APPENDIX B

OIL WELL CLEAN UP PILOT PROGRAM REPORT (JULY 2022)

Framework for Oil Well Cleanup Pilot Program

County of Los Angeles

July 2022

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County of Los Angeles

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Los Angeles County Public Works
Office of Oil and Gas

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Executive Summary

On September 15, 2021, the Los Angeles County Board of Supervisors (Board) adopted a motion instructing the Office of Oil and Gas, in coordination with the California Geologic Energy Management Division (CalGEM), the Chief Sustainability Office, Department of Regional Planning, Department of Public Health, and Fire Health HazMat to develop a framework for an Oil Well Cleanup Pilot Program to plug and abandon idle oil wells that includes the following:

1. Prioritization of oil wells that pose health and safety risks to residents based on proximity to frontline communities, risk of leakage, unknown operator, and other health and environmental equity measures.

2. Stakeholder consultation steps that involve workers, communities, and other stakeholders in the planning process.

3. Within 180 days, return with recommendations and next steps for an Oil Well Cleanup Pilot Program Framework.

The idle oil wells in the unincorporated County were reprioritized based on the Board's prioritization measures described under 1. above. This refined ranking system identified 42 wells (see Table 2.8) as high priority idle wells. Twenty of those wells were previously screened by the County Oil and Gas Strike Team and were found not to have any evidence of leaking in the field. As a result of the findings and consistent with the previous efforts conducted by the Oil and Gas Strike Team, a recommendation is made to visit the remaining 22 wells that were ranked highest under the prioritization criteria and to reevaluate the other 20 wells to establish a current baseline. It should be noted that three of the wells identified as high priority and not previously assessed by Strike Team are currently undergoing plugging and abandonment efforts by a developer who is redeveloping the site (403714988, 403714989, 403714987, these wells are still classified as idle by CalGEM). Physical verification of the wells would allow for ascertaining location, and to allow for testing to determine if the wells show any evidence of leakage. This could be accomplished using the same methodology employed by the Oil and Gas Strike Team, with handheld monitors and with neighbor interviews.

Once the wells have been visited, and if there is any evidence of gas migrating to the surface, then a subsequent soil vapor testing program should be put in place to verify whether a leak is occurring and to determine the extent of the well leakage. In addition, various methods could be used to try to determine the exact location of the potentially leaking wells by using magnetometers and/or ground penetrating radar.

The County should also provide CalGEM with the prioritization scheme and results to ensure that their own prioritization scheme agrees with the one conducted by the County. Or with the assistance of CalGEM, to help identify other wells that CalGEM may consider of higher priority.

In accordance with the details of Task 6 for this effort the County should submit a refined list of idle and non-producing wells to CalGEM and request they make a determination whether the wells should be plugged and abandoned.

a. Within 60 days, CalGEM may require the owner or operator to file a statement on why the wells should not be plugged and abandoned.

b. Within 120 days, CalGEM to make a determination on whether the wells should be plugged and abandoned.

c. Failure of the operator to file a statement shall be conclusive evidence of desertion of the well, thereby permitting CalGEM to declare the well "orphan" and order the well abandoned.

If an identified well receives "orphan" status, proceed with the following:

As allowed under the Idle Well Program, the Los Angeles County Board of Supervisors can send a letter requesting that CalGEM further investigate the highest priority wells and, if determined to pose a risk to the public or the environment, request that those wells are prioritized for proper plugging and abandonment under their Orphan Well Abandonment Program. For the purposes of this report, an orphan well is a well that has no party responsible for it, leaving the state responsible to plug and abandon it. Work with CalGEM to identify state and federal funding sources for plugging and abandoning prioritized County wells which may include existing funds in the state budget or from recently approved federal appropriations.

1.0 Background

This report follows the Los Angeles County Oil and Gas Strike Team efforts to assess and report on the conditions, regulatory compliance and potential public health and safety risks associated with existing oil and gas facilities in unincorporated Los Angeles County. This effort further categorizes idle wells and develops listing of the highest priority wells based on a refined prioritization scheme.

The efforts of the Oil and Gas Strike Team, as directed by Board motions on July 28, 2015, March 29, 2016, and September 4, 2018, were focused on existing and abandoned oil and gas infrastructure, including facilities and pipelines. These efforts are summarized below.

1.1 Los Angeles Oil and Gas Well Inventory Project

The County Oil and Gas Strike Team comprised of the Department of Regional Planning (DRP), the Department of Public Health (DPH), the Department of Public Works (PW), and the Fire Department created a detailed inventory of all oil fields and the associated level of environmental monitoring of all oil wells operating within the unincorporated areas of the County of Los Angeles. The well inventory research included a review of local, State, and Federal regulatory requirements for the drilling of oil and gas wells. Local agency review included DRP, County Fire Department, DPH, and the South Coast Air Quality Management District. The report also reviewed the provisions of the Los Angeles County Zoning Ordinance, General Plan, and Zoning Enforcement activities with regard to oil and gas well drilling and operation. The report is available on the DRP web site (http://planning.lacounty.gov/oil-gas/well).

1.2 Oil and Gas Facility Compliance Review Project

The Oil and Gas Strike Team in coordination with the County Fire Chief, Director of the DPH, and Director of PW assessed the conditions, regulatory compliance and potential public health and safety risk associated with existing oil and gas facilities in unincorporated Los Angeles County. The project was documented in a series of reports to the Board and included an update to the existing inventory of oil and gas facilities, the development of protocols to identify permit and compliance issues, and a field inspection of 557 out of 620 (63 wells were inaccessible) operational oil and gas wells and twenty different facilities. Facility inspections included a description of the existing facility, a description of existing conditions based on the site visits, an analysis of permit compliance, recommendations for further action as appropriate, and a public health screening assessment. The report is available on the DRP web site (http://planning.lacounty.gov/oil-gas/strike).

1.3 Oil and Gas Assessment Project

The Oil and Gas Strike Team continued the work from the Oil and Gas Compliance Project to assess abandoned and orphan wells, hazardous materials storage facilities, pipelines associated with oil and gas operations and hazardous chemicals associated with oil and gas operations. Staff coordinated with CalGEM on orphan and abandoned wells and developed a database of orphan and abandoned wells in the unincorporated County. The Oil and Gas Strike Team developed a prioritization scheme based on a variety of technical and risk factors to prioritize the plugged and abandoned wells for further, more detailed examination and completed field inspections of those wells identified as high risk. Incidentally, the Oil and Gas Strike Team found that idle wells also presented potential for risk since they were a designation that had been used by CalGEM as a

default for some wells that may have been "left behind" for many years with no current operator of record. CalGEM regulations require idle wells to be tested including a fluid level test and casing pressure test and, if necessary, repaired, or permanently plugged and abandoned. However, there are many idle wells that are not part of a management program since in some cases the operator no longer exists. The CalGEM Idle Well Management Plans (IWMP) provides incentives to operators to abandon long-idle wells, as well as providing funding for CalGEM to contract to abandon wells themselves and paid for as part of fees deposited into the Hazardous and Idle-Deserted Well Abatement Fund. Under Public Resources Code section 3206, subdivision (a)(2), operators may, in lieu of paying annual idle well fees, file an IWMP that provides for the management and elimination of all the operator's Long Term Idle Wells (LTIWs). An operator may eliminate a LTIW by either properly plugging and abandoning the well in accordance with the requirements of Public Resources Code section 3208 or demonstrating to CalGEM's satisfaction that the well has maintained production of oil or gas or been used for injection for a continuous six-month period. If not part of an IWMP, the operator must pay additional fees or abandon the well.

