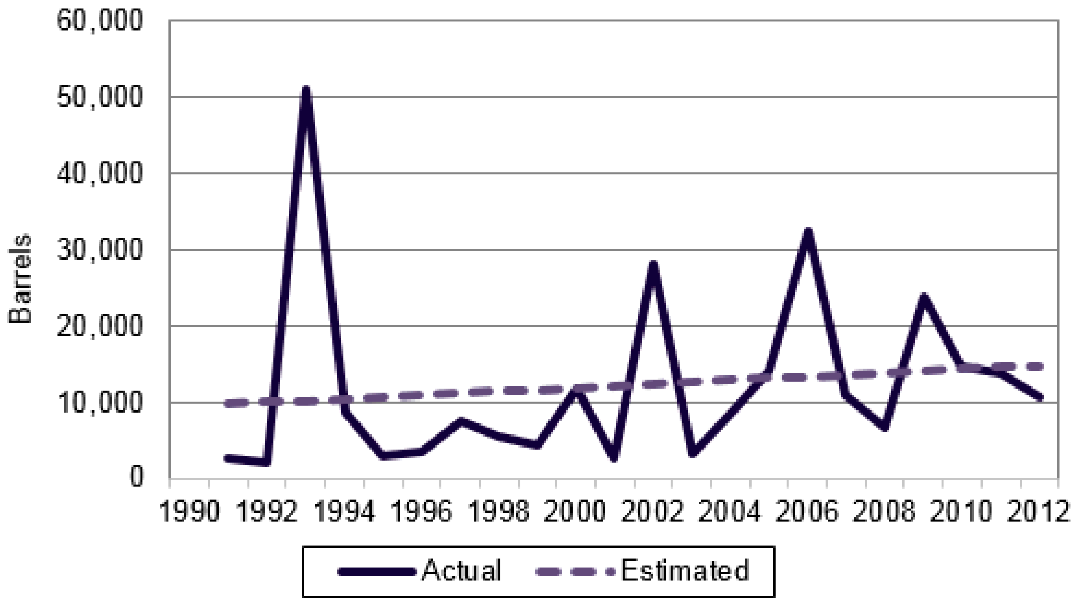

Figure 6.6: Historic Large-Scale (greater than 2,000 Bbls) Oil Spill Average Volumes (Bbls per Spill) and Trend

As noted previously, these comparisons of average volumes between earlier and later periods exclude the effects of the DWH spill. Adding that single event would lead to a much higher projected time trend that differs significantly from a pre-DWH trend. Therefore, while the data are not sufficient to provide a robust statistical model capturing how spill frequencies or volumes may be changing on an aggregated basis, the influence that the DWH spill would have on the analysis were it included supports a focus on more recent time periods as indicative of future trends. Therefore, the future spill scenarios are assessed using a weighted average of long-run and recent trends in spill frequencies and volumes, which are discussed in detail in the following section.

d. Historic Oil Spill Sample Probabilities and Scenario Adjustment Factors

While the general oil spill trends discussed above form the basis for assessing the likely impacts of changes to Louisiana's supply disposition, the average probability of a spill was calculated for several benchmark historical periods to assist in providing a picture of how risks are allocated across types of activities. These probabilities also provide a basis for incorporating some of the nuances of potential changes to the supply of oil reflected in the three future disposition scenarios. The average probabilities are calculated for the pre-DWH period (1990-2009), the post-DWH period (2010-2012), and the total sample period (1990-2012). Because of the uniqueness of the DWH spill, those volumes have been omitted from the primary analysis. Then, a weighted average of these time periods is used to arrive at the expected future spill scenarios using a weight of 60 percent on the post-DWH period and 40 percent on the pre-DWH period. These weights are consistent with those used in calculating costs and the patterns determined based on the review of small and large spills discussed above. Table 6.1 shows the probability of one barrel of oil being spilled for each barrel of total supply by spill type to provide a general picture of the prevalence of each type of spill and outline the methodology selected for projecting total oil spill volumes under each scenario.

Table 6.1: Average Oil Spill Probabilities by Type
(Bbls spilled per Bbls Total Crude Oil Supply)

	Type of Spill						
	Platform	Fixed	Pipeline	Vessel	Storage	Other	Total
	(Percent)						
1990-2009	0.0012%	0.0020%	0.0007%	0.0006%	0.0002%	0.0010%	0.0056%
2010-2012	0.0068%	0.0019%	0.0008%	0.0001%	0.0003%	0.0000%	0.0100%
Weighted Average	0.0046%	0.0019%	0.0008%	0.0003%	0.0003%	0.0004%	0.0082%

In general, platform spills are most likely to occur followed by fixed and pipeline spills. Most spill types show a relatively stable probability of spill in the early and later time periods with the exception of platform spills, which have become increasingly more likely over the last several years. Collectively, the other spill types show an average decline in probability of spill from the earlier period to the later period, though some spill types increased slightly.

These patterns are consistent with the trends presented previously. Long-run trends in the number of smaller spills have been relatively flat in recent years, but the future outlook in all three supply disposition scenarios suggests that number of spills should rise. In addition, the reported volume per spill for smaller platform-based spills has steadily risen and should continue to do so under all three scenarios without any other structural or technological change shifting the trend downwards. Conversely, the average reported volume per spill for smaller spill types has increased slightly, although recent years have been below that trend. Finally, across all types of large spills, the number of spills and, in particular, the volume per spill has grown in recent years. Collectively, these results support more reliance on recent data. However, over such a short time frame, the data do not provide a reliable trend when using the last three years alone. Therefore, a weighted average of the two results (before and after DWH) is used to assess the future likelihood of spills under each scenario. For the final analysis, the general probabilities presented in Table 6.2 are further refined so that each spill type is based on the specific types of oil disposition that are most closely associated with the type of spill (e.g. platform spill probabilities are calculated based on Louisiana production of oil and gas for purposes of carrying out scenario calculations).

e. Projected Louisiana Oil Spills

Table 6.2 provides a summary of projected oil spill volumes under differing supply scenarios and oil spill occurrence probabilities per volume of oil produced or moving into or through the state. Each supply outlook is then subjected to three differing sets of spill probabilities to estimate the range of potential spills that may arise from the increasing in-state crude oil volumes. The three sets of probabilities are based upon those observed prior to the DWH incident (pre-DWH), those observed after the DWH incident (post-DWH), and a weighted average between the two time periods where a 60 percent weight has been placed on the post-DWH spill probabilities and a 40 percent weight placed on the pre-DWH spill experience.

Table 6.2: Projected Louisiana Oil Spills By Scenario[26]

	Scenario 1			Scenario 2			Scenario 3		
Year	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)
2013	73.29	131.20	108.03	73.39	131.73	108.39	74.00	132.28	108.97
2014	73.00	130.94	107.76	73.21	132.02	108.50	74.58	133.28	109.80
2015	72.74	130.70	107.52	73.07	132.34	108.63	75.20	134.32	110.67
2020	71.83	129.79	106.61	72.75	134.49	109.80	78.73	140.23	115.63
2025	71.49	129.30	106.18	73.10	137.49	111.73	82.94	147.19	121.49
2030	71.66	129.18	106.17	74.04	141.32	114.41	87.74	155.12	128.17
2035	72.27	129.38	106.54	75.52	145.98	117.79	93.10	163.97	135.62
Cumulative Total:	1,655.39	2,983.13	2,452.03	1,690.81	3,163.89	2,574.66	1,899.53	3,371.56	2,782.75
Annual Average:	71.97	129.70	106.61	73.51	137.56	111.94	82.59	146.59	120.99
Cumulative Percent Increase:	-1.39%	-1.38%	-1.38%	2.90%	10.82%	8.67%	25.80%	23.96%	24.46%
Annual Avg Percent Increase:	-0.06%	-0.06%	-0.06%	0.13%	0.49%	0.39%	1.17%	1.09%	1.11%

While some of the changes in sources of crude oil will influence where those spills occur, the relative similarity in the overall size of projected spill volumes is driven by the large number of platform spills that are expected and the continued growth of offshore development, which is a key component of each scenario. It is important to note that while the post-DWH time period is examined, due to the recent changes in spill probabilities, those spill probabilities exclude the DWH incident itself. So each forecast should be interpreted as the outlook for what can be loosely referred to as "typical spills" not extraordinarily large spill events like DWH.

f. Summary and Conclusions

The results of the spill projection modeling indicate that the projected number of Louisiana-based spills could be varied, but only moderately across the different supply scenarios included in this analysis. Spills are, however, influenced by changes in the supply disposition since different sources of oil spills have different spill probabilities. In addition, the analysis is more sensitive to assumptions regarding how heavily to weigh the most recent years of increased activity. Even excluding the effects of the DWH spill, it is clear that the frequency and size of spills has increased over the past several years and could continue to increase short of some change in regulation, offshore operating practices, or technologies that undermine these recently-observed trends. In order to avoid placing too much emphasis on these recent years of data, a weighted average of

[26] Spill outlooks after 2015 are summarizes as the annual amount for every five years.

this recent trend and the longer-run more moderate trend is used to provide a reasonable set of future spill scenarios to serve as a basis for assessing the state's future funding needs for response, assessment and restoration related to oil spills, which is explored in greater detail in Section 7.

Section 7: Contingency Fund Adequacy

a. Introduction

One of the primary purposes of this research is to determine whether or not the recently-modified Oil Spill Contingency Fund fee mechanism, which assesses a quarter-cent per barrel fee on all crude oil received by a refinery for storage or processing, is adequate given anticipated spill volumes under normal industry operating conditions, as well as those that could arise under an extreme event such as the DWH spill. For purposes of this analysis, "adequacy" is defined as the ability of Fund revenues to cover anticipated annual agency costs, <u>excluding</u> any other sources of funding or reimbursement including specific direct agency assessments or NPFC reimbursements. This is a conservative definition and was chosen to assess the state's potential annual liability if no other funding sources are available. Thus, the adequacy analysis included in this report can be thought of as a form of "worst-case" scenario where Louisiana has no immediate financial recourse to fund its agency costs, except through the Fund and the annual fee revenues that are contributed to this Fund.

Two types of adequacy analyses have been conducted in this section of the report. The first adequacy analysis is defined as a "back-cast" that estimates potential Fund balances that could have arisen in the past if the funding mechanism created by Act 394 were in place. The differences between the funding mechanisms (two-cents per barrel at a marine terminal and one-quarter cent per barrel at a refinery) are considerable, and have been summarized below in Table 7.1.

Table 7.1: Louisiana Oil Spill Contingency Fund: Differences in Revenue Collection Regimes

Legislation		Volumetric Fee ($/Bbl)		Fee Trigger, Minimum Balance		Fee Trigger, Maximum Balance		Fund Balance Cap
			-------------------	($ Million)	-------------------			
Act 7 (1991)	$	0.0200*	$	8.0	$	15.0	$	30.0
Act 740 (1995)	$	0.0200*	$	8.0	$	10.0	$	30.0
Act 1082 (2003)	$	0.0200*	$	5.0	$	7.0	$	30.0
Act 633 & Act 962 (2010)***	$	0.0200*	$	5.0	$	-	$	-
Act 394 (2013)	**$**	**0.0025****	**$**	**-**	**$**	**-**	**$**	**-**

***** The fee may be levied at the rate of four cents per barrel ($0.0400/Bbl) if certain conditions provided for in the law are met. La. R.S. 30:2486(C) (effective until June 30, 2014).

** The fee may be levied at the rate of one-half cent per barrel ($0.0050/Bbl) if certain conditions provided for in the law are met. La.R.S. 30:2485(C) (effective July 1, 2014). Notwithstanding these conditions, the fee will be levied at the rate of one-half cent per barrel until December 31, 2015. See Act 394.

******* In 2010, the fee trigger associated with the maximum balance as well as the Fund cap was removed, but only during emergencies or declared disasters.

The second type of adequacy analysis estimates potential Fund balances and liabilities on a forward-looking, or projected basis, using the three different crude oil disposition supply and spill scenarios discussed in detail in Sections 5 and 6 of this report. This simulation is dependent upon the assumptions included in both the future state crude oil supply disposition and the relationship of that disposition to future spills.

Both sets of analyses included in this section examine Fund adequacy based upon a level of spills that is consistent with past historic trends and proportional to the volume of oil moving through the state. The Fund financial analysis included in this section will not examine Fund adequacy relative to “extreme” oil spill events like the one experienced during the DWH spill. Fund adequacy relative to extreme oil spill events, like the DWH spill, will be considered in greater detail in Section 8, which provides the report’s conclusions and recommendations.

b. Historic Fund Adequacy: Back-cast Analysis

The first step in the back-cast analysis is to simulate prior-period revenue collections using the recently modified fee structure outlined in Table 7.1. Figure 7.1

provides estimates of the potential past annual revenue collections had the current oil spill funding approach been in place since 1992.[27] Potential annual revenues are provided in both nominal (i.e., non-inflation adjusted) and constant dollar terms (2012 is the base year). Annual revenue estimates range from a low of around $1.9 million in 1992, to a high of $2.6 million in 2012. Annual revenues are estimated to have generally risen, in nominal terms, between 1992 and 2012 at an annual average rate of about 1.6 percent. However, Figure 7.1 shows that had the current fee structure been in place since 1992, annual Fund revenues would have fallen in real, inflation-adjusted terms by over 11 percent during that same period of time since inflation was generally faster than the nominal 1.6 percent annual average increase.

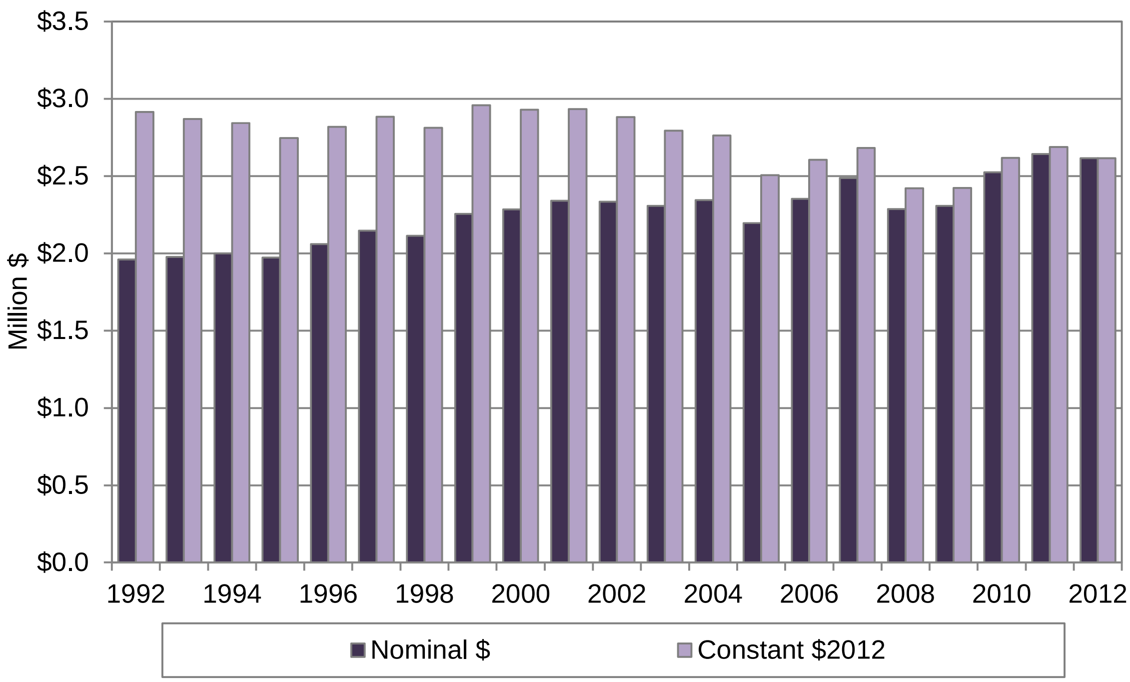

Figure 7.1: Back-cast Analysis, Estimated Louisiana OSCF Annual Revenues (Nominal and Constant Dollar, 2012=100)

Figure 7.2 compares estimated annual fee revenues that would have been collected under the new fee structure to those actually collected between 1992 and

[27] Figure 7.1 multiplies the historic Louisiana refinery crude oil requirements (see Figure 5.4) by the $0.0025 fee per barrel to generate the estimated annual revenue.

