



Oil and Gas Assessment Project
Phase II – Report Number 2
County of Los Angeles
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County of Los Angeles

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Los Angeles Oil and Gas Strike Team
Bi-Annual Report Number Seven

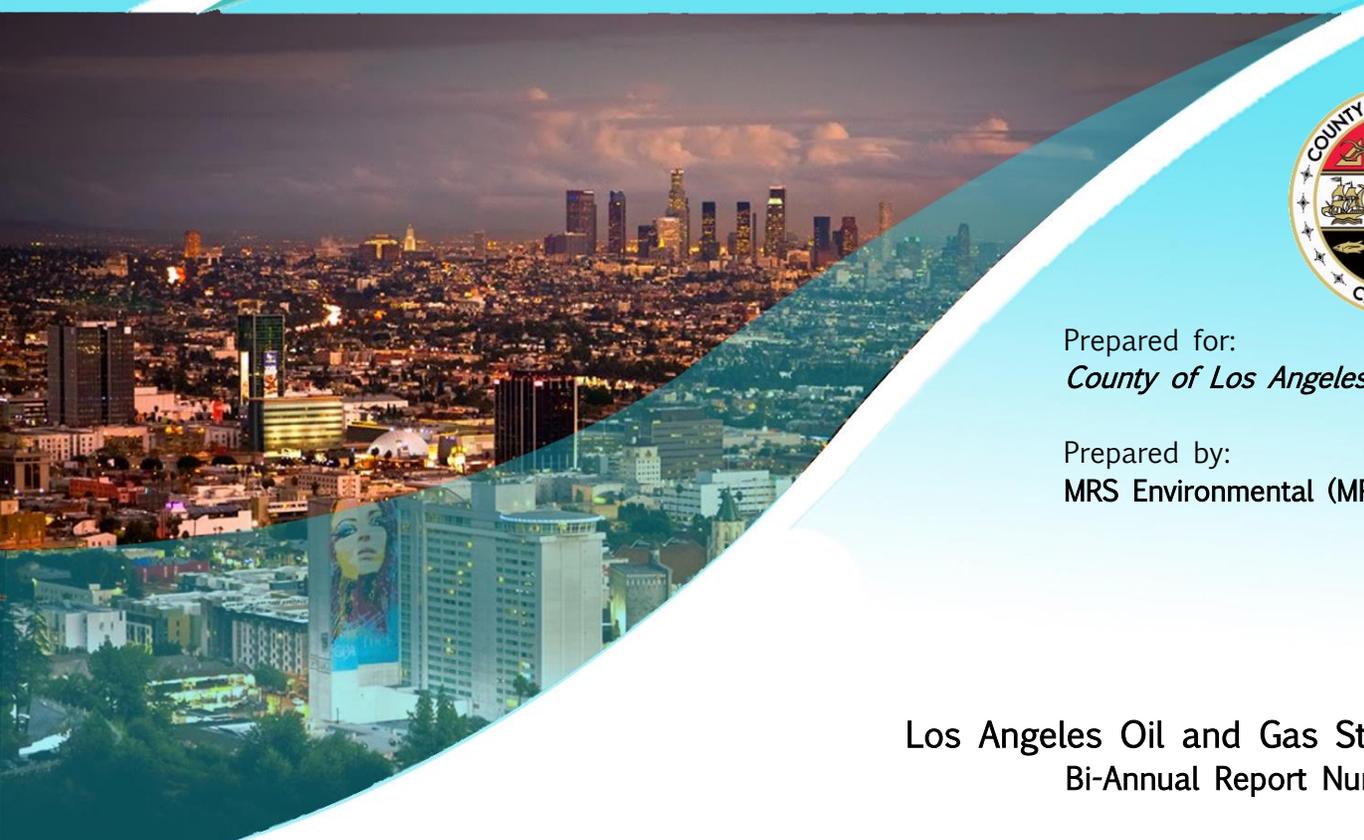


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Executive Summary

On March 29, 2016, the Los Angeles County Board of Supervisors (Board) passed a motion instructing the Director of Regional Planning, in coordination with the Fire Chief, Interim Director of the Department of Public Health, and Director of the Department of Public Works, to convene a Strike Team to assess the conditions, regulatory compliance and potential public health and safety risk associated with existing oil and gas facilities in unincorporated Los Angeles County (unincorporated County), excluding that area of the Inglewood Oil Field that is regulated under the Baldwin Hills Community Standards District. The Board instructed the Strike Team to report back on a biannual basis with a summary of its findings and any recommendations on legislative and regulatory positions that the Board should consider.

Phase I of the project was completed in September 2017 and provided an assessment of oil and gas facilities in unincorporated Los Angeles County with the following tasks:

- Verifying and updating an existing inventory of oil and gas facilities;
- Conducting site visits and compliance review of the oil and gas facilities;
- Developing a public health assessment screening tool; and,
- Researching the regulatory frameworks of other jurisdictions with similar oil and gas infrastructure.

The results of the Phase I efforts are detailed in biannual reports dated October 2016, March 2017, and September 2017 and concluded that additional investigation into oil and gas facilities was warranted.

On September 4, 2018, the Board approved contractual consulting services to continue the efforts of the Strike Team related to oil and gas facilities. This report is the second of six biannual reports to be provided to the Board during the current 36-month long Strike Team Phase II effort. Under Phase II the Strike Team is tasked with researching and investigating the following oil and gas elements:

- Abandoned and orphan wells;
- Storage facilities;
- Pipelines; and,
- Hazardous chemicals.

This second report provides an overview of the data obtained to date and presents an initial prioritization screening approach for the large number of wells, pipelines, chemicals, and facilities under review to guide future analysis. Forthcoming reports will reflect the progression in the collection and analysis of additional data and refined prioritization methodologies.

1.0 Background

This is the seventh report to update the Board on the Strike Team's efforts. The two board actions are summarized below. Consistent with the Phase I reports, the Phase II reports will be cumulative in the analysis: the findings of each Phase II report will be incorporated into forthcoming reports as information is collected and the analysis updated.

1.1 Board Motion Regarding Proactive Planning and Enforcement of Oil and Gas Facilities Operating in Unincorporated Los Angeles County

On March 29, 2016, the Los Angeles County Board of Supervisors passed a motion to:

- Convene a Strike Team consisting of the Director of Regional Planning, the Director of Public Health, the Director of Public Works, and the Fire Chief to assess and report on a biannual basis the conditions, regulatory compliance and potential public health and safety risks associated with existing oil and gas facilities in unincorporated Los Angeles County;
- Review Los Angeles County Title 22: Zoning Code to ensure that oil and gas facilities may no longer operate by right in the unincorporated portion of the County and to ensure that regulations reflect best practices and current mitigation measures and technologies, minimize environmental impacts and protect sensitive uses and populations;
- Coordinate with cities throughout the County that are interested in collaborating on the development of regulatory requirements and protocols for monitoring and evaluating their local oil and gas facilities;
- Create an Advisory Panel consisting of independent experts in oil and gas exploration and production as appointed by the Board of Supervisors to assess the biannual reports of the Strike Team; and,
- Ensure that County Planning and Code Enforcement services are not negatively impacted.

1.2 Board Action Regarding Continued Strike Team Efforts Regarding Oil and Gas Facilities Operating in Unincorporated Los Angeles County (Phase II)

The results of the work completed under Phase I concluded that additional investigation was merited related to oil and gas facilities in the unincorporated County. Therefore, on September 4, 2018, the Los Angeles County Board of Supervisors approved contractual consulting services to continue assisting the efforts of the Strike Team on oil and gas facilities with focus on the following tasks:

- Continue the work of the Strike Team consisting of the Director of Regional Planning, the Director of Public Health, the Director of Public Works, and the Fire Chief to assess and report on a biannual basis the conditions, regulatory compliance and potential public health and safety risks associated with existing oil and gas facilities in unincorporated Los Angeles County for the following:
 - Identify, assess, and prioritize orphaned and abandoned oil and gas wells in the unincorporated County;

- Identify, assess, and inventory oil and gas pipelines within oil and gas fields, common carrier pipelines outside of oil fields and utility pipelines within the unincorporated County;
- Identify and assess oil and gas storage facilities in the unincorporated County; and, Review chemicals at oil and gas facilities not identified in Hazardous Materials Business Plans.
- Continue the coordination and corroboration with the Advisory Panel consisting of independent experts in oil and gas exploration and production as appointed by the Board of Supervisors to assess and to provide written comments on the biannual reports.

1.3 Previous Reports

1.3.1 Los Angeles County Oil and Gas Well Inventory

On July 28, 2015, the Board directed the Department of Regional Planning (DRP), in consultation with the Department of Public Health (DPH), to develop a detailed inventory of all oil fields and the associated level of environmental monitoring of all oil wells currently operating within the unincorporated areas of the County of Los Angeles. MRS Environmental (MRS), a consulting firm with expertise in the oil and gas industry, along with County DRP Staff prepared the Los Angeles County Oil and Gas Well Inventory report dated December 2015. The Oil and Gas Well Inventory report identifies facility and well locations and includes a review of local, State, and Federal regulatory requirements for the drilling and operating of oil and gas wells. The report is available on the County Department of Regional Planning web site (<http://planning.lacounty.gov/oil-gas/well>).

1.3.2 Los Angeles County Oil and Gas Compliance Reports (Phase I)

As noted above, the Oil and Gas Facility Compliance Review Project reports completed under the Strike Team Phase I efforts were submitted to the Board in October 2016, March 2017, and September 2017. The reports included inspection checklists, a well inspection protocol, results from facility inspections and a screening public health assessment for 12 facilities and 557 oil and gas wells. The report also included review and recommendations for further review on legislative positions, regulatory positions, legal positions, and other facilities that may benefit the County by undergoing a similar review. The report is available on the County Department of Regional Planning web site (<http://planning.lacounty.gov/oil-gas/strike>).

1.3.3 Los Angeles County Oil and Gas Compliance Reports (Phase II)

The initial Phase II Oil and Gas Facility Compliance Review Project report was submitted to the Board in March 2019. The research, database development, and mapping in the initial report provided an overview of the Strike Team Phase II issue areas and provided staff with applicable tools to continue forward with the Project as reflected in this second report. The report is available on the County Department of Regional Planning web site (<http://planning.lacounty.gov/oil-gas/strike>). Input from the Strike Team Advisory Panel on the first report is summarized in Appendix A.

1.4 Phase II Project Scope

As listed in Section 1.2 above, the Phase II scope includes review and assessment of orphaned and abandoned wells, oil and gas pipelines, oil and gas storage facilities, and chemicals not identified in Hazardous Materials Business Plans. Tasks also include a review of regulatory agency databases and permits, site visits, evaluation and prioritization of public health and safety risk, and recommendations for further action. The scope does not include a review of down-hole compliance issues (well testing and conditions of well bores below the surface of the ground) or ambient air monitoring such as the installation of toxic air pollutant monitoring stations.

1.5 County Departments and Their Roles

County Departments involved in the Strike Team include the following:

- Regional Planning;
- Public Health;
- Public Works;
- Fire; and
- County Counsel.

The role of each of these is discussed below.

1.5.1 Department of Regional Planning (DRP)

The DRP is the lead County agency for this compliance review effort. DRP is responsible for the following components and tasks:

- The Director or her designee to attend Strike Team public meetings;
- Project management;
- Hire and manage the consultant assisting the County;
- Coordinate and facilitate staff meetings;
- Coordinate and staff Advisory Panel and Strike Team meetings;
- Research and collection of regulatory mapping, infrastructure, and inspection data;
- Coordinate information exchange between all involved agencies;
- Develop an unincorporated County orphan and abandoned well database;
- Develop an unincorporated County pipeline database;
- Develop an unincorporated County chemical database;
- Attend the field site visits;
- Prepare field site findings; and
- Prepare biannual reports.

1.5.2 Department of Public Health (DPH)

The DPH's role on the Strike Team includes:

- The Director or her designee to attend Strike Team public meetings;
- Research and collection of DPH issues, complaints, and enforcement actions;
- Attend staff meetings;

- Review and comment on Project documentation;
- Attend the field site visits; and
- Review and comment on draft reports.

1.5.3 Department of Public Works (DPW)

The DPW's role on the Strike Team includes:

- The Director or his designee to attend Strike Team public meetings;
- Research and collection of DPW permits;
- Research and collection of DPW issues, complaints, and enforcement actions;
- Attend staff meetings;
- Review and comment on Project documentation;
- Attend the field site visits; and
- Review and comment on draft reports.

1.5.4 County Fire Department (Fire)

The Fire Department's Fire Prevention Bureau/Petroleum Chemical Unit and the Health Hazardous Materials Division roles on the Strike Team includes:

- The Fire Chief or his designee to attend Strike Team public meetings;
- Research and collection of fire prevention permits;
- Research and collection of Certified Unified Program Agency-CUPA permits (hazardous materials, hazardous waste, above ground petroleum storage, and California Accidental Release Prevention Program-CalARP);
- Research and collection of fire issues, complaints, and enforcement actions;
- Attend staff meetings;
- Review and comment on Project documentation;
- Attend the field site visits; and
- Review and comment on draft reports.

1.5.5 County Counsel

County Counsel provides the following assistance to the Strike Team:

- Review of contract for consultant assisting the County;
- Review and comment on Project documentation;
- Attend staff meetings;
- Attend Advisory Panel and Strike Team meetings;
- Advise County on legal positions as necessary; and
- Review and comment on draft reports.

1.5.6 Strike Team Members

The Strike Team consists of the Director of Regional Planning, the Director of Public Health, the Director of Public Works, and the Fire Chief, or their designees. The Strike Team reviews the reports provided by Project Staff, holds public meetings to discuss the reports, and decides to submit the reports to the Board of Supervisors.

1.5.7 Project Staff

The Project Staff consists of staff from DRP, DPH, DPW, Fire, and MRS, the consultant assisting the County with the Project. In addition, staff from the California Department of Conservation's Division of Oil, Gas and Geothermal Resources (DOGGR), the South Coast Air Quality Management District (SCAQMD), and Los Angeles Regional Water Quality Control Board (LARWQCB) have volunteered to assist the County in this effort.

1.5.8 Strike Team Advisory Panel

The Advisory Panel consists of five members. Each member was appointed by a Board of Supervisor District Office. The Advisory Panel members are issue area experts in oil and gas, environmental, and/or health issues. The Advisory Panel's role in the Project is to review, comment, and provide written input on the Project reports. The Advisory Panel consists of the following members listed below.

- Julia May (1st District)
- Andrew Weissman (2nd District)
- Tim O'Connor (3rd District)
- Matt Rezvani (4th District)
- R. Rex Parris (5th District)

2.0 Progress Update

This report is the second biannual report for the Strike Team Phase II effort, this section provides a summary of the Project activities completed through September 2019. Tasks completed include one Project Staff meeting and expanded and updated analysis for the following:

- Three Project Staff meetings;
- Coordination and correspondence with DOGGR on data request on orphan and abandoned wells;
- Review of the DOGGR WellSTAR database for orphan and abandoned wells;
- Development of unincorporated County orphan and abandoned well database and associated mapping;
- Coordination and correspondence with the Office of the State Fire Marshall on data request for pipeline mapping, pipeline operator data submittal forms (PSD-101) and pipeline inspection data;
- Review of Pipeline and Hazardous Materials Safety Administration National Pipeline Mapping System (NPMS) database;
- Development of unincorporated County pipeline (NPMS) database and associated mapping;
- Initial review of sources of data for oil and gas storage facilities; and,
- Review of South Coast Air Quality Management District (SCAQMD) Rule 1148.2 database for oil and gas drilling, well completion, and well rework chemical use.

2.1 Chronology of Project Meetings

2.1.1 Project Staff Meetings

Three Project Staff meetings have occurred with the first, the initial kick off meeting for the Project Staff on Thursday October 25, 2018. The meetings are attended by representatives from DRP, DPH, DPW, Fire, DOGGR, and RWQCB. Staff from MRS also attended. The meetings are summarized below.

- Project Staff Kick Off Meeting - October 25, 2018.
 - Introduction of Project Staff – Staff from each participating County agency, DOGGR and MRS were introduced, and contact information was distributed.
 - Purpose of the Project – The Board motion was discussed along with primary Project tasks.
 - Timeline for first report – The first report would be issued as a draft in March 2019.
 - Roles and responsibilities and regulatory authority – Project goals and agency responsibilities were discussed with each department or agency providing input on the process.
- Project Staff Meeting Report 1 - March 11, 2019
 - Project Staff met to review and comment on the first draft report. The meeting was attended by staff from DRP, DPH, DPW, Fire, and RWQCB.

- Project Staff Meeting Report 2 – September 17, 2019.
 - Project Staff met to review and comment on the second draft report. The meeting was attended by staff from DRP, DPH, DPW, Fire, and RWQCB.

2.1.2 Strike Team Meeting

The Strike Team met on March 21, 2019 at the Regional Planning Commission Hearing Room where the DRP and MRS provided a presentation to the Strike Team on the findings of the first report. Subsequently, members of the Strike Team asked questions on the Strike Team efforts and findings and provided comments on the Report. The DPH provided comments on the need to ensure that wells near people are assigned a higher ranking in the prioritization process to identify those abandoned wells with the potential to leak and impact the public health and safety of nearby communities. No public comments were provided at the meeting.

2.1.3 Strike Team Advisory Panel Meeting

The Strike Team Advisory Panel met on April 22, 2019 with Advisory Panel members Timothy O'Connor and Matt Rezvani in attendance and Julia May via teleconference. The first report was discussed, and Advisory Panel comments were submitted to the BOS on April 25, 2019.

3.0 Orphan and Abandoned Wells

Project Staff has continued coordination and correspondence with DOGGR on orphan and abandoned wells, provided review and input regarding the re-abandonment of Well DOW RGC-10 well, and developed a database of orphan and abandoned wells in the unincorporated County. Discussion on the status of this effort is provided in the following sections.

3.1 DOGGR Data Request

Staff from DOGGR attended the Kickoff meeting on October 25, 2018 and provided Project Staff with an overview to the WellSTAR project which updates and revises the WellFinder base, and input on DOGGR's recent efforts on idle and abandoned wells. DOGGR's expertise and data are key components to the orphan and abandon well issue and Project Staff correspondence with DOGGR for additional input is listed below.

- 9/19/2018 – Project Staff correspondence including meeting request sent to DOGGR.
- 12/11/2018 – Project Staff correspondence and including meeting request sent to DOGGR.
- 1/14/2019 – Project Staff meeting request sent to DOGGR.
- 1/15/19 –Response received from DOGGR detailing DOGGR Central and Southern Section coordination efforts on Project Staff request.
- 5/8/19 – Project staff met with DOGGR via teleconference on the WellSTAR database status and abandoned well issues.
- 5/24/19 - DOGGR provided the County with additional information covering the following requests:
 - An excel spreadsheet containing updated well list for Los Angeles County. A data column with abandonment dates for wells that have been plugged and abandoned will be provided separately.
 - An excel spreadsheet containing the orphan well list for Los Angeles County as of May 23, 2019. Currently there are no “declared” orphan wells within the Los Angeles County. However, DOGGR is currently evaluating approximately 1,272 potential orphan/deserted wells within the County.
 - An excel spreadsheet containing State-abandonment well list for Los Angeles County.
- On July 2, 2019, DOGGR provided DRP with an excel spreadsheet with water level data from idle wells within the Los Angeles County.

3.2 Marina Del Rey Well Incident

When a well reaches the end of its productive life, or if it fails to find economic quantities of oil or gas, the well operator is required by regulators to remove all equipment and plug the well to prevent leaks. Usually, cement is pumped into the well to fill at least the top and bottom portions of the well and any parts where oil, gas, or water may leak into or out of the well. This generally prevents contamination of groundwater and leaks at the surface. However, a number of wells abandoned over the last 100 plus years in the unincorporated area of the County of Los Angeles were not abandoned to today's technological standards and have subsequently been re-abandoned.

In some cases, wells are found at the site of a new construction project and the developer is tasked with the proper re-abandonment of the well if no operator of record exists for that well.

In the Marina Del Rey case, a land developer, MDR Hotels LLC., leased property from Los Angeles County on the Marina Del Rey waterfront to build a hotel. The project involves constructing a six-story Residence Inn and five-story Courtyard Marriot (288 rooms with waterfront restaurant and amenities) on the site as part of a redevelopment Project. As part of the work, MDR Hotels was required by DOGGR to re-abandon the well (DOW RGC 10) on the property to current standards. The 1930s era well was originally abandoned and plugged in the 1950s. DOGGR issued a permit in June 2018 to MDR Hotels to re-abandon the well.

On January 11, 2019 during the routine plugging operations, pressure built within the well casing which caused an uncontrolled release of fluids and gas spraying it into the air. The material is believed to have included natural gas (mainly methane), heavy abandonment mud, and water. The well currently is emitting no gas and there is no emergency impacting public safety. To address immediate health and safety concerns, DOGGR issued an emergency order to put into place precautions to protect health, safety, and property including testing protocols and twenty-four hour a day monitoring. The order also requires that the operator prepare a report detailing what caused the blow out and emissions.

When the incident was first reported, the information provided to regulators, including Los Angeles County Public Health, was that the leak was quickly contained, and first responders reported that there was no continuing methane being released. On January 18, 2019 DOGGR notified local authorities that they would be issuing an emergency order to the operator. In addition, Public Health asked DOGGR to require the development of a Community Health, Safety and Notification Plan (Safety Plan) and requested that monitoring data be submitted for DPH review as it is generated. The Safety Plan was completed by the operator with the assistance of DPH, DOGGR, Los Angeles County Fire, and the Los Angeles County Department of Beaches and Harbors on February 22, 2019 (see Appendix B).

