CITY OF LONG BEACH

Gas & Oil

DEPARTMENT

M E M O R A N D U M

Working Together To Serve

Date: March 2, 2017

To: Patrick H. West, City Manager

From: Robert Dowell, Director of Long Beach Gas and Oil /s/

For: Mayor and Members of the City Council

Subject: Response to Request for Information on Current Oil and Gas Operations in Long Beach - December 6, 2016 City Council Meeting, Item #16

At its meeting of December 6, 2016, the City Council requested the City Manager to report back to City Council, in no more than 90 days, on the current oil and gas operations conducted in Long Beach. Attached for your review is the requested report.

Provided below is a brief summary of the oil and gas operations currently conducted under Long Beach Gas and Oil's oversight:

- All exploration or well drilling operations are limited to areas defined in the Long Beach Municipal Code.
- All well drilling or abandonment operations are comprehensively regulated by both the Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR) and the City.
- The stimulation technique known as "hydraulic fracturing" is not currently utilized in the City's oil operations nor is it anticipated to occur in the near future.
- Aboveground oil storage tanks and oil pipelines must meet stringent regulations for their construction, maintenance, and periodic integrity testing.
- Oil operators are mandated to develop and maintain comprehensive emergency response plans to manage a multitude of incidents that could potentially occur.

Long Beach Gas and Oil recognizes that oil operations will be in place for many years to come and is fully committed to continuing to protect the City's environmental landscape and ensuring no adverse conditions arise as a result of its operations.

If you have any questions regarding this matter, please contact Kevin Tougas, Oil Operations Manager, at (562) 570-3963.

Attachment

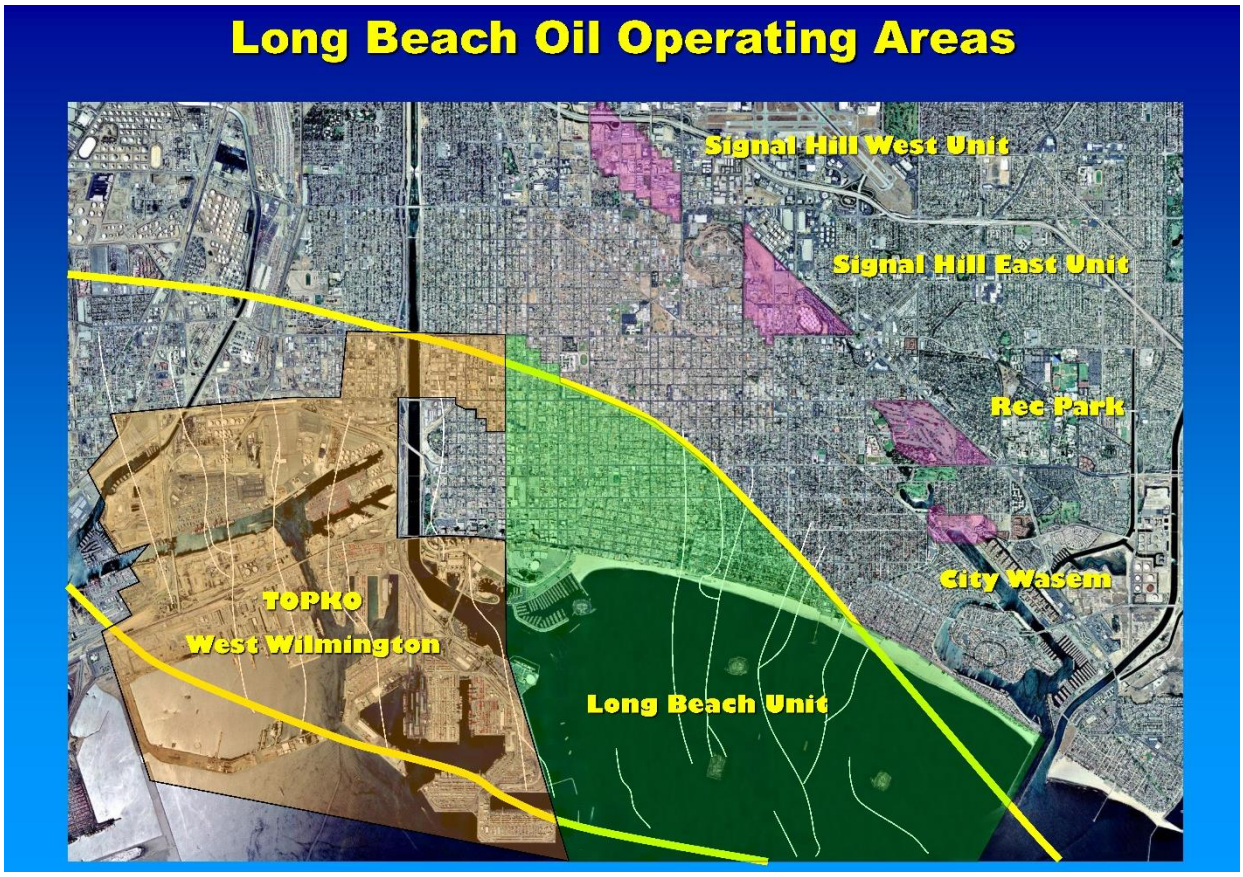
cc: Charles Parkin, City Attorney
Laura L. Doud, City Auditor
Tom Modica, Assistant City Manager
Anitra Dempsey, Interim Deputy City Manager
Rebecca Jimenez, Assistant to the City Manager
City Clerk (Ref. File #16-1084)