2009 in both nominal and constant dollar terms. The years associated with the DWH spill (2010-2012) have been excluded from this analysis. A negative number in Figure 7.2 indicates that more money was actually collected than would have been collected in that year under the new fee mechanism, whereas a positive number indicates the new fee mechanism would have generated more revenue than was actually collected. The difference in annual fee revenue between historic and current collection schemes moves up and down considerably, primarily due to the Fund revenue caps and floors that were in place historically that impact the actual fee revenue collections, and were discussed in greater detail in Section 4.

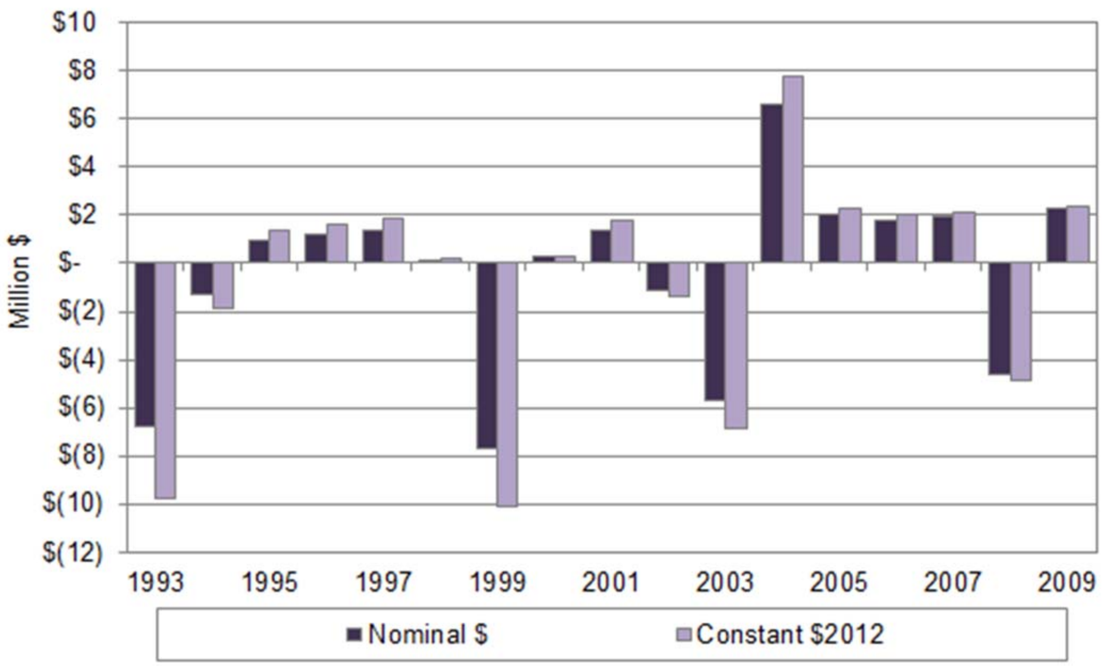

Figure 7.2: Back-cast Analysis, Comparison of Actual less Estimated Louisiana OSCF Annual Revenues (Nominal and Constant Dollar, 2012=100)

Overall, the new fee mechanism would have collected less total fee revenues (on both an inflation and a non-inflation adjusted basis), despite being expanded to a larger volume of crude oil (i.e., all crude oil transported to Louisiana refineries as opposed to just the oil associated with marine terminals). In other words, the sum of the negative bars in Figure 7.2 is greater in absolute value than the positive bars provided in the chart (positive bars are the potential revenue gains based on the new fee structure). The new fee mechanism would have collected an estimated $7.1 million less in total fee revenues, on a nominal basis, and $11.2 million less in total fee revenues, on an inflation-adjusted basis, relative to the historic oil spill fee structures of the entire back-cast period. This revenue deficiency, as will be seen in projected scenario analyses, would likely have resulted in the Fund being inadequate to have even met normal spill events, much less those associated with an extreme oil spill event like the DWH spill.

The second part of the back-cast analysis estimates the annual year end ("YE") balances under the new fee revenue mechanism. These YE Fund balances are estimated as the net difference between (a) the carried-over prior period Fund balances, (b) the estimated annual fee revenue collections (from the new fee revenue mechanism) and (c) the actual annual state agency expenses (discussed in greater detail in Section 4). Additional sources of revenues reported in any given year, such as any annual federal or state contributions, or reimbursements paid by responsible parties, are not included in this analysis in keeping with the "adequacy" definition described earlier. In addition, the years associated with the DWH and its aftermath are generally excluded from this Fund balances back-cast since it is clear that annual revenue collections of $2.5 million alone would not have been sufficient to meet the several hundred million dollars in state agency expenses associated with this catastrophic event. Lastly, this back-cast analysis of Fund balances assumes an initially "seeded" Fund balance of $1.5 million, where this seed is estimated as the difference between what would have been collected from refinery inputs in 1991 (at the quarter-cent per Bbl fee) less an estimated annual agency average cost. This assumption will be relaxed in the later parts of the back-cast analysis.

Figure 7.3 graphs the estimated Fund balances (nominal, constant dollar terms) in any given year based upon the new funding regime and an initial Fund balance of

$1.5 million.[28] The chart shows that the Fund would have likely been adequate to pay for operations between 1992 and 1996. Fund balances are estimated to have been robust during the 1992-1995 time period yet would have likely decreased at a rapid rate after 1995. The Fund balance is estimated to have become inadequate (i.e., negative balance) in 1997, and is estimated to have remained inadequate, assuming the current fee assessment mechanism was in place.

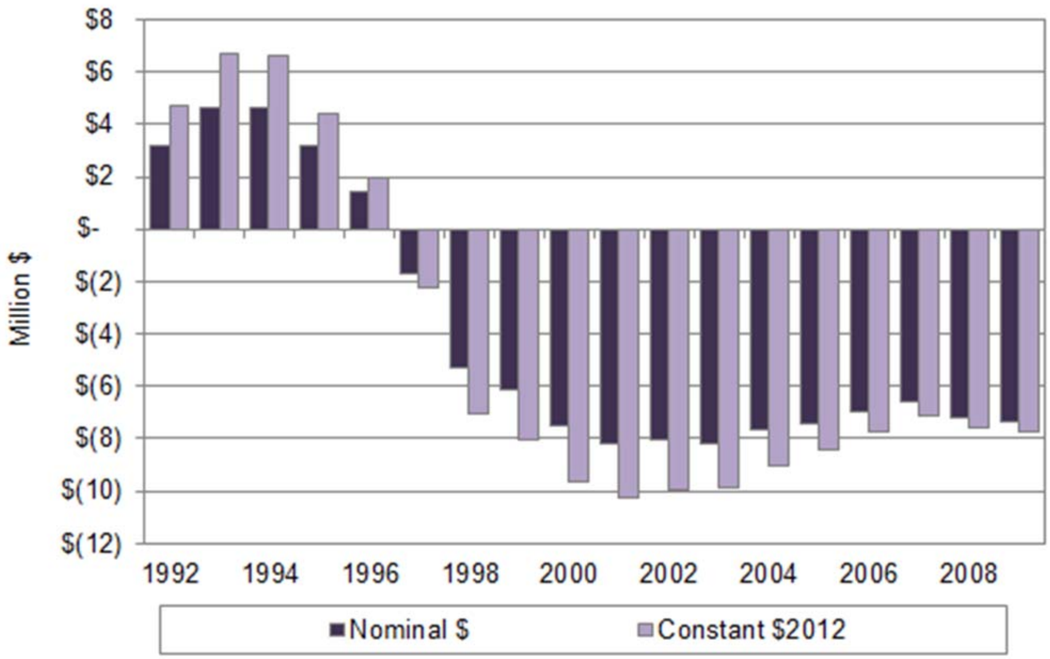

Figure 7.3: Back-cast Analysis, Estimated Louisiana OSCF Annual Balances with Initial $1.5 Million Seed, Pre-DWH (Nominal and Constant Dollar, 2012=100)

Figure 7.4 provides the same back-cast analysis estimating Fund balances without the initial $1.5 million seed balance that was assumed in the prior back-cast analysis. The chart shows that the Fund would have generally been adequate to sustain state agency activities for only a four year period (1992-1995). The Fund would have become inadequate to support state agency activities beginning in 1996, and

[28] Figure 7.3 estimates the annual balances that could have arisen had the new fee structure (and its corresponding annual revenues) been in place holding annual historic agency costs constant (see Figure 4.4 for historic annual agency costs).

would have remained significantly inadequate (negative balances generally over $7 million) for every year prior to the DWH without additional sources of financial support.

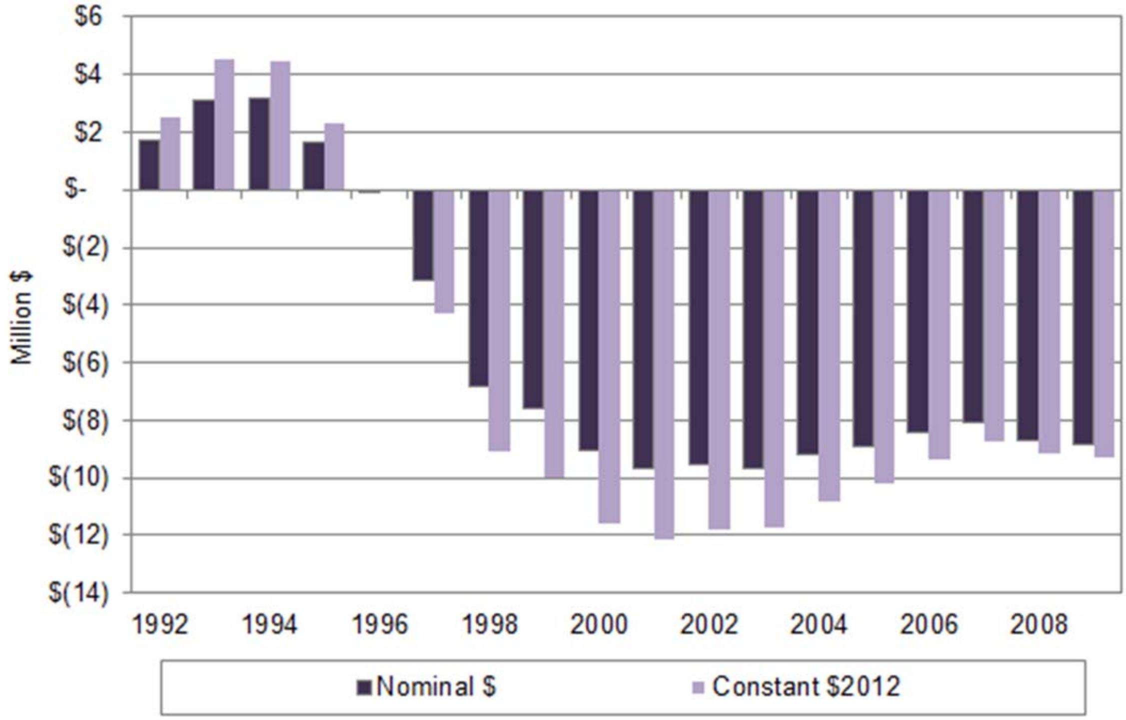

Figure 7.4: Back-cast Analysis, Estimated Louisiana OSCF Annual Balances, No Initial Seed Balance, Pre-DWH (Nominal and Constant Dollar, 2012=100)

c. Projected Fund Adequacy: Scenario/Spill Outcome Analysis

The projected Fund adequacy analysis is based upon three sets of information: (1) the crude oil supply disposition scenario analysis discussed in Section 5; (2) the oil spill outcome analysis and projections discussed in Section 6; and (3) the agency costs analysis (i.e., state agency cost per Bbl-spilled) discussed in Section 4. Recall that three crude oil supply scenarios are defined in Section 5 that include: (1) a BAU scenario; (2) a high domestic import scenario; and (3) a high domestic/international export scenario.

Three potential oil spill outcomes are assessed within each crude oil supply scenario. These three potential oil spill outcomes are based upon a set of historic spill probabilities calculated from: (1) pre-DWH reported spill data; (2) post-DWH spill data that includes the DWH time period (but not the specific DWH volumes); and (3) a weighted average of both pre- and post-DWH time period spill data where a 60 percent weight is applied to the post-DWH period and a 40 percent weight is applied to the pre-DWH data, as discussed in greater detail in earlier sections of this report.

In addition, two separate sets of agency costs (state agency cost per Bbl-spilled) are utilized in this analysis, which were defined earlier in Section 4. These costs are referred to as "unit costs" since they are standardized to cost per barrel-spilled terms. The volume of spills in any given scenario is then multiplied by the various unit cost assumptions to arrive at a total annual agency costs.

Lastly, Fund "adequacy," in the following analyses, is defined as having sufficient revenues in each year to cover anticipated costs over the span of the time period examined (2014-2035). Assuming a "zero" balance definition for Fund adequacy implies no buffer or margin to account for any uncertainty or risks associated with either agency costs or fee revenues: this is clearly not the case in reality and it may be necessary to include some form of additional financial "cushion" to guard against these uncertainties, as well as differences in the time value of money associated with time periods when positive or negative Fund balances arise due to the timing of fee collections and expenditures.

Revenue Projections Summary

Annual revenues under the new fee structure of a quarter cent per barrel delivered to refinery are estimated to grow from $2.7 million in 2013 to $3.3 million by 2035, or by an annual average rate of some 1.1 percent in 2013-dollar terms.[29] This fee revenue growth will be constant across all three potential oil spill outcomes, and across all three crude oil supply scenarios, since (1) the fee is fixed, and (2) the refinery

[29] No inflation/cost escalation assumptions have been utilized in this analysis. The role of inflation in the assessment of Fund revenues is discussed in greater detail in the discussion of policy options and in Appendix B.

volumetric requirements forecast, while growing over time, is the same for each crude oil supply disposition scenario. Further, annual fee revenues under the new fee structure are estimated to be lower than they would have been if the prior fee structure were in place.

Figure 7.5 compares projected fee revenues under the new versus prior fee structure. The current/new fee structure is a function of refinery requirements and is, thus, insensitive to the various supply scenarios examined in this report. The prior fee structure, however, is a function of supply source; primarily changes in marine-based crude oil supplies, which vary across the three scenarios. Thus, there is one series provided in Figure 7.5 for the new/current fee structure at the regular rate as well as one at the emergency rate (see below) and three series (one for each supply scenario) for the estimated revenues that may have been collected under the older fee structure.