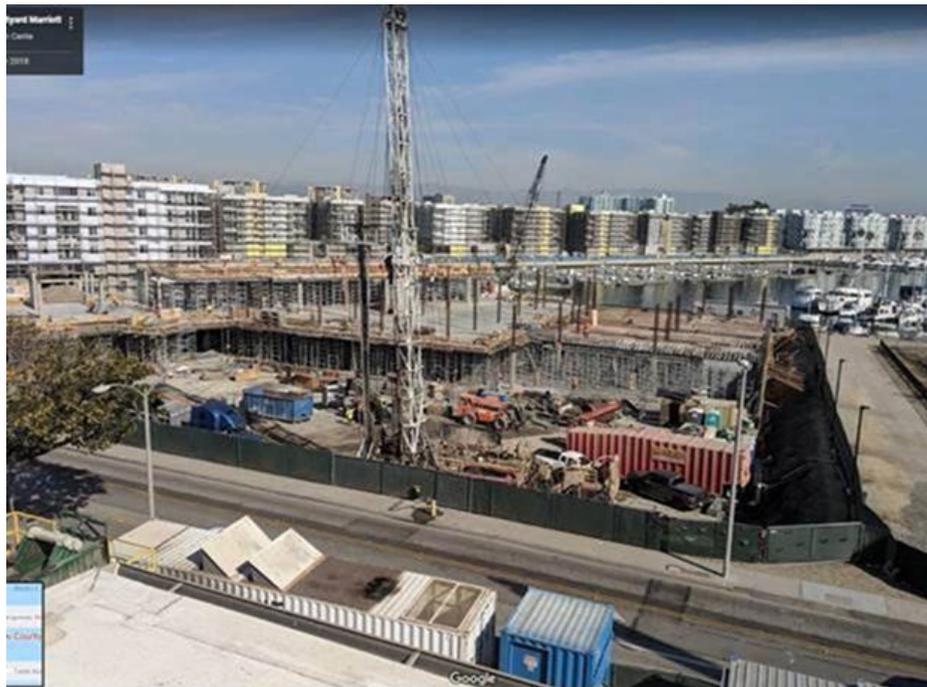
In the interim, first responders onsite have reported to DPH that there are no measurable levels of natural gas in the air. Officials from DOGGR and Los Angeles County Fire Department Health Hazardous Materials Division are on site monitoring operations. Figure 3-1 shows an area map and Figure 3-1 shows the location of the well under abandonment and the adjacent proximity to residential areas.

Figure 3-1 Marina del Rey Well DOW 10 Area Map



Source: Incident Action Plan CA-LAC-011239 January 29, 2019.

Figure 3-2 Marina del Rey Well DOW 10



Source: DOGGR January 18, 2019 Information Report.

This orphaned and improperly abandoned well is considered a typical case study of wells that can be found in the unincorporated area during construction and development activities. Note that the well, DOW RGC 10, was scored as a seven on the well risk prioritization scale (See Section 3.3.7). The well abandonment was completed on April 4th, 2019 and all equipment was removed from the site. DRP has requested the final roots/cause analysis for this well re-abandonment and is awaiting receipt of the final report for review and incorporation into the Strike Team Report. Lessons learned from this effort will be incorporated into recommendations from the Strike Team as appropriate.

3.3 DOGGR Database and Abandoned Well Preliminary Prioritization

The DOGGR database of wells as provided by DOGGR in May 2019 was utilized to develop a prioritization scheme based on several different criteria. The prioritization scheme is utilized to identify those abandoned wells that are most likely to leak and impact the public health and safety of nearby communities.

For many older wells the exact location of abandoned wells is only an estimate in the DOGGR database as illustrated by the Marina Del Rey incident well location which was not found at the database location but was offset by 70-80 feet from the database location. However, the approximate location of the abandoned wells and other information in the DOGGR database such as the well location relative to other active wells and information on the field in which the wells are located allows for a prioritization scheme to be developed. In addition, the approximate location of the well along with the population density as estimated by historical census data allows for an understanding of potential impact of well leaks or blowouts relative to populations.

The abandoned wells were prioritized based on their potential impact to public health and safety related to the potential for leakage of gas to the surface. Wells were prioritized based on the following characteristics:

- Well status (plugged or unknown);
- Well location and census block population density;
- Historical well type;
- Well location within 500 feet of an active injector well;
- Age of well by spud date (date on which well drilling commenced);
- Well located in an oil and gas field by field age;
- Reservoir characteristics;
- The location of the well relative to the Cal EnviroScreen 3.0 analysis; and
- The location of the well relative to the Los Angeles County methane zones and proximity to landfill methane areas.

Each of these along with the prioritization method are discussed below.

3.3.1 Well Status

Figure 3-1 shows the location of all plugged and abandoned wells in the unincorporated areas of the County of Los Angeles as of the May 2019 DOGGR database. The DOGGR database includes 4,443 total wells in the unincorporated areas, with the characteristics shown in Table 3.1.

Table 3.1 Wells in the Los Angeles County Incorporated Area

Category	Number
Active wells	1,046
Canceled wells (well application cancelled)	18
Idle wells ¹	637
New wells (not drilled or currently being drilled)	5
Plugged & Abandoned wells	2,731
Unknown wells (not classified by DOGGR)	6
Total wells	4,443

Source: DOGGR May 2019.

1. Idle wells defined by DOGGR as a well that has not been used for two years or more and has not yet been properly "plugged and abandoned" per DOGGR requirements.

3.3.2 Abandoned Well Location and Census Block Population Density

Wells locations were overlaid with the census data by census block to identify wells that are located near high density areas. The focus of this effort is on the possible effects on human populations and not on other possible environmental degradation (e.g. Significant Ecological Areas). Wells that are in low density areas do not provide as high a priority since a leak would have a lower probability of impacting the public. Many abandoned wells are in sparsely populated areas and those wells are not as high a priority as the abandoned wells located in more densely populated areas. Figure 3-2 shows the location of the abandoned wells relative to the census population density. Table 3.2 shows the number of abandoned wells by location relative to the census population density.

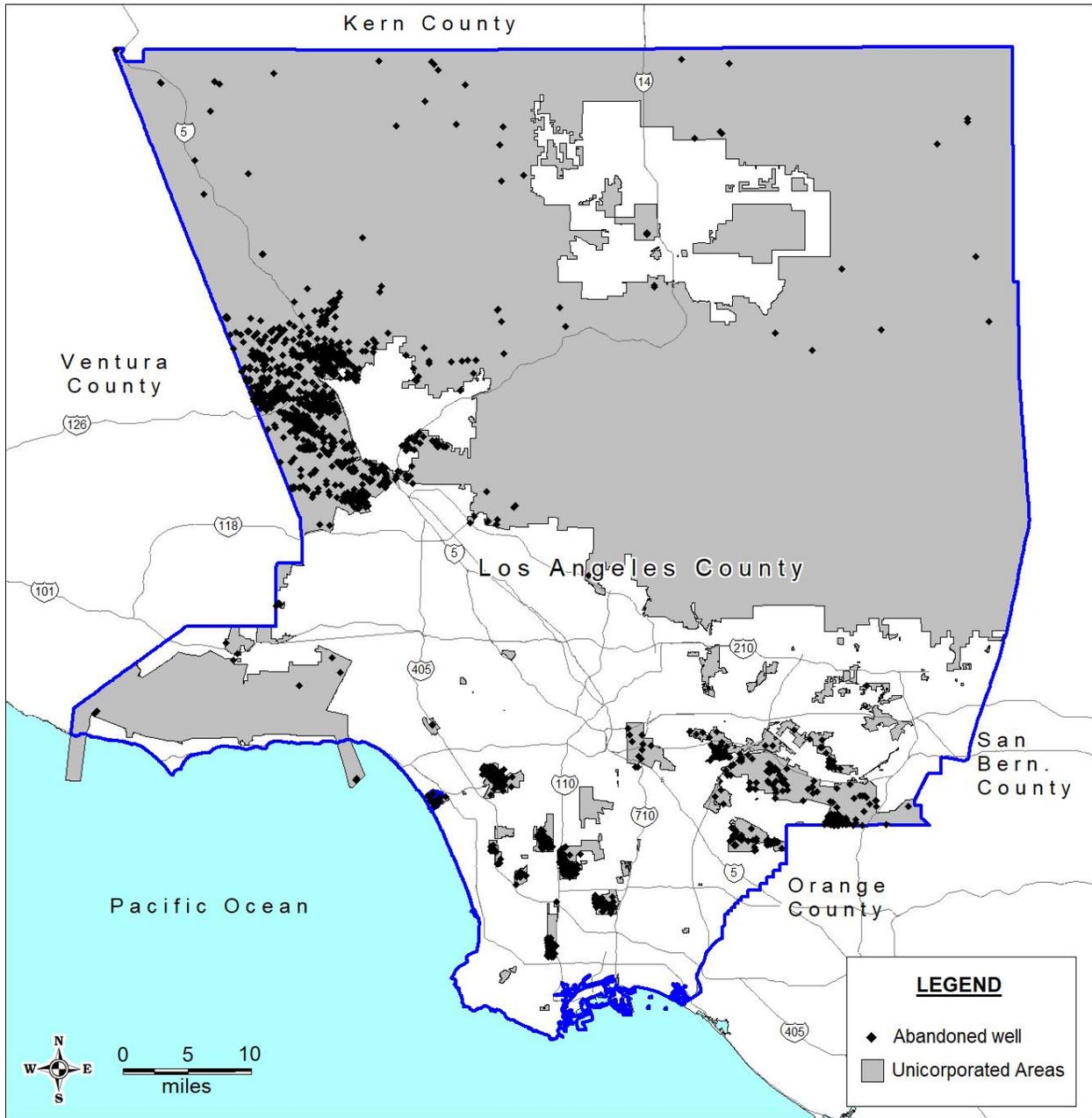
Table 3.2 Abandoned Wells by Population Density

Population Density	Number
Less than 900 persons per square mile	2,163
More than 900 persons per square mile	568
More than 4,700 persons per square mile	283
More than 8,900 persons per square mile	173
More than 13,100 persons per square mile	74

Source: DOGGR January 2019.

Note: Data presented to show the number of wells more than a specific threshold: i.e. population density and defines the number of wells that might need to be included in a high priority listing if that threshold were selected. The number of wells does not sum because some wells are included in multiple categories.

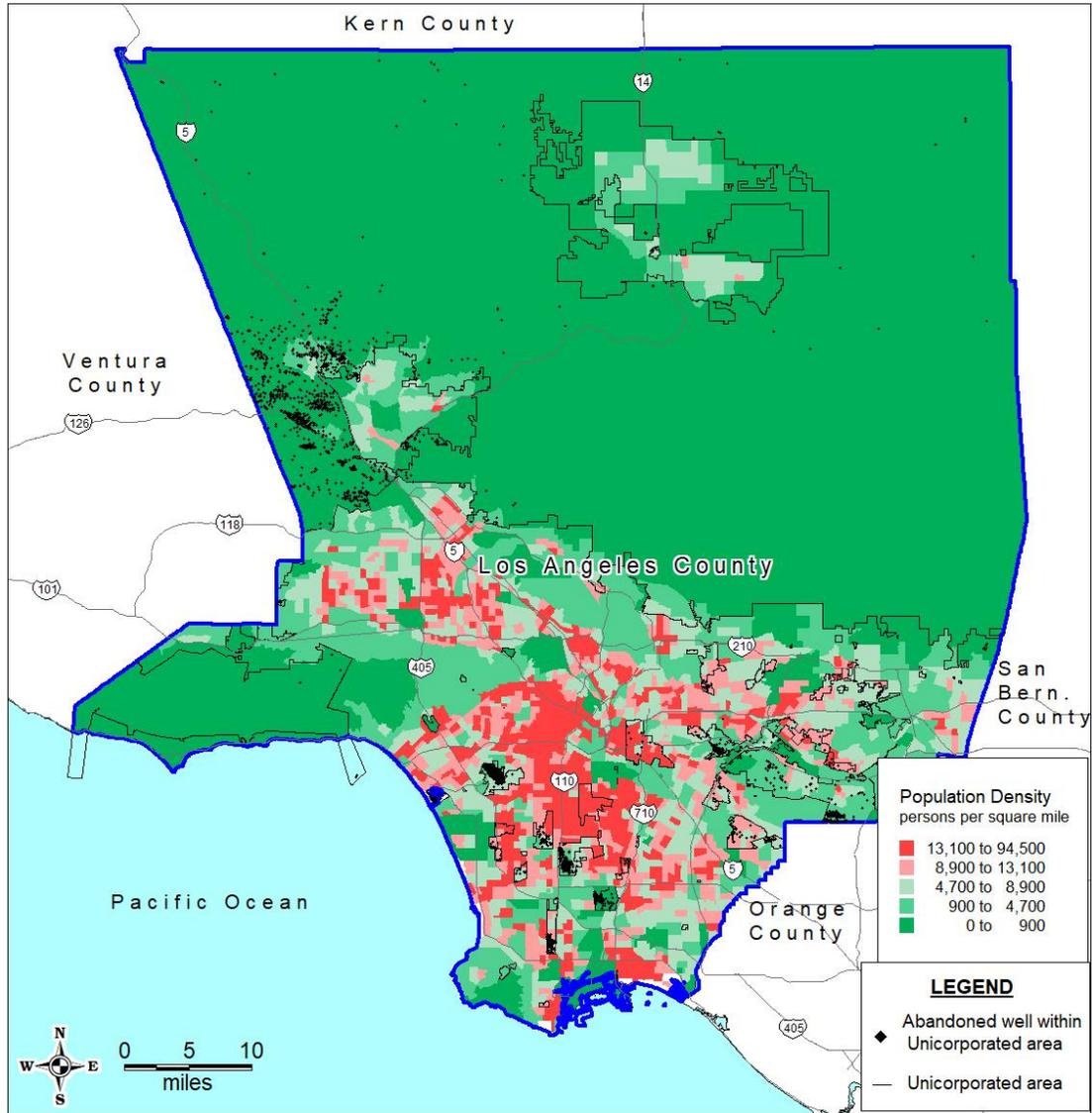
Figure 3-1 Plugged, Abandoned and Unknown Wells



Source: DOGGR January 2019.

NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Figure 3-2 Abandoned Wells and Census Block Population Density



Source: DOGGR January 2019.

NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County’s regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.3.3 Abandoned Well Type

Wells are classified by the type of well including oil and gas, gas storage, water source, etc. Wells that resulted in dry holes, for example, would present a lower priority than wells that were historically used for oil and gas production or multiple uses. Table 3.3 shows the number of abandoned wells by type in the unincorporated areas.

Table 3.3 Abandoned Wells by Type

Well Type	Number
Core Hole	9
Dry Hole	636
Gas	5
Gas Storage	27
Injection	157
Multiple use	101
Oil and Gas	1,793
Water Source	3
TOTAL	2,731

Source: DOGGR January 2019.

3.3.4 Well Location and Active Injector Well

The abandoned well location in relation to active injector wells gives rise to the potential for leakage from a well due to the increased reservoir pressures near the injection wells. Figure 3-3 shows the location of abandoned wells that are located within 500 feet of an active injection well and located within the unincorporated parts of the County. About 354 plugged and abandoned wells are located within 500 feet of an active injector well.

3.3.5 Well Age by Spud Date

Older wells increase the likelihood that abandonment was not performed to as high a level standard as the current requirements. Although the date the well was started is not the same as the date the well was abandoned, it does provide some indication of the potential for lower quality abandonments which would increase the probability of the well leaking and affecting public health. Information on the abandonment date of the wells is not located in the DOGGR database and is an issue that is proposed for further research once the wells are initially prioritized. Information obtained from DOGGR only listed wells that have been abandoned since 2004 and does not include wells that were abandoned before that date.

The DOGGR database only lists the spud date (begin drilling date) for a limited number of wells. For abandoned wells only about 8 percent have spud date information for wells located in the unincorporated areas. These wells, as a function of age, are shown in Figure 3-4 and listed in Table 3.4.

Table 3.4 Abandoned Wells by Spud Date Age

Well Spud Date Age, Years	Number	Percentage of Total
TOTAL	225	100%
Less than 25 years	6	2.7%
More than 25 Years	218	96.9%
More than 35 Years	210	93.3%
More than 45 Years	191	84.9%
More than 55 Years	183	81.3%
More than 65 Years	151	67.1%

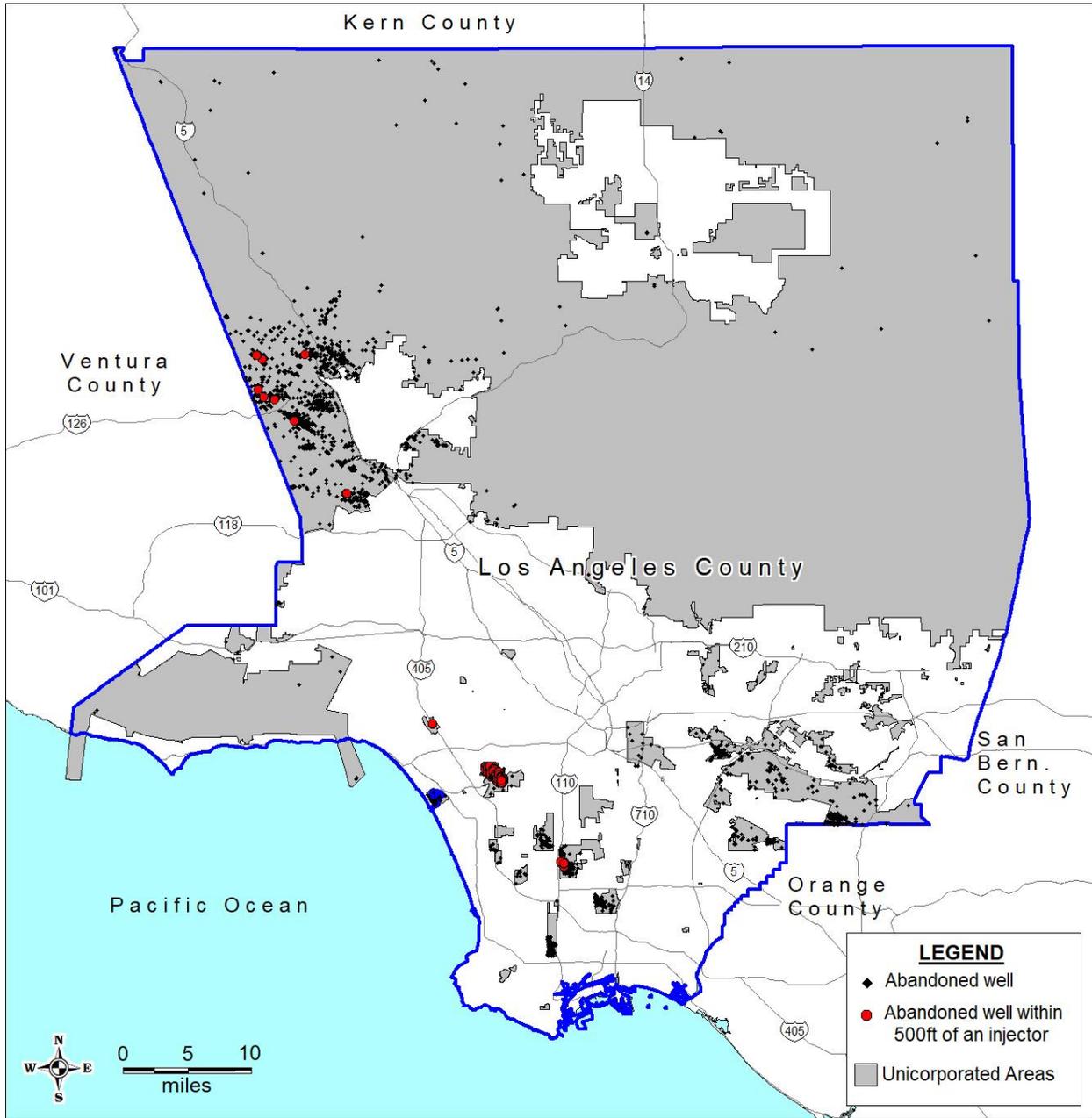
Table 3.4 Abandoned Wells by Spud Date Age

Well Spud Date Age, Years	Number	Percentage of Total
TOTAL	225	100%
More than 75 Years	46	20.4%
More than 85 Years	10	4.4%

Source: DOGGR January 2019.

Note: Data presented to show the number of wells more than a specific age. The number of wells does not sum because some wells are included in multiple categories.

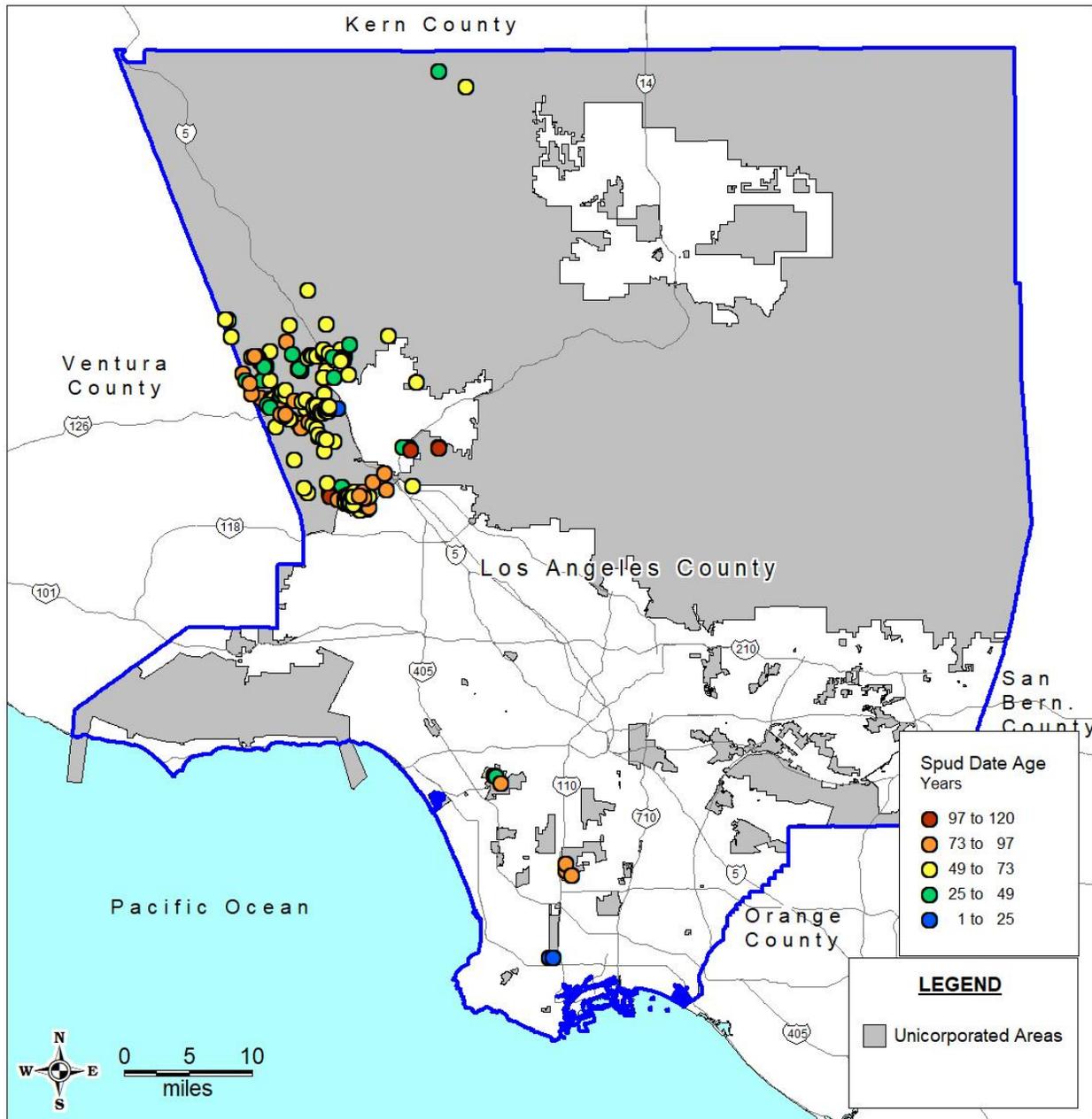
Figure 3-3 Wells Located within 500 feet of an Active Injector Well



Source: DOGGR January 2019.

NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Figure 3-4 Wells by Years from Spud Date



Source: DOGGR January 2019.

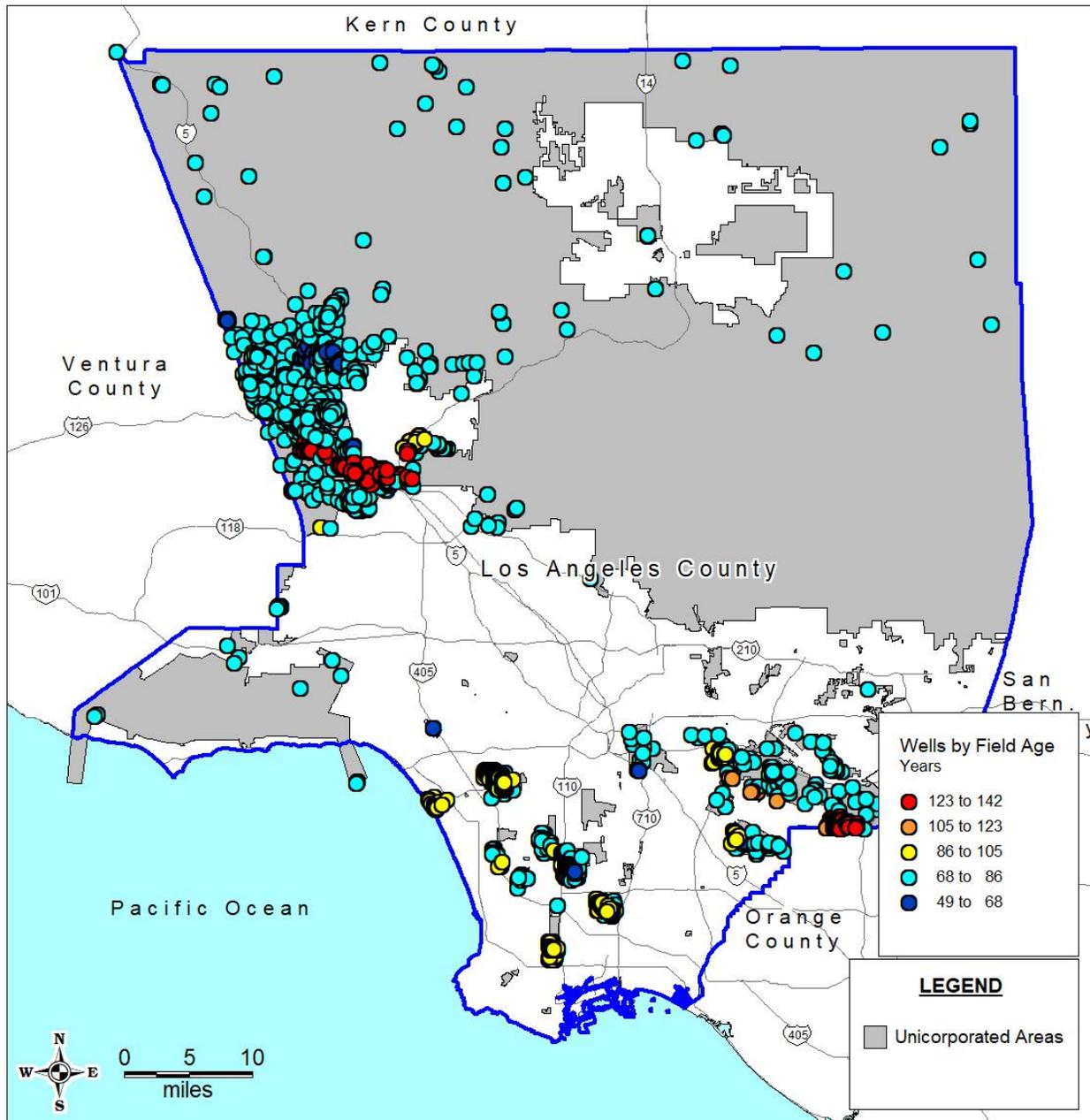
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County’s regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.3.6 Abandoned Wells by Field Age

Abandoned wells located in older fields may have a higher probability of having older abandonment dates. As mentioned above, the DOGGR database does not have abandonment date, and this is an issue that will be researched further after the prioritizations are applied. Field age is

based on the oldest discovery date for all the reservoir pools identified in the DOGGR California Oil and Gas Fields Volume II (DOGGR 1991). Figure 3-5 and Table 3.5 show the wells by field age.

Figure 3-5 Wells by Field Age



Source: DOGGR January 2019.

NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Table 3.5 Wells by Field Age

Well Field Age, Years	Number	Percent of Total
TOTAL	2,731	100%
After 1969 (50 years)	5	0.2%
Prior to 1969	2,726	99.8%
Prior to 1944 (75 years)	2,333	85.4%
Prior to 1919 (100 years)	487	17.8%
Prior to 1894 (125 years)	354	13.0%

Source: DOGGR May 2019.

Note: Data presented to show the number of wells more than a specific age. The number of wells does not sum because some wells are included in multiple categories.

3.3.7 Abandoned Wells by Reservoir Characteristics

The fields in which the wells are located were ranked by several different characteristics that could contribute to increased risk of abandoned well leakage. Field information was developed from pools identified in the DOGGR California Oil and Gas Fields Volume II (DOGGR 1991). Issues that could contribute to increased risk would include the following:

- High Gas Oil Ratio (GOR);
- Older Fields;
- Shallow reservoirs;
- High API gravity of the produced oil;
- High sulfur content of the crude oil; and
- High pressure gradients (psi per linear foot of well depth).

Each of these field characteristics were assigned points from zero to two based on the scoring matrix shown in Table 3.6. Fields were then ranked based on the sum total of the scores with a maximum ranking of 12 points. Fields with a higher rank score may have a higher probability of having abandoned wells that produce greater risk.

Table 3.6 Field Rank Scoring Matrix

Characteristic	Field Score		
	Score of 0 points	Score of 1 point	Score of 2 points
GOR	Less than 100	Between 100-1000	Greater than 1000
Initial Production Date	After 1950	1930 - 1950	Before 1930
Depth	Greater than 5000 ft	Between 1000 – 5000 ft	Less than 1000 ft
API ¹	Less than 20	Between 20 - 30	Greater than 30
Sulfur	Less than 0.5 %	Between 0.5 - 1.5 %	Greater than 1.5
PSI/ft	Less than 1.0 psi/ft	between 1 - 2 psi/ft	Greater than 2.0 psi/ft

Source: DOGGR January 2019.

1 – American Petroleum Institute gravity of oil relative to water, higher numbers are associated with lighter oil.

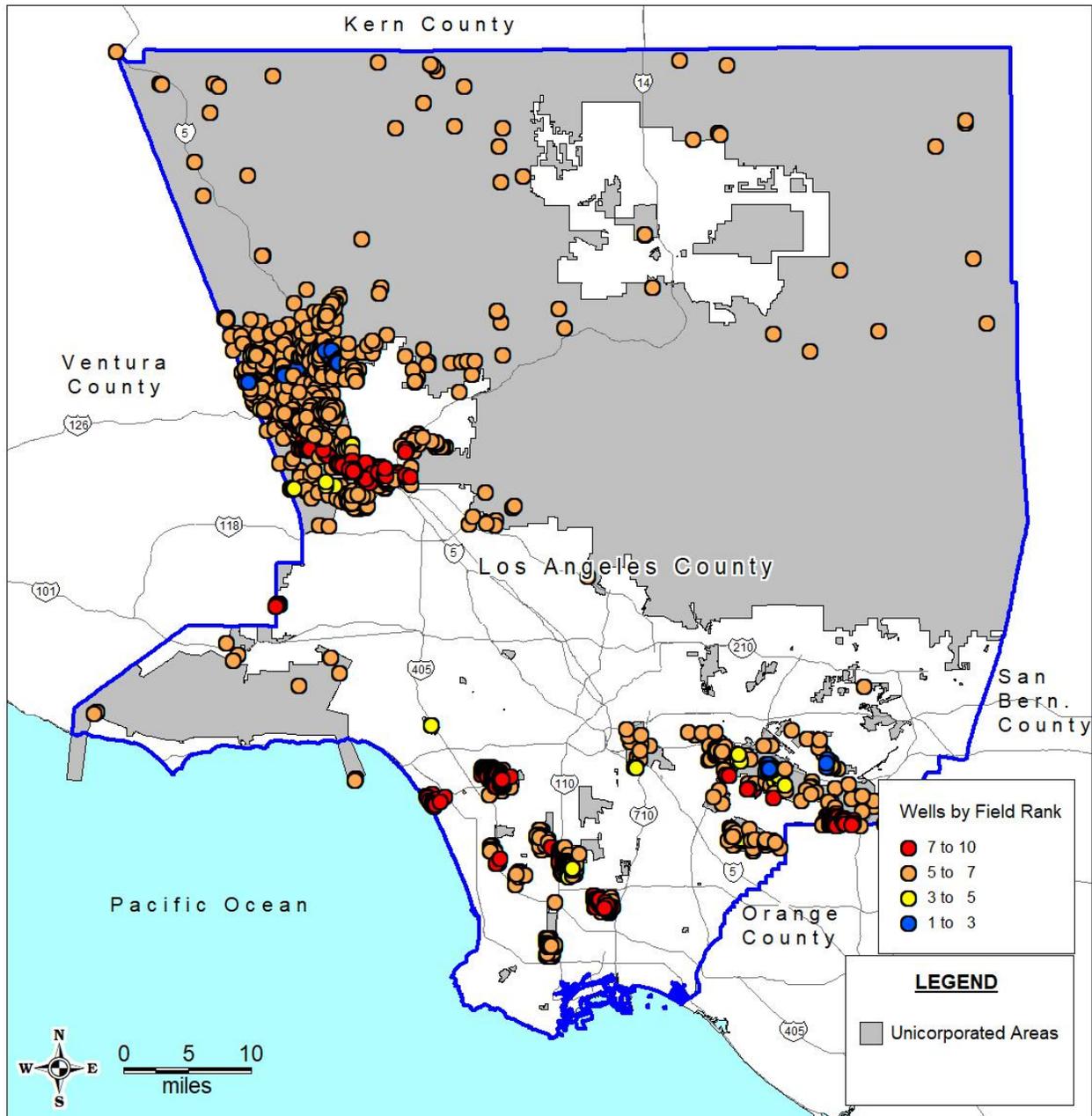
Figures 3-6 and Table 3.7 shows the wells based on the field rankings discussed above. Note that the Marina Del Rey field discussed in Section 3.2 above received a score of seven on the above matrix.

Table 3.7 Wells Based on Field Ranking

Well Field Rank	Number of Abandoned Wells	Percentage
1	55	2%
2	52	2%
3	21	1%
4	61	2%
5	704	26%
6	571	21%
7	35	1%
8	436	16%
9	592	22%
10	204	7%
TOTAL	2,731	100%

Source: DOGGR May 2019.

Figure 3-6 Wells by Field Rank



Source: DOGGR January 2019.

NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.4 Abandoned Wells by EnviroScreen Score

In January 2017, the Office of Environmental Health Hazard Assessment (OEHHA), on behalf of the California Environmental Protection Agency (CalEPA), released Version 3.0 of the California Communities Environmental Health Screening Tool (CalEnviroScreen). CalEnviroScreen version 3.0 identifies California communities by census tract that are disproportionately burdened by, and vulnerable to, multiple sources of pollution. The tool ranks each of the state's 8,000 census tracts using data on 20 indicators of pollution, environmental quality, and socioeconomic and public health conditions. SB 535 requires CalEPA to identify disadvantaged communities based on geographic, socioeconomic, public health and environmental hazard criteria, and the CalEnviroScreen tool is utilized to allow for this requirement. Environmental exposures and effects examined as part of the CalEnviroScreen model include:

- Ozone concentrations in air.
- PM 2.5 concentrations in air.
- Diesel particulate matter emissions.
- Drinking water contaminants.
- Use of certain high-hazard, high volatility pesticides.
- Toxic releases from facilities.
- Traffic density.
- Drinking water quality.
- Cleanup sites.
- Groundwater threats.
- Hazardous and solid waste facilities/generators.
- Impaired water bodies.

Sensitive population and socioeconomic factors addressed include:

- Asthma rates.
- Cardiovascular disease rates.
- Low birth rate rates.
- Education attainment.
- Housing burden.
- Linguistic isolation.
- Poverty.
- Unemployment.

Plugged and abandoned wells were classified based on the CalEnviroScreen percentile score for each census tract. The results are shown in Table 3.8 and Figure 3-7.

Table 3.8 Wells Based on CalEnviroScreen 3.0 Percentile

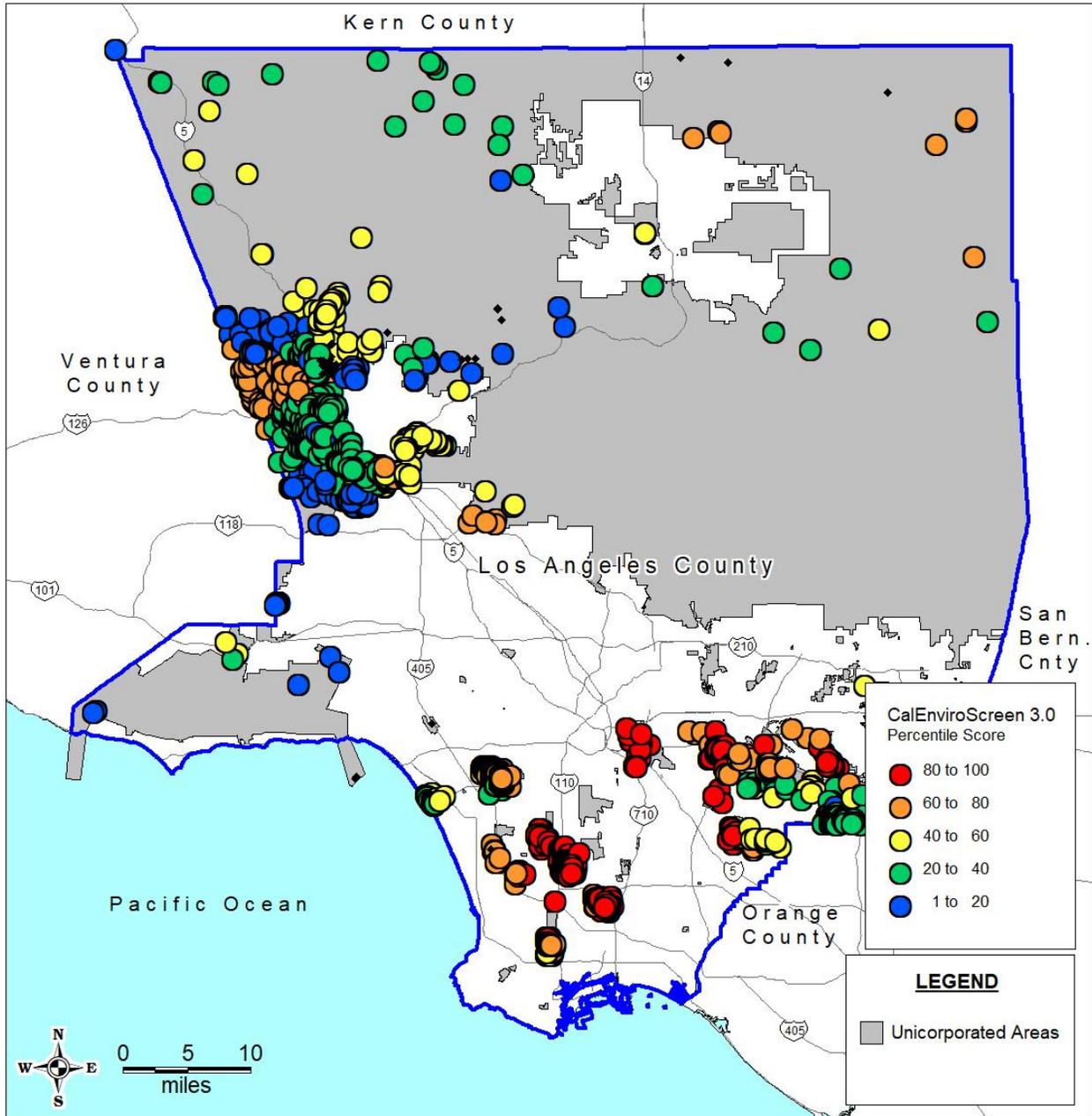
CalEnviroScreen 3.0 Percentile	Number of Abandoned Wells	Percentage
Greater than 90%	345	12.6%
Greater than 80%	475	17.4%
Greater than 70%	650	23.8%
Greater than 60%	1,264	46.3%

Table 3.8 Wells Based on CalEnviroscreen 3.0 Percentile

CalEnviroscreen 3.0 Percentile	Number of Abandoned Wells	Percentage
Greater than 50%	1,330	48.7%
Less than 50%	1,401	51.3%

Source: DOGGR May 2019. CalEPA 2018.

Figure 3-7 Wells by CalEnviroscreen 3.0 Percentile



NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County’s regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

3.5 Abandoned Wells by Methane Zone

The Los Angeles County Department of Public Works Landfill gas protection policy was adopted in 1975 to prevent the migration of landfill gas into structures and the County Building Code was revised to prohibit construction of any structure on or within 1,000 feet of a landfill containing decomposable material unless the fill is isolated by an approved protection system. Twenty-two plugged and abandoned wells were identified that are within 1,000 feet of a designated methane producing landfill.

3.6 Abandoned Wells Prioritization

A prioritization scheme was developed based on the above factors to prioritize the plugged and abandoned wells for further, more detailed examination. Further examination will include review of documents related to abandonment activities, such as blowouts and loss-of-well control history, that will require detailed, historical paper records reviews at the DOGGR offices. The prioritization scheme is used to filter the thousands of wells in the DOGGR database to those of the highest priority to conduct a detailed paper document review and in-field testing and examinations.

The prioritization scheme goal is to identify those wells that have the highest probability of leaking to the surface and combine that with the potential for impacts to the community. Although a well might have a high potential for leakage, if it is in an area designated by census data as having very low or no populations, then it would not be classified as a high priority well.

Table 3.9 shows the prioritization scheme.

Table 3.9 Wells Based on CalEnviroscreen 3.0 Percentile

Factor	Ranking Score	Score Distribution
Location Near injectors	0 - 5 points	0 points not near an injector 5 points if near an injector
Spud Data age	0 - 5 points	Less than 45 years old = 0 points 45 – 55 years = 1 point 55 – 65 years = 2 points 65 – 75 years = 3 points 75– 85 years = 4 points > 85 points = 5 points No data= 3 points
Field Ranking	0 – 10 points	Field ranking of zero = zero points Field ranking of 10 or more = 10 points Field ranking = points
Methane zone	0 – 5 points	Not near a methane zone = zero points Near a methane zone = 5 points
Enviroscore	0 - 5 points	Below 50% = zero points 50 – 60% = 1 point 60 – 70% = 2 points 70 – 80% = 3 points 80 – 100% = 4 points Score of 100 = 5 points

Table 3.9 Wells Based on CalEnviroscreen 3.0 Percentile

Factor	Ranking Score	Score Distribution
Census data	0-10 points	0 population = zero points Units in persons per square mile 0 – 2,000 = 1 point 2,000 – 4,000 = 2 points 4,000 – 6,000 = 3 points 6,000 – 8,000 = 4 points 8,000- 10,000 = 5 points 10,000 – 12,000= 6 points 12,000 – 14,000 = 7 points 14,000 – 16,000 = 8 points 16,000 – 18,000 = 9 points More than 18,000 = 10 points

Source: DOGGR May 2019. CalEPA 2018.

The prioritization scheme is conducted by summing the points associated with factors that could increase the probability for a well to be leaking (location near injectors, spud date age, field ranking and methane zone) and then multiply that score by the sum of the census and the Enviroscreen.

In total, the priority ranking produced scores ranging from zero to 143, with 128 wells ranking a score of above 75 and therefore classifying as a “higher priority well”. Figure 3-8 shows the location of the higher priority wells. Note that the higher priority wells are generally located in the southern County areas in the areas with higher population density. Table 3.10 shows the number of higher priority wells by Planning District and by Supervisor District.

Figures 3.10 through 3.14 show details of the areas with the higher priority wells.