Idle wells in the CalGEM 2020 database showed a total of 622 idle wells located in the unincorporated areas of Los Angeles County (including the Inglewood Oil Field). As a result of the prioritization scheme developed for idle wells, 35 wells out of the 622 where characterized as high risk and were subsequently visited by the Oil and Gas Strike Team. Based on the order, neighbor interviews, the use of handheld monitors, and visual inspection of the sites, no evidence of leaking wells was found during the site visits conducted by the Oil and Gas Strike Team.

2.0 Idle Wells

This report presents an identification and prioritization of idle oil wells in the unincorporated areas of Los Angeles County that may pose health and safety risks to residents based on a screening method involving a variety of health and environmental equity measures. This effort is a continuation from the Oil and Gas Strike Team efforts mentioned above and aims to update and build upon those findings to identify idle wells that pose a substantial risk and need to be prioritized for proper plugging and abandonment. The results of this idle well screening can be used by stakeholders including oil workers and communities for the implementation of a planning process for the eventual cleanup of these wells.

Unproperly plugged and abandoned wells may leak fluids or gasses to the surface and present public health and safety and environmental issues. Identifying wells that may be leaking is an important first step in determining which wells need to be prioritized for abandonment beyond the prioritization scheme based on the CalGEM databases. Gas migration along wellbores can exhibit itself as gas pressure on the surface casing, gas migrating through the soil around the wellbore, or both. Utility trenches, storm drain systems, and sewer lines provide lateral migration pathways, accumulation areas, and near-surface openings for natural gas release.

Gas can also reach the surface through natural geologic features, including porous and permeable formations, aquifers, fracture systems, fault planes, and unconformities. However, the potential for gas migration to reach the surface is considered to be the greatest through or along man-made structures. Once penetrated, a poorly constructed idle or abandoned well can serve as a conduit for upward migration of natural gas. Even when proper construction and abandonment methods have been applied, such conduits can develop as old wells deteriorate.

Several factors contribute to possible gas migration through idle abandoned wells, such as original drilling, development and completion, operations and redevelopment, and abandonment, and secondary recovery operations (e.g., water or steam injection). Many wells and dry holes were drilled during the exploration and early field development period. Dry or non-commercial wells were abandoned or were left behind and may be considered idle. Common practice by some operators in the 1920s through 1940s was to abandon wells and dry holes by filling them with construction debris or other items, such as telephone poles or railroad ties, prior to covering the surface with soil. These improperly abandoned idle wells have been unearthed during grading operations for construction sites located over old oil fields in several areas of the Los Angeles Basin. Many of these wells and dry holes may not have been plugged to modern standards. Current abandonment requirements have developed since the 1950s to the more stringent standards today. Old dry holes and noncommercial wells have a high potential to provide migrations pathways.

Wells that were drilled and completed many years ago are also subject to ongoing corrosion and deterioration of both the steel casings and the cements.

When present, shallow high-pressure gas zones can create problems for cement annular seals. During the well completion process, cement slurry is pumped into the annular space between the hole drilled (rock face) and casing, to form a seal. Gas from shallow, high-pressure zones can enter cement within the annular space during this process. Gas bubbles within the slurry weaken

the cement and can compromise seals around these zones. In turn, poor seals could allow fluid migrations and enhance corrosion of both casing and cement in these areas.

2.1 Idle Well Definition

CalGEM provides the following definitions for idle wells in Section 1760 of the Requirements for Idle Well Testing and Management Regulations.

- **"Idle well"** means any well that for a period of 24 consecutive months has not either produced oil or natural gas, produced water to be used in production stimulation, or been used for enhanced oil recovery, reservoir pressure management, or injection. For the purpose of determining whether a well is an idle well, production or injection is subject to verification by the CalGEM. An idle well continues to be an idle well until it has been properly abandoned in accordance with Public Resources Code section 3208 or it has been shown to the CalGEM's satisfaction that, since the well became an idle well, the well has for a continuous six-month period either maintained production of oil or natural gas, maintained production of water used in production stimulation, or been used for enhanced oil recovery, reservoir pressure management, or injection. An idle well does not include an active observation well.

- **"Long-term idle well"** means any well that has been an idle well for eight or more years.

- **"Low-priority idle well"** means an idle well for which it has been demonstrated that the well:
  (1) Does not penetrate an Underground Source of Drinking Water (USDW);
  (2) Does not indicate any pressure at the surface and is not open to the atmosphere;
  (3) Is not in an area of known geologic hazards, such as subsidence, landslides, or a history of damage to wells in the area from seismicity; and
  (4) Is not a critical well, is not in an urban area, and does not have an environmentally sensitive wellhead.

Many wells classified as idle were historically just left in place and frequently buried and have no surface indication of their presence. These idle wells have no record of being plugged and abandoned and therefore may present a risk to the community if they leak flammable or toxic materials. During the Oil and Gas Strike Team effort, a total of 35 idle wells were visited, in addition to other abandoned wells, and the area around the idle wells was examined with handheld monitors for leaks. None of the 35 idle wells had any surface facilities or indications that there was an idle well present.

2.2 CalGEM WellSTAR Database

The CalGEM WellSTAR database of wells was accessed in May 2022 for idle wells. As noted above, idle wells are those wells that have historically not been recorded as having been plugged and abandoned and are not currently operating and producing oil/gas. Many idle wells are associated with a producing field and for a number of reasons have not produced oil/gas recently but are managed by an operator. However, some idle wells may have just been left and potentially buried by a previous operator, and not properly abandoned. Wells that have not been properly plugged and abandoned, and are not being actively managed, can present a potential risk to the

public or environment if they are associated with reservoirs that have some potential for gas production.

CalGEM has an Idle Well Management Program (IWMP) to address this potential concern. Reporting shows there are over 36,000 wells in California categorized as idle (as of the April 2022 database).

CalGEM regulations require idle wells to be tested including a fluid level test and casing pressure test and, if necessary, repaired, or permanently plugged and abandoned. However, there are many idle wells that are not part of a management program since in some cases the operator no longer exists. The CalGEM IWMP program provides incentives to operators to abandon long-term idle wells, as well as providing funding for CalGEM to contract to abandon wells themselves and pay for as part of fees deposited into the Hazardous and Idle-Deserted Well Abatement Fund.