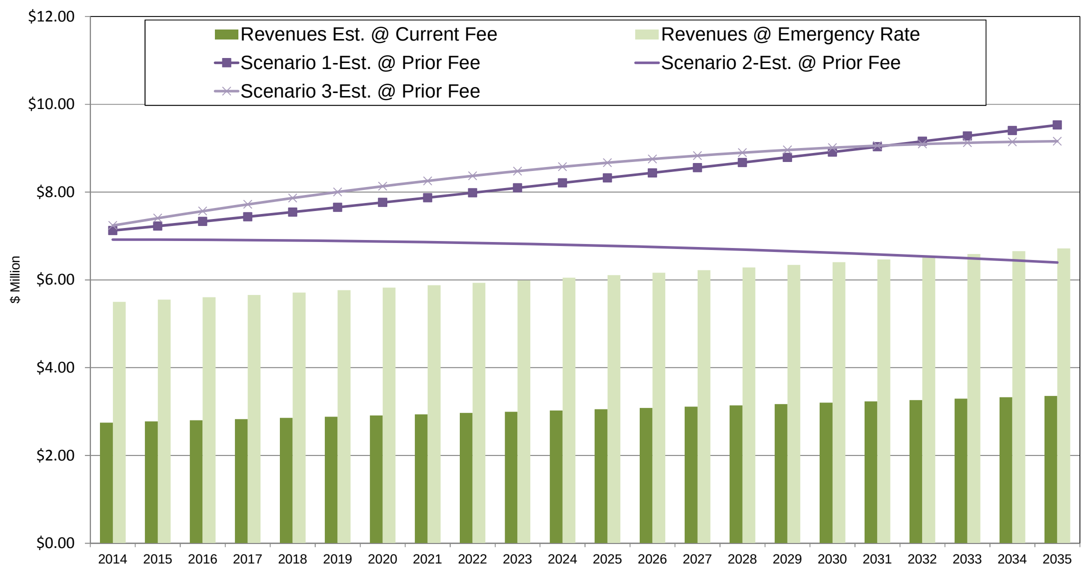

Figure 7.5: Revenue Comparison Under Prior and Current Fee Structure (Constant Dollar, 2012=100)

Figure 7.5 shows that revenue collections under the prior fee structure (assuming no Fund or annual revenue caps) are higher than the current fee structure for each year in the forecast period as well as the likely annual revenues that would be collected under the half-cent per barrel emergency rate currently allowed by statute.[30] Annual revenues estimated under the current fee structure are anticipated to range between $2.7 million to $3.3 million per year and only increase as refinery demand increases (since current fees are assessed on refinery deliveries). Annual revenues are estimated to double (ranging from $5.4 million to $6.6 million) if the emergency rate were to be put into place, and maintained, throughout the forecast period.

Annual fee revenues under the prior fee structure are estimated to range from an annual low of $6.2 million to a high of over $9.5 million depending upon the supply scenario. The annual differences in revenue projections (under the prior fee structure and current fee structure) range from between $2.4 million per year to as high as $5.3 million depending upon the supply scenario examined. The relatively smaller difference between Scenario 2 annual revenue projections under the prior method, and current projected revenues, is based upon the assumption that marine-based imports will decrease on relative basis as international imports of oil decrease.

Adequacy of Fund Revenue

While revenues associated with the current fee structure are relatively consistent, estimated annual agency costs do vary and are a function of both (a) the assumed spill scenario and (b) the assumed spill unit costs. Changes in these costs will directly impact the projected Fund adequacy since annual revenues are the same across all three scenarios and strictly a function of estimated crude oil deliveries to refineries. The balance between estimated Fund revenues and agency costs are provided in the following two tables for spill outlooks. Each table shows the effect of the three oil supply scenarios and differing spill probabilities for the relevant cost per barrel spilled assumption.

[30] Act 394 defines a number of conditions for the emergency rate to be set into place. The estimated fee revenues provided in Figure 7.5 assume those conditions are met every year to examine the upper boundary of potential revenues that may be collected under existing law.

Table 7.2 shows annual net revenue (revenues minus expenses) at several benchmark time periods based on the current fee of a quarter cent and an agency cost per barrel spilled of $44.61 calculated from the five year period right before the DWH spill. In general, the quarter cent fee falls short of covering expected agency costs. Using the more conservative spill probability assumption based on pre-DWH trends, the annual imbalance is more modest. However, even in scenario 1, which provides the most conservative outlook for the number of spills, fee revenue does not cover projected expenses.

Table 7.2: Annual Net Fund Revenue: Quarter Cent Fee and 2005-2009 Costs

	--------------- Scenario 1 ---------------			--------------- Scenario 2 ---------------			--------------- Scenario 3 ---------------		
Year	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)
2015	$ (592,537)	$ (3,242,594)	$ (2,182,571)	$ (607,244)	$ (3,317,651)	$ (2,233,488)	$ (704,849)	$ (3,408,098)	$ (2,326,799)
2020	$ (848,895)	$ (3,847,351)	$ (2,647,969)	$ (896,554)	$ (4,090,569)	$ (2,812,963)	$ (1,205,731)	$ (4,387,269)	$ (3,114,654)
2025	$ (1,177,319)	$ (4,561,034)	$ (3,207,548)	$ (1,271,276)	$ (5,040,532)	$ (3,532,829)	$ (1,847,183)	$ (5,608,188)	$ (4,103,786)
2030	$ (1,591,256)	$ (5,400,685)	$ (3,876,914)	$ (1,748,855)	$ (6,204,971)	$ (4,422,525)	$ (2,656,731)	$ (7,118,911)	$ (5,334,039)
2035	$ (2,106,670)	$ (6,386,075)	$ (4,674,313)	$ (2,350,292)	$ (7,629,369)	$ (5,517,738)	$ (3,667,231)	$ (8,977,824)	$ (6,853,586)

A second agency cost per barrel spilled is calculated using data covering all years leading up to the DWH spill, except the extreme outlier years, 1995 and 1996. This average cost per barrel of $83.13 results in an even greater annual imbalance between fund revenues and agency costs across all scenarios and spill probability assumptions. Table 7.3 shows fairly significant revenue shortfalls in 2015 that only grow over time as projected agency costs grow more rapidly than fee revenues.

Table 7.3: Annual Net Fund Revenue: Quarter Cent Fee and 1993-2009 Costs

	--------------- Scenario 1 ---------------			--------------- Scenario 2 ---------------			--------------- Scenario 3 ---------------		
Year	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)
2015	$ (3,464,682)	$ (8,403,020)	$ (6,427,685)	$ (3,492,089)	$ (8,542,886)	$ (6,522,567)	$ (3,673,973)	$ (8,711,433)	$ (6,696,449)
2020	$ (4,057,665)	$ (9,645,237)	$ (7,410,208)	$ (4,146,475)	$ (10,098,471)	$ (7,717,672)	$ (4,722,622)	$ (10,651,366)	$ (8,279,868)
2025	$ (4,790,568)	$ (11,096,066)	$ (8,573,867)	$ (4,965,655)	$ (11,989,602)	$ (9,180,023)	$ (6,038,849)	$ (13,047,421)	$ (10,243,992)
2030	$ (5,688,729)	$ (12,787,537)	$ (9,948,014)	$ (5,982,412)	$ (14,286,311)	$ (10,964,751)	$ (7,674,223)	$ (15,989,421)	$ (12,663,342)
2035	$ (6,782,180)	$ (14,756,780)	$ (11,566,940)	$ (7,236,165)	$ (17,073,639)	$ (13,138,649)	$ (9,690,259)	$ (19,586,462)	$ (15,627,981)

While the recent law revision established a new fee rate of one quarter cent per barrel under normal conditions, the fee will be levied at the rate of one half cent through December 31, 2015. In addition, the one half cent fee can be levied if certain conditions are met including a fund balance of less than five million dollars and either a large spill has recently occurred or the reduced balance is due to expenditures for certain activities as outlined by the law. Therefore, an alternative adequacy analysis is conducted assuming that the half-cent rate is in place. It is likely that future fee collections will oscillate between the two rates as future spill conditions and agency expenditures change. Therefore, this adequacy analysis provides a best possible outlook under the existing fee structure as well as providing guidance on the appropriate overall fee level under any conditions. Table 7.4 shows the annual net revenue based on the higher fee of a half cent per barrel and the lower agency cost per barrel spilled of $44.61 calculated from the five years right before the DWH spill. With this higher level of fee revenue, the overall level of revenues and expenses is much more balanced across the oil supply scenarios and assumptions about probability of spill. Across all three oil supply scenarios, revenues are slightly above anticipated agency costs using the pre-DWH spill probabilities, agency costs exceed revenues using the post-DWH spill probabilities, and are fairly well balanced using the weighted average spill probability with revenues only slightly exceeding expected agency costs in early years, but agency costs growing more rapidly than revenues leading to modest deficits beyond five to ten years from now. Considering the continued need for additional revenues to support DWH-related activities, which are not formally addressed in this section, the modest revenue surplus in early years suggests that this higher fee is not likely to lead to the accumulation of significant excess revenues under the lower agency cost per barrel assumption of $44.61.

Table 7.4: Annual Net Fund Revenue: Half Cent Fee and 2005-2009 Costs

	Scenario 1			Scenario 2			Scenario 3		
Year	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)
2015	$ 2,141,156	$ (508,901)	$ 551,121	$ 2,126,448	$ (583,958)	$ 500,205	$ 2,028,844	$ (674,405)	$ 406,894
2020	$ 1,768,460	$ (980,171)	$ 219,211	$ 1,970,626	$ (1,223,390)	$ 54,216	$ 1,661,449	$ (1,520,090)	$ (247,474)
2025	$ 1,340,496	$ (1,553,850)	$ (200,364)	$ 1,735,909	$ (2,033,348)	$ (525,645)	$ 1,160,001	$ (2,601,004)	$ (1,096,602)
2030	$ 849,799	$ (2,246,660)	$ (722,888)	$ 1,405,170	$ (3,050,946)	$ (1,268,500)	$ 497,294	$ (3,964,885)	$ (2,180,013)
2035	$ 287,890	$ (3,078,038)	$ (1,366,276)	$ 957,745	$ (4,321,332)	$ (2,209,701)	$ (359,194)	$ (5,669,787)	$ (3,545,550)

A comparison of annual revenues and projected agency costs using the higher half cent fee and higher agency cost per barrel assumption of $83.13 calculated across the full range of pre-DWH data is shown in Table 7.5. Despite the higher fee collection, annual revenues are found to be inadequate using the higher agency cost per barrel assumption. Even with the most conservative oil supply scenario and lowest spill probability assumptions, agency costs are projected to exceed revenues in 2015 and that differential only grows over time as expenses grow more rapidly than revenues.

Table 7.5: Annual Net Fund Revenue: Half Cent Fee and 1993-2009 Costs

	Scenario 1			Scenario 2			Scenario 3		
Year	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)	Pre-DWH Probability-Based (MBbls)	Post-DWH Probability-Based (MBbls)	Weighted Average (MBbls)
2015	$ (730,989)	$ (5,669,327)	$ (3,693,992)	$ (758,396)	$ (5,809,193)	$ (3,788,874)	$ (940,281)	$ (5,977,741)	$ (3,962,757)
2020	$ (1,190,485)	$ (6,778,057)	$ (4,543,028)	$ (1,279,296)	$ (7,231,291)	$ (4,850,493)	$ (1,855,442)	$ (7,784,187)	$ (5,412,689)
2025	$ (1,783,384)	$ (8,088,882)	$ (5,566,683)	$ (1,958,471)	$ (8,982,418)	$ (6,172,839)	$ (3,031,665)	$ (10,040,237)	$ (7,236,808)
2030	$ (2,534,704)	$ (9,633,511)	$ (6,793,988)	$ (2,828,386)	$ (11,132,285)	$ (7,810,726)	$ (4,520,198)	$ (12,835,396)	$ (9,509,317)
2035	$ (3,474,143)	$ (11,448,743)	$ (8,258,903)	$ (3,928,128)	$ (13,765,602)	$ (9,830,613)	$ (6,382,223)	$ (16,278,425)	$ (12,319,944)

d. Summary and Conclusions: Fund Adequacy Analysis

Overall, the Fund revenues at a quarter cent per barrel will be entirely inadequate to meet state agency costs under each crude oil supply scenario. While these Fund deficiencies are smaller for outlooks and unit costs based upon pre-DWH trends, they are still significant and grow to very large levels if other post-DWH-based assumptions are utilized. At the accelerated rate of a half cent per barrel, Fund revenues appear to be fairly well balanced assuming that future agency costs per barrel will be similar to the five years just before the DWH spill. However, if agency costs are more in line with longer-run historical norms, even this higher level of revenue will not be sufficient. The role of increasing fees and/or expanding volumes to help mitigate these deficiencies will be discussed in the conclusions and recommendations section of this Report.

It is important to reiterate that the results from this Fund adequacy analysis are based upon the presumption that no additional revenue sources, or other sources of financial support, exist to assist state agencies in their oil spill activities and, as such, represents a type of "worst case" financial liability for the State. Thus, the adequacy analysis represents the outer financial exposure the State, and its respective natural resource agencies including LOSCO, has in responding to the type of oil spills that have typically occurred in Louisiana, not extreme oil spill events like the DWH spill.

Section 8: Summary and Conclusions: Fund Adequacy Analysis

a. Potential Policy Options – Funding Agency Costs Typical of the Pre-DWH Time Period

Section 7 estimated consistent Fund deficiencies for most combinations of assumptions that could result in the Fund being inadequate to meet Louisiana's estimated agency costs. These Fund deficiency estimates, however, are premised upon what may be considered an aggressive assumption that no additional sources of revenue are available for the state to respond to oil spills. This is not an entirely unreasonable assumption, at least from a planning and policy perspective, for a number of reasons.

First, the Fund deficiencies estimated in this report are based on what have historically been more typical types of spills, not the historically rare "extreme" events like the DWH spill. While it is true that the federal government and the responsible party during the DWH spill provided significant revenue assistance, there is nothing to suggest that the same outcome would arise, on an annually consistent basis, in responding to typical spill activity.

Second, there were lags in the disbursement and reimbursement of revenues and other forms of financial support during this recent "extreme" spill event. Louisiana had to bear the financial and cash flow risk associated with these payments and financial support lags. There is nothing reasonable, nor economically efficient, about the state bearing the cash flow risk related to spill response and assessment.

Third, these estimated Fund deficiencies are driven exclusively by state agency cost projections being consistently larger than anticipated annual Fund revenue collections under the normal fee rate of a quarter cent per barrel. Consideration of the higher half cent fee collection rate showed that revenues could be sufficient under a low agency cost assumption, but may still fall short if agency costs are more in line with a broader historical trend. The higher state agency cost estimates (for spills that are more typical in Louisiana), are not entirely unreasonable considering that a heightened level of spill activity in the five years preceding the DWH spill drove down agency costs per barrel spilled to a level that may have needed adjusting even before the DWH spill brought a new appreciation for the potential oil spill risk associated with today's oil activities.

However, there are, admittedly, a number of uncertainties associated with the future crude oil supply disposition and oil spill outlooks included in this report. If the Legislature agrees, based upon the estimates provided, and its own findings, that there is a high likelihood of future Fund deficiencies, then there are a number of different policy options that could be followed to address those deficiencies including:

Option 1: Status Quo

Option 2: Increase Volumetric Fees

Option 3: Expand Volume Eligibility and Fees

Option 1: Status Quo: Deferring to the status quo is an option, but choosing that option comes with a cost. As noted earlier, the Fund is projected to be consistently deficient under each supply scenario, as well as each spill and cost assumption at the normal collection rate. Doing nothing exposes the State to potential future financial liabilities if the projections included in this report materialize. These deficiencies will only be higher if spill probabilities are more in line with post-DWH information or agency costs are above the 5-year period leading up to the DWH spill, which is the lowest sustained period for agency costs since the inception of the Fund.

There is, however, an admittedly high degree of uncertainty about the future crude oil supply disposition and spill activity level. The continued development and expansion of unconventional crude oil and natural gas resources in the U.S. are resulting in a complete realignment of North American energy markets as well as a realignment of the infrastructure utilized to move hydrocarbons to markets. This realignment will have impacts on future Louisiana oil spills that, at this point in time, are indeterminate.

As recently as eight years ago, the U.S. was anticipated to import as much as 80 percent of its crude oil supplies and 25 percent of its natural gas supplies from international sources.[31] Those trends suggest a considerably large movement of crude oil, and ultimately liquefied natural gas ("LNG"), via large ocean-going tankers carrying thousands of barrels of crude oil or billions of cubic feet of natural gas. Today, those trends have completely reversed with many asserting that the U.S. could become one of the world's largest, if not the largest, crude oil and natural gas producer.