CURRENT OIL & GAS OPERATIONS IN LONG BEACH

INTRODUCTION

The City of Long Beach (City), through the Long Beach Gas & Oil Department (LBGO), manages oil and gas assets located within the Wilmington Oil Field. LBGO is also involved, although to a lesser extent, in oil operations in which the City has financial interest such as Signal Hill East and West Units, Recreation Park, and Marine Stadium. The majority of the Wilmington Oil Field resides in the State of California (State) tidelands (Figure 1). The State granted the tidelands to the City in the early 1900s for development and the City, therefore, became the trustee for the State in the Wilmington Oil Field when it was discovered in the early 1930s.

Figure 1



Early oil production from the Wilmington Oil Field caused subsidence to occur that had to be mitigated for oil operations to continue any further. In 1953, the City initiated a pilot waterflood program for the Wilmington Oil Field which stabilized reservoir pressures and halted any further subsidence. This pilot successfully demonstrated that subsidence could be controlled by the City and, as a result, the State Legislature and City Charter approved the continued development of the east portion of the Wilmington Oil Field and the construction of the four artificial THUMS oil

islands (White, Grissom, Freeman, and Chaffee, named for the first American astronauts who gave their life in the U.S. space program). For over 80 years, the City has successfully operated the Wilmington Oil Field and generated billions of dollars in revenue for both the State and City.

The LBGO Oil Operations Bureau staff consists of engineers and geologists with vast experience in the oil industry. The majority of the staff hold a professional license as an engineer, geologist, or surveyor. LBGO's staff oversees oil production that currently exceeds 12 million barrels of oil per year and the management of approximately 2,000 active production and injection wells. As the operator of the Wilmington Oil Field, LBGO works closely with its contractor, California Resources Corporation (CRC), the California State Lands Commission (SLC), the California Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR), and on occasion the California Coastal Commission (CCC).

This report will provide an update on the City's current oil operations including the exploration of the Wilmington Oil Field, well drilling techniques, well abandonments, oil storage, pipeline maintenance, and emergency planning preparedness. The City manages the Wilmington Oil Field closely and has less involvement in other oil fields located throughout the Long Beach area.