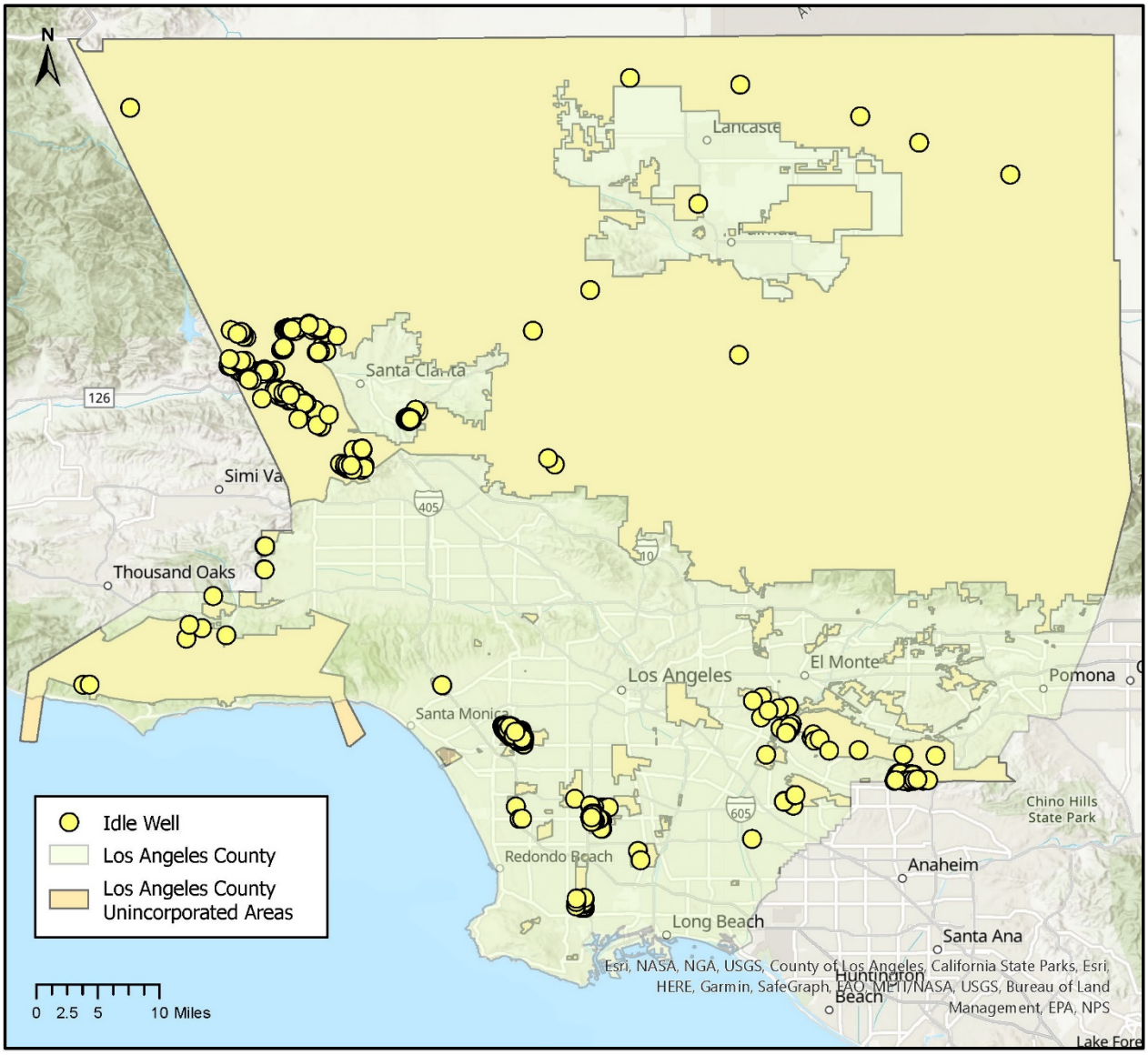
Idle wells in the CalGEM database shows a total of 696 idle wells located in the unincorporated parts of Los Angeles County (including the Inglewood Oil Field), according to CalGEM database dated May 2022. See Figure 2-1. Table 2.1 provides a breakdown of the idle wells in the different categories within the unincorporated areas of Los Angeles County. 638 idle wells out of the 696 are within an IWMP. Also, there are 441 Long Term Idle Wells (LTIW), which means they have been idle for more than 8 years.

Table 2.1 Idle Wells in the Los Angeles County Incorporated Area, Breakdown

Category	Number
Total Idle Wells	696
Long Term Idle Wells (over 8 years idle)	452
Wells Within an Idle Well Management Plan	638
Idle Wells within the Inglewood Oil Field*	224
Number of wells not within a an IWMP	58

Source: CalGEM IWMP database May 2022.
* All idle wells within the Inglewood Oil Field are under an Idle Well Management Plan.

Figure 2-1 Idle Wells



Source: CalGEM May 2022.