The first U.S. natural gas exports are anticipated to start departing Louisiana ports in 2015.[32] The U.S. is anticipated to become self-sufficient in crude oil production and potentially a net exporter of crude oil by 2020.[33] In fact, 2014 is likely to be the first time in over six decades in which the topic of U.S. exports will be a serious part of current public policy debate.[34] One, if not several, of the leading potential ports that would likely support these potential U.S. crude oil exports will be located in Louisiana. In fact, these dramatic industry and market changes motivated the supply disposition outlooks included in Scenarios 2 and 3 of this study. Both of these scenarios have attempted to account for these increasing domestic and international crude oil trade opportunities.

In the past, the nature of crude oil trade was restricted to very large tankers and ships moving crude oil into the state to refineries and other intermediate storage facilities. Crude oil has passed through and out of the state via a number of interstate

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[31] Energy Information Administration, U.S. Department of Energy. *Annual Energy Outlook 2004 with Projections to 2025*.

[32] The Advocate. 2013. Cheniere updates progress at Sabine Pass LNG terminal. Available at: http://theadvocate.com/news/business/7529415-123/cheniere-updates-progress-at-sabine

[33] Daniel Gilbert. 2013. Exxon Presses for Exports, U.S.'s Largest Energy Producer Says North America Has Abundant, Long-Lasting Fuel Supplies. Wall Street Journal. December 11, 2013; Jim Snyder and Mark Drajem. 2013. Oil Industry May Invoke Trade Law to Challenge Export Ban. Bloomberg. Available at: http://www.bloomberg.com/news/2013-11-06/oil-industry-may-invoke-trade-law-to-challenge-export-ban.html; Ed Crooks. US export ban has oil producers over barrel. FT.com. November 2013. Available at: http://www.ft.com/cms/s/0/58d048d6-2530-11e3-b349-00144feab7de.html#axzz2nHm4vO7i; and Patti Domm. 2013. Ship, baby, ship! Calls come for US to export oil. Available at: http://www.cnbc.com/id/101087815.

[34] Ibid.

pipelines. These trends are likely to change given the new emphasis on domestic crude oil resources likely to move into the state. In the future, domestic crude oil imports are likely to move into, and even out of the state through a broader and more diversified set of transportation modes that rely less on ocean-bound tankers and more on coastal marine vessels and barges, pipelines, and increasingly, rail.[35] How these changes in crude oil supply and transportation will impact future spills is unknown. While these potential movements can be simulated (and have been in Scenario 2 and Scenario 3), those simulations are not based upon historic crude oil movements, and likely volume magnitudes, that are comparable to what could occur in the future.

The uncertainty associated with future Louisiana oil spill outcomes, and state agency costs, are further compounded by the nature of Louisiana crude oil production. In the past, the state was a prolific crude oil producer. While crude oil production is still an important part of Louisiana's energy economy, onshore production has fallen considerably and is expected to continue to decrease without the development of some new, large in-state resource like the Tuscaloosa Marine Shale, located across the Florida parishes, or the Brown Dense Shale, located in North Louisiana. Other things being equal, this should lead to a continued decrease in reported fixed location spills at onshore production sites.

Trends in offshore Louisiana production, however, have been flat to increasing over the past several years. Offshore production is a very important determinant of reported spills and reported spill volumes and, as highlighted in Section 3, platform-based spills account for 27 percent of all reported spill volumes and this share has been growing over the past several years despite relatively flat overall offshore production. Whether this trend will continue in the future in the aftermath of the DWH spill is still uncertain for a variety of reasons.

[35] See, for instance, Zain Shauk. "Kinder Morgan to Buy Tanker Business for $1 Billion." *FuelFix*, December 23, 2013 and Zain Shauk. "Rail Explosions Won't Curb Soaring Oil Shipments." *FuelFix*. December 31, 2013.

First, the future scope of offshore activity continues to be unclear even three years after the DWH spill. While it is clear that OCS activity will likely be (a) focused on crude oil, as opposed to natural gas development and (b) focused primarily in deepwater areas of the Gulf, the degree with which future drilling and production activities will be pursued is still ambiguous. Offshore regulators continue to adopt, and consider, changes in regulations that could impact offshore production investment attractiveness.

If these changes are perceived by investors and developers as negatively impacting profitability, investment dollars will likely move to other domestic and international producing basins thereby reducing offshore activity, and potentially reducing total annual oil spills. Other industry observers, however, suggest that the better part of these regulatory changes are over, and that the OCS is becoming a more attractive area for oil and gas investment.[36] If this view emerges as the consensus, then additional activity may arise in the Gulf, potentially increasing spill volumes over time.

Second, the effectiveness of new federal offshore safety and environmental regulations, as well as the new technologies and response protocols independently implemented and adopted by industry, represent another set of factors that will influence future oil spill activity and are uncertain at the current time.

Option 2: Increase Volumetric Fees: Increasing fee revenues, through an increase in volumetric fees (assessment rates) applied on crude oil refinery deliveries, is one potential policy response to remedy the Fund deficiencies identified earlier in Section 7. As shown in the previous section, a fee of one half cent per barrel on crude oil delivered to Louisiana refineries will produce revenue much closer in line with projected agency costs for most of the outlooks considered when using the low agency cost assumption. However, it is important to recall that the low agency cost estimate is

[36] Market Watch.com. 2013. “Strong growth drives capital investment in deepwater oil & gas drilling in Gulf of Mexico.” October 22; and J. Larino. 2013. “Noble Energy to spend $450 million on Gulf of Mexico drilling projects.” The Times-Picayune. December 28.

based on the five years right before the DWH spill. It may be true that those costs were artificially low due to high spill volumes and a binding agency budget constraint that prevented a level of response more in line with long-term trends. It may also be true that costs have risen since the DWH spill. If annual agency costs are expected to return to levels more in line with long-term trends, then a per barrel fee in the range of three quarters of a cent to one cent per barrel would bring revenues in line with annual agency costs, based on this report's definition of adequacy, which is a zero balance at the end of each year. Based on the analysis of revenues and expenses in Section 7, the exact fee that would bring 2015 revenues and expenses (based on the $83.13 agency cost assumption) into balance using pre-DWH spill probabilities would be about $0.0057 per barrel across all three scenarios, $0.01 per barrel based on post-DWH spill probabilities, and $0.0085 based on the weighted average spill probabilities. Under all three oil supply scenarios, the fee needed to keep up with anticipated agency cost growth will increase over time reaching a range of $0.0076 to $0.0173 per barrel by 2035 depending on the spill probability and specific spill scenario.

Option 3: Expanding Eligible Volumes and Increasing Fees: One potential solution to the potentially large increases in fees needed to make estimated Fund revenues adequate under several potential scenarios would be to expand the scope of the eligible volumes contributing to the Fund. Currently, fees are assessed on only those crude oil volumes delivered to Louisiana refineries for storage or processing. These refinery deliveries account for 73 percent of total supply volumes over the past five years. The remaining volumes are associated with storage and export. There are several strong arguments for expanding the scope of eligible volumes to all Louisiana crude oil supplies.

The first argument for potentially expanding volumetric fee eligibility is the lack of uniformity and fairness associated with export volumes but not those associated with refinery deliveries. Crude oil is a commodity and, generally, of uniform and homogeneous quality. It is difficult from a public finance perspective to differentiate one barrel of crude oil from another as it relates to that barrel's impact on Louisiana oil spills. A crude oil spill on a pipeline in Louisiana creates potential damage to the state regardless of whether that crude oil was ultimately destined to be delivered to a refinery in Baton Rouge, Louisiana or a refinery in Lima, Ohio. Subjecting a barrel of oil to a fee to cover the cost of spills, while exempting another comparable barrel, simply violates most public finance definitions of uniformity and equity, and could serve as ample reason to expand the scope of fee collections to all crude oil volumes entering the state.

Cost causation is a second potential rationale for expanding the scope of Fund contribution eligibility. This report has shown in several places that spill volumes are influenced by both total crude oil supplies as well as the sources of those supplies (i.e., platforms, pipelines, vessels, etc.). Increases in total spills results in an increase in total agency costs. However, not all crude oil volumes are required to make a contribution to the Fund even though they can contribute, at least in some part, to total Louisiana oil spills. Such an outcome is inefficient from an economic perspective since one party (those transporting crude for export) are imposing a cost onto Louisiana that is not recovered. Inefficient outcomes of this nature can, at least in theory, lead to a greater level of spills than would otherwise occur if the "externality" imposed by the crude oil volumes were assessed a fee (i.e., paid for the cost imposed upon the State of Louisiana). Thus, economic efficiency would dictate that all volumes that have the possibility of imposing costs on the state should be required to make a contribution to the Fund.

Lastly, there is a significant chance that Louisiana crude oil volumes will grow over the next several years to meet growing exports: both domestic and international. In fact, the Scenario 3 supply disposition is modeled upon the premise that exports will grow to levels that comprise as much as 40 percent of total Louisiana crude oil supplies by 2035. As noted in Section 2, this assumption is not unreasonable, or inconsistent with past historic experience, since Louisiana crude oil exports have reached levels as high as 40 percent in 1990. Excluding such large volumes from Fund revenue contributions could have significant ramifications for Louisiana oil spill costs if they continue to be exempt from Fund contributions.

Figure 8.1 and Figure 8.2 present a comparison of the various fee revenue collections that could arise from assessing fees on refinery volumes versus those that apply to all volumes that cross state lines. The expansion of eligible volumes, at current fees, would only increase Fund revenue collections from between close to $1 million to over $2 million per year and while it would help in reducing estimated Fund deficiencies, the expansion of volumes alone would not entirely offset revenue deficiencies under many future scenarios considered.

Figure 8.1: Potential Annual Fee Revenue Collections Under Expanded Volume Eligibilities (Scenario 1 & 2) (Constant Dollar, 2013=100)[37]

[37] Scenarios 1 and 2 both forecast the same total supply volumes, the only factor which differs between the two scenarios is where those supplies originate. Scenario 1 relies upon more international imports than Scenario 2 which is based heavily upon greater domestic imports.

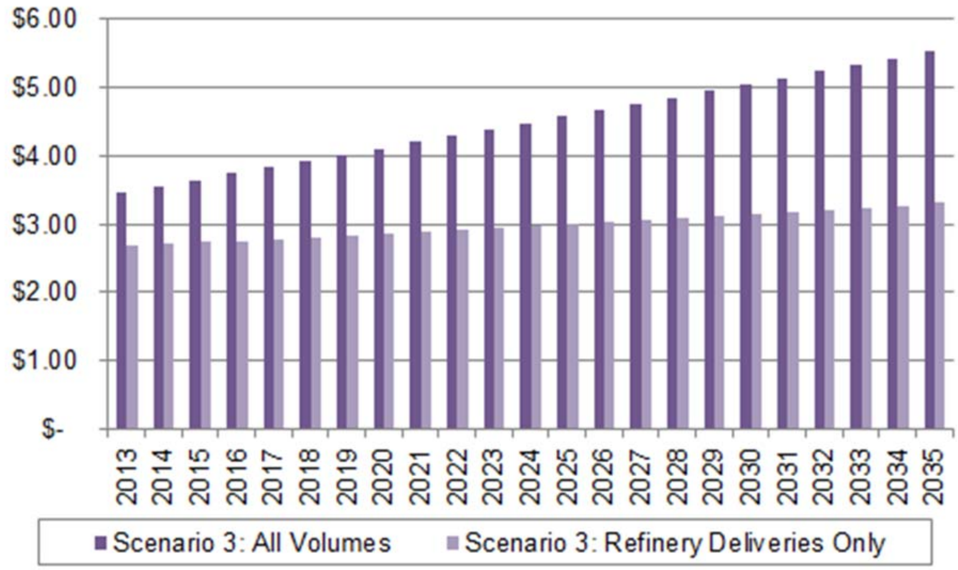

Figure 8.2: Potential Annual Fee Revenue Collections Under Expanded Volume Eligibilities (Scenario 3) (Constant Dollar, 2013=100)

b. Other Policy Considerations – Normal Spills

Regardless of which policy option is chosen, there are a number of additional Fund policy modifications that should be considered, even if a status quo option is selected for the fee level and volume basis. These additional policy considerations include:

(1) No revenue caps on Fund balances (as provided in Act 394).

(2) Implementation of a $17 million Fund balance floor (instead of $5 million) with a trigger mechanism that increases fees to provide ongoing floor support.

(3) Inflation indexing of the volumetric fee.

(4) A periodic review to update and follow-up on the results of this study and keep the Legislature, LOSCO, and other stakeholders apprised of any Fund challenges.

Each of the policy safeguards are discussed in further detail below.

Elimination of Revenue Cap: In the past, the Fund has been subjected to various different caps on its balances. For instance, in 1991 there was a cap of $15 million which was ultimately reduced down to $7 million. Acts 633 and 962 of 2010 removed these caps. Fund balances should be allowed to grow if fees are increased in order to develop some type of Fund adequacy over time. Currently projected deficiencies would be much less severe if caps had not been placed on the Fund in the past.

Adoption of $17 Million Fund Balance Floor with Supplemental Fee Trigger: Section 7 estimates annual agency costs, under several worst-case scenarios, of around $14 million to almost $16 million. Thus, a $17 million Fund balance floor should provide protection against high cost oil spill response years that are still considered normal in scope relative to that experienced with the DWH spill. A meaningful floor should provide the state with adequate financial protection against larger spills. A floor of this level is also consistent with the balances that are currently held in other states' oil spill trust funds. Figure 8.3 highlights the current balances and fund caps for these states. Louisiana's existing balances and caps are far off from most of those states.

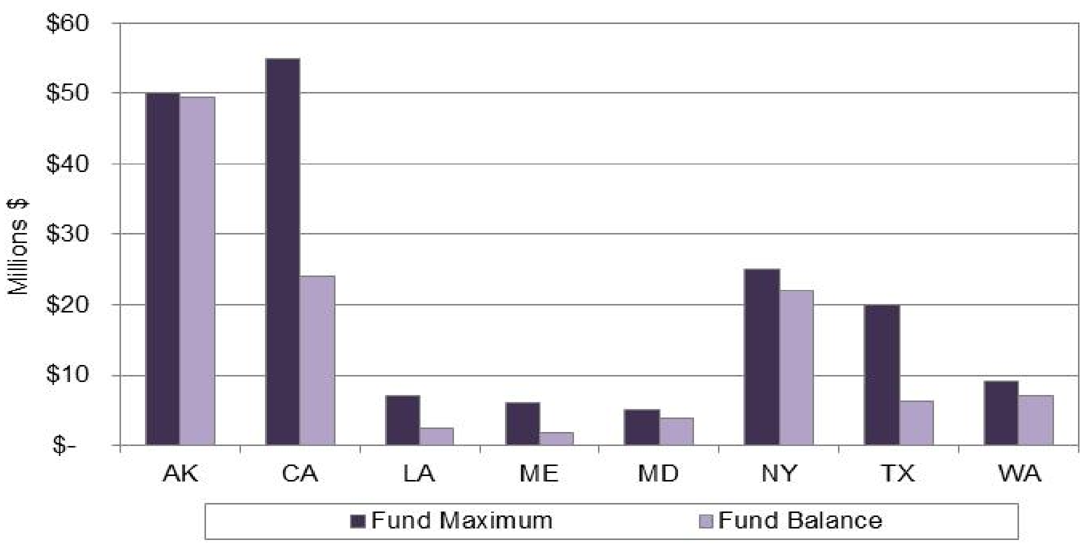

Figure 8.3: Comparison of Other States' Current Estimated Balances and Fund Caps

A supplemental volumetric fee trigger could also be utilized that takes actual or projected Fund deficiencies in any given year, and divides that deficiency by most-recently reported refinery inputs in order to construct a supplemental volumetric fee designed to bring the Fund above its $17 million floor.