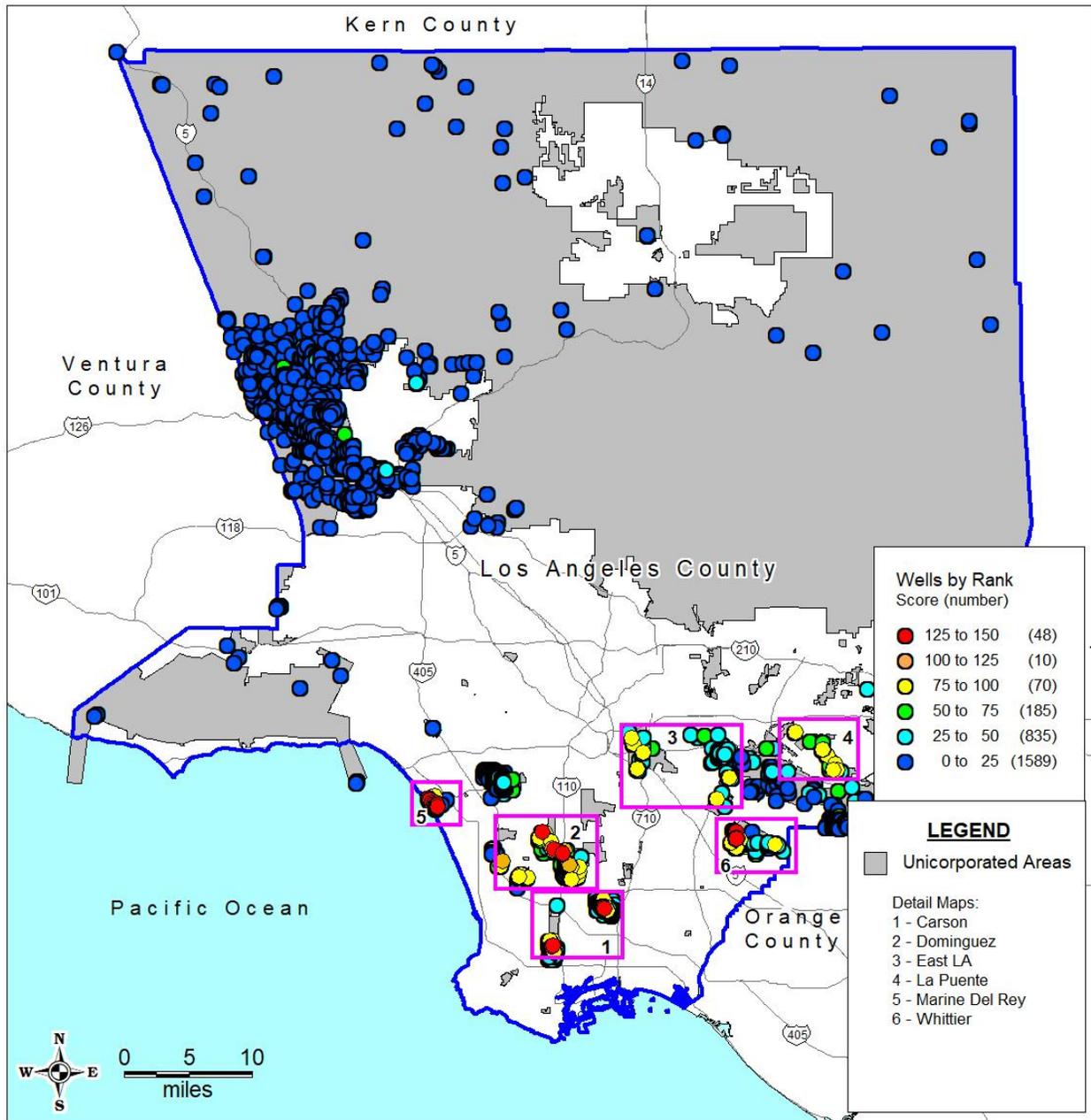
Table 3.10 Ranked Abandoned Wells by Districts

District	Number of Higher Priority Wells (Ranking 75 and above)
Planning District	
5 - Westside Planning Area	19
6 - East San Gabriel Valley Planning Area	8
9 - Metro Planning Area	38
10 - Gateway Planning Area	40
11 - South Bay Planning Area	23
Supervisor District	
District 1	12
District 2	78
District 4	38

Note: Districts not shown have no high-ranking wells.

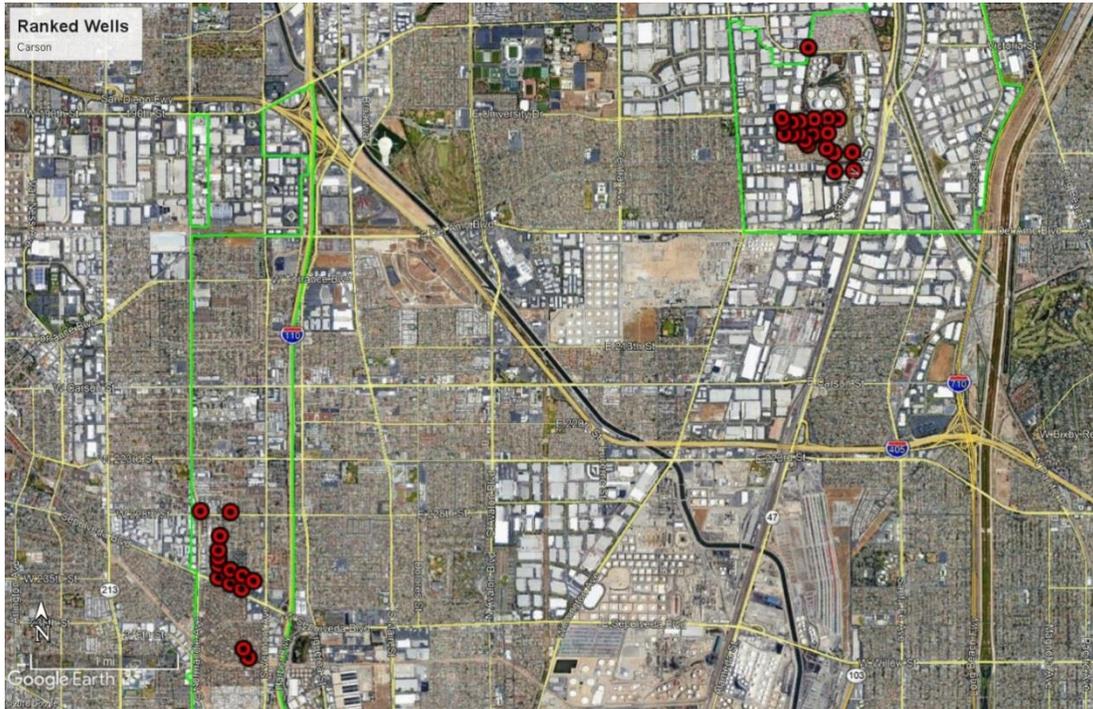
Note: Planning Districts from LA County General Plan November 2014.

Figure 3-8 Wells by Ranking Score



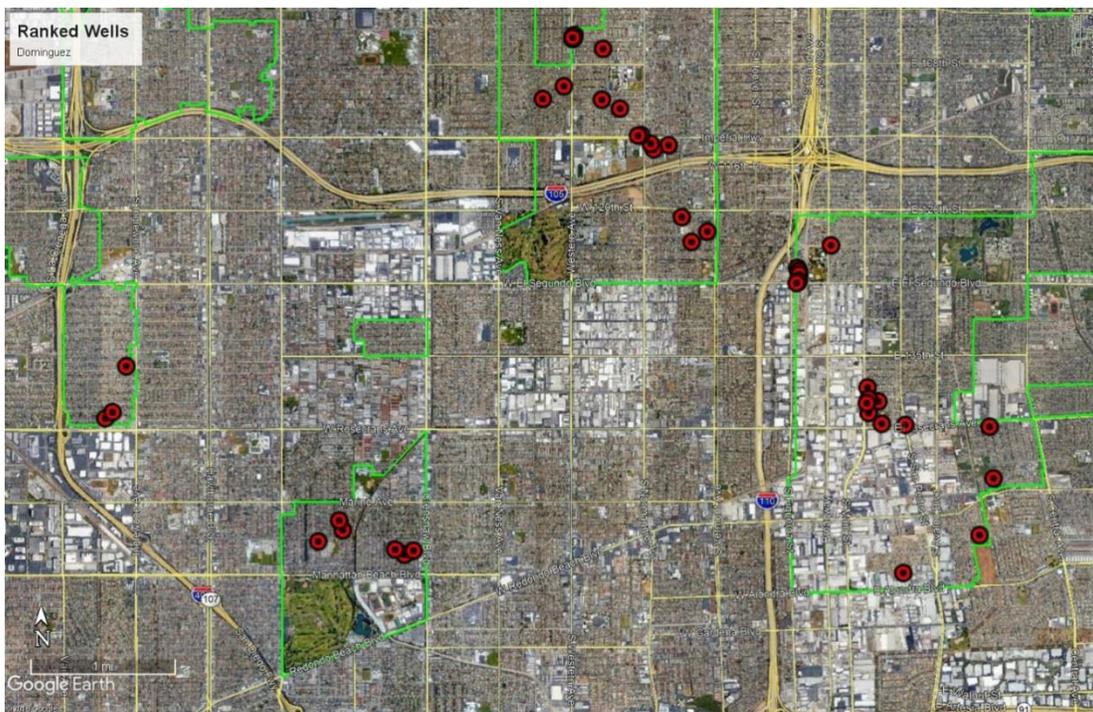
NOTE: The Inglewood Oil Field is included for reference purposes only and is not a part of the Strike Team effort. For more information on the County's regulatory framework for the Inglewood Oil Field, please visit the website at planning.lacounty.gov/baldwinhills.

Figure 3-9 High Ranking Wells Near Carson



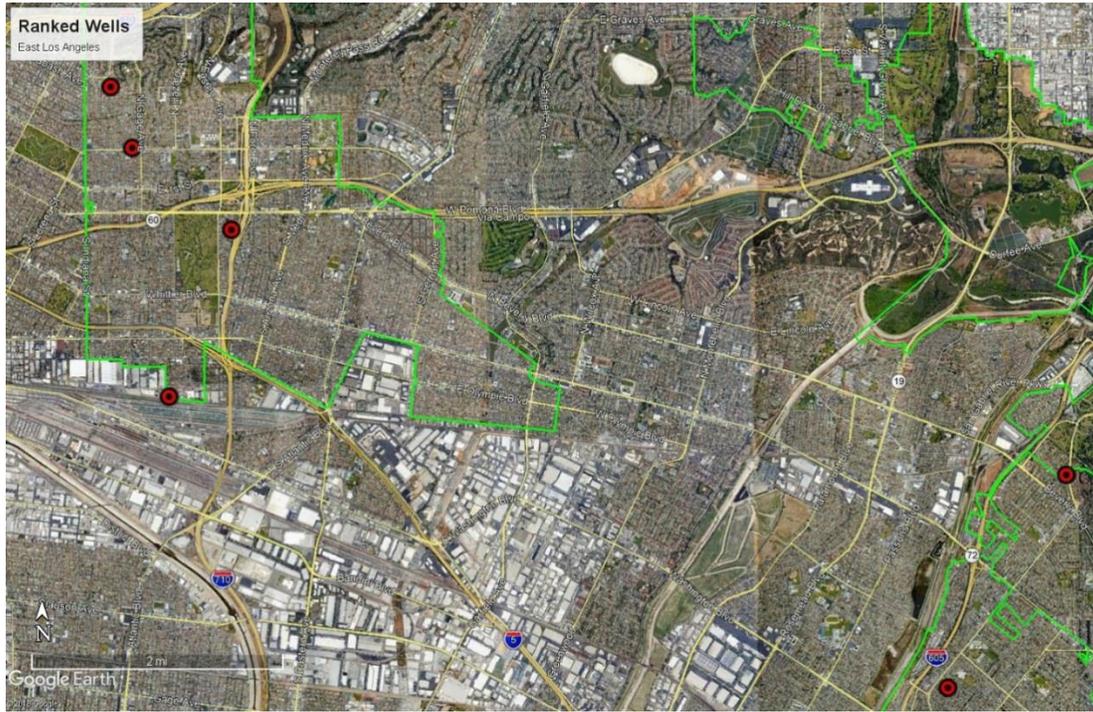
Note: Green lines are unincorporated area boundaries. Red dots are plugged/abandoned wells ranked high priority

Figure 3-10 High Ranking Wells Near Dominguez



Note: Green lines are unincorporated area boundaries. Red dots are plugged/abandoned wells ranked high priority

Figure 3-11 High Ranking Wells Near East Los Angeles



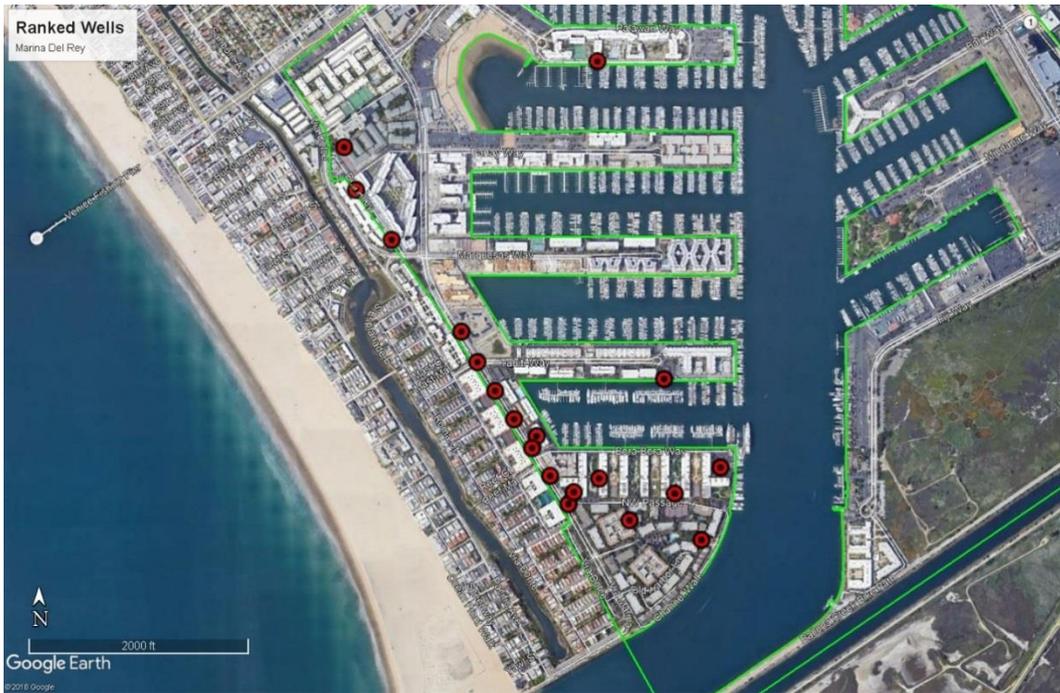
Note: Green lines are unincorporated area boundaries. Red dots are plugged/abandoned wells ranked high priority

Figure 3-12 High Ranking Wells Near La Puente



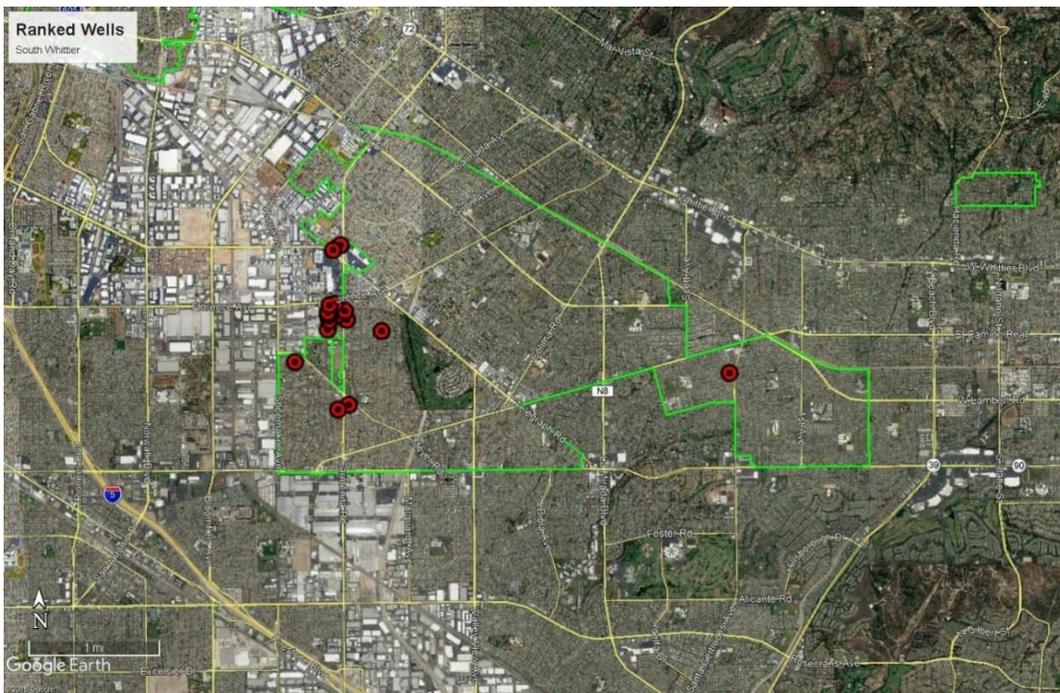
Note: Green lines are unincorporated area boundaries. Red dots are plugged/abandoned wells ranked high priority
Source Map: GoogleEarth

Figure 3-13 High Ranking Wells Near Marina Del Rey



Note: Green lines are unincorporated area boundaries. Red dots are plugged/abandoned wells ranked high priority
Source Map: GoogleEarth

Figure 3-14 High Ranking Wells Near Whittier



Note: Green lines are unincorporated area boundaries. Red dots are plugged/abandoned wells ranked high priority
Source Map: GoogleEarth

3.7 Next Steps

This analysis for wells provides an overview of the abandoned wells located in the unincorporated areas of Los Angeles County as well as presenting proposed factors that are used to prioritize the abandoned wells for further historical document reviews and in-field inspections. Additional work that will be performed will include the following:

1. Review detailed in-house DOGGR data on orphaned and abandoned wells history, including data on historical leaking abandoned wells, history of complaints and history of well blowouts.
2. Research Public Works records on abandoned wells encountered during construction projects (such as at Marina Del Rey).
3. Explore opportunities for interagency coordination to obtain additional types of well data to enhance the analysis.
4. Review interagency well drilling and well activity communication protocols for potential improvements in notification procedures.
5. Develop a site visit and inspection protocol for the high priority wells.
6. Conduct site inspections of high priority wells.
7. Provide recommendations on potential public and environmental health and safety concerns of high priority wells.

4.0 Oil and Gas Pipelines

Initial Project Staff work on oil and gas pipelines consisted of a meeting with a member of the Advisory Panel (Matt Rezvani), review of pipeline inspection regulations, interactions with the Office of the State Fire Marshall to obtain detailed pipeline data, and review of the National Pipeline Mapping System (NPMS) data.

4.1 Advisory Panel Member Matt Rezvani Meeting

Project Staff met with Mr. Rezvani on October 25, 2018 at the County DRP offices. Mr. Rezvani was involved with drafting of the California Pipeline Safety Act as well as some California oil spill legislation and is an asset and resource to the Strike Team. The discussion included an overview of the Elder California Pipeline Safety Act of 1981 which authorized the State Fire Marshal to exercise exclusive safety, regulatory and enforcement authority over intrastate hazardous liquid pipelines and implement the Federal Hazardous Liquid Pipeline Safety Act. Components of the legislation provide for annual inspections and testing of hazardous liquid pipelines as discussed in detail in Section 4.2 below. Mr. Rezvani also provided input and direction to Project Staff on obtaining pipeline data, the fact that regulatory agencies have staffing challenges with regards to pipeline oversight, that the State has a significant number of abandoned pipelines, and the fact that many utility transmission pipelines in the State were built long ago and are now in or adjacent to new residential development.

4.2 Pipeline Inspection Regulations

Pipeline regulations that dictate maintenance and testing requirements are based on State regulations and Federal regulations for pipeline safety. The discussion below provides the basis for the State's regulations and the Federal guidance that is promulgated within those regulations.

4.2.1 State Regulations - California Pipeline Safety Act of 1981

This Act gives regulatory jurisdiction to the State Fire Marshal for the safety of all intrastate (i.e. within state) hazardous liquid pipelines and all interstate (i.e. between states) pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the Federal Hazardous Liquid Pipeline Safety Act and Federal pipeline safety regulations. Recent amendments require pipelines to include leak prevention and cathodic protection (i.e. the application of an electrical charge to a pipeline to prevent corrosion) systems as reviewed and approved by the State Fire Marshal. All new pipelines must also be designed to accommodate passage of instrumented inspection devices (smart pigs) through the pipeline.

State of California Government Code Parts 51010 through 51018 provide specific safety requirements including periodic hydrostatic testing of pipelines, specific accuracy requirements on leak rate determination, hydrostatic testing by state-certified independent pipeline testing firms,

pipeline leak detection, and reporting of all leaks. Specific testing requirements of various intrastate pipelines are as follows:

Under Section 51012.3(a)(3), pipelines must meet cathodic protection requirements in accordance with Section 195.414 of Title 49 of the Code of Federal Regulations. Section 195.416 requires also that each operator shall, at intervals not exceeding 15 months, but at least once each calendar year, conduct tests on each buried, in contact with the ground, or submerged pipeline facility in its pipeline system that is under cathodic protection to determine whether the protection is adequate. Each operator shall, at intervals not exceeding 2 ½ months, but at least six times each calendar year, inspect each of its cathodic protection rectifiers. Each operator shall, at intervals not exceeding 5 years, electrically inspect the bare pipe in its pipeline system that is not cathodically protected and must study leak records for that pipe to determine if additional protection is needed.

Pipelines built after 1990 are required to be piggable (accommodate the passage of instrumented internal inspection devices) (Section 51013).

Section 51013.5 of the Public Safety Code requires pipeline testing as follows:

- Pipelines without automatic pressure relief devices shall be hydrostatically tested annually;
- Pipelines over 10 years of age and not provided with effective cathodic protection shall be hydrostatically tested every three years, except for those on the State Fire Marshal's list of higher risk pipelines, which shall be hydrostatically tested annually;
- Pipeline over 10 years of age and provided with effective cathodic protection shall be hydrostatically tested every five years, except for those on the State Fire Marshal's list of higher risk pipelines which shall be hydrostatically tested every two years;
- Piping within a refined products bulk loading facility served by pipeline shall be tested hydrostatically at 125 percent of maximum allowable operating pressure utilizing the product ordinarily transported in that piping if that piping is operated at a stress level of 20 percent or less of the specified minimum yield strength of the pipe. The frequency for pressure testing these pipelines shall be every five years for those pipelines with effective cathodic protection and every three years for those pipelines without effective cathodic protection. If that piping is observable, visual inspection may be the method of testing;
- Test methods other than the hydrostatic tests required above, including inspection by instrumented internal inspection devices, may be approved by the State Fire Marshal on an individual basis. If the State Fire Marshal approves an alternative to a pressure test in an individual case, the State Fire Marshal may require that the alternative test be given more frequently than the testing frequencies specified above;
- The test pressure for each pressure test conducted must be maintained throughout the part of the system being tested for at least 4 continuous hours at a pressure equal to 125 percent, or more, of the maximum operating pressure and, in the case of a pipeline that is not visually inspected for leakage during test, for at least an additional 4 continuous hours at a pressure equal to 110 percent, or more, of the maximum operating pressure; and,

- When hydrostatic testing is required by Section 51013.5, the test results shall be certified by an independent testing firm or person who is selected from a list, provided by the State Fire Marshal, of independent testing firms or persons approved annually by the State Fire Marshal.

Section 51055.1 provides that commencing January 1, 2017, the State Fire Marshal, or an officer or employee authorized by the State Fire Marshal, shall annually inspect all intrastate pipelines and operators of intrastate pipelines under the jurisdiction of the State Fire Marshal to ensure compliance with applicable laws and regulations. Per the State Fire Marshal Guidelines each inspection shall contain the following:

- Evaluation of the risks to each intrastate hazardous liquid pipeline based upon the operator history, integrity testing results, preventative and mitigative measures, construction activities, leak history, and compliance history;
- An annual inspection of each operator of an intrastate hazardous liquid pipeline in accordance with California State Fire Marshal Annual Inspection Procedures dated July 1, 2016; and,
- An annual inspection of each intrastate hazardous liquid pipeline in accordance with California State Fire Marshal Annual Inspection Procedures dated July 1, 2016.