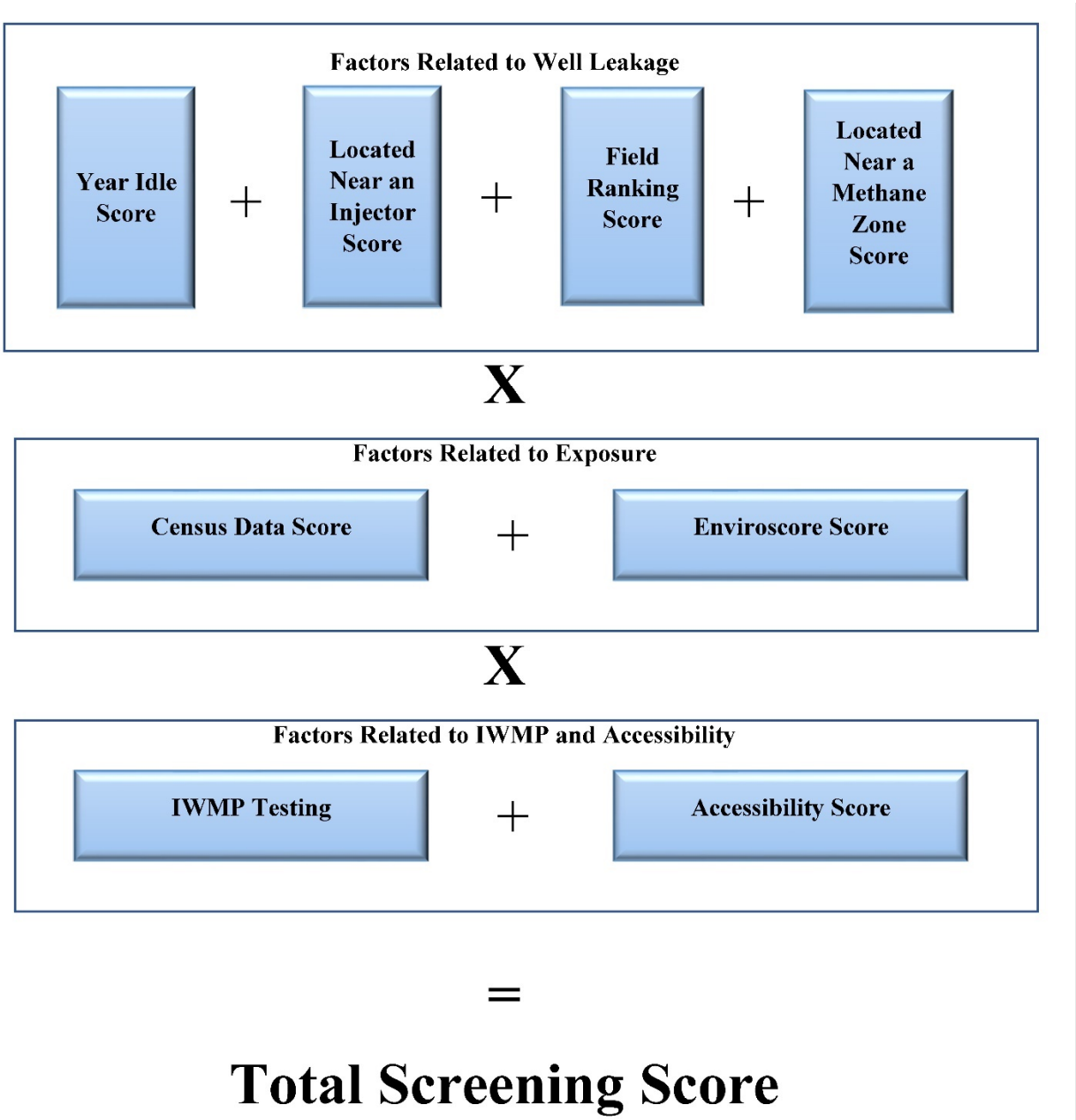
2.3 Screening Prioritization

The idle wells in the unincorporated area of Los Angeles County (including the Inglewood Oil Field) in the CalGEM database were prioritized based on their potential impact to public health and safety (related to the potential for leakage of gas to the surface), proximity to receptors (using census and CalEnviroScreen data) and whether the wells are a part of the IWMP, which includes added safeguards such as testing, or whether the wells are inaccessible. Wells were prioritized based on the following characteristics:

- Years the well has been idle;
- Reservoir characteristics and ranking;
- Well proximity to an active injection well;
- Well location and designated methane zone;
- Well location and census block population density and ranking;
- CalEnviroScreen score;
- Inclusion of the well in an active IWMP that includes testing of the well; and
- Well accessibility.

Each of these along with the prioritization method are discussed below. The prioritization method is shown in Figure 2-2.

Figure 2-2 Wells Prioritization Schematic



2.3.1 Idle Well Years Idle

Table 2.2 shows the idle wells categorized by the years the well has been idle. Generally, the longer a well has been idle, the greater the probability of the well not being in a condition that would prevent the passage of gas to the surface and also increases the probability that the well was idled in a manner that increases the public safety risks. Note that many wells are not considered long-term idle wells and are probably part of an actively managed oil field. However, there are some wells that have been idle for more than 100 years.

Table 2.2 Idle Wells in the Los Angeles County Incorporated Area, by Years Idle

Years Idle	Number	"Years Idle" Rank
not LTIW (<8 years)	244	0
Idle 8 - 19 years	123	1, 2
Idle 20 – 39 years	134	3, 4
Idle 40 – 59 years	101	5, 6
Idle 60 – 79 years	6	7, 8
Idle 80 – 99 years	18	9, 10
Idle >= 100 years	70	10
Total wells	696	

Source: CalGEM IWMP database May 2022.
Notes: Idle wells defined by CalGEM as a well that has not been used for two years or more and has not yet been "plugged and abandoned" per CalGEM requirements. Long Term Idle Wells (LTIW) are those wells idle for more than 8 years. Rank defined by 10s: 0-8 = 1, 8-19 = 2, 20 – 29 = 3, etc.

2.3.2 Idle Well 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 CalGEM California Oil and Gas Fields Volume II (CalGEM 1991). Issues that could contribute to increased risk of well leakage 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 2.3. Fields were then ranked based on the sum total of the scores with a maximum ranking of 12 points as shown in Table 2.4. Fields with a higher rank score may have a higher probability of having idle wells that produce greater well leakage risk.

Table 2.3 Field Rank Scoring Matrix

Field Score			
Characteristic	**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/H_2S[2]	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: CalGEM May 2022.
1 – American Petroleum Institute gravity of oil relative to water, higher numbers are associated with lighter oil.

Table 2.4 Idle Wells in the Los Angeles County Incorporated Area, by Reservoir Ranking

Reservoir Rank	Number
Less Than 4 ranking	35
4-6 ranking	99
6-8 ranking	226
8-9 ranking	39
9-10 ranking	230
>10 ranking	67
Total wells	696

Source: CalGEM May 2022.

2.3.3 Idle Well Population Density

Table 2.5 shows the idle wells categorized by the density of the population of the area in which the idle well is located. Highly urban areas with high population densities increase the risk of a leaking well impacting a receptor. A well located in a rural area with no populations nearby does not present as much risk. Wells located in areas with zero population density per Census Blocks data are assigned an overall rank of zero. Other population density ranks are handled in accordance with Table 2.5 and the ranking scheme shown above. Note that most of the idle wells are located in rural, low-density areas in north County areas.

Table 2.5 Idle Wells in the Los Angeles County Incorporated Area, by Population Density

Population Density	Number	Population Density Rank
PPSM = 0 - 999	590	0
PPSM = 1,000 – 1,999	24	1
PPSM = 2,000 – 3,999	34	2
PPSM = 4,000 – 5,999	13	3
PPSM = 6,000 – 7,999	9	4
PPSM = 8,000 – 9,999	10	5
PPSM = 10,000 – 11,999	5	6
PPSM = 12,000 – 13,999	1	7
PPSM = 14,000 – 15,999	9	8
PPSM = 16,000 – 17,999	0	9
PPSM greater than 18,000	1	10
Total wells	696	

Source: CalGEM May 2022. Census Tract Data
Notes: Population density is defined by the census block group that the idle well is located within and is persons per square mile (PPSM).

2.3.4 Idle Well Management Plan Wells

Information was obtained from CalGEM on the idle wells that are also a part of an IWMP and therefore are subject to regular testing and maintenance or planned regular maintenance and testing. These idle wells would present less risk because they are regularly tested and maintained. Of the total number of idle wells, 58 are classified in the CalGEM database as "Unsatisfactory Abandonment" and are estimated to not be part of a testing program (not part of an Idle Well Management Plan).

Operators of idle wells are required to either submit an annual idle well fee for each well or file an Idle Well Management Plan (IWMP) for the elimination of all of the operator's long-term idle wells. Idle well fees are calculated as follows:

- One hundred fifty dollars ($150) for each well that has been an idle well for three years or longer, but less than eight years;
- Three hundred dollars ($300) for each well that has been an idle well for eight years or longer, but less than 15 years;
- Seven hundred, fifty dollars ($750) for each well that has been an idle well for 15 years or longer, but less than 20 years; or
- One thousand, five hundred dollars ($1,500) for each idle well that has been an idle well for over 20 years or longer.