Inflation Indexing the Volumetric Fee: The back-cast analysis included in Section 7 noted that total potential fee revenues, at least in constant (inflation-adjusted) dollars, have been decreasing. This example shows how, over time, inflation can chew away at the Fund's financial adequacy to respond to oil spills. One potential remedy to this problem would be to index the annual Fund volumetric fee to a commonly reported measure of inflation like the Gross Domestic Product Price Index ("GDP-PI"). The relative merits of this type of inflation adjustment have been provided in Appendix B.

Periodic Fund Adequacy Review: An additional review, comparable to the one provided here should be done periodically. As noted earlier, the upstream[38] oil and gas industry, and many sectors of the midstream[39] components of the industry, are in the midst of a significant transition and where that transition will lead is somewhat uncertain. However, within the next three years, the industry outlook for unconventional crude oil production should become increasingly clear as a large number of wells, from a broader distribution of unconventional shale basins come on line. The outlook for deepwater activity should also become more apparent as the number of offshore lease sales increases, as the offshore permitting process becomes more apparent, and as a larger number of post-DWH fields come on line. Lastly, the policy outlook for U.S. crude oil exports should also have greater transparency over the next three years. Thus, conducting a continued periodic review of the Fund and oil spills generally would appear to be a prudent public policy endeavor.

[38] Drilling, production, and services are typically thought of as the "upstream" component of the oil and gas industry. This is the component of the industry that focusses on exploration and production ("E&P") activities.

[39] Midstream activities include those associated with gathering, processing, refining, and transportation. The midstream portion of the industry links production to the retail (end-use, marketing, or "downstream") side of the industry.

c. Addressing Major Spills and Their Fund Impact

Section 4 established the relationship between agency costs and spills. A number of estimates for these agency costs were developed highlighting the positive relationship between costs and spills. While only pre-DWH cost data were utilized in considering the funding requirements of normal spill volumes, the post-DWH years provide perhaps the best data on current agency costs associated with a major spill. Figure 8.4 highlights this linear relationship between costs and spills across the various different agency cost assumptions (i.e., cost per Bbl-spilled) developed in Section 4 including the average cost per barrel for the post-DWH years. Two lines intersect these estimated total cost trends that represent the highest and lowest annual spill volumes estimated across the nine different potential oil spill outlooks. This estimated spill range is based upon a more typical potential spill level that could occur in any given year; these estimated ranges do not include the possibilities for any "large" spill volumes. In fact, large spills were excluded from the analysis included in Section 6.

Randomly-occurring large spills could have considerable impacts on the Fund that have to be considered independently of normally-occurring activity. Figure 8.4 includes a number of points for major historic spills that indicates the order of magnitude difference in costs that could arise in responding to extreme, catastrophic events.

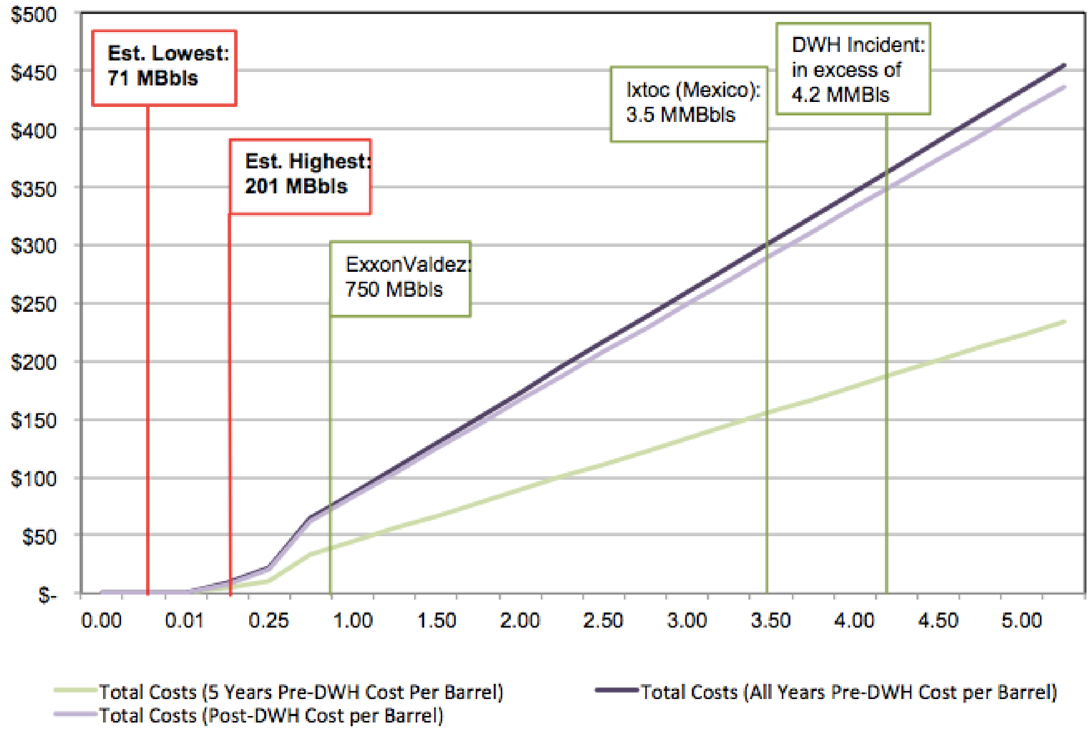

Figure 8.4: Oil Spill Costs versus Spill Volumes

The random nature of extremely large spills makes it difficult to accurately predict the future frequency and size of these events. However, the anticipated cost associated with spills of a particular size can also be thought of as fair "insurance" values for an oil spill since theoretically, a risk averse economic agent (like the State of Louisiana) would be willing to pay this amount to insure against an event of this nature from occurring. The specific level of "insurance," using the example for oil spills above, would be the specific spill amount the State would be interested in financially defending itself against if such an insurance product could be purchased. If those funds were not accrued ahead of time, then these would be the costs the state would have to cover when a large-scale event occurs.

While the State likely cannot purchase insurance of this nature, it can create its own self-insurance increasing annual fee revenues to financially insure against such potential events. Table 8.1 provides an illustration of the various "incremental" financial contributions (i.e., fee collections) the State would need to develop based upon the various ranges of state agency unit costs. These fee revenue contributions/Fund balance requirements are "incremental" to those identified earlier in the various supply scenario analyses.

Table 8.1: Illustrative Incremental Fund Balances for Large Spills

	Spill Levels (MBbls)									
	2	5	10	100	500	1,000	1,500	2,000	3,000	5,000
Unit Cost Assumptions	(Minimum Large Spill Revenue Requirements, $ Millions Annual)									
Total Costs (5 Years Pre-DWH Cost)	$ 0.089	$ 0.223	$ 0.446	$ 4.461	$ 22.305	$ 44.610	$ 66.915	$ 89.220	$ 133.830	$ 223.050
Total Costs (All Years Pre-DWH Cost)	$ 0.166	$ 0.416	$ 0.831	$ 8.313	$ 41.565	$ 83.130	$ 124.695	$ 166.260	$ 249.390	$ 415.650
Total Costs (Post-DWH Cost)	$ 0.173	$ 0.433	$ 0.865	$ 8.654	$ 43.270	$ 86.540	$ 129.810	$ 173.080	$ 259.620	$ 432.700

If the State wanted to increase the Fund balance to insure against a future 10,000 barrel spill, it would need to ensure an incremental Fund balance by raising additional revenue of $870,000 using the post-DWH cost assumptions. If the State wanted to increase fee revenue collections to be prepared for a one million barrel spill, an additional $86 million Fund balance would be required based on the post-DWH agency cost assumptions, while the required Fund balance to defend against the cost of a five million barrel spill is estimated to be around $415 to $430 million.

d. Summary and Conclusions

The purpose of this study has been to provide the House and Senate legislative committees with research and information responsive to the Legislature's direction outlined in Act 394. This report starts with a survey of Louisiana's historic crude oil supply and annual historic reported spills and spill volumes in order to examine how trends in each have evolved and changed over the past two decades. A survey of the Fund, as well as LOSCO's and other state agencies' oil spill related costs, is also provided. The relationships between crude oil supply, spills, and state agency funding are estimated in order to simulate potential impacts on Fund adequacy.

The outlook for Louisiana crude oil supply is based upon three different scenarios in this report. Each of these scenarios is tied to a differing set of oil spill probabilities by type of spill (i.e., platform, pipeline, vessel, etc.). In addition, a range of differing state agency cost estimates, on a barrels-spilled basis, has been provided. Thus, the simulations and estimates included in this Report consider a wide range of potential supply, spill and cost outlooks. All, however, are premised upon a range of spills that, while potentially large, do not constitute “extreme” spill levels like those observed during the DWH spill. Three different policy options are offered in order to address anticipated “typical” spills that are likely to arise based upon the best-faith estimates and scenarios provided in this report. These options include:

Option 1: Status Quo

Option 2: Increase Volumetric Fees

Option 3: Expand Volume Eligibility and Fees

Lastly, this report has identified a number of issues and options that should be considered in establishing any new funds or fund supplements to provide the financial resources needed to respond to ”extreme” spill events like the DWH spill.

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Appendix A: Survey of Other State and Country Oil Spill Contingency Funds

a. Other Coastal States' Dedicated Spill Taxes

Statutes of other coastal states, including Alaska, were searched looking for taxes or fees dedicated specifically to oil spill response and prevention activities. This survey did not include underground storage tank fee programs which exist in most states. Sixteen states, including Louisiana, levy spill response fees for crude oil and/or petroleum products. Figure A-1 shows those states and the fees charged per barrel of crude oil/petroleum product.

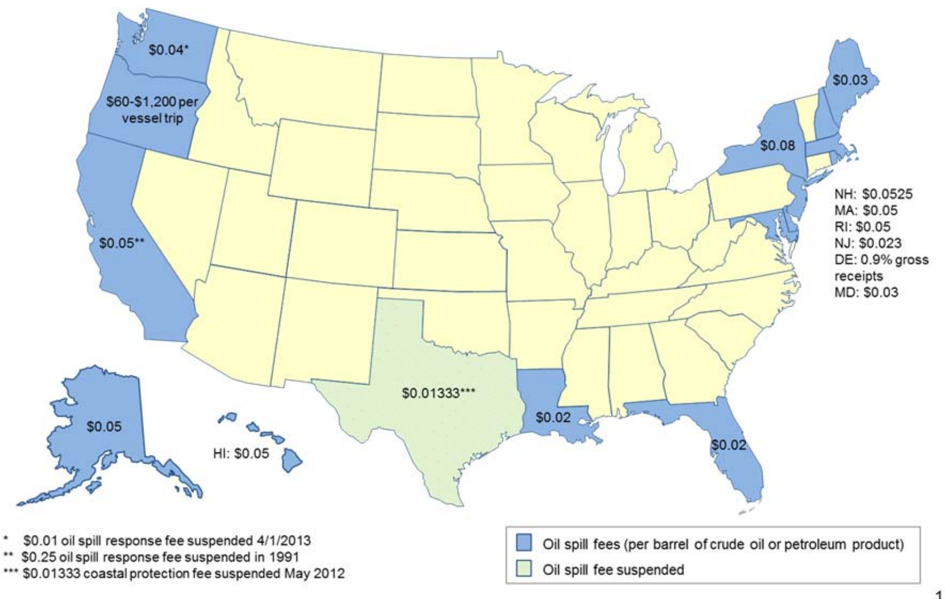


Figure A-1. State Oil Spill Fees
Source: Individual State Statutes

A number of states impose fees on both crude oil and petroleum products; only Delaware exempts crude oil from fees while charging for other petroleum products. Arkansas, Texas and Louisiana only levy oil spill fees on crude oil.

The point at which fees are levied varies by state although most include crude oil transfer by vessel at marine terminals. California and New York specify refineries as transfer points subject to fee collection on crude oil and petroleum products. Table A-1 summarizes coastal state oil spill response and prevention programs.

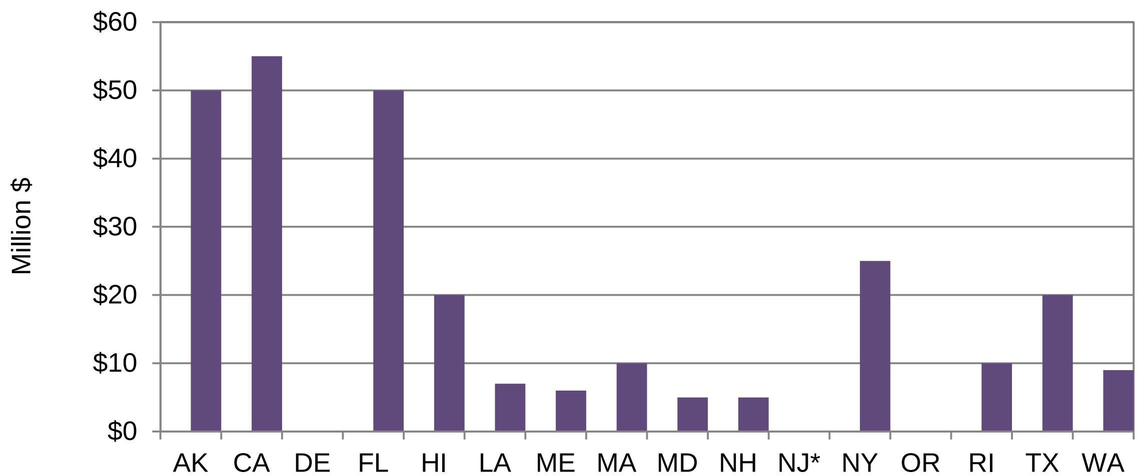
Table A-1. Coastal States' Oil Spill Prevention and Response Taxes

State	Title	Tax or fee?	Applied to	Rate	Fee Status
Alabama	None found				
Alaska	Oil and Hazardous Substance Release Prevention and Response Fund	Surcharge on each taxable barrel of oil produced in the state	Oil produced from each lease or property in the state, less any oil which is exempt from taxation.	$0.01 per barrel for Response Account if fund less than $50M; $0.04 per barrel for Prevention Account	Current
California	1. Oil Spill Prevention and Administration Fund 2. Oil Spill Response Trust Fund	1. Fee 2. Fee	Oil and petroleum products owned and received at marine terminal within the state or transported by means of a pipeline operating across, under or through state marine waters. The Response Fee is also imposed on crude oil received at a refinery within the state.	1. $0.05 per barrel 2. $0.25 per barrel if fund less than $54.875M Also fee on non-tank vessels up to $2,500 for non-tank vessels carrying over 6,500 barrels.	1. Current 2. Suspended in 1991
Connecticut	None found				
Delaware	Hazardous Substance Cleanup Fund	Tax	Wholesale gross receipts of the sale of most petroleum products not including crude oil	0.9% of gross receipts paid only once regardless of how many times product is sold or resold in Delaware.	Current
Florida	Coastal Protection Trust Fund	Excise tax	Pollutants produced in or imported into the state for sale, use, or otherwise. Applies to production or importation of motor fuel, diesel, fuel, aviation fuel, or other pollutants.	$0.02 per barrel if fund less than $50M. If catastrophic discharge would significantly reduce fund balance, up to $0.10 per barrel.	Current
Georgia	None found				
Hawaii	Environmental Response Revolving Fund	Tax	Crude oil or petroleum products sold by distributors	$0.05 per barrel if fund less than $20 million	Current
Louisiana	Oil Spill Contingency Fund	Fee	Crude oil transferred to or from a vessel at marine terminals.	$0.02 per barrel if fund less than $7 million	Current
Maine	Coast and Inland Surface Oil Clean-Up Fund	License fee	Crude oil and all other refined oil greater than 25 barrels transported by rail or highway into Maine.	$0.03 per barrel if fund less than $6 million	Current
Maryland	Oil Disaster Containment, Clean-Up and Contingency Fund	License fee	Fee imposed at first point of transfer in the state. Transfer means the offloading or on loading of oil from or to any commercial vessel, barge, tank truck, tank car, pipeline, or any other means used for transporting oil.	$0.04 per barrel if fund less than $5 million	Current