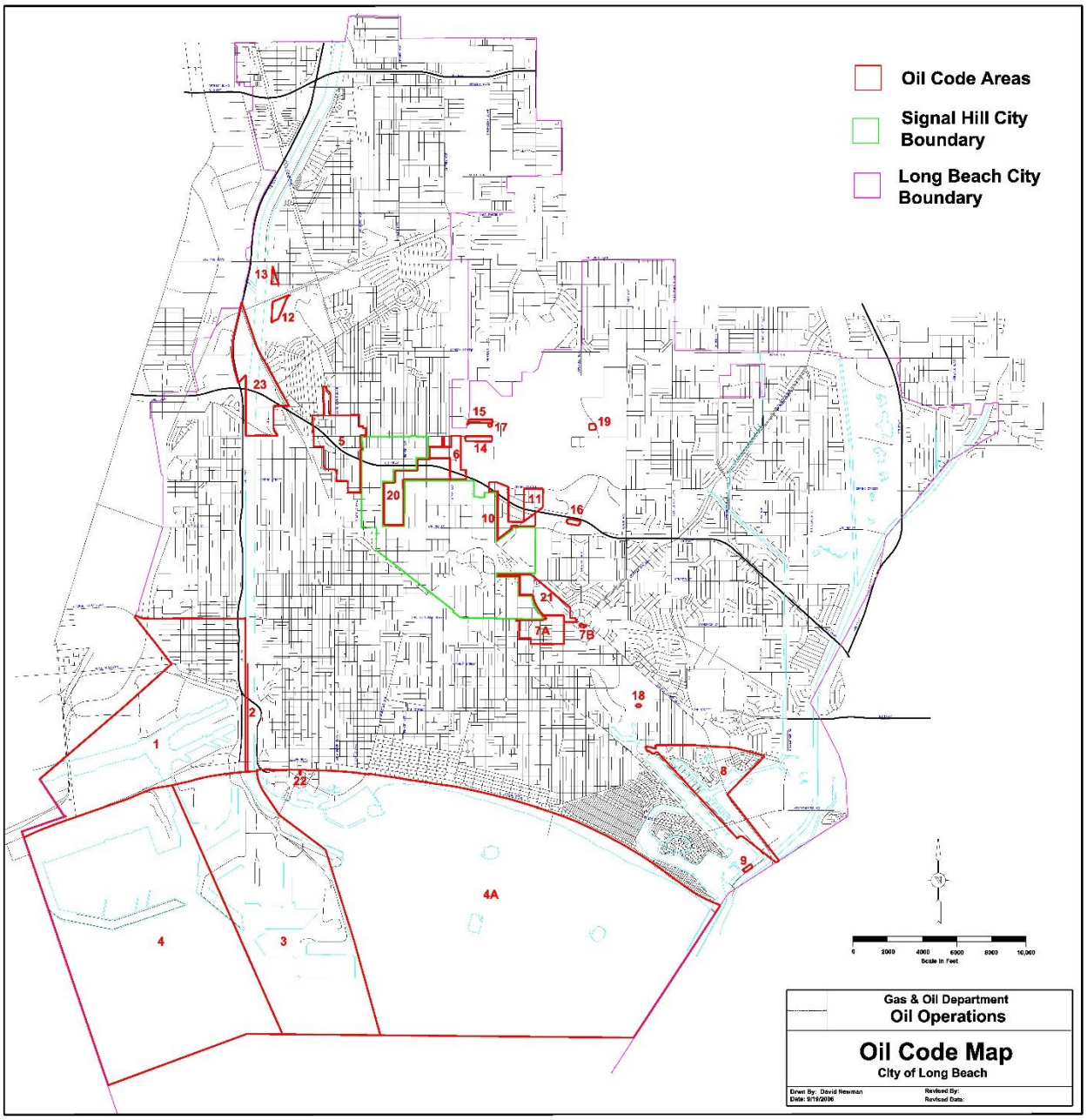
OIL EXPLORATION

Oil was first discovered in the Long Beach area in the 1920s. In the nearly 100 years of oil development since, the oil fields have been thoroughly explored. Today's activities focus on the continued full field development with no further exploration opportunities planned. As technology develops, there are opportunities to run new surveys of the existing oil fields to better understand the assets, but the surface locations from which the oil development will occur are clearly defined in the City's Municipal Code.

Chapter 12.08 of the Municipal Code defines the areas within the city where oil operations are permissible (Figure 2). It is unlawful to drill or conduct oil operations outside a designated oil operating area. All new well drilling will occur from these oil operating areas and any modification of an oil operating area requires approval by the City Council. The City's Municipal Code stipulates how close an oil well may be located to a public street, building, or school land. The City also dictates a time schedule when drilling operations may occur to minimize any potential impacts to the local community.

In the Wilmington Oil Field, the City conducts all its oil operations from either the THUMS oil islands or designated areas throughout the Port of Long Beach (POLB). LBGO and the POLB have a memorandum of understanding that defines where oil development activities may be located within the POLB. These areas identified for continued oil operations were selected to benefit the development of the POLB and the Wilmington Oil Field.

Figure 2



WELL DRILLING

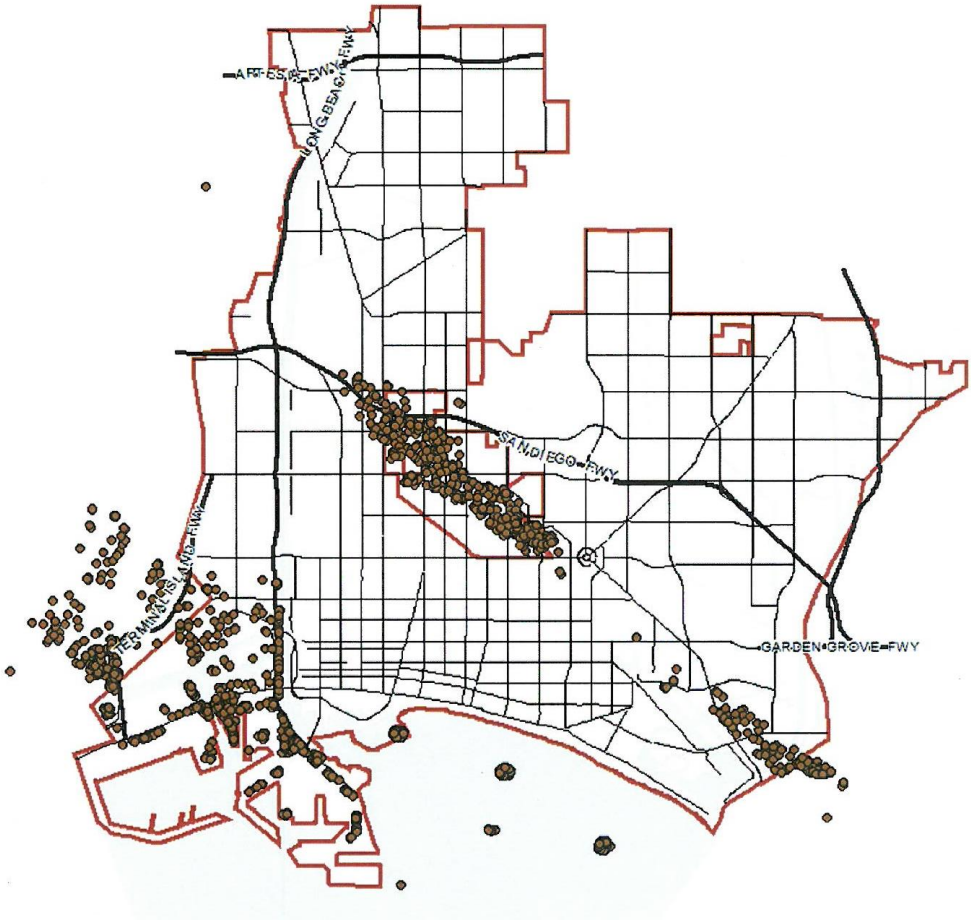
All oil and gas well drilling operations in the State are extensively regulated and require approval from the State of California. DOGGR is the State agency tasked with overseeing the drilling, operation, maintenance, plugging, and abandonment of all oil, natural gas, and geothermal wells. DOGGR routinely updates and publishes new statutes and regulations, particularly those that govern well drilling operations.