By filing an IWMP, the operator is committing to eliminating a specific number of long-term idle wells per year. The IWMP and any revisions must be approved by CalGEM. The IWMP may cover a period up to 5 years and is subject to annual review by CalGEM. The required rate of elimination

for an IWMP is based on the operator's idle well inventory as of January 1 of each calendar year. The rate of elimination is determined as follows:

- Operators with 250 or fewer idle wells are required to eliminate 4 percent of their long-term idle wells each year, and in no case, less than 1 long-term idle well;
- Operators with 251 - 1,250 idle wells are required to eliminate 5 percent of their long-term idle wells each year, and in no case, less than 1 long-term idle well; or,
- Operators with 1,251 or more idle wells are required to eliminate 6 percent of their long-term idle wells each year, and in no case, less than 1 long-term idle well.

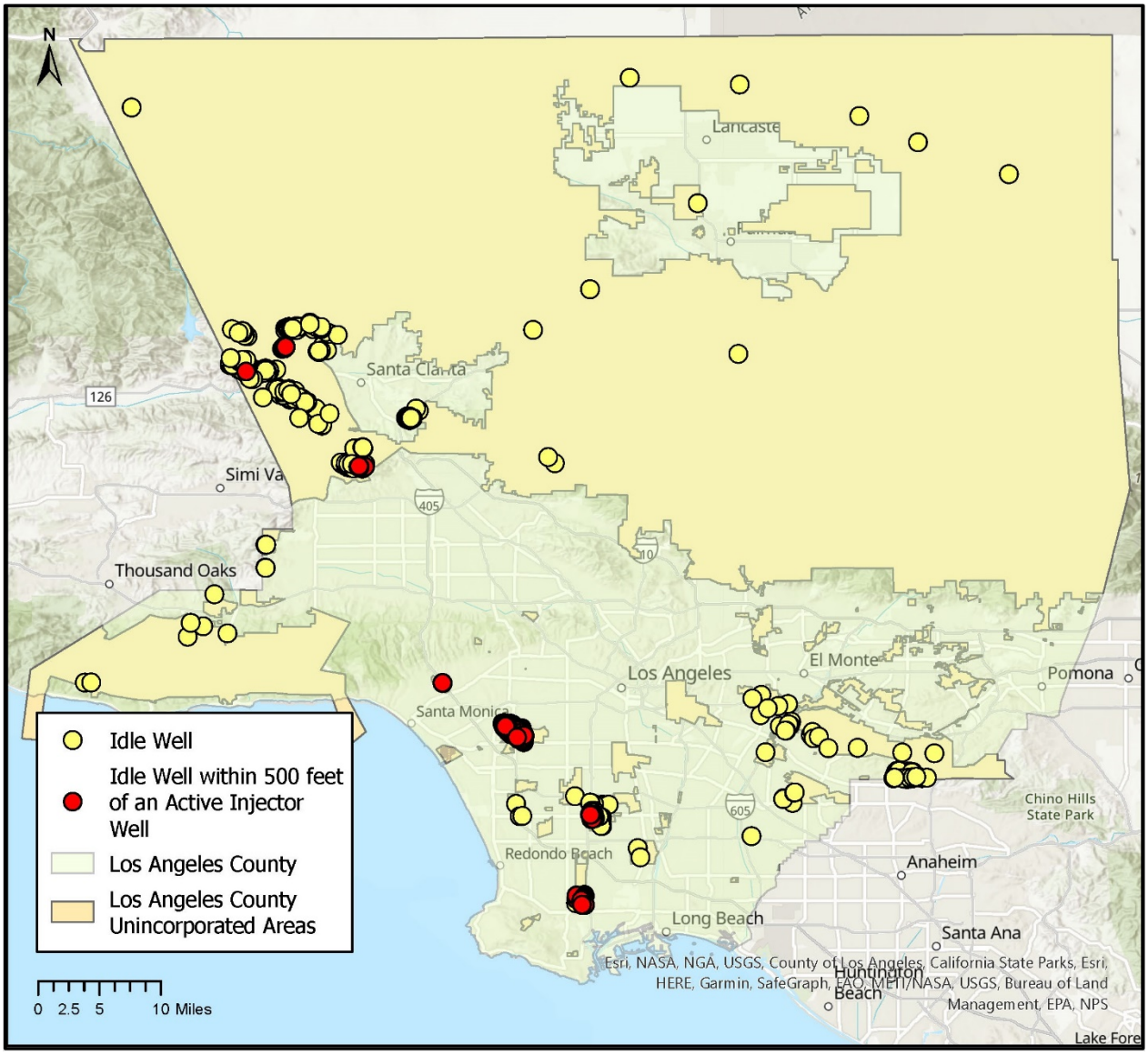
Wells in the IWMP are required to perform a series of tests and plans including:

- Casing Pressure Test - to demonstrate mechanical integrity;
- Clean Out Tags – test to demonstrate operator's ability to reach CalGEM approved depth of the well;
- Testing Compliance Work Plan (TCWP) – plan and schedule for well tests;
- 15-Year Engineering Analysis – analysis to determine viability of a well to return to service if idle 15 or more years; and
- Testing Waiver Plan (TWP) - plan for operator to commit to 8-year schedule to plug and abandon idle wells. Wells under a TWP are not subject to certain test and plan requirements.

2.3.5 Well Location and Active Injector Well

The abandoned well location in relation to an active injector well gives rise to the potential for leakage from a well due to the increased reservoir pressures near the injection wells. Figure 2-3 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. Of the idle wells, 253 idle wells are within 500 feet of an active injector well, with 34 wells within 500 feet of an injector well not located within the Inglewood Oil Field.

Figure 2-3 Idle Wells Located within 500 feet of an Active Injector Well



Source: CalGEM May 2022. Includes all idle wells. Most idle wells located within 500 feet of an injector well are located within the Inglewood Oil Field.

2.3.6 Abandoned Wells by Methane Zone

The County of Los Angeles Building Code prohibits the issuance of building permits for new buildings, enclosed structures, additions, or conversions of a building or structure to habitable or occupiable space in the presence of an unmitigated potential gas hazard. Potential gas hazards exist within 1,000 feet of fill sites containing decomposable materials (Building Code Section 110.3), within 300 feet of nearby oil and gas wells (Building Code Section 110.4), and on contaminated soils (Building Code Section 110.5). Of the idle wells, 29 idle wells are located within the defined methane zone.

2.3.7 Abandoned Wells by CalEnviroScreen Score

In October 2021, the Office of Environmental Health Hazard Assessment (OEHHA), on behalf of the California Environmental Protection Agency (CalEPA), released Version 4.0 of the California Communities Environmental Health Screening Tool (CalEnviroScreen). CalEnviroScreen Version 4.0 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 frequency.
- Education attainment.
- Housing burden.
- Linguistic isolation.
- Poverty.
- Unemployment.