State	Title	Tax or fee?	Applied to	Rate	Fee Status
Massachusetts	Oil Spill Prevention and Response Trust Fund	Fee	Petroleum products received at a marine terminal within the commonwealth by means of a vessel from the point of origin from outside the commonwealth.	$0.02 per barrel if fund less than $10 million	Current
Mississippi	None found				
New Hampshire	Oil Pollution Control Fund	License fee	Any import of oil into the state by any person whether by vessel, pipeline, truck, railroad or any other contrivance	$0.00125 per gallon if fund less than $5 million	Current
New Jersey	Spill Compensation Fund	Tax	Transfer of petroleum products and other hazardous substances at the first point of transfer. Payable by owner or operator of a major facility (200,000 gallons petroleum products, 20,000 or more for nonpetroleum hazardous substances	Petroleum products: $0.23 per barrel; non petroleum: 1.53% of fair market value. Fund capped at 150% of claims due to petroleum spill.	Current
New York	Environmental Protection and Spill Compensation Fund	License fee	First point of transfer. Major facility: refinery, storage or transfer terminal, pipeline, deep water port, drilling platform that are used to refine, produce, store, transfer, process or transport petroleum. Vessel is a major facility when petroleum is transferred between vessels.	$0.08 per barrel if fund less than $25 million	Current
North Carolina	None found				
Oregon	Oil Spill Prevention Fund	Fee	Collected on petroleum products transported on a per-trip basis for vessels traveling within navigable water of Oregon. Offshore and onshore facilities pay yearly fee.	Cargo and passenger vessels: $70 Tank barges: <25,000 barrels: $60; up to 99,999 barrels, $70; >100,000 barrels, $100; Tank vessels: $1,200; Dredge vessels: $36 per day; facilities: $5,900 per year	Current
Rhode Island	Oil Spill Prevention, Administration and Response Fund	Fee	Petroleum products received at a marine terminal by means of a vessel from outside the state	$0.05 per barrel if fund is less than $10 million. Fee is $0.01 per barrel of asphalt products or derivatives.	Current
South Carolina	None found				

State	Title	Tax or fee?	Applied to	Rate	Fee Status
Texas	Coastal Protection Fund	Fee	Crude oil transferred to or from a marine terminal	$0.01333 (expressed as one and one-third cents) per barrel if fund less than $20 million	Suspended May 2012
Virginia	None found				
Washington	1. Oil Spill Response Fund 2. Oil Spill Administration Fund	1. Tax 2. Tax	Receipt of crude oil or petroleum products at a marine terminal from a vessel or barge on navigable waters of Washington	1. $0.01 per barrel if fund is less than $9 million 2. $0.04 per barrel	1. Suspended April 2013 2. Current

Similar to Louisiana, most states cap their oil spill response funds (but not oil spill prevention and administration funds if separate). Currently oil response fund fees are suspended in Texas, California and Washington because the funds have reached their maximum levels (California and Washington still collect oil spill administration fees). Figure A-2 shows oil spill response fund caps by each state.



*Fund capped at 150% of pending claims

Figure A-2. Oil Spill Response Fund Caps

Source: Individual State Statutes

Total oil spill revenues include fees, fines and payments received by responsible parties. Recent annual revenue collection was highest in New York, followed by California, Texas, and Alaska. Figure A-3 shows oil spill fee revenue by state using the most recent year available (mostly 2011-2012).

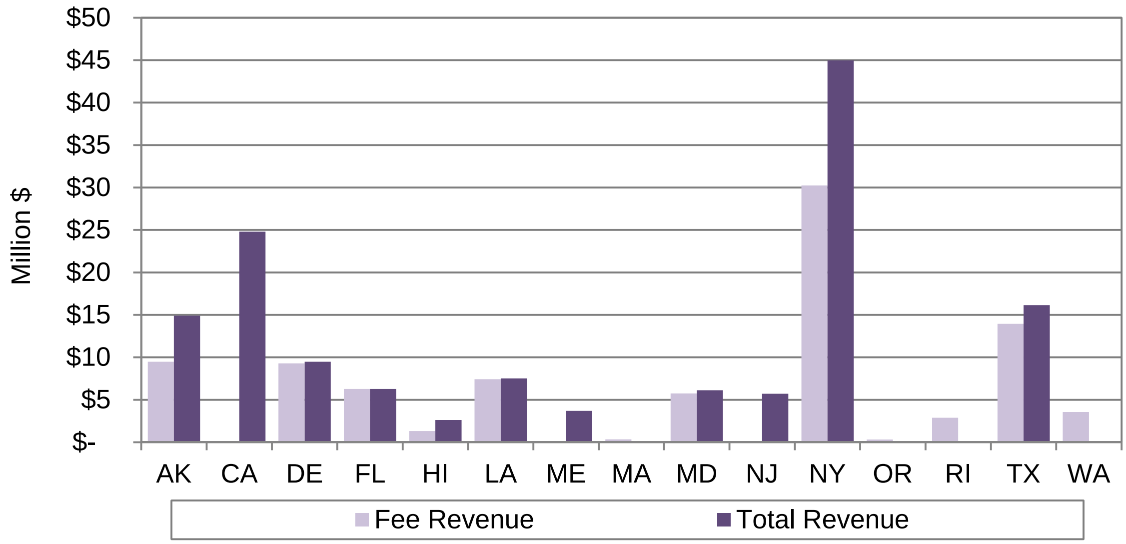


Figure A-3. Oil Spill Response and Prevention Revenues

Source: State Revenue Departments

b. International Oil Spill Response Programs

Oil spill response programs vary by country and are not necessarily comparable to programs in the United States. Funding mechanisms include private/public partnerships, responsible party fees, general government funds, and dedicated taxes on transportation of crude oil. One feature that most oil spill response programs share is the polluter's cost liability. Oil spill response program funding mechanisms for a sample of countries are described below.

North America

Canada requires polluters to pay for clean-up of oil spills, and the Canada Shipping Act of 2001 requires oil spill response programs at all oil handling facilities. The relevant regulations are the Canadian Marine Oil Spill Preparedness and Response Regime. The Canadian Coast Guard oversees clean-up, and maintains its own oil spill response program but lacks dedicated funding for these activities.[40]

[40] Canadian Coast Guard's Oil Spill Response Outdated: Audit. Huffington Post. 6/3/2013. http://www.huffingtonpost.ca/2013/06/03/canadian-coast-guard-oil-spill-response_n_3380707.html.

Mexico does not appear to levy a tax specifically for oil spill response but taxes its state-owned oil company Pemex at 99.5 cents per dollar of revenue. Recent tax reforms have not effectively lowered this rate. [41]

Europe

A survey of European Union countries only turned up one country that charges a specific oil spill tax. Finland levies an "oil damage duty" which is payable by oil importers and holders of oil in transit.[42] The duty is 2.20 Finnish Marks (about $0.50 USD) per ton of oil in transit and 4.40 FIM per ton for oil tankers without a "double bottom." Taxes are deposited in the National Oil Pollution Compensation Fund. Revenue is used to cover expenses from oil accidents and for creating and maintaining the necessary infrastructure to prevent and to fight oil accidents.

The United Kingdom does not levy a specific tax targeting oil spill response but does charge a "petroleum revenue tax." The tax rate on the difference between incomings and expenses from oil fields is 50 percent. [43]

The European Union as a whole established the European Maritime Safety Agency which "provides Member States and the Commission with technical, operational and scientific assistance in the field of accidental or deliberate marine pollution by ships and oil and gas installations..."[44] EMSA offers a network of contracted oil pollution response vessels that can be called upon by Member States in case of a major oil spill at sea. EMSA is funded by the European Union and provides services to member countries.

Norway is not a member of the EU but has considerable oil resources. The marginal tax rate on oil and gas industry profits is 78 percent. Oil spill response depends on the source of pollution. Oil spills from ships are handled by the Norwegian

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[41] Mexico to keep pumping Pemex for tax money despite promised reforms. Reuters, October 30, 2013. http://www.reuters.com/article/2013/10/30/mexico-reforms-pemex-idUSL1N0IB0OI20131030 (accessed January 28, 2014).

[42] Inventory of Taxes, Luxembourg, 2000. http://ec.europa.eu/taxation_customs/resources/documents/tax_inventory_17_en.pdf, accessed 11/27/2013.

[43] Petroleum Revenue Tax, HM Revenue and Customs, http://www.hmrc.gov.uk/oilandgas/guide/prt.htm, accessed January 28, 2014.

[44] http://www.emsa.europa.eu/about/what-we-do-main/mission-statements.html.

Coastal Administration (NCA) which compensates resource owners for use of their equipment.[45] Oil spills from offshore installations are handled by the private industry-supported Norwegian Clean Seas Association for Operating Companies (NOFO). The operator is held responsible for oil spill response and clean-up and may utilize NOFO and NCA resources.

South America

In Brazil the semi-public petroleum company Petrobras established nine Oil Spill Response Centers throughout the country.[46] These response centers maintain oil spill response equipment, conduct training, and prepare sensitivity maps and risk assessments. Other oil companies have expressed interest in joining the system in order to share operational costs and have access to spill response resources and services. The overall tax rate on oil companies is 25 percent of profits.

Asia

Japan's oil response program is carried out through the government Maritime Safety Agency. The industry- and government-funded Marine Disaster Prevention Centre organizes clean-up operations using commercial contractors. Japan is a party to the 1992 Protocols to the 1969 Civil Liability Convention and the 1971 Fund Convention which governs liability and ability to receive compensation from the International Oil Pollution Compensation Funds. One complicating factor is that not all countries are subject to the same protocols. In 1997, for instance, the liability of a Russian tank owner for a spill off the Japanese coast was limited since the Russian Federation was not a party to the 1992 Protocols.

Australia

Australia's contingency plan is The National Plan to Combat Pollution of the Sea by Oil and other Noxious and Hazardous Substances (National Plan) which is managed

[45] Ole Gunnar Austvik. The Norwegian Petroleum Experience, Lillehammer University College, Norway. April 2011. http://www.muniles.ca/images/Upload/5_forum_sur_les_hydrocarbures/forum_contenu_conferences/anglais/5-_ole_gunnar_-_norway-experience-english.pdf.

[46] Oil spill response centers in Brazil—A new experience. Proceedings of the International Oil Spill Conference, 2003. Pp. 755-759. http://ioscproceedings.org/doi/pdf/10.7901/2169-3358-2003-1-755.

by the Australian Maritime Safety Authority. Funding for National Plan activities is provided by a levy on ships carrying 10 or more tonnes of oil that use Australian ports. The levy was raised in 2009 from AUD 0.096 to AUD 0.1125 per tonne of bulk oil and is collected per quarter. The minimum fee is AUD 10 per quarter. The Australian Marine Oil Spill Centre (AMOSC) is financed by nine participating oil companies and other companies and operates the country's major oil spill response equipment stockpile. Oil company-owned equipment is shared under a voluntary mutual aid arrangement.

Africa

A review of 14 African countries engaged in oil exploration and production revealed no specific taxes dedicated to oil spill response programs.[47] African countries tax oil production either through petroleum profit taxes, corporate taxes, royalties, or a combination of all three. Most oil operations are at least partially owned by government interests or are subject to profit sharing agreements with the national governments.

Nigeria has experienced many oil spills off its coast line and negotiates with the responsible party (such as Shell or Exxon) for cost recovery. Nigeria's petroleum profits tax is required on all companies engaged in the extraction and transportation of petroleum. The tax may be as high as 85 percent if no capital allowances are taken, are lowered to 65.75 percent during the first five years of operation, and are lowered further to 50 percent under production sharing contracts.

[47] Oil and Gas Tax Guide for Africa 2013. PwC network, 2013.

Appendix B: Options for Indexing Oil Spill Contingency Fees

Consumer Price Index (CPI)

The Consumer Price Index is a broad estimate of the change in prices of final goods and services purchased by consumers. The index is constructed by measuring the change in the prices paid for a "typical" basket of consumer goods and services purchased by urban consumers. The goods and services represented within this basket reflect an average of expenditure decisions by households sampled in the Consumer Expenditure Survey. Changes in the index can be interpreted as changes in the price of the weighted average of goods and services represented within the basket. For example, a change in the index from 100 to 110 represents a 10% increase in the price of the basket.

Implicit Price Deflator for Gross Domestic Product (GDP Deflator)

The Implicit Price Deflator for Gross Domestic Product is another broad estimate of the change in prices of final goods and services purchased by consumers over a given time period. The value of the index is determined by dividing the dollar value of all final goods and services purchased in the economy (nominal GDP) by a chained index of the volume of all final goods and services purchased in the economy (real GDP). This calculation isolates the percentage increase in the prices at an aggregate economy-wide level. For example, suppose that the volume of final goods and services increases from 100 in year 1 to 105 in year 2, but the total sales of these goods and services increases from $100 to $120. The index would change from 100 in year 1 to roughly 114 in year 2 (or 120 divided by 105). While the CPI calculates a change in the price of a basket of goods, the GDP Deflator calculates the change in price for all final goods and services. However, the values of these two measures do not differ significantly over time.

Employment Cost Index (ECI)

The Employment Cost Index measures changes in total employee compensation. The index accounts for changes in wages, salaries, and benefit costs. The data series is available for several compensation categories, including wages and salaries, benefits costs, and total compensation. It is also available for total private industries, and state and local government workers, as well as industries, occupational groups, union/non-union status, census region and division, and 15 large metropolitan areas. The index is weighted to control for the effects of shifts among occupation groups and industries.

Producer Price Index (PPI)

While the CPI measures the purchase prices paid by consumers for final consumer goods and services, the Producer Price Index measures the selling prices of goods and services received by producers. These two indexes differ for two main reasons. First, the average composition of goods sold by producers can be quite different from the group goods purchased by consumers, especially when looking at a specific group of goods or services. The CPI only accounts for final goods purchased by consumers, while the PPI accounts for goods sold by producers, which, in turn, could include sales to other producers. Therefore, the PPI basket includes the intermediate goods that are sold to firms, whereas the CPI does not. Second, consumers and producers are faced with different taxes and subsidies that affect the difference between the sales price and the purchase price of a given item. This means, for example, that sales taxes paid on an item are counted in the price of a good in the CPI, but not in the purchase price of the same good in the PPI. Subcategories of the data series include the PPI by industry classification, commodity classification, and commodity-based state-of-processing classification.

Producer Price Index (New Construction and Inputs to Construction Components)

The New Construction series is a subcategory of the PPI. This index measures the change in the final sales prices received by the sellers of new construction, which would include the types of activities involved in restoration after an oil spill. The Inputs to Construction is another subcategory of the PPI that measures the prices of inputs to construction faced by the construction industry.

Summary

The chart below compares each of the indexes from 1986-2013. Each index is normalized so that the value of the index is 100 in the year 2001. This normalization does not impact year-over-year changes that would be used to apply any of these indices as a price or fee adjustment, it is simply to provide a comparable measure of the relative growth of each index in recent years. Notice that the ECI was not available before 2001. It is also important to note that historical changes do not necessarily provide an indication of expected future changes. Prices change due to the interaction of supply and demand and the historical relationship of those two forces does not always predict the future relationship of those goods and services. For example, health care costs are a significant component of the ECI. Because of significant changes in the market for health care, changes in health care costs may differ significantly in coming years from what has been seen historically.

