Final Report

“Case Study of Oil Drilling in Urban Cities”

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1. Introduction

Oil Drilling, which was once restrained to only rural areas, has now not even spared urban areas. The potential risks caused by oil drilling to communities’ health and safety living nearby, and environment, are magnified by high population density. In many cases, companies are able to re-open old wells after decades of inactivity without obtaining a new permit or notifying nearby residents. These urban oil fields are either camouflaged and hidden with office buildings, trees around like in Los Angeles, London, Houston or done offshore near population exploded areas like Mumbai. This paper analyses urban oil drilling in four locations around the world: Los Angeles (California), Houston (Texas) in US, London (UK), Mumbai (India), where drilling is contested by social movements. The definition of an “urban area” varies nationality-wise. The cities chosen are considered urban respective of their country, according to the UN definition of “urban”¹ (“United Nations Statistics Division - Demographic and Social Statistics,” n.d.).

Urban Oil Drilling is a new concept today, in the sense that the companies have started to look in to the possibility of drilling in urban area, to combat the increasing demand of oil and depleting oil quantities in the existing sources. Moreover even if the oil drilling in urban existed from long, a whole lot of population is unaware about its existence. Due to the rapid urbanization, and increasing population, more and more cities are falling into the urban oil drilling category. Places like Mumbai where oil drilling near the Arabian Sea coast have existed from long, but it is only recently that the communities living nearby have started to realize that there is a big elephant in the room.

This paper studies the oil field locations in detail for each city with the main focus on Los Angeles, and examines their proximity to the population nearby. It looks into the accidents due to the oil drilling practices or pipeline breakage, and their effects on the environment – water, air and soil and the society. It also looks into the type of population affected on the basis of discrimination, income, colour, and class. The paper also digs into the issues raised by the communities living nearby the oil fields and pipelines, environmentalists, and reasoning of the companies in charge of those oil fields. The paper makes a comparison between the four cities, based on the above factors: location of the oil fields, impact on the community, which includes health impact and socio-economic impacts, type of community living nearby the oilfields, response of the communities living nearby, the impacts on the environment including water, air and land, and response of the Oil Industry and Government to the issues raised up due to urban oil drilling.
2. Methodology

The research work involved **Background Research work on Urban Oil** drilling in general. Oil drilling practices in various countries were looked at, and four cities were selected based on the definition of “urban” and their economic importance to the respective country, so that all the four cities are comparable to each other. Various **News Articles** were studied relating to impacts of the oil drilling activities on the environment, society, and causalities occurred due to oil drilling nearby and pipelines breakage. Relation between **Maps of** oil drillings, oil fields and population density, and pipelines were analyzed to study the companies operating the oilfields, causalities occurred in the area and the type of population effected. The company profile of Freeport Mc Moran Oil & Gas, which is largely responsible for the urban drilling in Los Angeles, was studied, through the website statistics and internet research details.

3. Background

3.1 Company Profile – Freeport McMoran Oil & Gas

Freeport-McMoran² (“Freeport-McMoran Online Annual Report 2013 - Oil and Gas Operations,” n.d.) is a global US- based natural resource company, with a diverse portfolio of mineral assets, oil and gas resources, with headquarters in Phoenix, Arizona, US. FCX’s portfolio of oil and natural gas assets includes oil production and drilling activities mainly in US onshore- California, Eagle Ford Shale and offshore- Gulf of Mexico, and California. In 2013, FCX acquired Plains Exploration and Production Company (PXP) and McMoRan Exploration Co. (MMR). California contributes up to 40% to the FCX oil & gas reserves. James R. Moffett is the Chairman of the Board of Freeport, and Flores, James C. is the President and CEO of Oil and Gas LLC³(“FCX_Freeport-McMoRan Inc. - Investor Center, BOD,” n.d.).