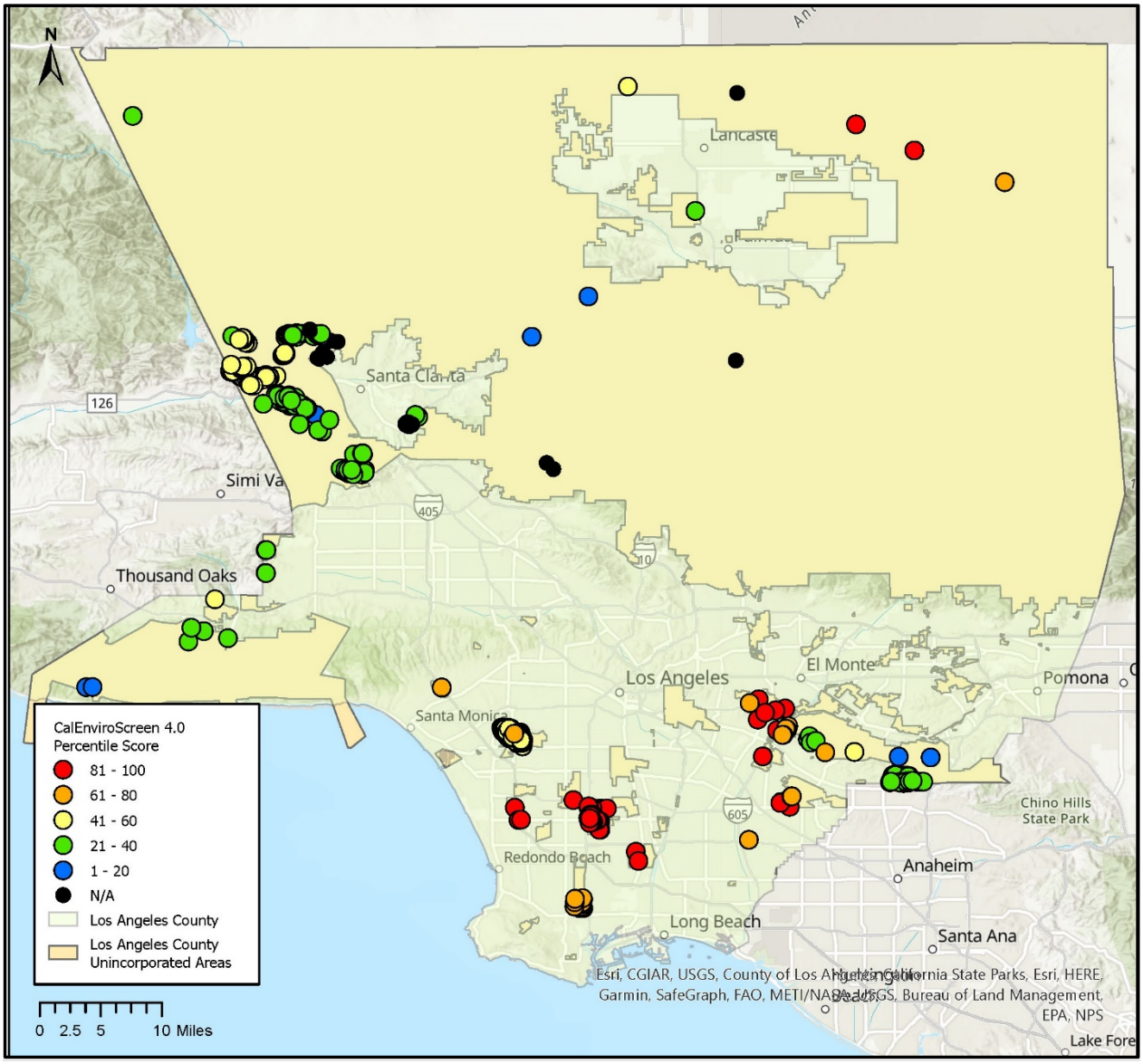
Plugged and abandoned wells were classified based on the CalEnviroScreen percentile score for each census tract. The results are shown in Table 2.6 and Figure 2-4.

Table 2.6 Wells Based on CalEnviroScreen 4.0 Percentile

CalEnviroScreen 4.0 Percentile	Number of Idle Wells	Rank
More than 90%	56	9, 10
Between 81 and 90%	9	7, 8
Between 71 and 80%	17	5, 6
Between 61 and 70%	84	3, 4
Between 51 and 60%	43	1, 2
Between zero and 50%	487	0
Total	696	

Source: CalGEM May 2022. CalEPA 2018.
Note: Ranking is defined by increments of 5: 95% and above = 10, 90 = 9, 85 = 8, etc.

Figure 2-4 Idle Wells by CalEnviroScreen Ranking



Source: CalGEM May 2022.

2.3.8 Well Accessibility

Well accessibility is based on the ability to access a well for abandonment. In general, a well needs to have 10 feet on each side and 50 feet on one accessible side in order to be considered abandonable. These are based on requirements related to development in proximity to abandoned wells. Idle wells that are located under buildings or in areas that have no access are considered inaccessible. Some of the idle wells were visited during the Oil and Gas Strike Team effort (see above) and the accessibility is well known. Other wells with medium and high rankings were examined in Google Earth allowing for an estimate of the accessibility. Wells that are considered inaccessible, that is, wells that are under buildings as noted above, were eliminated from the ranking.

2.3.9 Idle Well Ranking

The priority ranking system for idle wells is based on the ranking related to the propensity for a well to leak (reservoir characteristics, proximity to injection wells, etc.), multiplied by the potential exposure criteria (population density rank and CalEnviroScreen scores), and then multiplied by whether the wells are part of an IWMP or accessible (zero or one).

This ranking scheme allows for a lower ranking for wells that are located in low population density areas, which would generally produce lower impacts if a well is found to be leaking. In addition, this ranking scheme takes into account wells that are part of the IWMP and are actively being tested and managed and therefore would have a lower probability of leaking.

Table 2.7 shows the results of the ranking. Figure 2-5 below shows the location of the wells and their associated rankings. Most of the wells are ranked low as they are located in low population density areas. However, there are 42 wells which are ranked above 100 (higher priority) and these are listed in Table 2.8.

The previous Oil and Gas Strike Team efforts examined both abandoned and idle wells. Of the wells examined in the field, 35 of the wells were high ranking idle wells. This revised ranking scheme is somewhat different since it also includes accessibility, and proximity to injection wells and methane zones (which were examined only for abandoned wells in the previous effort). Of the idle wells examined in the Oil and Gas Strike Team effort, some have been recently abandoned (2 wells), one of the locations was more definitely defined by CalGEM (which placed it outside of the County), some were determined to be inaccessible based on site visits or Google Earth reviews (9 idle wells) and some dropped in ranking due to becoming part of an IWMP or not being near an injection well or in the methane zones. The remaining wells are high ranked (11 of the 13 wells ranked above 300, six of the 10 wells ranked 200–299, and three of the 19 wells ranked 100–199 were part of the Oil and Gas Strike Team effort). Out of the 42 wells identified as high priority in Table 2.8, twenty wells were previously classified as high priority under the Oil and Gas Strike Team efforts and were visited by the Oil and Gas Strike Team.