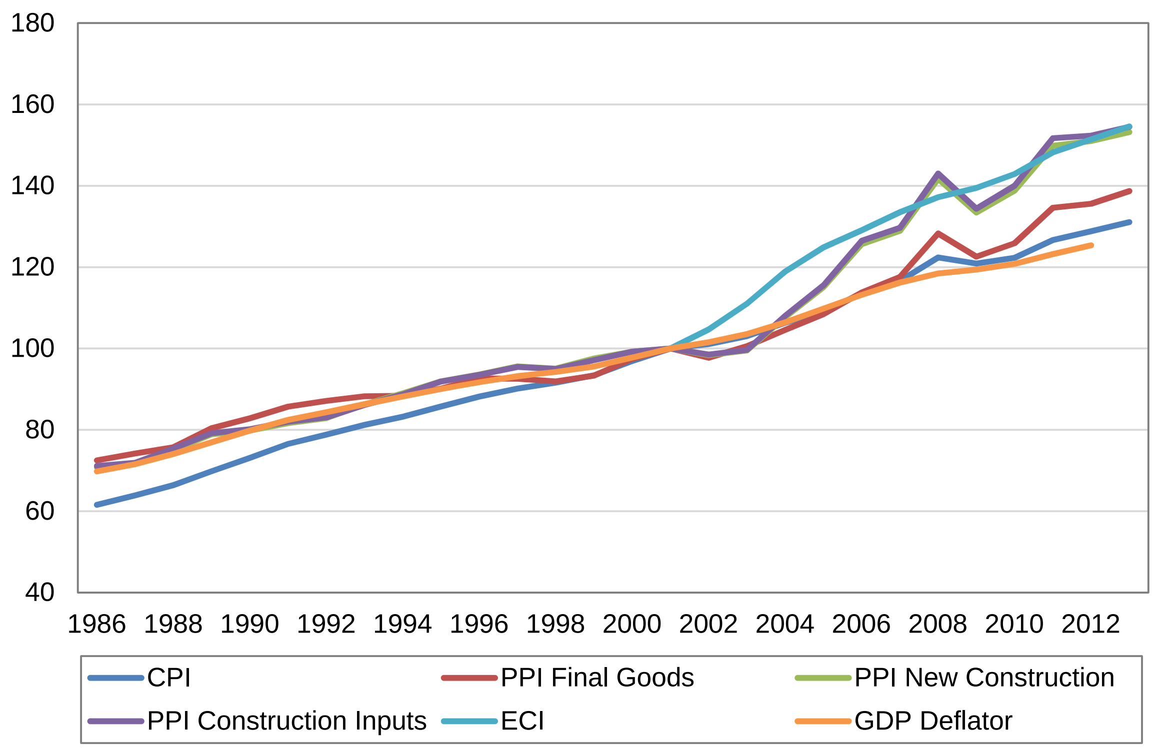

Figure B-1. Comparison of Indices

Appendix C: Detailed Summary of Spill Notifications by Type

a. Platform-Related Spill Notifications

Figure C-1 provides a time-series analysis of the number and volume of platform-related spill notifications in Louisiana. Over the past 20 years, Louisiana has experienced an average of some 346 platform-related oil spill notifications in any given year. These spill notifications account for about 60 percent of all Louisiana oil spills. Louisiana experienced its lowest level of platform-related spill notifications in 2004 (190) and its highest level in 1990 (648). Platform-related spill notifications currently occurring in Louisiana are reported at levels (in number of reported incidents) comparable to the mid to early-1990s.

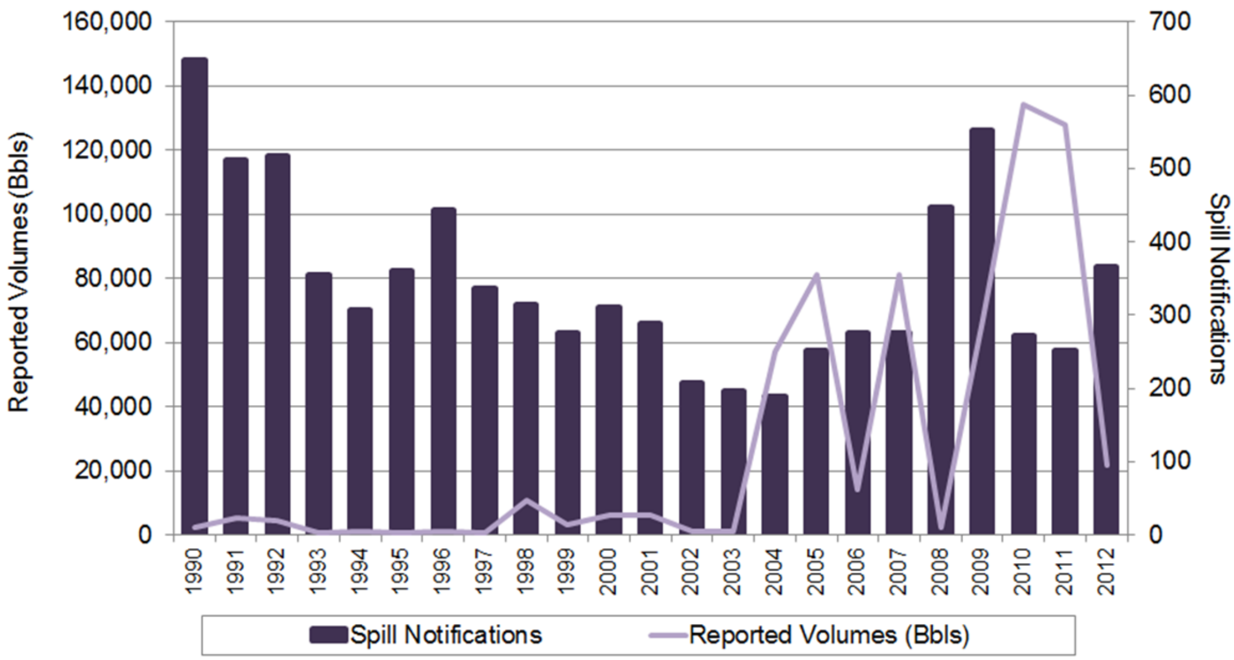

Figure C-1: Louisiana Platform-Related Oil Spill Notifications and Reported Total Reported Volumes
Source: NRC, LSP and LOSCO data

During the period 1993-1997, platform-related reported oil spill volumes were generally less than 1,000 Bbls in any given year. The total reported volume of Louisiana platform-related oil spill notifications increased to over 10,000 Bbls in 1998 before another five-year period of relative calm. Louisiana platform-based reported oil spill volumes began to explode in 2004 and have generally continued to increase up to

2012. Total annual platform-related reported spill volume has ranged from 22 MBbls to 135 MBbls over the past three years (not including the DWH spill).

Similar trends are seen in Figure C-2 which charts average platform-related oil spill notifications and average reported volumes. Platform-related spill notifications are growing post-2004 in both frequency and in their average reported size. Figure C-2 shows that the average reported size of a Louisiana platform-based oil spill notification has been increasing dramatically in 2010 and 2011. In fact, the average reported size of a platform-based oil spill notification is at the highest recorded average level in 2011 at over 500 Bbls per spill.

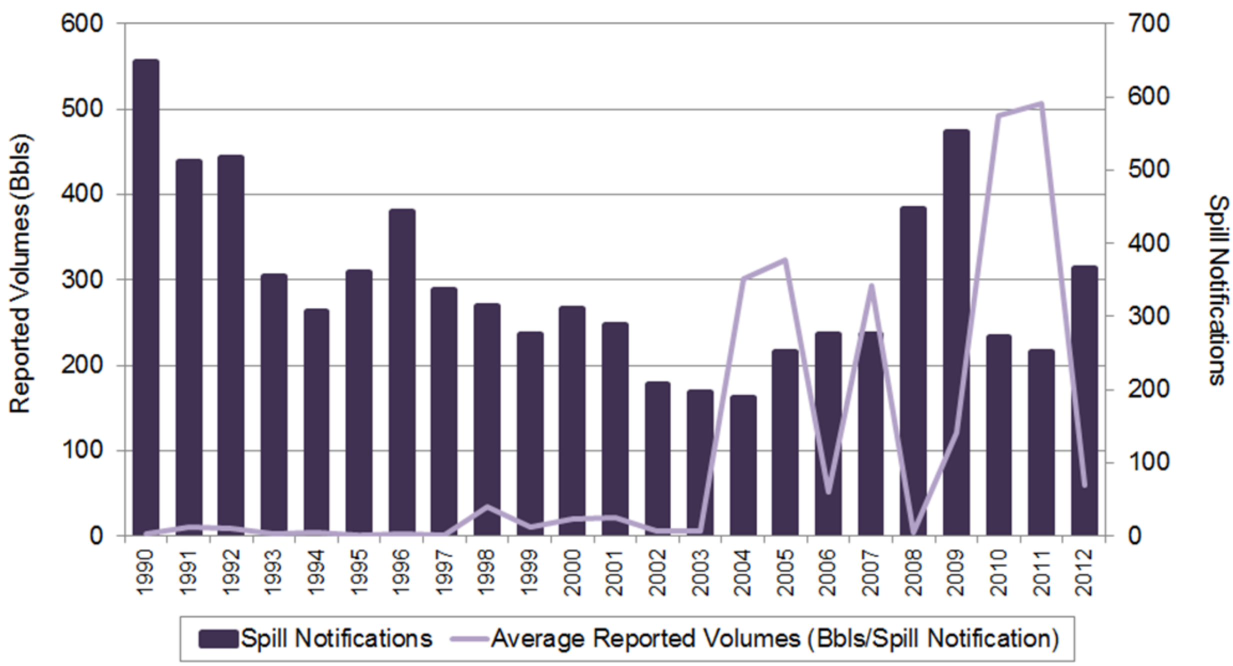

Figure C-2: Louisiana Platform-Related Oil Spill Notifications and Average Reported Volumes
Source: NRC, LSP and LOSCO data

b. Fixed-Location Spill Notifications

Fixed location-related spill notifications, which can include oil field production sites and a range of other unmovable transportation-related or storage-related equipment, rank as the second leading type of Louisiana oil spill notifications (in frequency terms). Figure C-3 highlights the trends associated with oil spill notifications at fixed onshore locations. Fixed type oil spill notifications peaked in 1991 and decreased dramatically between 1995 and 2000 before leveling off in the range of 50 to 100 per year for most years since that time.

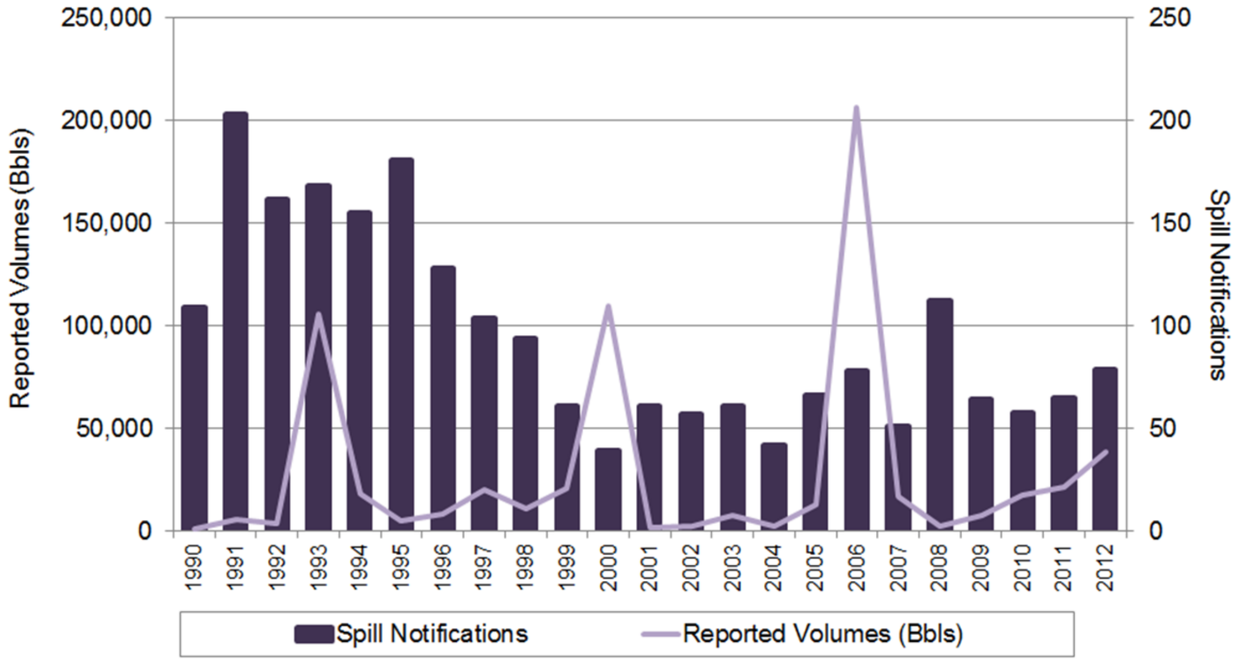

Figure C-3: Louisiana Fixed Location-Related Oil Spill Notifications and Total Reported Volumes

Source: NRC, LSP and LOSCO data

Fixed location spill reported volumes demonstrate a marked random component indicative on an infrequent discrete event with reported volume significantly larger than the vast majority of notifications in most years. Reported volumes for fixed site spill notifications have generally remained below 10 MBbls in any given year with the exception of a number of seemingly random spikes, each of which is driven by one very large (100,000+ Bbls) incident report. In 2000, fixed site total reported volumes spike to over 100 MBbls before declining to a relatively low level over an extended six-year period. Fixed site total reported volumes increased again to over 200 MBbls in 2006 before returning to a significantly reduced level the following year. However, since that time the total reported volumes have crept up to around 39 MBbls in 2012.

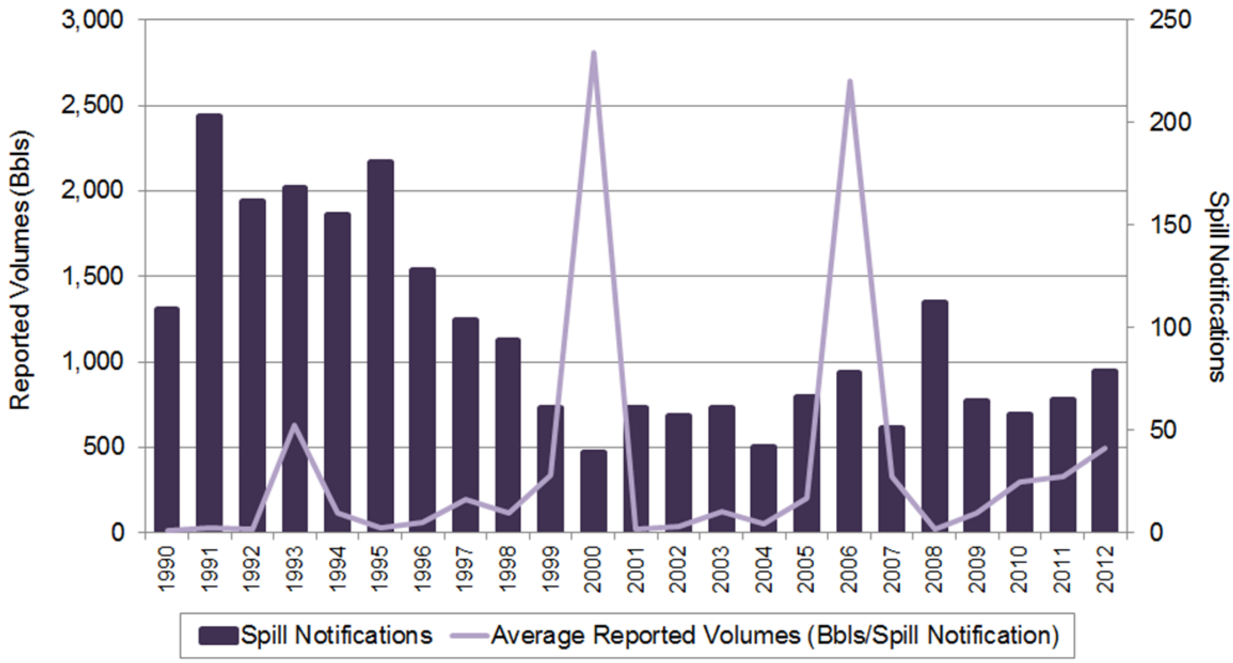

Figure C-4: Louisiana Fixed Location-Related Oil Spill Notifications and Average Reported Volumes

Source: NRC, LSP and LOSCO data

Fixed location average reported spill size, provided in Figure C-4, shows a similar pattern of relatively low volumes in most years with seemingly random spikes associated with a small number of large reported volumes, though the average volume has risen somewhat steadily over the past five years.

c. Pipeline-Related Spill Notifications

Pipeline-related spills represent the third most common oil spill notification type in Louisiana over the past two decades. These pipeline-related spill notifications have remained relatively flat with only a slight decrease in frequency since about 1998, as shown in Figure C-5.