Each operator of an intrastate hazardous liquid pipeline shall complete and submit to the Office of the State Fire Marshal Form PSD-101 for each intrastate hazardous liquid pipeline no later than July 1st annually.

4.2.2 DOGGR Regulations

DOGGR has regulations that typically apply to smaller flowlines, pipelines within oil fields, gathering lines, production lines or injection lines typically within the administrative boundaries of an oil and gas field. New regulations for certain pipelines associated with California oil and gas production (Assembly Bill 1420) became effective on October 1, 2018. The regulations now require as follows:

- Operators shall visually inspect all aboveground pipelines for leaks and corrosion at least once a year;
- Operators shall inspect all active gas pipelines in sensitive areas that are 10 or more years old for leaks or other defects at least once a year, or at a frequency approved by the Supervisor and listed in the operator's Pipeline Management Plan. The operator shall conduct the inspection in accordance with applicable regulatory standards or, in the absence thereof, an accepted industry standard that is specified by the operator and listed in the Pipeline Management Plan;

- DOGGR may order such tests or inspections deemed necessary to establish the reliability of any pipeline system. Repair, replacement, or cathodic protection may be required;
- Operators shall conduct pressure testing using: (A) The guidelines recommended by industry standards, such as the American Petroleum Institute, American Society of Mechanical Engineers for oil or gas pipelines; or (B) The method approved by the State Fire Marshal, Pipeline Safety Division for liquid pipelines or US Department of Transportation, Pipeline and Hazardous Materials Safety Administration for gas pipelines; on any pipeline that has had a leak resulting in the release of a fluid in a quantity that triggers reporting of the release under any regulatory, statutory, or other legal requirement. The pipeline shall not be returned to service unless the pressure testing has been successfully completed. Test results shall be provided to the Division for review within seven days following the test;
- The operator shall perform periodic mechanical integrity testing on all active environmentally sensitive pipelines that are gathering lines, all urban pipelines over 4” in diameter, and all active gas pipelines in sensitive areas. The mechanical integrity testing shall be conducted every two years, or at an alternative frequency approved by DOGGR based on demonstrated wall thickness and remaining service life over a period of at least two years. The testing frequencies shall be specified in the operator’s Pipeline Management Plan. Pipelines less than 10 years old are exempt from the two-year testing requirements of this subdivision. These tests shall be performed to ensure the pipeline integrity by using at least one of the following methods: Subject to review and approval by the Division, the operator shall identify effective mechanical integrity testing methods based on pipeline type and use. The mechanical integrity testing methodology for compliance with this subdivision shall be specified in the operator’s Pipeline Management Plan and shall include at least one of the following: (1) Nondestructive testing using ultrasonic or other techniques approved by DOGGR, to determine wall thickness; (2) Pressure testing consistent with SFM regulations; (3) Internal inspection devices such as a smart pig, as approved by DOGGR; Any other method of ensuring the integrity of a pipeline that is approved by the Supervisor that ensures mechanical integrity so as to protect life, health, property and natural resources; and,
- Copies of mechanical integrity test results shall be maintained in a local office of the operator for ten years and made available to the Division, upon request. The operator shall assess all test results to determine continued safe operations and that risks identified in the Pipeline Management Plan are adequately addressed. The operator shall repair and retest or remove from service any pipeline that fails the mechanical integrity test. The Division shall be promptly notified in writing by the operator of any pipeline taken out of service due to a test failure.

4.2.3 California Public Utility Commission Regulations

The California Public Utilities Commission (CPUC) regulations on pipelines are considered to not supersede the Federal Pipeline Safety Regulations but are supplements to the Federal Regulations. The Regulations provide minimum requirements for the design, construction, quality of materials, locations, testing, operations and maintenance of facilities used in the gathering, transmission and

distribution of gas and in liquefied natural gas facilities to safeguard life or limb, health, property and public welfare and to provide that adequate service will be maintained by gas Operators under the jurisdiction of the CPUC.

For CPUC lines the following requirements apply: At least 60 days prior to the construction of a new pipeline, reconstruction, or reconditioning of an existing pipeline, a report shall be filed with the CPUC setting forth the proposed route and general specifications for such pipeline. The specifications shall include but not be limited to the following items:

- Description and purpose of the proposed pipeline;
- Specifications covering the pipe selected for installation, route map segregating incorporated areas, class locations and design factors, terrain profile sketches indicating maximum and minimum elevations for each test section of pipeline;
- Maximum allowable operating pressure for which the line is being constructed;
- Test medium and pressure to be used during strength testing; and,
- Protection of pipeline from hazards and external corrosion.

For distribution and transmission systems the following regulations apply for leakage surveys and procedures:

- A gas leak survey, using leak detecting equipment, must be conducted in business districts and in the vicinity of schools, hospitals and churches, including tests of the atmosphere in gas, electric, telephone, sewer and water system manholes, at cracks in pavement, and sidewalks, and at other locations providing an opportunity for finding gas leaks, at intervals not exceeding 15 months, but at least once each calendar year; and,
- A gas leakage survey of transmission pipelines, using leak detecting equipment must be conducted at least twice each year and at intervals not exceeding 7 ½ months.

4.2.4 Federal Regulations

Some hazardous liquid pipelines are under the jurisdiction of the Department of Transportation (DOT) and must follow the regulations in 49 CFR Part 195, Transportation of Hazardous Liquids by Pipeline, as authorized by the Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. 2004). Other applicable Federal requirements are contained in 40 CFR Parts 109, 110, 112, 113, and 114, pertaining to the need for Oil Spill Prevention Control & Countermeasures (SPCC) Plans; 40 CFR Parts 109– 114 promulgated in response to the Oil Pollution Act of 1990.

Part 195.30 incorporates many of the applicable national safety standards of the:

- American Petroleum Institute (API);

- American Society of Mechanical Engineers (ASME);
- American National Standards Institute (ANSI); and,
- American Society for Testing and Materials (ASTM).

Part 195.50 requires reporting of accidents by telephone and in writing for:

- Explosion or fire not intentionally set by the operator;
- Spills of five gallons or more or five barrels if confined to company property and cleaned up promptly;
- Daily loss of five barrels a day to the atmosphere;
- Death or injury necessitating hospitalization; or
- Estimated property damage, including cleanup costs, greater than \$50,000.

The Part 195.100 series includes design requirements for the temperature environment, variations in pressure, internal design pressure for pipe specifications, external pressure and external loads, new and used pipe, valves, fittings, and flanges.

The Part 195.200 series provides construction requirements for standards such as compliance, inspections, welding, siting and routing, bending, welding and welders, inspection and nondestructive testing of welds, external corrosion and cathodic protection, installing in-ditch and covering, clearances and crossings, valves, pumping, breakout tanks, and construction records.

The Part 195.300 series prescribes minimum requirements for hydrostatic testing, compliance dates, test pressures and duration, test medium, and records.

The Part 195.400 series specifies minimum requirements for operating and maintaining steel pipeline systems, including:

- Correction of unsafe conditions within a reasonable time;
- Procedural manual for operations, maintenance, and emergencies;
- Training;
- Maps;
- Maximum operating pressure;
- Communication system;
- Cathodic protection system;
- External and internal corrosion control;
- Valve maintenance;

- Pipeline repairs;
- Overpressure safety devices;
- Firefighting equipment; and,
- Public education program for hazardous liquid pipeline emergencies and reporting.

Part 195.452 addresses Pipeline Integrity Management Plans (IMP) in High Consequence Areas for Hazardous Liquid Operators which were existing on or after May 29, 2001. IMPs specify regulations to assess, evaluate, repair and validate, through comprehensive analysis, the integrity of hazardous liquid pipeline segments that, in the event of a leak or failure, could affect populated areas, areas unusually sensitive to environmental damage, and commercially navigable waterways. Section h.4 of 49 CFR 195.452 specifies repair criteria for pipelines based on smart pig results. These require that immediate repairs shall be conducted for the following conditions:

- Metal loss greater than 80% of nominal wall regardless of dimensions;
- Predicted burst pressure less than the established maximum operating pressure;
- A dent located on the top of the pipeline that has any indication of metal loss, cracking or a stress riser; and,
- A dent located on the top of the pipeline with a depth greater than 6% of the nominal pipe diameter.

An operator must schedule evaluation and remediation of the following conditions within 60 days for the following conditions:

- All the items listed above for the immediate repair period;
- A dent located on the top of the pipeline with a depth greater than 3% of the pipeline diameter (or 0.250 inches in depth for a pipeline diameter less than 12"); and,
- A dent located on the bottom of the pipeline that has any indication of metal loss, cracking or a stress riser.

An operator must schedule evaluation and remediation of the following conditions within 180 days for the following conditions:

- All the items listed above for the 60 day and immediate repair periods;
- A dent with a depth greater than 2% of the pipeline's diameter that affects pipe curvature at a girth weld or a longitudinal seam weld (or 0.250 inches in depth for a pipeline diameter less than 12");
- A dent located on the top of the pipeline with a depth greater than 2% of the pipeline's diameter (or 0.250 inches in depth for a pipeline diameter less than 12" (NPS 12));

- A dent located on the bottom of the pipeline with a depth greater than 6% of the pipeline's diameter;
- An area of general corrosion with a predicted metal loss greater than 50% of nominal wall;
- Predicted metal loss greater than 50% of nominal wall that is located at a crossing of another pipeline, or is in an area with widespread circumferential corrosion, or is in an area that could affect a girth weld;
- A potential crack indication that when excavated is determined to be a crack.;
- Corrosion of or along a longitudinal seam weld; and,
- A gouge or groove greater than 12.5% of nominal wall.

4.3 State Fire Marshall Data Request

The State Fire Marshal provides regulatory and enforcement authority over intrastate hazardous liquid pipelines and implements the Federal Hazardous Liquid Pipeline Safety Act. State Fire Marshall data relevant to the Project include geographic information files (GIS or Shapefiles), pipeline inspection data, and pipeline operator data submittal (PS-101) forms. Data requests and discussion with the State Fire Marshall commenced in September 2018. Correspondence is summarized below.

- 9/19/2018 – Project Staff meeting request sent to CalFire.
- 11/6/2018 – Response received from CalFire stating the Public Records Act (PRA) process is required for CalFire information.
- 11/7/18 – Project Staff clarification correspondence sent to CalFire.
- 11/8/18 – Project Staff sent PRA request with requested data detail sent to CalFire.
- 11/15/18 – Request for conference call received from CalFire.
- 11/19/18 – Request from CalFire for additional time to address PRA request.
- 11/20/18 – Conference call with Project Staff and CalFire on data request.
- 11/30/18 – Background detail on data requested received from CalFire, no data received.
- 12/3/18 – Request and notice that the PRA data request time limit expired sent to CalFire.
- 12/10/18 – Project Staff request for follow-up on PRA data extension request sent to CalFire.
- 12/10/18 – Response but no data received from CalFire.
- 12/11/18 – Clarification about limiting scope of data request to unincorporated County sent to CalFire.
- 12/13/18 – CalFire response for more time on data request scope received.
- 1/30/19 – Telecon with Project Staff and CalFire on PRA request.
- 2/5/19 – Project Staff request for first subset of pipeline data sent to CalFire.
- 2/8/19 – Response received from CalFire stating first set of pipeline data will be provided middle March 2019.
- 4/15/19 – Project Staff received a first set of pipeline data from CalFire.

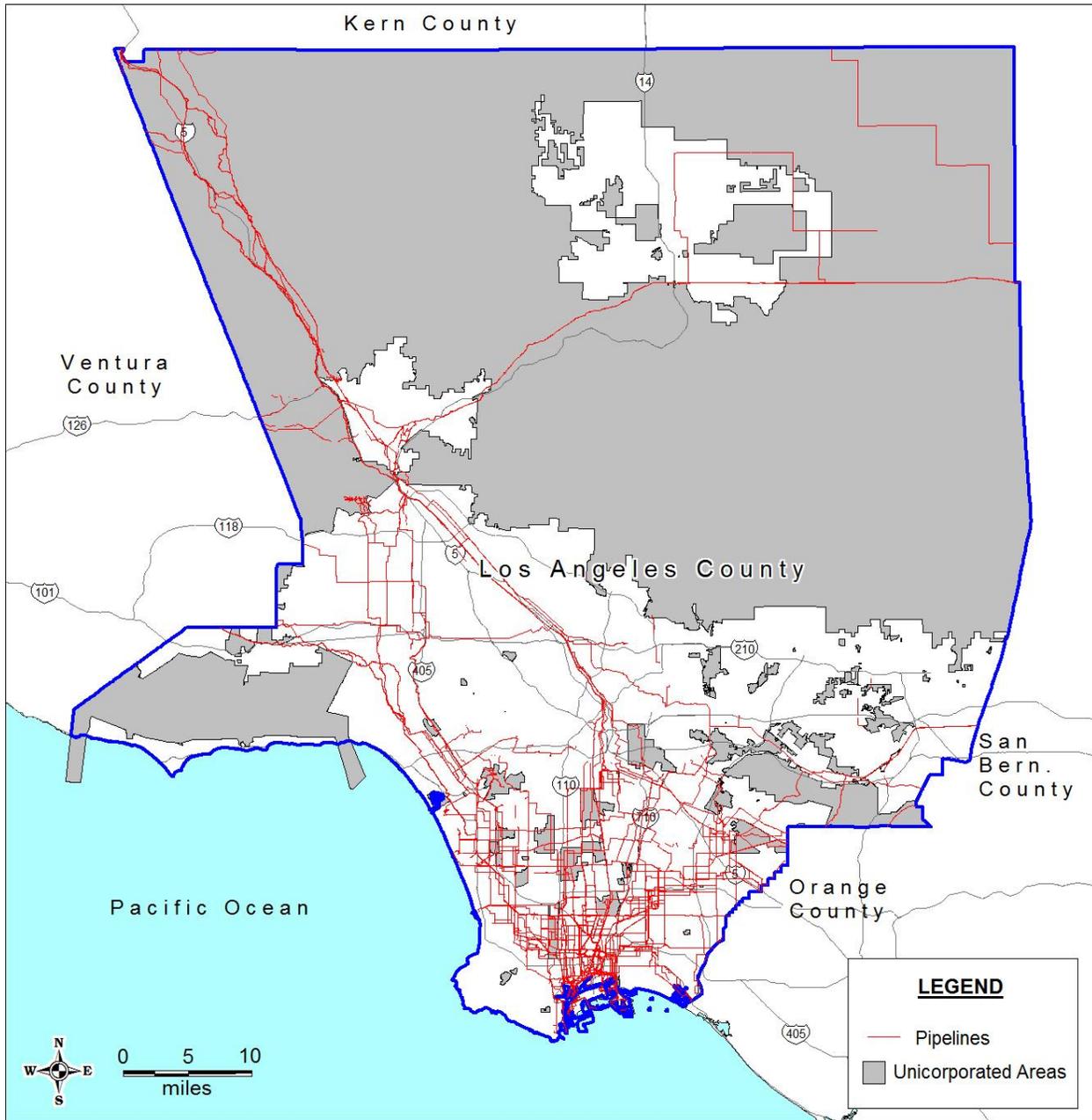
- 6/25/19 – Project Staff request for a second subset of pipeline data sent to CalFire.
- 8/8/19 – Project Staff received correspondence from CalFire stating a second set of pipeline data is available.
- 8/2/19 – Telecon with Project Staff and CalFire on PRA request.

The data request on February 5, 2019 consisted of a subset of the initial pipeline data request and focused on larger diameter pipelines (16 inch and larger) as a higher priority to begin the review process. As noted above, the initial data set was provided on April 15, 2019, however, the information provided did not include the pipeline operator data submittal (PSD-101) forms. Based on the correspondence from CalFire, the second set of data noted above is also currently lacking the PSD-101 forms. The PSD-101 forms contain current key information on pipeline specifications, pipeline commodities, integrity testing, hydrostatic pressure testing, leak detection system, and corrosion control. Therefore, Project Staff continues to work with the State Fire Marshall to obtain the PSD-101 forms, and other applicable data, in support of the Strike Team Phase II project.

4.4 NPMS Pipeline Data

The National Pipeline Mapping System (NPMS) is a Geographic Information System (GIS) data set that contains the location and attributes of hazardous liquid and gas pipelines, liquified natural gas (LNG) plants, and tank farms. Data is required to be reviewed by operators annually and must be re-submitted if any of the data has changed. Some NPMS data is available to the public and additional specific data is available to government agencies. A data set was obtained in November 2018 for Los Angeles County containing a mapping and pipeline data set and was reviewed and mapped for the unincorporated County. A general map of the pipelines from the NPMS data is shown in Figure 4-1. Note that detailed locations for pipelines are not presented in this report for homeland security and safety reasons.

Figure 4-1 Los Angeles County NPMS Pipelines



Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

Based on the NPMS data there are 1,400 hazardous liquid and gas pipelines managed by 20 different operators located in the unincorporated areas of Los Angeles County. For Los Angeles County as a whole, the NPMS data lists 4,342 pipelines with 42 operators. Table 4.1 lists the pipeline operators and number of pipelines for each in the unincorporated LA County. The database provides the status of the pipelines as “in service”, “idle”, “abandoned”, or “retired” as follows:

- In Service – currently transports hazardous liquids or natural gas;
- Idle – pipeline is maintained such that it may be brought back into service;
- Abandoned – pipeline is permanently removed from service; and,
- Retired – removed from service and no longer maintained but not permanently abandoned.

Pipelines in Table 4.1 below identified as abandoned for the operator are identified as permanently removed from service in the DOGGR data base. The 1,031 pipelines in service, idle, or retired in the unincorporated LA County have an identified designated operator. Table 4.2 provides the number of pipelines for each category of pipeline.

Table 4.1 Unincorporated LA County Hazardous Liquid and Gas Pipeline and Operators

Pipeline Operator	Number of Pipelines
Southern California Gas Company	811
Abandoned	369
Chevron Pipeline Company	64
Crimson Pipeline L.P.	28
Plains Pipeline L.P.	24
Shell Pipeline CO., L.P.	14
Torrance Basin Pipeline Company LLC	14
Phillips 66 Pipeline LLC	11
Torrance Valley Pipeline Company LLC	11
SFPP, LP	10
Plains Marketing, L.P.	9
Torrance Pipeline Company LLC	8
Breitburn Management Company, LLC	7
Tesoro SoCal Pipeline Company LLC	7
Paramount Petroleum Corp	5
City of Vernon	2
DOD Defense Energy Support Center	2
West Coast Terminal Pipeline (WCTP)	2
Air Products and Chemicals Inc	1
CalNev Pipeline CO.	1
Total	1,400
Total less Abandoned	1,031

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

Table 4.2 Unincorporated LA County Pipelines by Service Status

Service Category	Number of Pipelines
In Service	935
Idle	79
Retired	17
Permanently Abandoned	369
Total	1,400

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

Pipelines by commodity and size and are shown, less the permanently abandoned pipelines, in Tables 4.3 and 4.4. The NPMS data set lists 3,190 miles of hazardous liquid and gas pipelines in LA County with approximately 656 miles of those pipelines in the unincorporated LA County areas. It should be noted these totals do not include lengths for So Cal Gas pipelines as this data was not included in the NPMS data set. Table 4.3 provides the number of miles associated with each commodity type.

Table 4.3 Unincorporated LA County Pipelines by Commodity Type

Commodity	Number of Pipelines	Miles of Pipeline ¹
Crude Oil	147	202.6
Empty Gas	0	4.1
Empty Liquid	0	136.2
Fuel Grade Ethanol	0	0.0
Hydrogen Gas	1	1.0
Liquefied Petroleum Gas	0	0.0
Natural Gas ¹	821	221.1
Other Gas	0	0.0
Product (Non-Highly Volatile Liquid)	62	91.5
Totals	1031	656.5

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

1. National Pipeline Mapping System (NPMS) data set did not contain mileage data for So Cal Gas pipelines.

Table 4.4 Unincorporated LA County Pipelines by Diameter

Pipeline Diameter (Inches)	Number of Pipelines
20 to 24	20
18 to <20	0
16 to <18	23
14 to <16	11
12 to <14	23
10 to <12	21
8 to <10	36
6 to <8	33
4 to <6	34
Less than 4	8
No Data ¹	822
Total	1031

Source: National Pipeline Mapping System (NPMS) Los Angeles County November 2018.

¹ The majority of these pipelines (811) are SoCal Gas Company pipelines with no size detail in data set.

4.5 Next Steps

This analysis for pipelines provides a general overview of the data from the NPMS database for hazardous liquid and gas pipelines located in the unincorporated areas of Los Angeles County. Additional work on pipelines that will be performed includes the following:

1. Continue to work with the State Fire Marshall to obtain pipeline data to include operator and inspection information to update pipeline database; no additional data applicable to this second Phase II report was received.
2. Develop a listing of the high priority pipelines based on the pipeline specific and inspection data listed above and census tract/population data.
3. Develop a site visit and inspection protocol for the high priority pipelines;
4. Conduct site inspections of high priority pipelines.
5. Provide recommendations on potential public and environmental health and safety concerns of oil and gas pipelines.
6. The Strike Team will continue to review pipeline inspection records, and compliance with existing regulations and make recommendations for additional County regulations if needed.

5.0 Oil and Gas Storage Facilities

Oil and gas storage facilities can present risk to the community through accidental releases of materials and routine air emissions of toxic pollutants. Oil and gas facilities are facilities that are not included in the oil production category (which includes wells and produced crude oil and gas storage).

5.1 Facility Listings in TRI

Oil and gas storage facilities were examined utilizing the EPA Toxic Release Inventory data, which includes information in the industry type, the amount of chemicals stored onsite and the facility information in addition to toxic material release inventories. This information was compiled for Los Angeles County and the unincorporated areas for petroleum facilities, chemical facilities and for petroleum bulk storage facility industry types in order to encompass all potential oil and gas storage locations.