DOGGR reviews every new well drilling application to ensure the protection of all surface and subsurface freshwater aquifers through the adequate placement of casing, cementing practices, proper drilling procedures, adequate blowout prevention equipment, and compliance with the requirements of the California Environmental Quality Act. During the well drilling process, DOGGR staff are on-site to witness key operations to ensure safety and the protection of the environment.

The City also requires its own drilling permit in addition to the approved DOGGR permit. The City drilling permit is reviewed by the Fire Department, LBGO, and Development Services to ensure it complies with the City's Municipal Code. Figure 3 is a map displaying the locations of all active wells in the Long Beach area.

Figure 3

ACTIVE WELLS



The South Coast Air Quality Management District (SCAQMD) adopted a new regulation in 2013 requiring oil and gas operators to notify SCAQMD when well drilling operations and other types of well work activities are scheduled to occur. Under this new regulation, the SCAQMD may send staff to an operator's location to take air quality measurements during various times while wells are being drilled.

As trustee for the State, LBGO must also obtain additional administrative approvals to drill a new well. Initially, a budget to drill and operate new wells is prepared and submitted each year for approval by the City Council and the SLC. Additionally, CCC staff also reviews the budget plan for consistency with coastal regulations. Every proposed new well that is to be drilled is reviewed by LBGO staff and the SLC for economics, technical merit, and safety. Once a drill project has been approved by the SLC, LBGO staff participates in the planning meetings with CRC for the drilling of each well and, once drilling operations commence, LBGO receives daily updates to ensure best practices are followed.

The majority of wells drilled in the Wilmington Oil Field are of a traditional design. This entails a mostly vertical well path through the targeted production interval with a completion design incorporating a slotted or perforated liner. Occasionally, horizontal wells are drilled when the desired reservoir mandates this technique. The completion design is similar to a vertical well; however, the well path is horizontal through the production interval. Horizontal wells are typically used to capture bypassed oil that resides at the top of hydrocarbon zones.

WELL STIMULATIONS

As of January 1, 2014, a specific permit is required from DOGGR to conduct stimulation operations on oil and natural gas wells as defined in California Senate Bill 4 (SB4) which was enacted in 2013. The DOGGR regulations developed under SB4 apply to all hydraulic fracturing, acid fracturing, and acid matrix stimulation treatments and require groundwater and environmental monitoring as well as public disclosure of all chemicals to be used. DOGGR's involvement is to protect the environment, prevent pollution, ensure public safety, and confirm that all well stimulation regulations are followed. To receive a stimulation permit under DOGGR's regulations, an operator must notify several government agencies and any nearby residents of the planned well stimulation treatment and drill monitoring wells to test freshwater aquifers for any impact from the well stimulation, and the well must pass a mechanical integrity test of the casing. As specified in the DOGGR regulations, well stimulation treatments do not include waterflooding and routine well maintenance operations involving the use of acid.

Historically, hydraulic fracturing or acid matrix stimulation treatments have rarely been used in oil and gas wells in the Wilmington Oil Field. To this point, hydraulic fracturing operations have not been performed in the Long Beach area since 2013 nor are they anticipated to occur anytime in the near future. These applications are typically costly and, in the current low oil price environment, they are not economically feasible to be employed.

INJECTION WELLS

Water injection wells require an additional permit from DOGGR pursuant to the Underground Injection Control (UIC) program. DOGGR's permit review process involves verifying the mechanical integrity of all wells within a quarter mile of an injection well and determining the maximum allowable injection pressure at which an operator may inject.

Operators in the Long Beach area typically inject all of the produced oil field water. The City's operations require the injection of additional volumes of water to control subsidence. This additional volume of water is typically a combination of reclaimed municipal water purchased from the Long Beach Water Department and source water from zones deemed useable only for industrial purposes. No freshwater is utilized for injection in the City's operations. All volumes of produced and injected water utilized in the City's operations are reported to DOGGR on a quarterly basis in accordance with established regulations.