Following are the locations⁴(“FCX_Freeport-McMoRan Inc. - Worldwide Operations, Miami Mine and Processing Facilities,” n.d.) of its’ operation in California:

<table>
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<th>Onshore</th>
<th>Description</th>
<th>Ownership of FCX Oil &amp; Gas</th>
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<tr>
<td>1. Los Angeles Basin</td>
<td>LA Basin properties are characterized by light crude oil (21 to 32 degree American Petroleum Institute (API) gravity), have well depths ranging from 2,000 feet to over 10,000 feet and include both primary production and mature wells using waterflood recovery methods.</td>
<td>Hold a 100% working interest in the majority of our LA Basin properties in the Inglewood, Las Cienega, Montebello, Packard and San Vincente fields.</td>
</tr>
<tr>
<td>2. San Joaquin Basin</td>
<td>San Joaquin Basin properties are located</td>
<td>Hold a 100% working interest</td>
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primarily in the Cymric, Midway Sunset and South Belridge Fields. These properties are long-lived fields that have heavier oil (12 to 16 degree API gravity) and shallow wells (generally less than 2,000 feet) that require enhanced oil recovery techniques, including steam injection, and produce with high water cuts.

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<th>3. Other Onshore California Properties</th>
<th>Located in San Luis Obispo County, the Arroyo Grande Field is a long-lived field that has heavier oil (12 to 16 degree API gravity) and well depths averaging 1,700 feet requiring continuous steam injection.</th>
<th>Holds a 100% working interest in the Arroyo Grande Field.</th>
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<tr>
<td>Offshore</td>
<td>All the California Offshore properties are located in federal waters approximately 5 to 7 miles offshore in the Santa Maria Basin.</td>
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<td>4. Point Arguello</td>
<td>Point Arguello Unit is composed of the Hidalgo, Hermosa and Harvest platforms, and the various partnerships owning the related transportation, processing and marketing infrastructure.</td>
<td>Holds a 69.3% working interest in the Point Arguello Unit.</td>
</tr>
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<td>5. Point Pedernales</td>
<td>Platform Irene is the sole platform in Point Pedernales, which is utilized to access the Federal Outer Continental Shelf Monterey Reservoir by extended reach directional wells and support facilities, which lie within the onshore Lompoc field.</td>
<td>Holds a 100% working interest in the Point Pedernales field.</td>
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Table 1: FMOG Operations in California

**Foot Notes:** Since 1982, Mr. Flores has had an extensive career in the oil and gas industry in the roles of Chief Executive Officer, President and Chairman of a private and four public oil & gas exploration and production companies listed on the New York Stock Exchange. He co-founded and led Ocean Energy, Inc. from 1992 to 2001. In 2001, he became the Chairman and Chief Executive Officer of Plains Resources Inc. (NYSE:PLX). Under his leadership, the exploration and production assets of PLX were spun off into Plains Exploration & Production Company (NYSE:PXP) and began trading on the NYSE with Mr. Flores as Chairman and Chief Executive Officer in December 2002, and President since 2004. After 10 years of substantial growth, PXP was acquired by Freeport-McMoRan Inc. in May 2013.
3.2 Literature Review

Los Angeles

The patchwork of oil and natural gas deposits in California covers a vast area reaching from Southern California to Central California, but Los Angeles is home to the most urban oil fields in the United States, according to the Center for Land Use Interpretation (CLUI)\(^5\) (Preston, 2013). More than 3,700 derricks extract oil from about 55 active oil fields in the Los Angeles area alone. If one looks closely while travelling around town, one can notice tell-tale methane vents on curbs and the incognito buildings that house pumps in neighbourhoods and even in shopping centres. The more obvious oil wells sit in backyards, like those on Signal Hill and various hillsides.

To the west, the Sawtelle Oil Fields stretch beneath the Veterans Administration land with 18 operating wells near the 405 Freeway. Moving east, the Beverly Hills Oil Field covers an area in West Los Angeles near Pico and Olympic Boulevards that includes the Venoco Flower Tower and other sites. For years, the nearby backlot of Fox Studios was home to a drilling island until it was abandoned in 1990. The Rancho Park Golf Course and the Hillcrest Country Club, whose members once received royalties from oil revenue, have hosted pumps onsite that draw from the Cheviot Hills Oil Field. To the east, the Salt Lake Oil Field lies underground near Cedars Sinai Hospital and the Beverly Center shopping mall.