Table 2.7 Idle Wells in the Los Angeles County Incorporated Area, by Reservoir Ranking

Idle Well Rank	Number
Less Than 100	644
100-199	19
200-299	10
300-399	8
>= 400	5
Total wells	696

Source: CalGEM May 2022.
Notes: Wells with zero population density or that are inaccessible are ranked = 0.

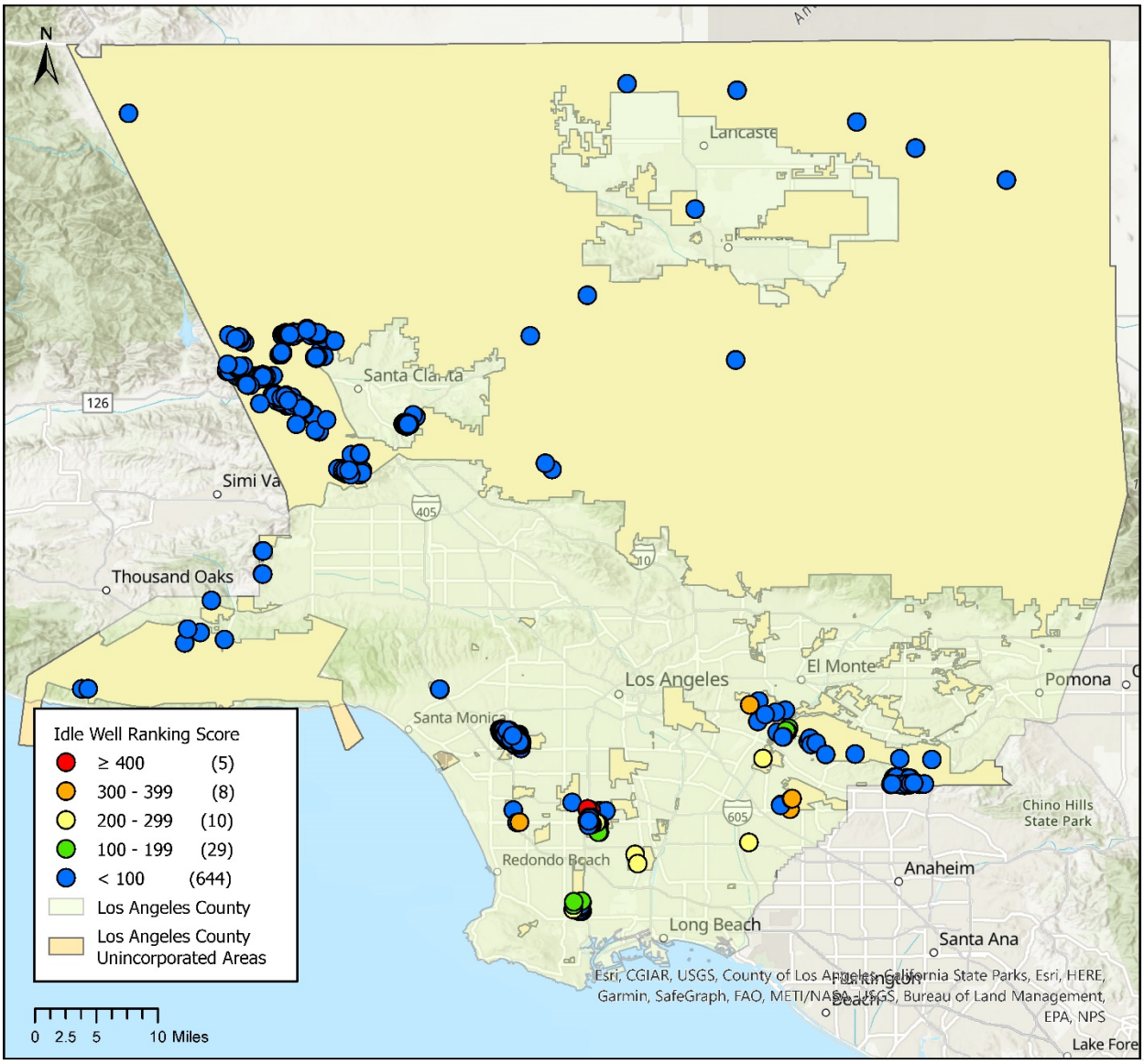
Table 2.8 Idle Wells Ranked 100+

Well API	Population Density, ppsm	CalEnviroScreen Score	Injector / Methane	Idle Years	Reservoir Rank	Ranking
403716951	5,043	64	N/N	10.0	7	108
403716917	4,180	64	N/N	43.0	7	126
403705540	5,038	75	N/N	19.9	5	128
403716926	3,840	64	Y/N	43.0	7	130
403716941	6,093	64	N/N	33.4	7	140
403716919	7,618	64	N/N	43.0	7	147
403716920	6,217	64	N/N	43.0	7	147
403718476	7,185	62	N/N	43.0	7	147
403705703	5,980	75	N/N	43.3	5	152
403705704	5,980	75	N/N	43.3	5	152
403714569	2,300	91	N/N	3.7	4	154
403714590	2,300	91	N/N	0.6	4	154
403712029	5,980	75	N/N	43.3	6	160
403717635	7,084	64	Y/N	17.2	7	161
403717625	9,526	64	Y/N	0	7	176
403722379	9,526	64	Y/N	2.6	7	176
403722382	9,526	64	Y/N	4.9	7	176
403717641	8,791	64	Y/N	8.8	7	184
403721761	8,791	64	Y/N	24.1	7	192
403718496	8,902	64	N/Y	43.0	7	208
403705533	2,069	95	N/N	43.3	5	209
403714989	4,817	95	N/N	3.7	8	216
403721974	2,235	93	N/N	27.7	8	220
403714990	4,817	95	N/N	17.9	8	228
403705142	12,074	62	N/N	93.4	5	240
403705525	7,545	95	N/N	43.3	5	248
403705461	4,719	95	N/N	77.9	5	265
403705223	14,379	95	N/N	19.9	5	273
403706744	7,686	93	N/N	43.3	8	286
403705466	8,556	95	N/N	77.9	5	309
403705555	10,449	85	N/N	91.8	5	313
403705844	14,379	95	N/N	43.3	5	324
403706131	15,056	75	N/N	103.9	5	326
403706132	15,056	75	N/N	102.6	5	326
403705199	10,479	99	N/Y	19.9	5	337
403708607	10,142	87	N/N	88.3	7	350
403706181	14,328	77	N/N	111.0	5	351
403714385	9,196	99	N/Y	43.3	8	405
403713573	10,479	99	N/Y	43.3	8	432

Well API	Population Density, ppsm	CalEnviroScreen Score	Injector / Methane	Idle Years	Reservoir Rank	Ranking
403705557	11,511	99	N/Y	88.4	5	449
403714987	4,817	95	N/N	100.0	8	672
403714988	4,817	95	N/N	100.0	8	672

Notes: wells with ranking above 200. The wells marked in green were previously evaluated as part of the Oil and Gas Strike Team efforts.

Figure 2-5 Idle Wells Ranking



Source: CalGEM May 2022.