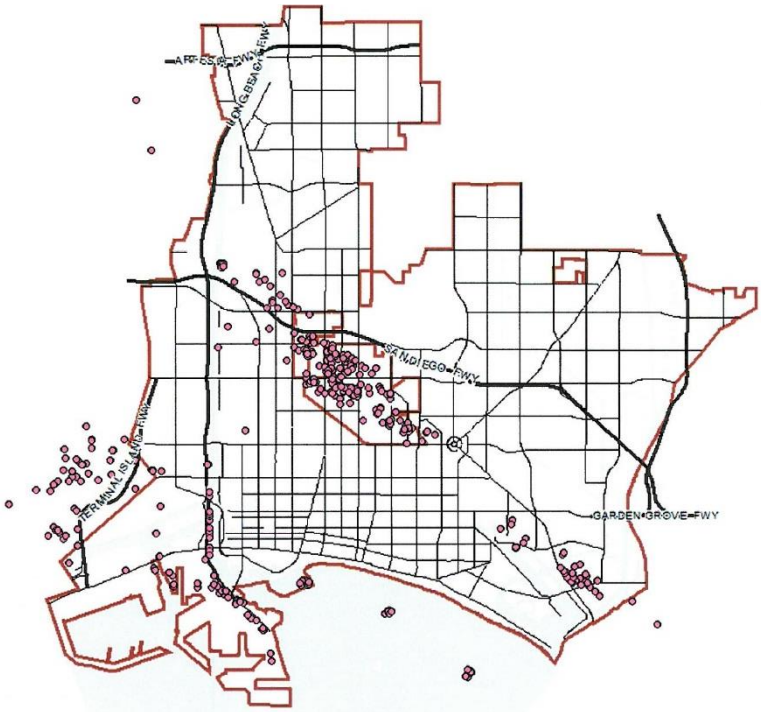
IDLE WELLS

Idle wells are also regulated by both the DOGGR and the City. Last year, the State Legislature updated idle well requirements under Assembly Bill 2729. An idle well is defined as any well that has not produced oil or natural gas or has not been used for injection purposes for 24 consecutive months. Operators of idle wells are required to test them periodically to ensure that no damage is occurring to oil and gas reservoirs or any freshwater aquifers. An idle-well test may be as simple as a fluid-level survey or may be a more complicated well-casing mechanical integrity test.

DOGGR is responsible for tracking and maintaining the idle well inventory for the entire State. An operator that has a high number of idle wells is required by DOGGR to abandon a specified percentage of long-term idle wells on an annual basis. Furthermore, DOGGR requires an operator to purchase indemnity bonds for their idle wells to ensure that well abandonment is funded in the event of any insolvency circumstances. Figure 4 is a map displaying the locations of all idle wells in the Long Beach area.