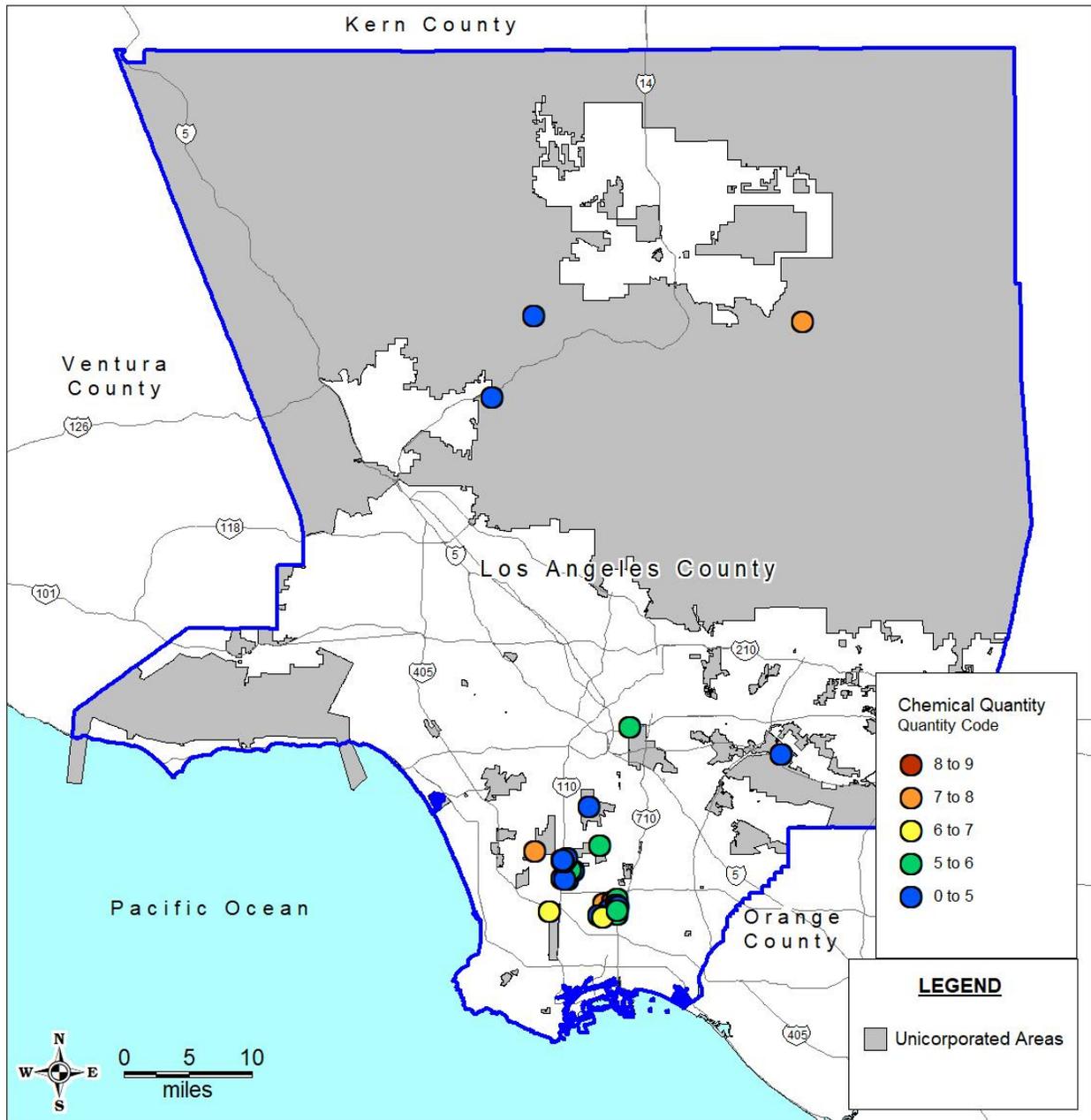
Table 5.1 shows the listing of the facilities with the largest inventories. Figure 5-1 shows the location of potential oil and gas facilities in the unincorporated areas of Los Angeles County.

Table 5.1 Facilities with the Largest Quantity of Chemicals

Facility Name	City
American Polystyrene Corp	Torrance
Ameritone Paint Co	Rancho Dominguez
Betz Labs Inc Compton	Compton
Chevron Chemical Co	Los Angeles
Essex Polytech Inc	Compton
Flask Chemical Corp	Lynwood
General Petroleum	Rancho Dominguez
Grow Group Inc Automotive Division	Compton
Henkel Electronic Materials LLC	Rancho Dominguez
Holliday Rock-Palmdale	Littlerock
Interplastic Corp	Hawthorne
LMC Enterprises DBA Flo-Kem	Compton
Manner Plastic Materials	Rancho Dominguez
Oakite Products Inc	City of Industry
Pacific Terminals – Dominguez Hills Pump Station	Compton
Phillips 66 Los Angeles Terminal	Los Angeles
Plaskolite West LLC	Compton
Spectrum Laboratory Products Inc	Gardena

Source: TRI Database with over 1 million pounds for industry codes 324 Petroleum & Coal Products, 325 Chemicals, and 4247 Petroleum and Petroleum Products Merchant Wholesalers.

Figure 5-1 Potential Oil and Gas Storage Facilities



Notes: Chemical quantities are designated as: 5=greater than 100,000 pounds; 6=greater than 1 million pounds; 7= greater than 10 million pounds; 8 greater than 100 million pounds and 9=greater than 1 billion pounds. Figure based on EPA Toxic Release Inventory data.

5.2 Facilities and Census Data

The facility locations were correlated with census data to identify those facilities that are in populated areas. Figure 5-2 shows the facilities and the census data population densities. Table 5.1 shows the number of facilities located in different population density areas.

Figure 5-2 Potential Oil and Gas Storage Facilities and Census Data

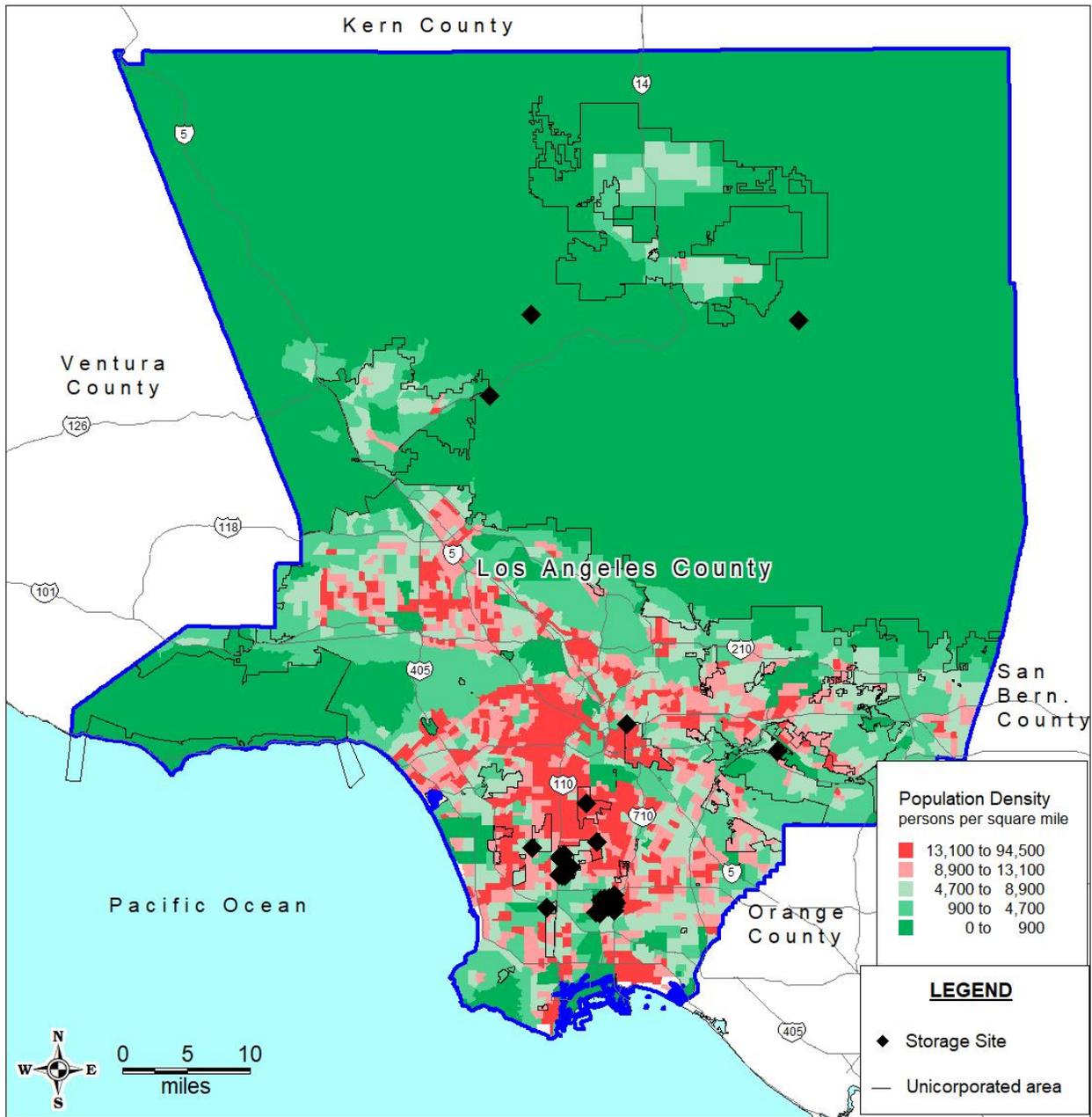


Figure based on EPA Toxic Release Inventory and 2010 U.S. Census Bureau data.

Table 5.2 Facilities and Census Data Population Densities

Population Density	Number of Facilities	Density Rank
Less than 1,000 persons/square mile	22	0
More than 1,000 persons/square mile	15	2
More than 5,000 persons/square mile	4	4
More than 10,000 persons/square mile	2	6
More than 15,000 persons/square mile	1	8

5.3 Facilities by Spill History

The Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA), Emergency Planning and Community Right-to-Know Act (EPCRA) and California law require responsible parties to report hazardous material releases if certain criteria is met. The California Office of Emergency Services (OES) maintains a database of spills in California. While this spill database does not generally maintain GIS reference information or facility name, address matching was reviewed for spills over the last 5 years. Of the facilities identified, two facilities (American Polystyrene Corp and Interplastic Corp) experienced spills in the last 5 years and an additional 4 facilities may have experienced spills based on the proximity of addresses.

5.4 Facilities Ranking

Based on the materials quantity and the census tract population density, the facilities were ranked by adding together the TRI quantity code, the census tract population density rank as shown in Table 5.2 and a score if there has been a spill in the last 5 years (0 for none, 5 for maybe and 10 for yes). The ranking for the top 10 facilities is shown in Table 5.3

Table 5.3 Facilities Ranking: Top 10 Facilities

Facility Name	Facility Rank
INTERPLASTIC CORP	19
AMERICAN POLYSTYRENE CORP	18
FLASK CHEMICAL CORP	11
GENERAL CARBON CO	10
BETZ LABS INC COMPTON	10
ESSEX POLYTECH INC	10
EXXONMOBIL LUBRICANTS & PETROCHEMICAL SPECIALTIES CO	9
CHEMLINE CA INC	9
LMC ENTERPRISES DBA FLO-KEM	9
CHEVRON CHEMICAL CO	9

5.5 Next Steps

The initial review of potential oil and gas storage facilities utilizes the EPA TRI database to review those facilities that could be oil and gas storage facilities based on the industrial codes, and a comparison of the facility locations to the census data. Additional details will be gathered including the following:

1. Review Federal and State agency databases for leak or contamination history at facilities.
2. Review Fire Department records and the California Environmental Reporting System (CERs) on hazardous materials business plans to identify additional facilities storing large quantities of oil and gas materials.
3. Review applicability of including underground natural gas storage facilities such as the Aliso Canyon, Playa Vista, Montebello, and Honor Ranch storage facilities.

6.0 Well Drilling and Well Maintenance Chemical Use

One of the Phase I Strike Team findings concerned the use of chemicals for well drilling, maintenance, and workover activities. These materials are not typically included in hazardous materials business plans because they are specific to each well activity, are only brought onsite as required and are not stored onsite. SCAQMD Rule 1148.2 requires reporting of all chemical use for oil or gas drilling, well completion, or well reworks for onshore wells located in the SCAQMD. Additional information required by Rule 1148.2 includes:

- Name and contact information of well owner and operator;
- Well name and API number;
- Well location;
- Nearest and type of sensitive receptor within 1,500 feet;
- Project schedule;
- Equipment data; and,
- Volumes and types of dry and fluid materials used.

Chemical specific data for each product used in a well drilling fluid, well rework fluid, or well completion fluid required by Rule 1148.2 includes:

- Identity and purpose;
- Total mass in pounds;
- CAS (Chemical Abstract Service Number);
- Mass of each chemical ingredient;
- Air toxic designation;
- Supplier data; and,
- Trade secret protection if applicable.

6.1 Well Activity

Data for the calendar years 2016 through June 2019 provided information on the type of well work activities and associated chemical use for wells subject to Rule 1148.2. Table 6.1 lists Rule 1148.2 well activity events for the 2016 through June 2019 time period for the entire Los Angeles County. As shown in Table 6.1, most of the chemical use reported was associated with maintenance acidizing, gravel packing, and well drilling. Maintenance acidizing is not defined in Rule 1148.2, however, most well operators use the term to describe a near-wellbore treatment to remove scale formation that can plug up well perforations. Definitions for these well activities can differ from agency to agency and no comprehensive single source is available. Table 6.2 lists the commonly used definitions and agency source used by the oil and gas industry. No hydraulic fracturing projects were reported in the Rule 1148.2 data base for all of Los Angeles County in the time period 2016 to June 2019. Most of the well report locations were in the cities of Long Beach, Los Angeles, and Wilmington as listed in Table 6-3.

Due to the small sample size of well activity in the unincorporated LA County area and to present a general idea of the types and amounts of chemicals used for well work activities in the Los Angeles basin, the data set presented in this section of the report is for the entire Los Angeles County.

Table 6.1 2018 Rule 1148.2 Well Activity LA County

Rule 1148.2 Data 2016 through June 2019	
Well Activity Type	Number
Well Drilling	98
Matrix Acidizing	0
Hydraulic Fracturing	0
Gravel Packing	149
Maintenance Acidizing	515
Acid Fracturing	3
Other	2
Total	767

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Table 6.2 Well Activity Definitions

Type	Definition	Source
Acid Fracturing	A well stimulation treatment that, in whole or in part, includes the pressurized injection of acid into an underground geologic formation in order to fracture the formation, thereby causing or enhancing, for the purposes of this division, the production of oil or gas from a well.	SB4
Acid Matrix Stimulation	An acid treatment conducted at pressures lower than the applied pressure necessary to fracture the underground geologic formation.	SB4
Acidizing	A treatment of the wellbore or reservoir formation with an acid to either clean out scale, damage, or other debris in the well, or react with the soluble substances in the formation to improve permeability and enhance production of oil and gas	SCAQMD Rule 1148.2
Gravel Packing	A method that uses water and additives to place sand and gravel near the wellbore itself with the objective of limiting entry of formation sands and fine-grained material into the wellbore	
Hydraulic Fracturing	A technique used in stimulating a formation or zone that involves the pressurized injection of hydraulic fracturing fluid, which is a carrier fluid mixed with chemical additives, and typically a proppant, into an underground geologic formation in order to fracture the formation, thereby causing or enhancing the production of oil or gas from a well	SCAQMD Rule 1148.2
Maintenance Acidizing	Commonly used by industry to describe the use of acid for well bore de-scaling maintenance activities.	Oil and Gas Industry

Source: SB4 Well Stimulation Regulations, SCAQMD Rule 1148.2, oil and gas industry staff.

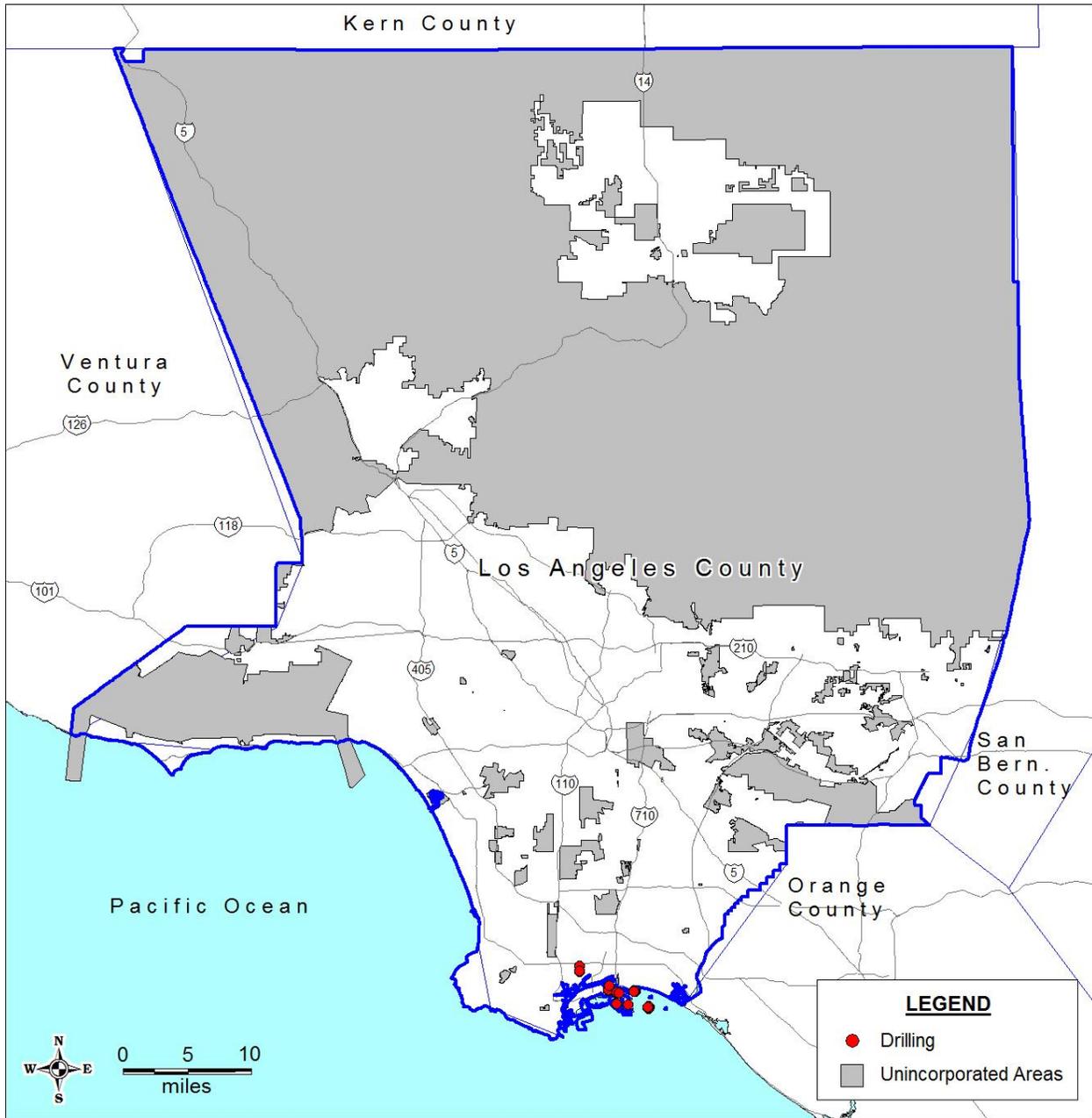
Table 6.3 Rule 1148.2 Well Drilling, Maintenance, and Workover Activities by City

Rule 1148.2 Data 2016 through June 2019	
City	Number of Well Activity Events
Long Beach	635
Los Angeles and Unincorporated Los Angeles	54
Wilmington	40
Signal Hill	12
Carson	8
None identified	6
Montebello	3
Santa Fe Springs	3
Castaic	2
Harbor City	1
La Habra Heights	1
Northridge	1
Valencia	1
Total	767

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

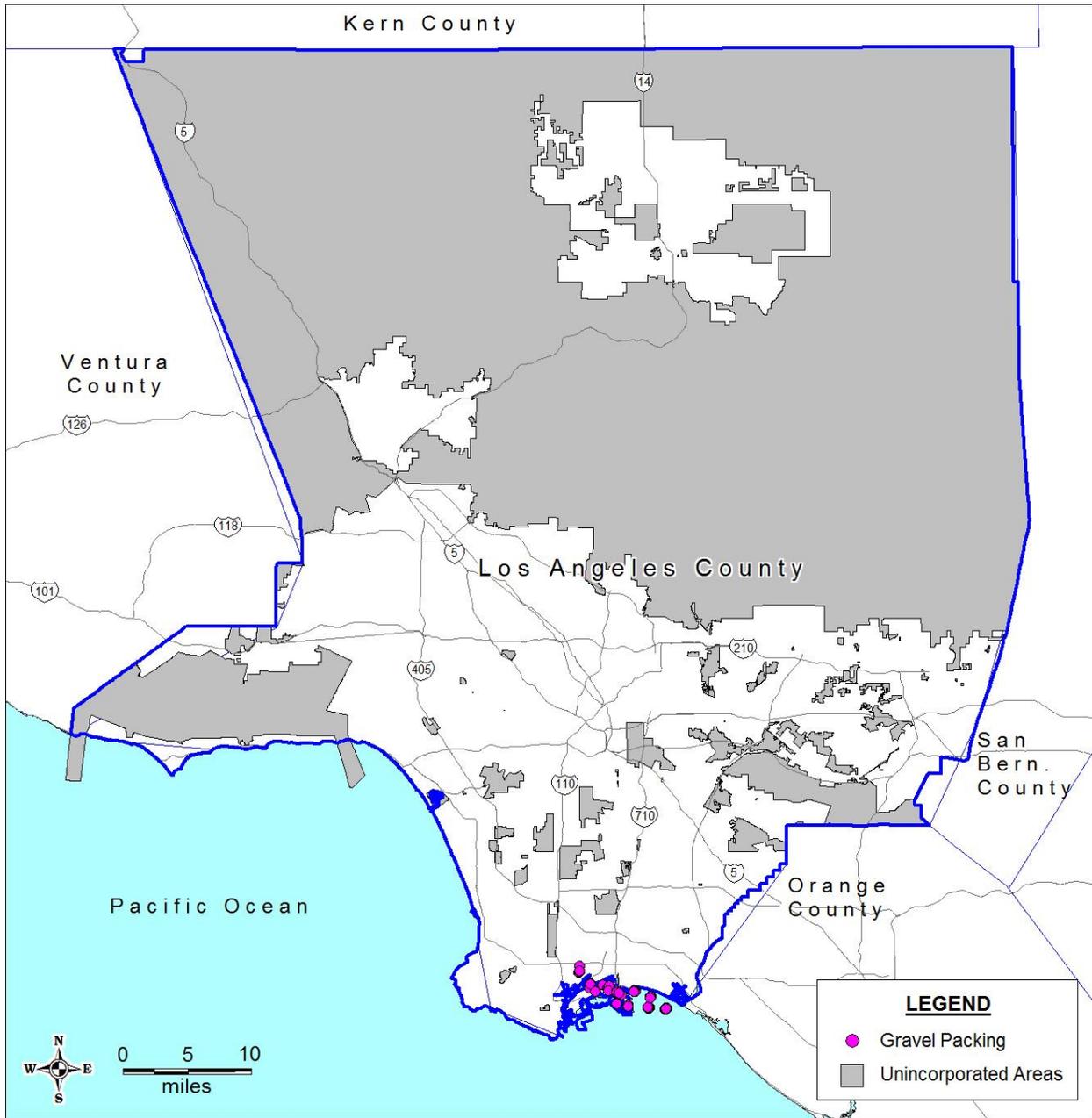
Figures 6-1 through 6-3 show the locations of the well activities listed in Table 6-1 above.