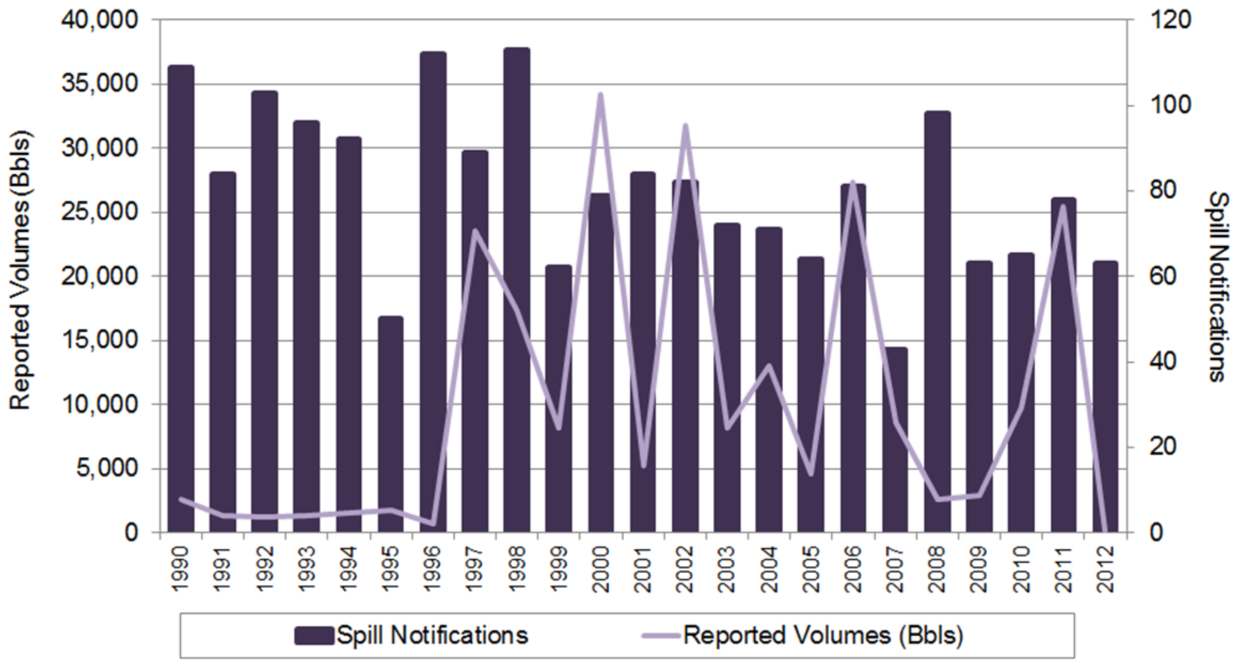

Figure C-5: Louisiana Pipeline-Related Oil Spill Notifications and Total Reported Volumes

Source: NRC, LSP and LOSCO data

Pipeline-related reported volumes, however, have shown a very different trend with the amount reported jumping significantly in the late 1990s after a seven-year period of low reported volumes. Prior to 1997, reported volumes for pipeline-related spill notifications amounted to a few thousand barrels per year. The total reported volume of Louisiana pipeline-related spill notifications jumped up between 1997 and 2002 with a stretch of years averaging annual total volumes reported in the range of 20 to 30 MBbls. Reported volumes for Louisiana pipeline-related spill notifications have generally decreased to a more normal level of less than ten thousand barrels a year with the exception of 2006 when pipeline spills of 27 MBbls were reported and 2011 when reported spill volumes were over 25 MBbls.

Figure C-6 shows similar trends for the average reported size and frequency of pipeline-related spill notifications in Louisiana.

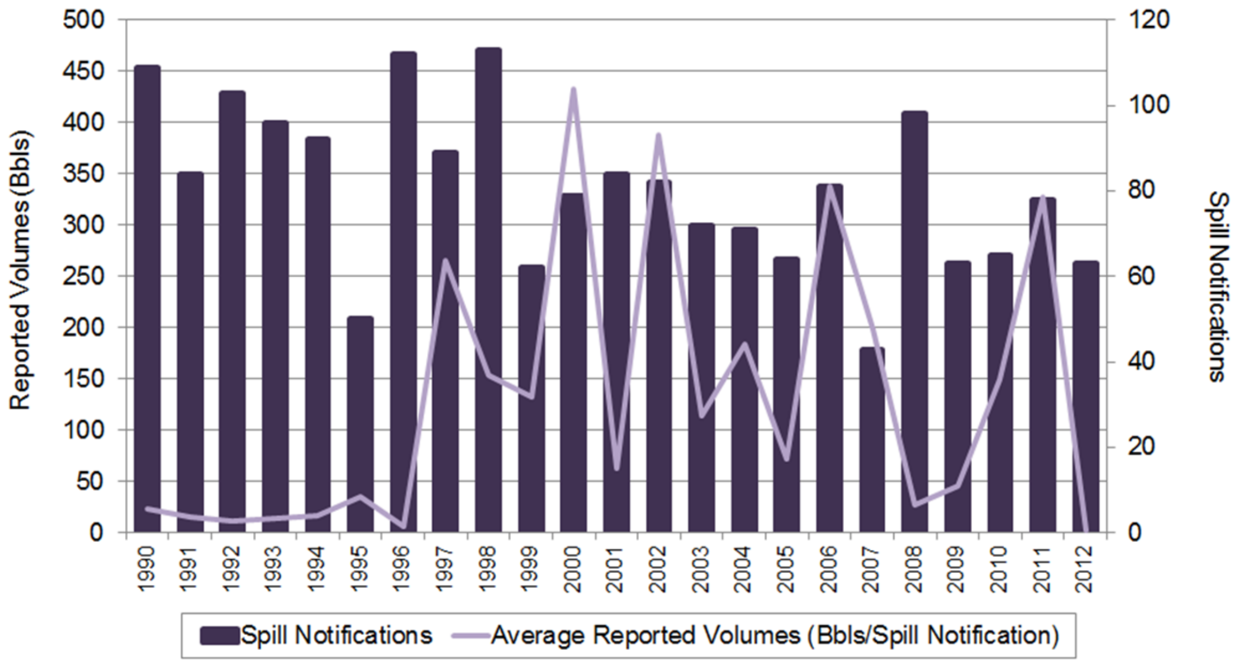

Figure C-6: Louisiana Pipeline-Related Oil Spill Notifications and Average Reported Volumes

Source: NRC, LSP and LOSCO data.

d. Vessel-Related Spill Notifications

Spill notifications associated with vessel traffic are the least common type among the frequently reported spill notification types in Louisiana, but these incidents tend to be large when they do occur. For instance, most vessel-related spill notifications tend to be less than one MBbl in any given year. However, 1994 saw a vessel-related spill notification with reported volume of 20 MBbls, 2005 total reported volumes were 55 MBbls, and 2006 total reported volumes were 46 MBbls.

Figure C-7 shows the historic relationship between annual total reported volumes for vessel-related spill notifications and the annual frequencies, while Figure C-8 provides similar information for the average reported size of these vessel-related spill notifications.

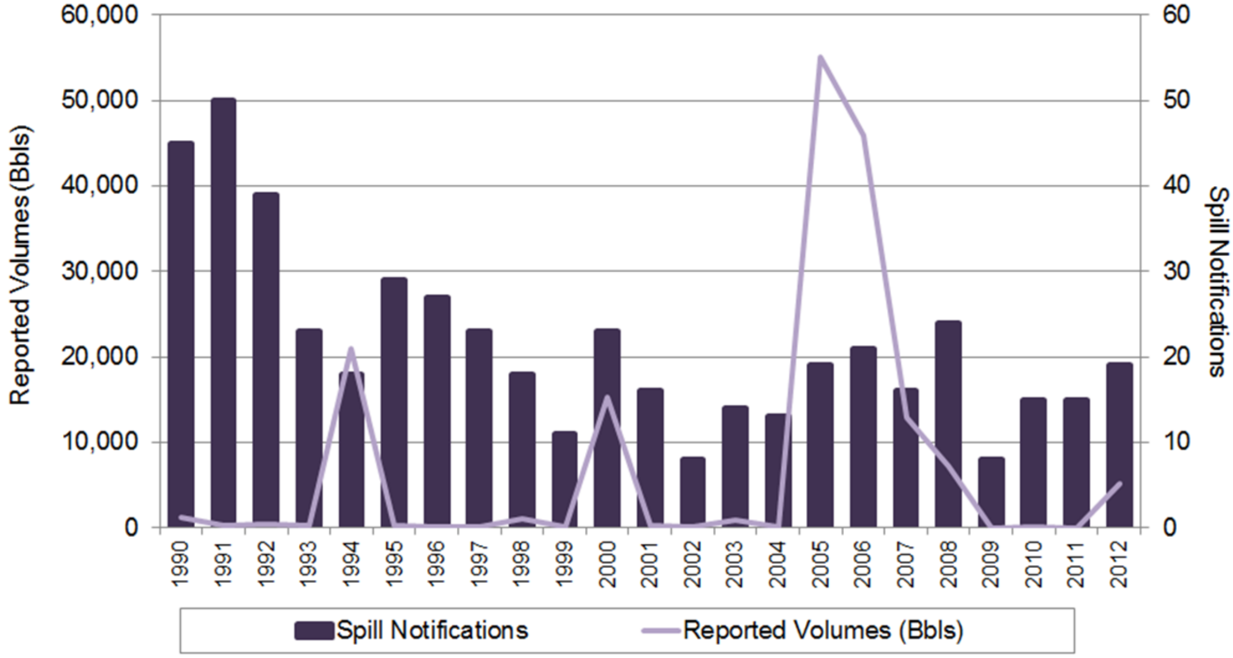

Figure C-7: Louisiana Vessel-Related Oil Spill Notifications and Total Reported Volumes

Source: NRC, LSP and LOSCO data

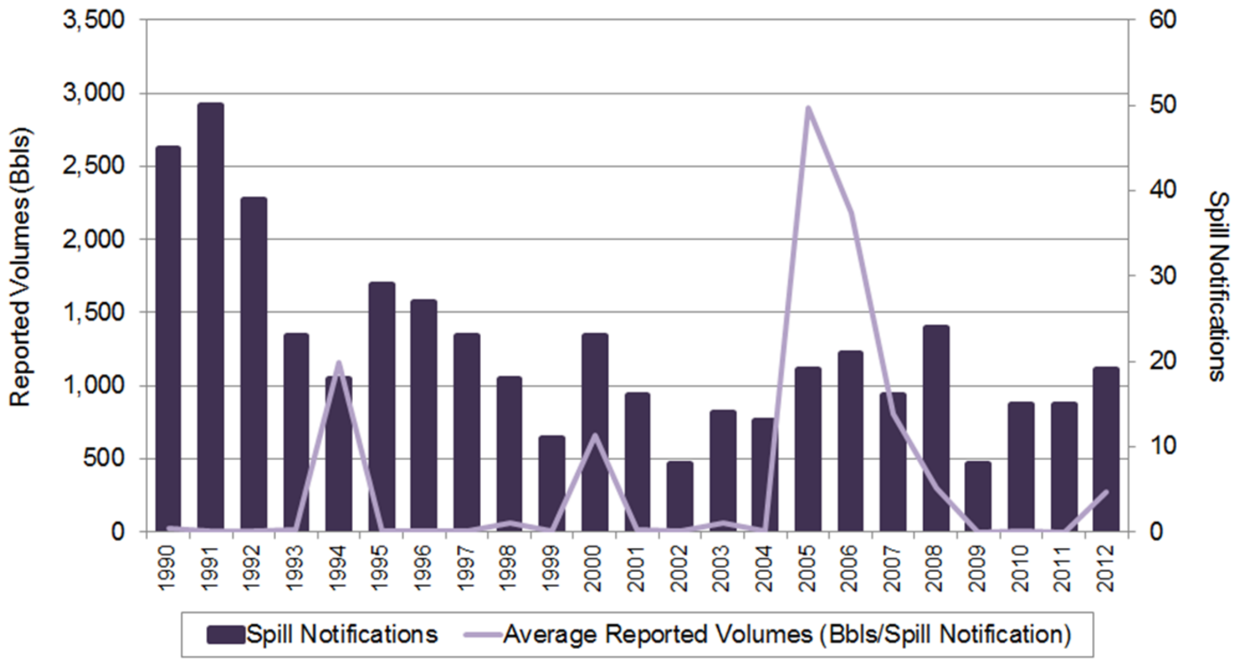

Figure C-8: Louisiana Vessel-Related Oil Spill Notifications and Average Reported Volumes

Source: NRC, LSP and LOSCO data

e. Other Spill Notifications

The remaining two percent of spill notifications that have been reported over the past 20 years are those associated with a number of other miscellaneous reporting classifications given by the NRC. Interestingly, these seemingly random spill notification categories account for, on average, close to 15 percent of the spill volumes reported during the past 20 years. Table C-1 shows annual spill notification frequency, total reported volumes, and average reported volumes for each of these less frequent oil spill notification types.

Table C-1: Trends in Other Types of Louisiana Oil Spills (Notifications, Reported Volumes and Average Reported Volumes)[48]

Year	Unknown			Storage Tank			Mobile/Railroad/Aircraft		
	Volume (Bbls)	Incidents (Number)	Average (Bbls)	Volume (Bbls)	Incidents (Number)	Average (Bbls)	Volume (Bbls)	Incidents (Number)	Average (Bbls)
1990	38	27	1	-	-	-	10	1	10
1991	26	24	1	-	-	-	24	4	6
1992	326	17	19	-	-	-	0	1	0
1993	598	10	60	-	-	-	114	4	29
1994	4	5	1	-	-	-	2	1	2
1995	71	19	4	-	-	-	1	1	1
1996	2,577	12	215	-	-	-	194	5	39
1997	40	20	2	-	-	-	236	5	47
1998	19	8	2	-	-	-	10	1	10
1999	41	5	8	-	-	-	17	3	6
2000	300	2	150	2,754	23	120	113	3	38
2001	10	4	2	4,471	36	124	15	1	15
2002	149	3	50	3,162	33	96	6	2	3
2003	20	1	20	603	19	32	1	1	1
2004	84	6	14	3,917	16	245	3	2	2
2005	2	3	1	31,533	14	2,252	-	-	-
2006	71,012	5	14,202	237	15	16	12	3	4
2007	35	2	18	3,359	16	210	-	-	-
2008	1	6	0	803	23	35	18	3	6
2009	203,136	5	40,627	2,259	14	161	0	1	0
2010	130	11	12	1,810	8	226	0	1	0
2011	208	5	42	184	7	26	400	2	200
2012	2	2	1	11,074	15	738	-	-	-
Total	**278,830**	**202**	**1,380**	**66,167**	**239**	**277**	**1,176**	**45**	**26**

[48] Source: NRC, LSP and LOSCO data.