Figure 4

IDLE WELLS



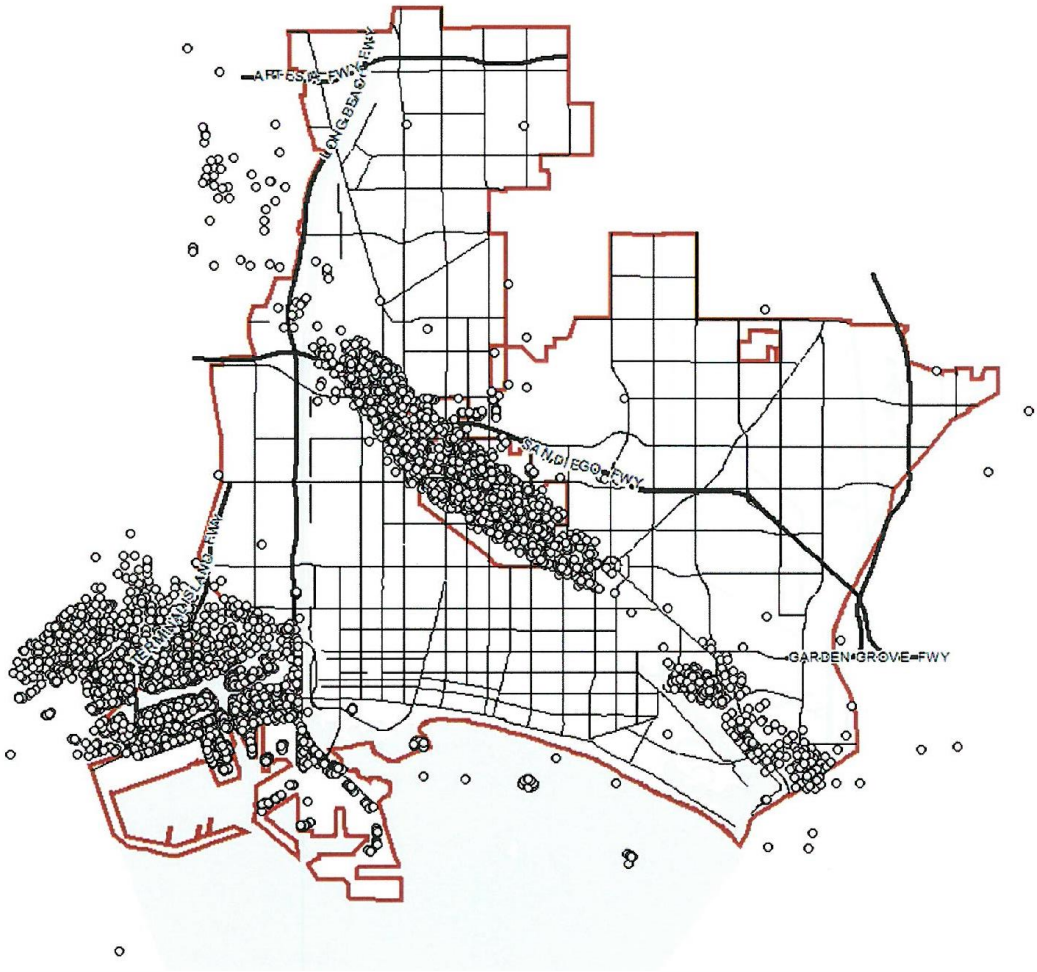
WELL ABANDONMENTS

In addition to regulations to drill and operate a well, DOGGR has regulations and a permitting process that govern the procedures to abandon a well. DOGGR well abandonment regulations have been revised over time as technology and improved techniques have been developed. Operators are always required to adhere to the most current regulations existing at the time any well abandonment operation is undertaken.

In general, cement plugs are placed across specific intervals in a well to isolate all oil and gas zones, prevent degradation of useable water aquifers, restore surface conditions, and protect public health and safety. DOGGR staff is required to be on-site to witness the placement of all cement plugs for the well abandonment to be approved. Once the well is plugged as required, the well casing is cut off approximately ten feet below the surface and a steel plate is welded on with identifying information. The final abandonment requirement includes the restoration of the surface wellsite location. LBGO staff also witnesses the final completion of any well abandonment in the city. Figure 5 is a map displaying the locations of all abandoned wells in the Long Beach area.

Figure 5

ABANDONED WELLS



OIL STORAGE

On the THUMS oil islands, very small volumes of produced oil are actually stored on-site as a measure to mitigate risk. The oil is separated from the water immediately after it is produced and shipped to shore via a subsea pipeline(s) for additional processing. To further improve reliability and protect the environment, CRC utilizes a Mechanical Integrity and Quality Assurance program (MIQA) to assess and maintain critical fluid handling equipment. The MIQA program utilized by CRC is designed to meet internal and regulatory requirements and provide a high level of equipment integrity.

Once on shore, produced oil is briefly stored in aboveground tanks before being transported and sold to local refineries. Chapter 12.40.030 of the City's Municipal Code defines how these aboveground storage tanks are designed, constructed, installed and maintained. DOGGR has similar regulations for aboveground oil storage tanks.

All aboveground tanks are required to have secondary containment in the event of a rupture to the tank. Leak detection equipment is required on all new aboveground tanks and DOGGR may require leak detection equipment on existing aboveground tanks that do not have a foundation with an impermeable barrier. Inspection schedules, maintenance plans, and minimum wall thickness testing are also required for all aboveground tanks for compliance with State regulations. Additionally, to comply with the SCAQMD regulations, all aboveground storage tanks are quipped with vapor recovery systems. Vapor recovery systems are designed to capture gases from the stored crude oil and prevent releases to the atmosphere. SCAQMD staff periodically inspects the City's aboveground tanks and oil facilities for compliance with their regulations.