Figure 6-1 Rule 1148.2 Well Drilling Locations



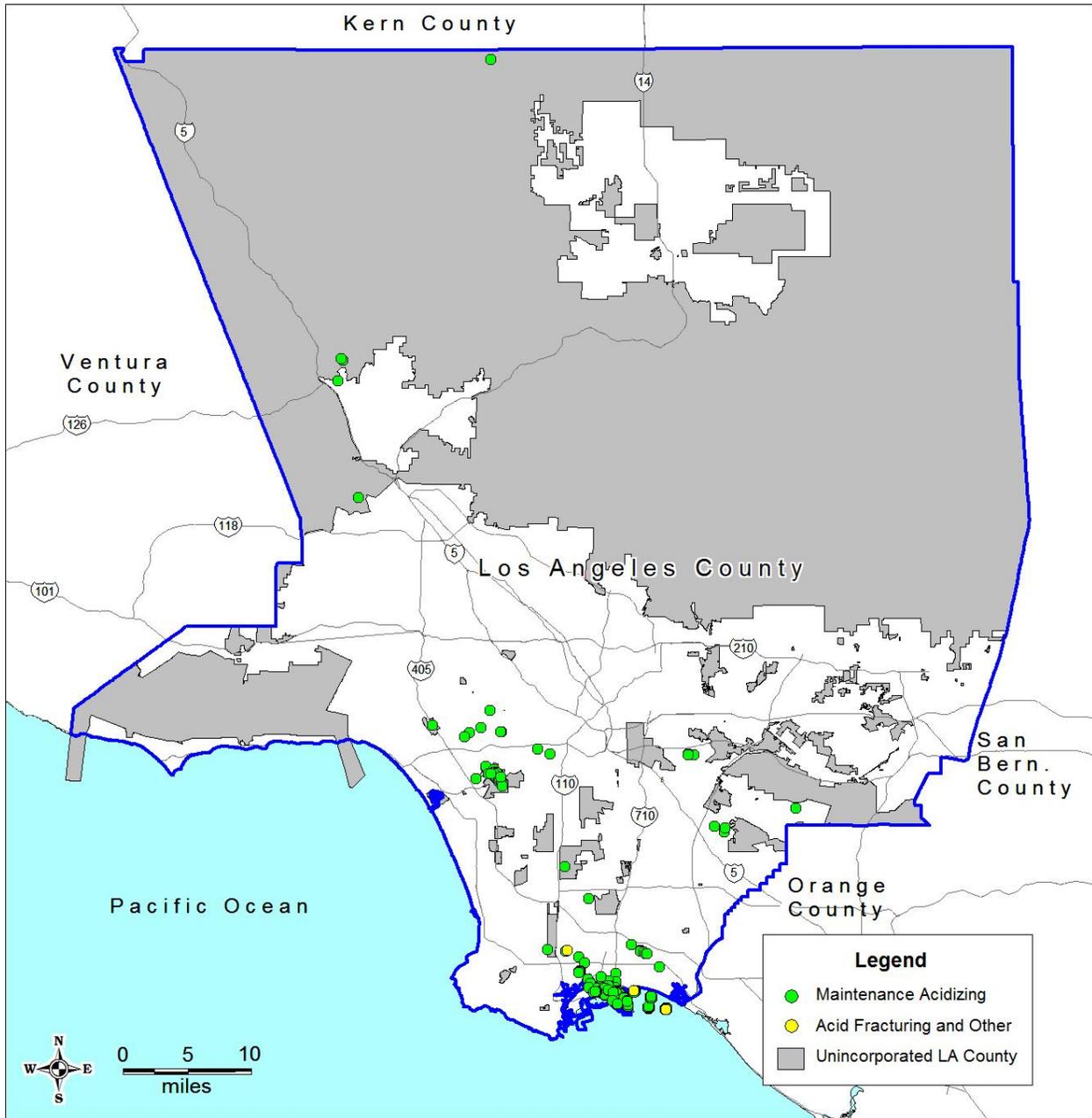
Source: SCAQMD Rule 1148.2 Chemical Database for 2016 through June 2019.

Figure 6-2 Rule 1148.2 Gravel Packing Locations



Source: SCAQMD Rule 1148.2 Chemical Database for 2016 through June 2019.

Figure 6-3 Rule 1148.2 Well Maintenance Acidizing, Acid Fracturing and Other Locations



Source: SCAQMD Rule 1148.2 Chemical Database for 2016 through June 2019.

6.2 Well Fluid and Chemical Use

Rule 1148.2 provides quantities, total fluid, and chemical specific data for each product used in a well drilling fluid, well maintenance fluid, or well completion fluid. Table 6.4 lists the average fluid use for each well activity type reported for the 2016 through June 2019 time period. It is important to note the fluid use numbers include water and the Rule 1148.2 data base reports total fluid use and does not break out individual types of materials by volumes of fluids.

Table 6.4 Rule 1148.2 Total Fluid Use by Well Activity

Rule 1148.2 Data 2016 through June 2019	
Well Activity Type	Average Fluid Use Including Water (Gallons)
Well Drilling	58,950
Gravel Packing	11,575
Maintenance Acidizing	32,600
Acid Fracturing	16,256
Other	47,880

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Review of the chemical use for the well activities in the 2016 through June 2019 Rule 1148.2 data set lists 224 different chemicals. The Rule 1148.2 data base includes chemical use calculated by mass, in pounds. It is important to note that the values shown indicate the amount of material or chemical used down hole for each well activity and do not represent calculations for materials released into the atmosphere. Tables 6.5 through 6.9 identify the top 25 materials and the average amount, in pounds, used for each well activity in the 2016 to June 2019 data set. As listed in Table 6.1 above, matrix acidizing and hydraulic fracturing were not conducted during the 2016 through June 2019 reporting period. Note for well activities with less than 25 different material use types, all materials use types are listed. Appendix B provides a complete list of all the material and chemical types with CAS numbers for Los Angeles County for the Rule 1148.2 data set years 2016 through June 2019.

Table 6.5 Rule 1148.2 Average Material Use by Well Activity- Well Drilling

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	393,495
BARITE	7727437	38,211
PORTLAND CEMENT	65997151	36,500
POTASSIUM CHLORIDE	7447407	31,115
CALCIUM CHLORIDE	10043524	23,361
CALCIUM CARBONATE	471341	14,747
CRYSTALLINE SILICA	14808607	14,186
SODIUM CHLORIDE	7647145	8,215
SILICA, CRYSTALLINE, QUARTZ	14808607	4,898
GYPSUM	13397245	4,661
SAPONITE	1319411	4,054
AMORPHOUS SILICA	7631869	3,226

Table 6.5 Rule 1148.2 Average Material Use by Well Activity- Well Drilling

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
QUARTZ (SILICA)	14808607	2,658
MAGNESIUM OXIDE	1309484	2,600
CALCIUM OXIDE	1305788	2,514
SULFONATE	0	2,490
MICA	12001262	2,333
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653	2,330
ANIONIC ACRYLAMIDE COPOLYMER	0	1,924
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324	1,889
MAGNESIUM	7439954	1,341
AMORPHOUS SILICA FUME	69012642	1,124
ALUMINUM OXIDE	1344281	981
SODIUM CARBONATE	497198	911
CARBONIC ACID CALCIUM SALT (1:1)	471341	863

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

Table 6.6 Rule 1148.2 Average Material Use by Well Activity-Gravel Packing

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	39,633
POTASSIUM CHLORIDE	7447407	7,679
CRYSTALLINE SILICA	14808607	6,953
CALCIUM CHLORIDE	10043524	1,880
SODIUM CHLORIDE	7647145	867
MAGNESIUM	7439954	113
HYDROXYETHYL CELLULOSE	9004620	106
QUARTZ (SILICA)	14808607	105
ACETIC ACID, SODIUM SALT (1:1)	127093	9
CELLULOSE	9004346	2

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Table 6.7 Rule 1148.2 Average Material Use by Well Activity-Maintenance Acidizing

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	131,673
HYDROCHLORIC ACID	7647010	2,149

Table 6.7 Rule 1148.2 Average Material Use by Well Activity-Maintenance Acidizing

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
BARITE	7727437	1,728
AMMONIUM CHLORIDE	12125029	1,107
PORTLAND CEMENT	65997151	1,028
POTASSIUM CHLORIDE	7447407	891
HYDROGEN CHLORIDE	7647010	775
XYLENE	1330207	536
CRYSTALLINE SILICA	14808607	380
CALCIUM CHLORIDE	10043524	344
SODIUM CHLORIDE	7647145	289
HYDROFLUORIC ACID	7664393	256
ACETIC ACID	64197	240
SILICA, CRYSTALLINE, QUARTZ	14808607	189
ETHYLBENZENE	100414	144
GYPSUM	13397245	137
CITRIC ACID	77929	135
METHANOL	67561	117
MICA	12001262	92
AMORPHOUS SILICA	7631869	91
SULFONATE	0	88
SAPONITE	1319411	77
CALCIUM OXIDE	1305788	73
MAGNESIUM OXIDE	1309484	69
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653	69

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

Table 6.8 Rule 1148.2 Average Material Use by Well Activity-Acid Fracturing

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	410,916
BARITE	7727437	91,434
PORTLAND CEMENT	65997151	72,216
POTASSIUM CHLORIDE	7447407	43,619
CRYSTALLINE SILICA	14808607	18,248
SILICA, CRYSTALLINE, QUARTZ	14808607	9,760
GYPSUM	13397245	9,629
CALCIUM OXIDE	1305788	5,079
SAPONITE	1319411	4,917
MICA	12001262	4,872
AMORPHOUS SILICA FUME	69012642	4,818

Table 6.8 Rule 1148.2 Average Material Use by Well Activity-Acid Fracturing

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653	4,814
MAGNESIUM OXIDE	1309484	4,814
SULFONATE	0	4,167
ANIONIC ACRYLAMIDE COPOLYMER	0	3,183
AMORPHOUS SILICA	7631869	2,985
HYDROCHLORIC ACID	7647010	2,761
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324	2,500
SODIUM CHLORIDE	7647145	2,302
AMMONIUM CHLORIDE	12125029	1,810
ALUMINUM OXIDE	1344281	1,569
DISODIUM METASILICATE	6834920	1,555
LIGNITE	1415936	1,502
SODIUM CARBONATE	497198	1,217
BENTONITE	1302789	1,048

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

Table 6.9 Rule 1148.2 Average Material Use by Well Activity-Other

Rule 1148.2 Data 2016 through June 2019		
Chemical Name	CAS Number	Amount (Pounds)
WATER	7732185	44,250
BENTONITE	1302789	21,138
SULFURIC ACID, BARIUM SALT (1:1)	7727437	5,000
QUARTZ (SILICA)	14808607	3,598
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324	875
ANIONIC POLYACRYLAMIDE	9003058	581
CARBONIC ACID SODIUM SALT (1:2)	497198	550
SODIUM BICARBONATE	144558	543
XANTHAN GUM	11138662	500
OIL, HYDROTREATED LIGHT NAPHTHENIC DISTILLATE	64742478	291
SODIUM POLYACRYLATE	9003047	123
COMPOUND SYNTHETIC DIESTERS	8029398	78
SULFURIC ACID, IRON(2+) SALT (1:1), MONOHYDRATE	17375416	18
POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-ISODECYL-.OMEGA.-HYDROXY-, PHOSPHATE, POTASSIUM SALT	68071170	14

Source: SCAQMD Rule 1148.2 Chemical Reporting Database.

Note certain chemicals identified with multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.

6.3 Next Steps

This review of chemicals used for well drilling, maintenance, and workover activities consisted of an initial evaluation of the SCAQMD Rule 1148.2 database. Additional review and analysis of the Rule 1148.2 will continue along with the following:

1. Continue to review and analyze the Rule 1148.2 database including chemical quantities and sensitive receptor information.
2. Review chemical compositions and toxicity for potential to affect public health and safety.
3. Provide recommendations on potential public and environmental health and safety concerns of subject well activities and chemicals.

7.0 Conclusion

This report was completed pursuant to the Board’s March 2016 motion and September 2018 action continuing the Strike Team’s efforts. The research, database development, and mapping in this report provides an overview of the Strike Team Phase II issue areas and provides staff with applicable tools to continue forward with the Project. Specific tasks, as outlined in the “Next Steps” sections above, will continue with the results presented in the next biannual report, due March 29, 2020.

Appendix A

Strike Team Advisory Panel Phase II Report 1 Input Summary

Comment	Comment	Resolution
May-1	Provide Strike Team and Advisory Panel and update on the analysis of setbacks, recommendation for 2,500-foot setback.	Forthcoming reports will include recommendations on potential public and environmental health and safety concerns of high priority wells. The Oil Code Update process will provide information and analysis on setbacks.
May-2	Need for a trained facilitator and use of environmental justice and equity principles at Strike Team public meetings to improve community participation.	The Strike Team will review the reference materials and consider an alternate approach to facilitating future meetings.
May-3	Recommendation for environmental justice and the use of CalEnviroscreen to be part of abandoned well analysis.	Report Two includes CalEnviroscreen data in the abandoned well analysis, Section 3.4.
May-4	Recommendation for air monitoring at abandoned wells.	As the comment states, air monitoring is not part of the project scope, however, the Strike Team may consider monitoring in future efforts based on the results of the current analysis.
May-5	Recommendation to include abandoned wells located in the City of Los Angeles.	Abandoned wells located in the City of Los Angeles are not under the jurisdiction of the County Los Angeles, therefore, are not part of the scope of this project.
May-6	Abandoned well analysis results.	Future reports will contain additional information on abandoned wells.
May-7	Recommendation that the Wilmington oil spill in 2014 be considered in the pipeline analysis section of the Strike Team report.	The referenced oil spill occurred in the City of Wilmington which is outside the project scope area. However, the Strike Team will review the incident as part of the pipeline analysis section of the report.
May-8	Recommend the report include data on pipeline spills and accidents.	Future reports will contain pipeline incident data where available.
May-9	Recommendation to use CalEnviroscreen in the pipeline analysis section of the report.	CalEnviroscreen will be considered in the pipeline analysis.
May-10	Clarify definitions used for pipeline contents and expand the pipeline regulation discussion.	The Strike Team will review and enhance the information and analysis in the pipeline analysis.
May-11	Use CAS numbers in the report for chemicals.	CAS numbers are included Report Two, Section 6.2 and Appendix C.
May-12	Recommendation to identify chemical use at well sites and consider transportation of such chemicals.	Chemical use at well sites is included in Report 2 in Section 6.2. Transportation of chemicals used at well sites will be considered in future reports.
May-13	Recommendation to include SCAQMD Rule 1148.2 public comments and recommendations in future reports.	An analysis of the implementation of SCAQMD Rule 1148.2 is not part of the scope of the project.

Comment	Comment	Resolution
May-14	Oil and gas storage analysis results.	Additional information on oil and gas storage facilities has been added to Report 2, Section 5.0.
O'Connor-1	Recommendation on the Strike Team process for greater involvement by the Advisory Panel on the preparation of the reports.	The existing process is consistent with the Advisory Panel mandate as documented in the Board Motion. Any member of the public may provide comments on Draft reports.
O'Connor-2	Reports should include new issues regarding the oil and gas industry and items noted during review of the reports.	Future reports will consider new data and input on previous report iterations.
O'Connor-3	Prioritization matrix for wells use and description in the reports.	The prioritization matrix has been updated in Report 2, Section 3.3. The prioritization matrix is being developed as more data is obtained and analyzed. Future reports will have additional information on the matrix and the future potential uses of same.
O'Connor-4	Prioritization matrix should be made public in the reports.	The prioritization matrix has been updated in Report 2, Section 3.3. Section 3.3 of the report contains information on the prioritization matrix. Future reports will have updates on the development and results of the matrix.
O'Connor-5	Request for additional information be included in the well priority matrix.	The prioritization matrix has been updated in Report 2, Section 3.3. Future versions of the priority matrix will contain additional data, including environmental justice issues, as it becomes available.
O'Connor-6	Request for the use of various well records from DOGGR be used in the idle well analysis for future reports.	Staff is actively corresponding and working with DOGGR to obtain any and all data available on idle wells.
O'Connor-7	Request to coordinate with DOGGR on current well plugging and abandonment projects and consider air monitoring of such projects.	Staff is actively corresponding and working with DOGGR to obtain any and all data available on wells and the plugging and abandonment of wells. Air quality monitoring of DOGGR projects is outside the scope of the Strike Team project.
O'Connor-8	Comment notes the importance of well plugging dates in determining what type of standards the well was plugged and abandoned with.	Comment acknowledged, Staff is actively corresponding and working with DOGGR to obtain any and all data available on wells.
O'Connor-9	Comment notes the methane issue in the LA basin, SB 1458, and the Roberti Study (provided as an attachment to the comment) as important to consider in the reports.	Staff is familiar with SB 1458 and the Roberti study and will incorporate as applicable to future reports. Report 2 contains discussion of methane zones, Section 3.5.

Comment	Comment	Resolution
O'Connor-10	Recommendation that a prioritization matrix be developed for pipelines and be included in future reports.	Staff is working with various agencies to collect additional data on pipelines. Future reports will include such data and may contain a matrix type approach to the analysis of the data.
O'Connor-11	The natural gas pipeline data in the report is incomplete.	As additional data is obtained, future reports will be more comprehensive.
O'Connor-12	Report should include data on So Cal Gas pipelines.	The natural gas pipelines operated by the So Cal Gas Company will be added to future reports as feasible.
O'Connor-13	Request to include the So Cal Gas facility located in Playa Vista in the report.	Playa Vista is in the City of Los Angeles and therefore outside the scope of the project.
O'Connor-14	Request the report include analysis of the chemicals found in oil and produced water as opposed to chemicals transported and used on oil field sites.	An analysis of the chemicals in oil or produced water is outside the scope of the project. In addition, the chemical constituents of oil or produced water vary greatly from different oil fields. The findings of the previous phase of the Strike Team found chemicals brought on-site for various well completion projects are not typically included in hazardous materials plans. A second finding found a gap in the regulations on the transportation of such chemicals. Thus, chemicals transported and used on oil field sites are the focus of this phase of the project.
O'Connor-15	The comment references two reports on the chemicals found in oil and gas leaks.	Comment acknowledged.
O'Connor-16	Recommendation that staff seek the most up to date and accurate information possible.	Data contained in the reports are the most recent and accurate available.
O'Connor-17	Reference to the chemicals used in the hydraulic fracturing process.	Chemicals transported and used on oil field sites, including those for hydraulic fracturing, are the focus of this phase of the project. Note that no hydraulic fracturing projects were reported through the SCAQMD Rule 1148.2 data base for the period analyzed in Section 6.0 of Report 2 (2016 through June 2019).
O'Connor-18	Produced water spills should be included in the report along with the chemical constituents in produced water.	Produced water spills are not a primary focus, however, staff will consider these events as applicable to the report analysis.

Appendix B

Community Health Safety and Notification Plan Marina Del Rey Well Abandonment

COMMUNITY HEALTH, SAFETY, AND NOTIFICATION PLAN

Marina del Rey Oil Well Abandonment Project

DOW RGC 10

February 22, 2019

Introduction

On January 11, 2019, an uncontrolled release of gas and mud from an old, abandoned oil well occurred on a construction site at 4360 Via Marina in Marina del Rey, California. The incident took place while a permitted contractor working for the property lessee, MDR Hotels, LLC (“Operator”), was performing well re-abandonment and activities to bring the formerly abandoned well into compliance with current California state abandonment standards. The Los Angeles County Fire Department responded to the incident and determined there were no injuries. Within ten minutes, the release was stopped using the blowout prevention equipment installed at the wellhead. The well is under control and being monitored continuously by the Operator and state officials.

Upon notification, the agency that permits and oversees oil and gas wells, California Department of Conservation – Division of Oil Gas, and Geothermal Resources (DOGGR), responded to the scene and engaged with the operator and contractor on their efforts to bring the well under control. On January 18, DOGGR issued an Order requiring the Operator to take additional steps, including transitioning to 24 hours per day, 7 days per week work schedule to ensure the work is done correctly, safely, and in a timely manner. At DOGGR’s request, the California Office of Emergency Services (CalOES) established a Unified Command to manage the incident. The Los Angeles County Fire Department is serving as the Incident Commander and is coordinating public updates that are available on the DOGGR website. State and local agencies are working in coordination to ensure the protection of health, safety and the environment. These include DOGGR and the California Office of Emergency Services, and Los Angeles County Office of Emergency Management and the Departments of Fire, Public Health, Sheriff, Regional Planning, and Beaches and Harbors.