3.0 CalGEM Idle Well Screening Project

CalGEM is developing a risk based initial screening criteria system to identify high priority wells quickly and accurately for plug and abandonment and to prioritize wells to ensure wells that may pose greater risks are prioritized for plug and abandonment in disadvantaged communities. CalGEM developed their methodology based in part on the Oil and Gas Strike Team efforts and that original methodology for idle wells. MRS subsequently added criteria to reflect the Board motion. While it appears that CalGEM has more information, all the information has been incorporated as appropriate into this effort and contains the majority of the pertinent data from CalGEM. In addition, the appendix (Appendix A) to the Report contains all the data that CalGEM includes.

The project is part of a CalGEM effort to plug and abandon orphan and deserted wells that have no responsible, solvent operator. The project is authorized and funded by two primary accounts; the Oil, Gas, and Geothermal Administrative (OGGA) Fund and the Hazardous and Idle-Deserted Well Abatement Fund (HIDWAF).

The project coincides with the Federal Energy Communities Revitalization Program (ECRAP) and the Infrastructure Investment and Jobs Act (IIJA), a program to address orphan oil and gas wells on Department of Interior, State, private, and tribal lands.

3.1 Screening Criteria for State Abandonment Prioritization

CalGEM presented a DRAFT screening criteria at a number of workshops on November 30, 2021, March 24, 2022, March 30, 2022, April 6, 2022, and April 13, 2022. The program was authorized by the California Code of Regulations §1772.4, Prioritization of Idle Wells for Testing and Plugging and Abandonment as specified in Public Resources Code § 3016, 3206, and 3206.1. The screening methodology includes the following:

- Assign point valuation to criteria based on regulations and CalGEM goals;
- Automate retrieval of digital data available through WellSTAR and GIS;
- Fill gaps in data using physical/scanned well files and technical reports;
- Combine with the most recent CalEnviroScreen data;
- Aggregate scoring and rank wells with highest points as priority for plug and abandonment; and,
- Conduct secondary screening that factors in feedback from local jurisdictions (cities and counties), accessibility (including the ability to locate the well if HUD tagged), and future development.

3.1.1 Criteria Example

The CalGEM presentation in November 2021 provided an example of the types of data that could be used in the screening process. For well location data from WellSTAR included:

- API Number;
- Field;
- Well designation;
- Operator code;
- District;

- Spud date;
- Last active date;
- Latitude;
- Longitude;
- Corner call; and,
- Well Management Map.

Surface study parameters include:

- Well head location;
- Geologic hazards;
- Well head pressure;
- Well site accessibility;
- Facilities present; and,
- BLM, Tribal, State lands designation.

Downhole study data may include:

- Top perforation;
- Damage depth;
- Fish/junk depth;
- Base of Fresh Water (BFW) depth;
- Under Ground Sources of Drinking Water Depth (USDW);
- Plug back partial abandonment depth; and,
- Total depth.

Potential hazards were also identified for the screening process as:

- Idle well fluid test result;
- Idle Well Cleanout Tag Result;
- Idle Well Casing Integrity Test Result;
- Years idle;
- Age of well;
- Inside Proposed Aquifer Exemption;
- Total population percentile;
- CalEnviroScreen 4.0 pollution burden percentile;
- CalEnviroScreen 4.0 population characteristic percentile; and,
- CalEnviroScreen 4.0 SB 535 Disadvantaged Communities.

3.1.2 CalGEM Evaluation Scoring

The DRAFT CalGEM screening process proposed to generate an aggregate scoring of Surface Study, Downhole Study and Other Potential Hazards. Wells would be grouped into five categories based on the numerical score rank and an estimated plug and abandonment cost estimate would be generated.

4.0 Conclusion

This report was completed pursuant to the Board's September 15, 2021, motion instructing the Office of Oil and Gas, in coordination with the California Geologic Energy Management Division (CalGEM), the Chief Sustainability Office, Department of Regional Planning, Department of Public Health, and Fire Health HazMat to develop a framework for an Oil Well Cleanup Pilot Program to plug and abandon idle oil wells to include the following:

1. Prioritization of oil wells that pose health and safety risks to residents based on proximity to frontline communities, risk of leakage, unknown operator, and other health and environmental equity measures.

2. Stakeholder consultation steps that involve workers, communities, and other stakeholders in the planning process.

3. Within 180 days, return with recommendations and next steps for an Oil Well Cleanup Pilot Program Framework.

The idle oil wells in the unincorporated County were reprioritized based on the Board's prioritization measures described under 1. above. This refined oil well prioritization ranking system identified 42 wells (see Table 2.8) as high priority idle wells. Twenty of those wells were previously assessed by the Oil and Gas Strike Team and were found not to have any evidence of leaking in the field. As a result of the findings and consistent with the previous efforts conducted by the Oil and Gas Strike Team, a recommendation is made to visit the remaining 22 wells that were ranked highest under the prioritization criteria and to reevaluate the other 20 wells to establish a current baseline. It should be noted that three of the wells identified as high priority and not previously assessed by Strike Team are currently undergoing plugging and abandonment efforts by a developer who is redeveloping the site (403714988, 403714989, 403714987, these wells are still classified as idle by CalGEM). Physical verification of the wells would allow for ascertaining location, and to allow for testing to determine if the wells show any evidence of leakage. This could be accomplished using the same methodology employed by the Oil and Gas Strike Team, with handheld monitors and with neighbor interviews.

Once the wells have been visited, and if there is any evidence of gas migrating to the surface, then a subsequent soil vapor testing program should be put in place to verify whether a leak is occurring and to determine the extent of the well leakage. In addition, various methods could be used to try to determine the exact location of the potentially leaking wells by using magnetometers and/or ground penetrating radar.

The County should also provide CalGEM with the prioritization scheme and results to ensure that their own prioritization scheme agrees with the one conducted by the County. Or with the assistance of CalGEM, to help identify other wells that CalGEM may consider of higher priority.

In accordance with the details of Task 6 for this effort the County should submit a refined list of idle and non-producing wells to CalGEM and request they make a determination whether the wells should be plugged and abandoned.

   a. Within 60 days, CalGEM may require the owner or operator to file a statement on why the wells should not be plugged and abandoned.

b. Within 120 days, CalGEM to make a determination on whether they should be plugged and abandoned.

c. Failure of the operator to file a statement shall be conclusive evidence of desertion of the well, thereby permitting CalGEM to declare the well "orphan" and order the well abandoned.

If an identified well receives "orphan" status, proceed with the following:

As allowed under the idle well program, the County Board of Supervisors can send a letter requesting that CalGEM further investigate the highest priority wells and, if determined to pose a risk to the public or the environment, request that those wells are prioritized for proper plugging and abandonment under their Orphan Well Abandonment Program. For the purposes of this report, an orphan well is a well that has no party responsible for it, leaving the state to plug and abandon it. Work with CalGEM to identify state and federal funding sources for plugging and abandoning prioritized County wells which may include existing funds in the state budget or from recently approved federal appropriations.