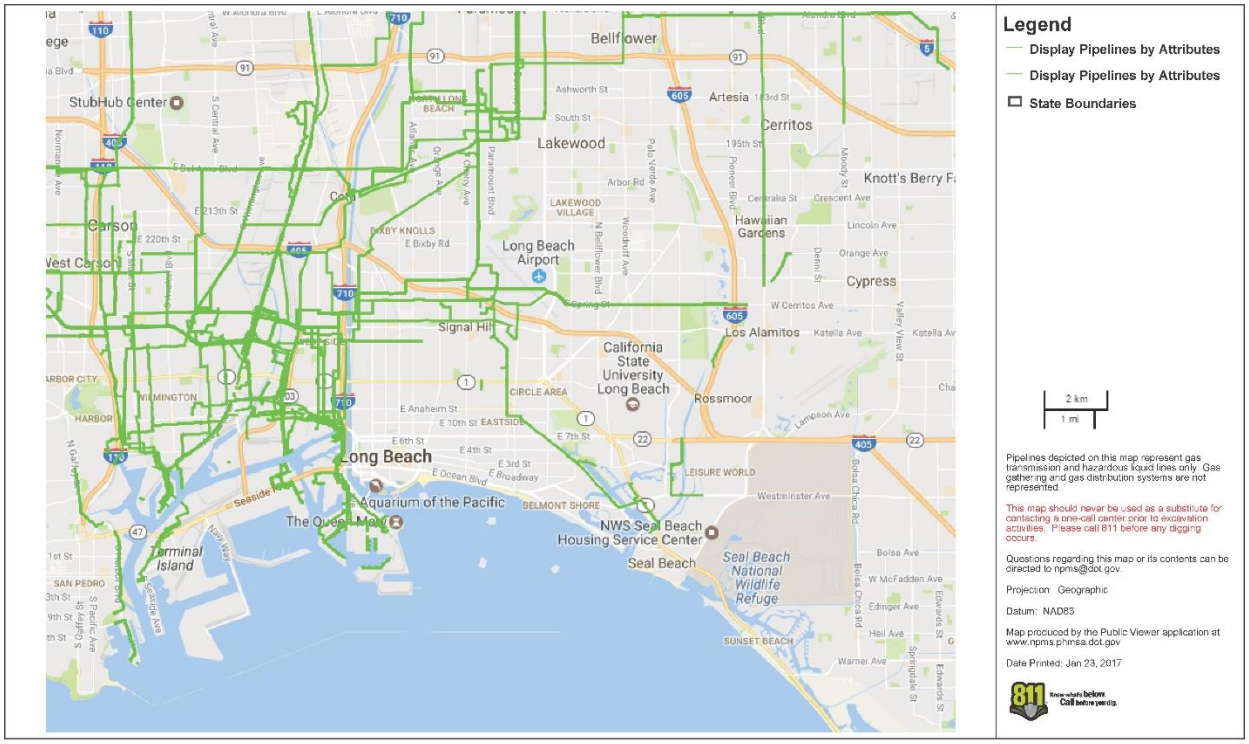
The City's produced oil is transported daily from the aboveground storage tanks to local refineries either through pipelines or by truck. The majority of produced oil is transported via pipelines and is further discussed in the next section. All loading and trucking of produced oil is regulated by Chapter 12.40.040 of the City's Municipal Code and is conducted in accordance with Fire Department regulations.

PIPELINE MAINTENANCE

More than 90 percent of the City's produced oil is shipped to local refineries via pipelines. The transportation of oil via a pipeline(s) is the single largest element assessed when evaluating potential risks to the environment for oil operators. The State and the City have established extensive regulations to minimize both the impact and frequency of potential pipeline incidents. Chapter 12.56 of the Municipal Code references Federal and State regulations that govern pipeline construction, maintenance plans, inspection, and testing. Per the City's Municipal Code, every pipeline operator is required to provide the City Engineer and the Fire Department a diagram showing the location of their respective pipelines. Figure 6 is a map displaying the location of all oil shipping lines in the Long Beach area.

Figure 6

OIL SHIPPING LINES



Some of the pipelines located in the City are regulated by DOGGR, while the larger shipping oil lines are regulated by the State Fire Marshal. The following is a partial list of practices routinely incorporated by pipeline operators to improve the safety of operating an oil pipeline.

- Adherence to construction principles in accordance with good oil field practice standards set forth by the American Petroleum Institute, American Society of Testing and Materials, or Code of Federal Regulations.
- Utilization of cathodic protection and corrosion inhibitors to minimize external and internal corrosion.
- Conducting integrity tests for all identified pipelines every two years (hydrostatic pressure testing to above the normal or maximum operating pressure is the most common nondestructive integrity testing method utilized).
- Utilization of internal devices to measure pipeline wall thickness where applicable or required.
- Preparation of a pipeline management plan that is updated when pipelines are installed, modified, or acquired.
- Incorporating, where practical, the use of equipment such as low-pressure alarms and safety shut-down devices to minimize spill volume in the event of a leak.

LBGO and its contractor, CRC, undertake significant measures to ensure the safety and integrity of its subsea pipelines that transport fluids to and from the THUMS oil islands and have a track record of proven, reliable performance. These subsea lines have emergency shut-down valves incorporated into their design for immediate leak isolation, should one ever occur. The subsea pipelines are also routinely inspected by DOGGR, the State Fire Marshal, and SLC staff. Finally, CRC utilizes a robust mechanical integrity program that includes cleaning, inspecting, and pressure testing all critical pipelines on a routine basis.

EMERGENCY PREPAREDNESS

Oil operators are required to have emergency response plans that cover various aspects of their operations. There are Federal, State, and local agencies that all have requirements for emergency response events. Emergency preparedness for the City's oil operations includes an oil spill contingency plan, an emergency action plan, an inventory of all hazardous materials on location, and a business resumption plan. Operators are required to conduct drills periodically to demonstrate the efficacy of their emergency response plans and their ability to respond in an actual emergency. Each operator is responsible for the financial costs of responding to, and the associated cleanup of, any spill or incident event.