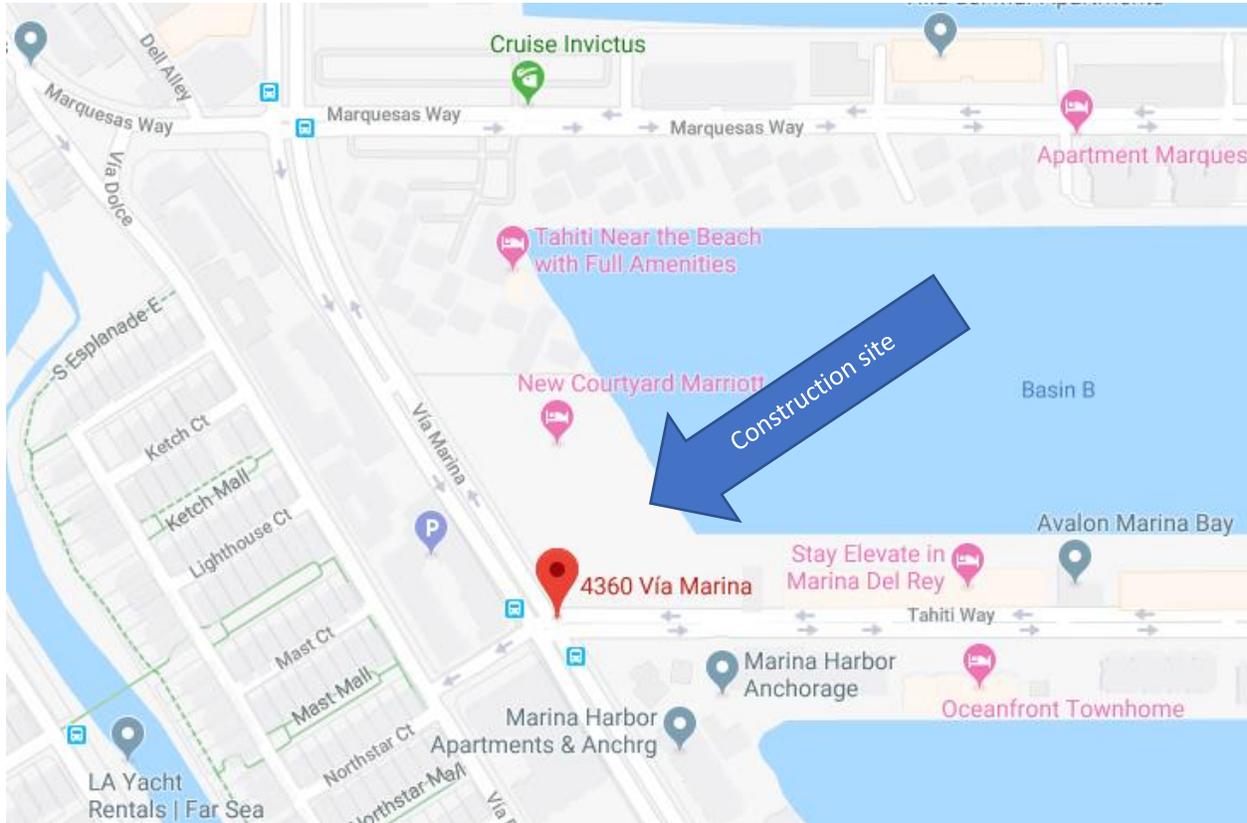
Purpose

The purpose of the Community Health, Safety, and Notification Plan is to inform community members of:

- The days and times work will happen, and how long it will take.
- Whom to call with questions or concerns, or in case of emergency.
- What to do in case of emergency.
- Strategies being used to protect the community from possible hazards.
- The government agencies that are overseeing the work.
- How updates will be provided from state and local agencies.

Worksite

The construction work is taking place at 4360 Via Marina in Marina del Rey, California. Streets bordering or near the construction site include Via Marina, Tahiti Way, Marquesas Way and Via Dolce.



Days and Times of Work, Expected Duration

Normally well abandonment work is not performed at night because it can be noisy and disruptive to nearby residents. After the incident and assessing the situation, DOGGR determined the operator must work 24 hours daily until the source of the gas has been located and contained. Once this has been done, work will return to a 12-hour schedule Monday-Friday. It is estimated that the work will take one to three months and may be completed by March or April 2019. During certain well work procedures, nearby streets may be temporarily closed. Security personnel will be onsite 24 hours daily, and only authorized personnel will be allowed entry.

Reporting Concerns

All members of the public should report concerns about the work at the site to the **MDR Hotels Hotline at (310) 908-1236** or via email to mdrhotelshotline@gmail.com. Specific government agencies may be able to provide more assistance, depending on the type of concern. See the specific areas below for details.

In case of an emergency that could threaten health, life, safety, or the environment, dial 911. These calls should be for fire, police, emergency medical service, or hazardous materials spills.

Strategies to Protect the Community and Workers from Possible Hazards

Site Emergency and Evacuation Plans

If unsafe conditions occur at or near the well, streets bordering the site may be closed temporarily, and the Sheriff's Department will post signs to notify the public. All road closures will be conducted in coordination with local law enforcement and fire department.

Prior to entering the well site, all personnel shall be briefed on the full Site Emergency & Evacuation Plan. If an emergency evacuation of the construction site is needed, verbal command and/or three two-second blasts from an air horn will signal workers to leave immediately. The full Site Emergency & Evacuation Plan notes emergency evacuation exits, exit routes, and post-evacuation meeting location.

In the unlikely event of an emergency that requires evacuation of nearby buildings, police and fire officials will notify residents to evacuate. Evacuation alerts will be sent via Alert LA County (go to <https://www.lacounty.gov/emergency/alert-la/> to sign up for alerts), via agency social media accounts listed below, and will be posted on the DOGGR website. Community members are urged to comply promptly with police and fire department instructions.

Site Access and Perimeter Protection

Perimeter fencing is in place between the work site and the public sidewalk on Via Marina. Site personnel and all truck / equipment deliveries enter the gate at the northwest corner. Security personnel are present at the gate, and only authorized personnel may enter. To ensure that the public is protected during certain well re-abandonment activities, the public sidewalk on Via Marina may be temporarily closed and foot traffic diverted to nearby pedestrian walkways and sidewalks. During critical well re-abandonment activities, the operator may request the public street (Via Marina) bordering the wellsite to the west be temporarily closed. Sidewalk and street closures will also happen if inert water-based mud used in the well re-abandonment or gases surface near the well.

All road closure plans meet current code requirements and will be conducted in coordination with local law enforcement and fire department.

Worksite Hazards and Monitoring Protocol

Procedures have been developed to prevent hazards from toxic emissions of gases, spills, odors, noise, and dust. The operator has cooperated with state and local agencies on the following plans.

A. Worksite Emissions/Air Monitoring

The operator is monitoring for four gases (methane, carbon monoxide, oxygen and hydrogen sulfide) at 10 locations around the worksite on an hourly basis (see map below for locations). On a daily basis, the Operator reports air monitoring results to DOGGR and Public Health; state and local officials are coordinating with the South Coast Air Quality Management District as needed. If elevated levels are found, the public sidewalk along Via Marina may be temporarily closed to prevent community exposure, and the Sheriff's Department will post signs to notify the public.



B. Noise Control

Noise at the site consists primarily of pipes clanging, truck deliveries, and equipment loading and unloading on the site. Certain operations may be noisy and disruptive, causing vibrations that make the ground shake. The Operator put up a sound wall to reduce noise and will minimize noise during nighttime hours as much as possible. Some noisy work may be necessary at night to maintain safe operations. Once the 24/7 working conditions have ceased, operations will return to a 12-hour schedule Monday thru Friday. **To report noise or vibrations, contact the Los Angeles County Department of Public Health at 213-738-3220.**

C. Dust Control

The majority of the site area consists of concrete. Sand, gravel, and crushed rock (called “base”) have been spread over the dirt areas of the site to control dust. A ramp at the site entrance is equipped with rumble plates to reduce dirt from vehicles entering and exiting the site, with thicker base added at the entry ramp. New base is spread approximately once a month or as needed to control dust. As needed, the site is periodically dampened with water using an existing water hose to control dust.

D. Odor Monitoring and Control

The operator is monitoring around the worksite for hydrogen sulfide that can cause a rotten egg-like smell. The worksite rig has hydrogen sulfide monitors and alarms in place, and worksite personnel wear hydrogen sulfide monitors at all times. If elevated levels of hydrogen sulfide are detected, sidewalk and street closures are triggered. Signs will be posted to indicate the closures and the public will be notified of odor emissions via

the DOGGR website and agency Twitter accounts listed below. **If members of the public detect odors near the worksite, they can report them to the MDR Hotels Hotline at (310) 908-1236 and to South Coast Air Quality Management District at 1-800-CUT-SMOG.**

E. Lighting Control

During nighttime operations, lights are used in the immediate work site around the well. All lights are directed downward at the rig and are only used as needed to ensure safe operations. Nighttime illumination of the wellsite will cease once the 24/7 working conditions have ended.

F. Community Notifications

Those in the immediate surrounding area must be made aware right away if a blowout or uncontrolled release occurs. The general public and media must be notified thereafter (no longer than 2 hours).

These notices will be made through one or more of the following mechanisms: a press release to local media, press conference, social media, website posting, or in-person or door-to-door notifications. If evacuation is necessary, alerts will be sent via Alert LA County (go to <https://www.lacounty.gov/emergency/alert-la/> to sign up for alerts) and via the DOGGR website and agency social media accounts listed below. Notifications will be in languages spoken by community members.

A Joint Information Center has been activated to coordinate public information from agencies monitoring the well re-abandonment project. Regular updates will be issued by Unified Command to ensure timely and relevant public information. For information on the well and operations, please visit the DOGGR website: <https://www.conservation.ca.gov/dog/Pages/DOW-RGC10-well.aspx>.

For Questions and Media Inquiries

For questions and media inquiries, please call the incident information line at (310) 908-1236.

Follow incident agencies on Twitter at the following handles:

Los Angeles County Fire Department: @LACoFDPIO

California Department of Conservation: @CalConservation

Los Angeles County Department of Public Health: @LAPublicHealth

Los Angeles County Department of Beaches and Harbors: @LACDBH

Agency Contacts

Agency	Name	Role	Telephone	Email
California Department of Conservation – Division of Oil Gas, and Geothermal Resources (DOGGR)	Teresa Schilling	Public Affairs Officer	(916) 323-1886	pao@conservation.ca.gov
L.A. County Department of Beaches and Harbors			(424) 526-7777	info@bh.lacounty.gov
MDR Hotels (“Operator”)	Michael Hale	EVP of Construction	(858) 314-7906	mhale@hardagehospitality.com
L.A. County Department of Public Health	Katie Butler	Supervisor	(213) 738-3220	kbutler@ph.lacounty.gov
LA County Fire, Health HazMat	Ask for “on-call HAZMAT Specialist”	Duty Hazardous Materials Specialist	M-F, 7a-5p: (323) 890-4317 After hours: (323) 881-2455	info@fire.lacounty.gov
California Office of Emergency Services	Chief David Stone		(916) 642-3837	david.stone@caloes.ca.gov

Appendix C
SCAQMD Rule 1148.2 Chemical List

**SCAQMD Rule 1148.2 Reported Chemicals List
Well Drilling, Well Completion, Well Reworks 2016 through June 2019**

Chemical Name	CAS Number*
1,2,3-TRIMETHYLBENZENE	526738
1,2,4-TRIMETHYLBENZENE	95636
1,3,5-TRIMETHYLBENZENE	108678
1-EICOSENE	3452071
1-HEXADECENE	629732
1-METHOXY-2-PROPANOL	107982
1-OCTADECENE	112889
1-TETRADECENE	1120361
2 PROPANOL	67630
2-BUTOXYETHANOL	111762
2-ETHYLHEXANOL	104767
2-HYDROXY-1,2,3-PROPANETRICARBOXYLIC ACID	77929
2-HYDROXYTRIMETHYLENE,BIS(TRIMETHYLAMMONIUM) DICHLORIDE	55636094
2-PENTANONE, 4-METHYL-	108101
2-PROPYN-1-OL	107197
3-PHENYL-2-PROPENAL	104552
4-ETHYL-1OCTYN-3-OL	5877429
ACETIC ACID	64197
ACETIC ACID ETHENYL ESTER, POLYMER WITH ETHENOL	25213245
ACETIC ACID, SODIUM SALT (1:1)	127093
ACETONE	67641
ACRYLIC POLYMER	9033798
ALCOHOLS, C12-14-SECONDARY, ETHOXYLATED	84133506
ALCOHOLS, C12-15, ETHOXYLATED	68131395
ALCOHOLS, C14-15, ETHOXYLATED	68951677
ALCOHOLS, C6-12, ETHOXYLATED	68439452
ALCOHOLS, C8-10, ETHOXYLATED PROPOXYLATED	68603258
ALKANES, C12-14-ISO-	68551199
ALKENES, C>10 .ALPHA.-	64743028
ALKYL BENZENESULFONIC ACID	68584225
ALKYLARYL SULFONATE	68484270
ALKYLBENZENE MIXTURE	68648873
ALUMINUM	7429905
ALUMINUM OXIDE	1344281
AMIDES, COCO, N-[3-(DIMETHYLAMINO)PROPYL], N-OXIDES	68155099
AMINES, HYDROGENATED TALLOW ALKYL, ACETATES	61790598
AMMONIA	7664417
AMMONIUM BIFLUORIDE	1341497

**SCAQMD Rule 1148.2 Reported Chemicals List
Well Drilling, Well Completion, Well Reworks 2016 through June 2019**

Chemical Name	CAS Number*
AMMONIUM CHLORIDE	12125029
AMMONIUM HYDROXIDE	1336216
AMORPHOUS SILICA	7631869
AMORPHOUS SILICA FUME	69012642
AMPHOTERIC SURFACTANT	68155099
ANIONIC ACRYLAMIDE COPOLYMER	0
ANIONIC POLYACRYLAMIDE	9003058
AROMATIC PETROLEUM DISTILLATES	64742945
BARITE	7727437
BENTONITE	1302789
BENTONITE, QUARTZ, CRYSTALLINE SILICA	14808607
BENZENE	71432
BENZENE, 1,2,3-TRIMETHYL-	526738
BENZENESULFONIC ACID, C10-16-ALKYL DERIVS.	68584225
BENZENESULFONIC ACID, C10-16-ALKYL DERIVS., COMPDS. WITH CYCLOHEXYLAMINE	255043084
BENZOIC ACID	65850
BIS(2-HYDROXY ETHYL)AMINE	111422
C12-C14 ISOALKANES	68551199
C13-C16 ISOALKANES	6855102
CALCITE	13397267
CALCIUM BROMIDE	7789415
CALCIUM CARBONATE	471341
CALCIUM CHLORIDE	10043524
CALCIUM DERIVATIVE (CALCIUM CARBONATE)	1317653
CALCIUM HYDROXIDE	1305620
CALCIUM MAGNESIUM OXIDE	37247919
CALCIUM OXIDE	1305788
CARBON	7440440
CARBONIC ACID CALCIUM SALT (1:1)	471341
CARBONIC ACID SODIUM SALT (1:2)	497198
CARBOXYMETHYLCELLULOSE SODIUM SALT	9004324
CELLOPHANE	9005816
CELLULOSE	9004346
CINNAMIC ALDEHYDE DIMETHYL ACETAL	104552
CITRIC ACID	77929
CITRUS TERPENES	94266474
COCAMIDOPROPYL BETAINE	61789400
COMPOUND SYNTHETIC DIESTERS	8029398

**SCAQMD Rule 1148.2 Reported Chemicals List
Well Drilling, Well Completion, Well Reworks 2016 through June 2019**

Chemical Name	CAS Number*
CROSSED POLYOL ESTER	129828315
CRYSTALLINE SILICA	14808607
CUMENE	98828
CYCLOHEXANAMINE, SULFATE (1:1)	19834027
CYCLOHEXANOL	108930
D-ERYTHRO-HEX-2-ENONIC ACID, .GAMMA.-LACTONE	89656
D-ERYTHRO-HEX-2-ENONIC ACID, .GAMMA.-LACTONE, SODIUM SALT (1:1)	6381777
DIISOPROPYLNAPHTHALENE	38640629
DINONYLPHENYL POLYOXYETHYLENE	9014931
DIPHOSSPHORIC ACID, TETRASODIUM SALT	7722885
DISODIUM METASILICATE	6834920
D-LIMONENE	138863
DODECYLBENZENESULFONIC ACID	27176870
ERYTHORBIC ACID	89656
ETHANEDIAL	107222
ETHANOL	64175
ETHOXYLATED ALCOHOL	68131395
ETHYL BENZENE	100414
ETHYL OCTYNOL	5877429
ETHYLBENZENE	100414
ETHYLENE GLYCOL	107211
ETHYLENE GLYCOL MONOBUTYL ETHER	111762
ETHYLENE OXIDE	75218
FATTY ACIDS	61790123
FERROUS SULFATE	17375416
FLY ASH, QUARTZ, CRYSTALLINE SILICA	14808607
FORMALDEHYDE	50000
FORMIC ACID	64186
FUMED SILICA	69012642
GLUTARAL	111308
GLYCERINE	56815
GLYCOL ETHER EB	111762
GLYOXAL	107222
GYPSUM	13397245
HEAVY AROMATIC NAPHTHA	64742945
HUMIC ACID	1415936
HYDROCARBONS, TERPENE PROCESSING BY-PRODUCTS	68956569
HYDROCHLORIC ACID	7647010

**SCAQMD Rule 1148.2 Reported Chemicals List
Well Drilling, Well Completion, Well Reworks 2016 through June 2019**

Chemical Name	CAS Number*
HYDROFLUORIC ACID	7664393
HYDROGEN CHLORIDE	7647010
HYDROGEN FLUORIDE (HYDROFLUORIC ACID)	7664393
HYDROGEN PEROXIDE	7722841
HYDROTREATED LIGHT DISTILLATE	64742478
HYDROXY ETHYL CELLULOSE	9004620
HYDROXYACETIC ACID	79141
HYDROXYETHYL CELLULOSE	9004620
ISOPROPANOL	67630
ISOPROPYLTOLUENE	25155151
ISOQUINOLINE	119653
LARYL DIMETHYL HYDROXYSULFOBETAINE	13197767
L-GLUTAMIC ACID, N, N-DIACETIC ACID	58976651
L-GLUTAMIC ACID, N,N-DIACETIC ACID, TETRASODIUM SALT	51981216
LIGHT AROMATIC NAPHTHA	64742956
LIGNITE	1415936
LIGNOSULFONIC ACID, SODIUM SALT	8061516
MAGNESIUM	7439954
MAGNESIUM OXIDE	1309484
MESITYLENE	108678
METHANOL	67561
METHYL AMYL ALCOHOL	108112
MICA	12001262
MODIFIED POLYMERIC ALKOXYLATE	52501072
MODIFIED SULFONATE	16106448
MULLITE 1302-93-8 10 - 30	1302938
NAPHTHALENE	91203
NAPHTHALENESULFONIC ACID, BIS(1-METHYLETHYL)-, COMPD. WITH CYCLOHEXANAMINE (1:1)	68425616
NATURAL WALNUT SHELL	84012431
NON-HAZARDOUS INGREDIENTS	0
NONYLPHENOL POLYETHYLENE GLYCOL ETHER	127087870
OIL, HYDROTREATED LIGHT NAPHTHENIC DISTILLATE	64742478
OLEFIN	64743028
OXYALKYLATED AMINE QUAT	138879944
OXYALKYLATED ALKYLPHENOL	9016459
OXYALKYLATED ALKYLPHENOLIC RESIN	63428922
PENTANEDIAL	111308
PEROXYACETIC ACID	79210

**SCAQMD Rule 1148.2 Reported Chemicals List
Well Drilling, Well Completion, Well Reworks 2016 through June 2019**

Chemical Name	CAS Number*
PETROLEUM RESINS	64742161
PHOSPHONATE SALT	20592852
PHOSPHONIC ACID	15827608
PHOSPHONIUM, TETRAKIS(HYDROXYMETHYL)-, SULFATE (2:1)	55566308
PHOSPHORIC ACID	7664382
PHOSPHORIC ACID, CALCIUM SALT (2:3)	7758874
PHOSPONATE SALT	20592852
PINE OIL	8002093
PLURONIC	9003116
P-MENTHA-1,8-DIENE	138863
POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-(4-NONYLPHENYL)-.OMEGA.-HYDROXY-, BRANCHED	127087870
POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-[2,4,6-TRIS(1-PHENYLETHYL)PHENYL]-.OMEGA.-HYDROXY	70559250
POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-HEXYL-.OMEGA.-HYDROXY-	31726348
POLY(OXY-1,2-ETHANEDIYL), .ALPHA.-ISODECYL-.OMEGA.-HYDROXY-, PHOSPHATE, POTASSIUM SALT	68071170
POLYACRYLATE	68479094
POLYAMINE POLYETHERS	68815651
POLYETHERS	68815656
POLYETHYLENE GLYCOL	25322683
POLYETHYLENE GLYCOL TRIMETHYL NONYL ETHER	84133506
POLYETHYLENE OXIDE	25322683
POLYGLYCOL ESTER	68400715
POLYMER	0
POLYOXYALKYLENES	68951677
POLYOXYETHYLENE DINONYLPHENOL	9014931
PORTLAND CEMENT	65997151
POTASSIUM CHLORIDE	7447407
POTASSIUM HYDROXIDE <10%	1310583
PROPARGYL ALCOHOL	107197
PROPENE HOMOPOLYMER	9003070
PROPYLENE GLYCOL	57556
QUARTZ (SILICA)	14808607
QUINALDINE	91634
QUINOLINE	91225
SAPONITE	1319411
SILANETRIOL, (3-AMINOPROPYL)-, HOMOPOLYMER	68400077
SILANETRIOL, 1-(3-AMINOPROPYL)-	58160999
SILICA, CRYSTALLINE, QUARTZ	14808607
SODA LIME BOROSILICATE GLASS	65997173

**SCAQMD Rule 1148.2 Reported Chemicals List
Well Drilling, Well Completion, Well Reworks 2016 through June 2019**

Chemical Name	CAS Number*
SODIUM ACETATE	127093
SODIUM ACID PYROPHOSPHATE	7758169
SODIUM BICARBONATE	144558
SODIUM CARBONATE	497198
SODIUM CARBOXYMETHYLCELLULOSE	9004324
SODIUM CHLORIDE	7647145
SODIUM DICHLOROISOCYANURATE	2893789
SODIUM GLUCONATE	527071
SODIUM HYDROXIDE	1310732
SODIUM LIGNOSULFATE	8061516
SODIUM POLYACRYLATE	9003047
SOLVENT NAPHTHA (PETROLEUM), HEAVY AROM.	64742945
SOLVENT NAPHTHA (PETROLEUM), LIGHT AROM.	64742956
STEARIC ACID	57114
SULFONATE	0
SULFURIC ACID	7664939
SULFURIC ACID, BARIUM SALT (1:1)	7727437
SULFURIC ACID, IRON(2+) SALT (1:1), MONOHYDRATE	17375416
SULFURIC ACID, MONOPOTASSIUM SALT	7646937
SYNTHETIC RED IRON OXIDE	1309371
TAR BASES, QUINOLINE DERIVATIVES	68513871
TERPENE HYDROCARBON	68956569
TERPENES AND TERPENOIDS, SWEET ORANGE-OIL	68647723
TETRASODIUM ETHYLENEDIAMINETETRAACETATE	64028
THIOUREA POLYMER	68527491
TOLUENE	108883
TRIETHYLENE GLYCOL	112276
TRIHYDROXYTRIETHYLAMINE	102716
TRIMETHYLBENZENE	25551137
WATER	7732185
WELAN GUM	72121881
WOOD DUST, SOFT WOOD	9004346
XANTHAN GUM	11138662
XYLENE	1330207

*Note certain chemicals/compounds have multiple or no CAS number, data based on SCAQMD Rule 1148.2 data base.