

# Environmental Issues

**Oil and Gas Well Issues Related to Real Estate/Infrastructure Development in Southern California**

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# Overview

- Locating and Managing Abandoned Wells
- Governing Agency – Division of Oil, Gas, and Geothermal Resources (DOGGR)
- Responsible Parties
- Well Abandonment or Re-Abandonment Process and Costs
- Abandonment to “Current DOGGR Standards

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# Overview

- DOGGR “Site Plan Review” Process
- Development Restrictions and Setbacks around Abandoned Wells
- Methane Protection Requirements
- Environmental Issues – Oily Soil and Other Concerns
- Typical Investigation Process
- Agency Oversight and Cleanup Requirements
- Reuse of Crude Oil-Impacted Soil
- Managing Ongoing oil and Gas production within Developments

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# Locating and Managing Abandoned Wells

- Munger Map Book – Oil and Gas Fields
- DOGGR
  - Review of Well Records
  - Review of Well Maps
- Historical Aerial Photographs
  - Fairchild Aerial Photography Collection at Whittier College
  - UCSB Department of Geography
  - Continental Aerial Photo
- Oil Field Operators
  - Production Maps
  - “Old-Timers”
- Excavation
  - Using the location of record, an excavation at least 15 feet long, 15 feet wide, and 6 feet deep, or sufficiently larger or deeper as necessary.
- Geophysical Survey
  - If a well is not located by excavation, a magnetometer should be used to survey the area inside and outside the excavation.

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# Governing Agency for Wells - DOGGR

- Formed in 1915
- No well data prior to 1915
- Repository for oil, gas, and geothermal well information
  - Tracks well data
  - DOGGR has plugged orphaned oil and gas wells
  - Web-based mapping program to access maps of oil and gas wells
- Construction-Site Review and Well Re-Abandonment Program to ensure that construction would not take place over improperly abandoned wells (1986)

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# Responsible Parties

- The potentially responsible parties (PRPs) may include the owner or operator of the property, the owner of the property at the time of well installation or operation.
- PRPs may be liable for costs for removal or remedial action.

# Well Abandonment or Re-Abandonment Process and Costs

- Oil Company Responsibility
  - Abandonment of wells to standard at the time
  - Existing wells essentially oil company responsibility
- Developers/Property Owners Responsibility
  - Abandonment of wells by oil company not up to current standards
- Adverse Conditions
  - May halt development plan
  - Create hazardous situation
  - Adversely affect monetary worth of property
- Proper Well Abandonment
  - Leakage due to Improper plugging
  - Well becomes a conduit
  - Protection of freshwater aquifers from fluid migration
  - Isolation of hydrocarbon production and water injection zones for environmental protection
  - Plugging of upper hydrocarbon zone and upper groundwater zone with cement grout
- Submittal of Application to DOGGR
  - DOGGR review to determine conditions and requirements
- Cost
  - Abandonment/Re-Abandonment Costs can range from \$50,000- \$150,000 per well.

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# Abandonment to “Current DOGGR Standards”

- An application to abandon or re-abandon each oil well must be filed with DOGGR.
- DOGGR’s engineer will review the well record to inform the applicant if the well was properly abandoned.
- Well files can be viewed prior to submitting the project.
- In general, wells abandoned circa mid-eighties are considered to be properly abandoned.

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# Well Closure Activities

- Removal of all surface structures and facilities
- Abandonment of pipelines with cement grout
- Excavation and disposal of soil impacted with crude oil as a result of exploration and production activities
- Excavation, demolition and disposal of concrete well cellars.

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# Local Permitting Agency

- Applicant (Developer/Landowner) presents a construction-site plan to the local permitting agency.
- Before issuing building or grading permits, local permitting agencies review and implement DOGGR's preconstruction well requirements.
- The local permitting agency checks the construction-site plan against DOGGR maps to determine if there are any wells located within or adjacent to the property boundaries.
- Interaction between local permitting agencies and DOGGR help resolve land-use issues and allows for responsible development.
- If the well appears to be located within this area, the applicant is directed to provide materials specified by Construction –Site Plan Review program to DOGGR to initiate the review process.

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# DOGGR “Site Plan Review Process” – Locating the Well

- Applicant provides DOGGR with pertinent information and DOGGR will provide the well location and elevation from well records.
- With this information, the applicant must locate, uncover, and when necessary, survey the well(s).
- If a well cannot be located using the a well record location description, sufficient efforts, including excavation, must be made to ascertain each well’s location within the construction-site boundaries.
- Applicant must notify DOGGR to witness all completed excavations before they are backfilled.
- If the well search efforts prove unsuccessful, the applicant must prepare a written report describing the search procedures.

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# DOGGR's "Site Plan Review Process – Testing

- All accessible abandoned wells must be tested for gas leakage and inspected for oil leakage. Any welded plates must be removed, and the presence of a competent cement plug must be verified in the casing and all annular spaces. All conductors must be plugged with cement and leak tested by the DOGGR inspector.
- Gas/Oil Leakage Tests
  - - Standing Water Test – water poured onto chipped cement and observed for bubbling
  - - Soap Test – soap solution sprayed on wellhead and any bubbling is tested for combustible gases with testing instrument.
  - - Bag Test – Attach plastic bag over casing and testing vapor in bag with testing instrument.
- If there is any indication of oil or gas leakage, or if the surface plug does not have competent cement in the casing and or/annular spaces, the well needs to be reabandoned.
- In the event that work is required on any well, including but not limited to plugging and abandonment, re-abandonment, cutting off casing, or adding a riser, written permission is needed from DOGGR.