LBGO takes additional precautions with the THUMS oil islands because of the close proximately to the ocean. Each year, LBGO conducts one field practice drill that involves deploying a boom to contain a potential spill. There is also a tabletop exercise administered each year to practice each person's role in establishing a unified command. The United States Coast Guard, California Department of Fish & Wildlife, CRC, and LBGO staff collectively participate in the preparation of both tabletop and equipment deployment drills.

As detailed in the agency-approved spill response plans, in the event of a discharge into any marine environment, CRC would establish an Incident Command Structure with support from Gallagher Marine Systems (GMS). GMS provides support in operations, technical advisors, emergency operations management, and 24/7 command center support. Any event that would require additional response capabilities and support would be done through contract manpower and equipment resources which can be obtained through the following oil spill removal organizations:

- Marine Spill Response Corporation (MSRC), formed in 1990, is the largest independent, non-profit, national spill response company dedicated to rapid response. MSRC's capabilities include over 15 Responder Class Oil Spill Response Vessels, 19 Oil Spill Response Barges, 25 X-Band radar and infrared systems, 5 Fast Response Vessels, 68 Shallow Water Barges, 650,000 feet of boom, 293 skimming systems, dedicated trained personnel, and 84 equipment sites nationwide (34 manned sites), and are complemented by a large contractor workforce in numerous locations in the continental U.S. MSRC resources are housed in the Port of Long Beach to respond to potential spills from the site that reach, or have the potential to reach, San Pedro Bay and/or Los Angeles Harbor.

- Patriot Environmental Services (Patriot) is a response contractor based in the Los Angeles area and is equipped to conduct both near shore and open water recovery activities as well as shoreline cleanup operations. Patriot resources include a fleet of modern equipment including vacuum trucks, chemical and petroleum pumps, pressure washing machines, and marine vessels to respond to oil or HazMat releases.
- NRC Environmental Services is an industry-supported cooperative that has been established in Southern California to provide aquatic spill containment, cleanup equipment, and personnel for spills. They are currently the world's largest commercial oil spill response organization and maintains oil spill equipment for immediate response. Their equipment worldwide includes over 15,000 vessels and 2,000 barges. Vessels include containment boom, skimmers, dispersants, and storage for recovered oils.

ENVIRONMENTAL SUSTAINABILITY

Since 2004, with the implementation and rigorous monitoring of native habitat gardens on each artificial oil island, the THUMS oil islands have held a Conservation Certification through the Wildlife Habitat Council (WHC). The THUMS oil islands habitat gardens utilize select plants that are native to California and are representative of the special Channel Islands and Coastal Sage Scrub native plant communities.

Over the years, the THUMS oil islands have always strived to sustain the native gardens by involving employees, community members, conservation organizations, and government agencies in the long term, active management of the property to improve wildlife habitat, provide an aesthetic place of work, and raise environmental awareness.

In 2016, the THUMS oil islands were presented by the WHC with the Landscaping Project Award. The certifications and award received from the WHC demonstrate the City's continuing commitment to environmental stewardship and habitat conservation.

LBGO has an excellent partner in CRC, whose commitment to protecting the environment is always a top priority. CRC has the lowest number of reportable spills to the ocean since 2010 in a comparison to the five largest oil operators working in and around the Pacific Ocean. The total volume of oil reported into the ocean from CRC's four events since 2010 was approximately 11 gallons. During the same period, the total volume of oil produced was 3.2 billion gallons. CRC also recently earned a national safety award in 2016 for their exceptional safety performance from the National Safety Council.

SUMMARY

To recap the oil and gas operations currently conducted under LBGO's oversight:

- All exploration or well drilling operations are limited to areas defined in the City Municipal Code.
- All well drilling or abandonment operations are comprehensively regulated by both the DOGGR and the City.
- The stimulation technique known as "hydraulic fracturing" is not currently utilized in the City's oil operations nor is it anticipated to occur in the near future.
- Aboveground oil storage tanks and oil pipelines must meet stringent regulations for their construction, maintenance, and periodic integrity testing.
- Oil operators are mandated to develop and maintain comprehensive emergency response plans to manage a multitude of incidents that could potentially occur.

The City of Long Beach and the State of California are leading the way to increase the use of alternative or renewable energy sources thereby reducing the state's reliance upon fossil fuels. This is an important endeavor that will take a significant period of time to achieve. Today, California consumes approximately 1.7 million barrels of oil per day which puts California, as a state, in the top 20 of all oil consuming countries. California is the third largest oil producing state in the United States but still must import over 65 percent of the oil that it consumes on a daily basis. Those imports come from places around the world that do not apply California's leading safety, labor, and environmental standards.

Recognizing the City's oil operations will be in place for many years to come, LBGO takes seriously the responsibility of operating a world class oil and gas facility while simultaneously providing responsible environmental stewardship. Through collaboration with our partners at CRC and SLC, and working in parallel with the numerous regulatory agencies that oversee our oil operations, LBGO is fully committed to continuing to protect the City's environmental landscape and ensuring no adverse conditions arise as a result of its operations.