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# Development Restrictions and Setbacks around Abandoned Wells

- The top of the outermost casing stub of all wells within the construction site should be maintained with 5 to 10 feet below the surface of the final grade. The casing can be cut off or a riser added to achieve the required depth.
- It is advised that no structure be constructed over any well.
- It is required that, to the maximum extent feasible, the slab or foundation for a proposed building not be constructed over or within 10 feet of an abandoned oil/gas well.

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# Methane Protection Requirements

- A soil gas investigation is to be conducted and a report of the findings submitted to the local fire authority.
- If a soil gas investigation report identifies combustible soil gas concentrations of 5,000 ppm or greater at any location(s), mitigation procedures are to be applied to all buildings within 300 feet of the affected location(s).
- If combustible soil gases in excess of 12,500 ppm at any location(s), all buildings within 300 feet of the affected location(s) are to have a specific soil gas mitigation plan approved by a Registered Professional.
- Mandatory Mitigation Procedures:
  - Source Removal
  - Passive Venting of Abandoned Oil/Gas Wells
  - Sub-Slab Passive Venting
  - Approved Sub-Slab Venting System Design
  - Active Methane Detection/Forced Air Venting

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# Environmental Issues – Oily Soil and Other Concerns

- Oily soil above regulatory cleanup levels may be present around the well and other ancillary equipment.
- Other constituents of concern that may be present above regulatory cleanup levels are metals (commonly lead and arsenic), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs).

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# Typical Investigation Process

- Phase I Environmental Assessment
  - Site Description
  - Site Geology and Hydrogeology
  - Site History
  - Agency Records Review
  - Historical Aerial Photography Review
  - Site Reconnaissance
  - Identification of Potential Environmental Concerns
  - Summary Report with Conclusions and Recommendations

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# Phase II Environmental Assessment

- Investigation of Potential Areas of Concern Identified in the Phase I
- Collection of Soil and/or Groundwater Samples for Laboratory Analysis
- Evaluation of Laboratory Results and Comparison with Regulatory Standards
- Summary Report with Conclusions and Recommendations

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# Remedial Action Plan

- If concentrations exceed regulatory cleanup goals then a Remedial Action Plan (RAP) should be submitted to the lead agency.
- The primary objective of the RAP is to outline proposed cleanup levels and procedures to reduce concentrations of identified releases to levels acceptable to the local health care agency, California Regional Water Quality Control Board or the Department of Toxic Substances Control Board for the intended use of the site.
- RAP consists of:
  - Identification of Areas of Concern to be Remediated
  - Proposed Cleanup Levels
  - Proposed Laboratory Analytical Methods
  - Proposed Mitigation Options

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# Regulatory Oversight

- Recognition of the regulatory framework and the lead agency responsible
- Understanding the role of the regulators management and technical team
- Understanding the regulatory requirements and compliance to standards
- Management of regulatory communications
- Regulatory and oversight costs and management of regulatory schedules

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# Cleanup Requirements

- The Cleanup Levels proposed in the RAP are based on current understanding of standards typically accepted by the regulatory agencies, with consideration given to local site conditions, future land use, and feasibility.
- Proposed action levels are founded on federal, state, and local regulations and guidelines to address the major constituents of concern.
- Cleanup requirements would be based on EPA Regional Screening Levels and California Human Health Screening Levels and local agency criteria.

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# Reuse of Crude-Oil Impacted Soil

- Crude-Oil impacted Soil can be reused at a site as deep fill material.
- Typically the upper 10 feet of soil would be tested to have not detectable concentrations or very low concentrations with no observable staining.
- Higher TPH concentrations can be placed at greater depths with agency approval.

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# Managing Ongoing Oil and Gas Production within Developments

- Oil wells must be accessible to service rigs. Approximately 50 feet of setback should be provided for access.
- An Environmental Impact Report (EIR) may be required to address impacts of oil field operations to residents as well as the environment with biological issues.

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# Summary and Conclusions

- There is a negative public perception about a site that was contaminated.
- Development of petroleum-impacted only sites have become less of an issue as residential developments have been built with minimal environmental impact.
- Dozens of residential communities have been redeveloped over former oilfield land.
- Due to the lack of available “non impacted” land in Southern California, developers are becoming more educated in redeveloping impacted properties.
- Regulatory agencies through Brownfield programs recognize the importance of working with developers to revitalize these properties and to educate the public to change the negative perception.
- There are many permitting and governmental hoops to jump through to redevelop contaminated sites requiring solid financial support as well as competent consultants to support the project over a fairly long period of time.
- It has become much easier to obtaining closure or a “no further action” letter from a regulatory agency.
- Liability is often a difficult hurdle to overcome. In the past, some residential developments were built over properties that were not cleaned up properly and the residents sued the developer.
- Transferring environmental remediation liability, often through purchase of an insurance policy, is becoming increasing common and can play a significant role in property transactions and remediation contracts.

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