It extends to the prehistoric La Brea Tar Pits, which still ooze tar (actually, asphalt) on the park’s walkways and grassy areas, but no oil. In close proximity to the tar pits, lies the Los Angeles County Museum of Art. Further east, the Las Cienega Oil Field reaches from La Brea Avenue to downtown. But the largest remaining oil-producing reservoir in Los Angeles is the fabled Inglewood Oil Field beneath Baldwin Hills to the south. First discovered in 1924, it traverses a nettled stretch of acreage above Culver City and Inglewood on the way to and from LAX. This desolate area is home to several oil company operations.

Los Angeles sits directly atop the nation’s largest urban oil field\(^6\) (“Urban Oil Extraction - CAFrackFacts,” n.d.), where there are thousands of active wells within a short distance of homes and schools. Nearly all of the oil wells that exist in densely populated L.A. communities were initially drilled in the early 20\(^{th}\) century, and have been allowed to re-open after decades of inactivity without obtaining new permits or notifying nearby residents. Today the oil fields of Los Angeles continue to produce the bubbling crude with extraction equipment that informs L.A.’s built environment.
The following above map shows active oil and gas wells in Los Angeles, according to the 2014 California Department of Conservation Data ("Division of Oil, Gas & Geothermal Resources Well Finder," n.d.). Inglewood Oil Fields is one of the largest urban oil fields in United States, which covers approximately 1,000 acres. It is located in the north-western area of the Los Angeles Basin, and sustains more than one million people within five miles of the oil field. It is mainly operated by Freeport-McMoran Oil and Gas and contains 959 wells, extracting over three million barrels of oil a year. AllenCo Energy operates 21 oil wells in South L.A., some of which use acidization on the land leased by the Catholic Church. In 2009, AllenCo purchased the 2-acre site, which borders low-income housing, day care centers, and numerous schools, which increased its oil production by 400%.
Freeport-McMoRan Oil and Gas (FMOG) operates 30 oil and gas well out of which 22 are active in the Murphy drilling site at 2126 Adams Street on land leased by the Catholic Church. Further it operates 3 oil wells at 1375 Jefferson (Jefferson Park) Boulevard 85 feet from homes and schools. Freeport-McMoRan’s July 2014 acid job used over 24,000 pounds of acid to aid oil recovery.

Wilmington Oil Field is Los Angeles Basin’s largest field in area and output. It extends from Torrance to Seal Beach, and includes drilling operations in Long Beach, Wilmington, and Carson. Since the oil field’s discovery in 1932, more than 6,150 wells have produced close to 3 billion barrels of oil. The majority of oil extracted from Wilmington Field is pulled from the offshore portions of the field from four artificial islands build in 1964; however, there are a number of active onshore drill sites in close proximity to homes and schools. In years past, scientists estimated that it might not be profitable to continue to extract oil from the field; however, new technologies like water flooding, steam flooding, and gravel packing have allowed oil companies to tap previously unrecoverable reserves.
neighbourhood of Porter Ranch. Recently, The Termo Company applied to drill 12 new oil wells along with the already operating 18 oil wells.

While L.A. oil wells are still productive and profitable, many of the original sites have been depleted over time and abandoned. Most of the wells of early Los Angeles that drew from the Los Angeles City Oil Field, beneath City Hall and Staples Center, have since been exhausted. Redevelopment at such a place requires costly clean-up and remediation. Due to decreasing oil production, more and more companies are exploring for crude and natural gas in urban areas. These companies are negotiating increasingly complex agreements with neighbours and local officials on rules governing aesthetics, noise, hours of operation and much more.

**Houston**

Houston, a metropolitan city of Texas is home to the largest concentration of refineries and petrochemical plants in the world. Oil drilling has long been an on-going activity on the arid plains of West Texas, but increasing oil prices, is luring energy industry to urban areas also, which were once marked as uneconomical. Businesses are concerned that oil production is not running with the demand. The emergence of urban oil exploration\(^8\) (Romero, 2005) in Houston illustrates the lengths to which some companies are going in their search for oil in areas long written off. New drilling technology, which allows companies to search for oil underground horizontally as well as vertically, and closer readings of well data stretching back to the 1930’s, has enabled companies to home in on promising areas.

![Figure 4: Oil and Gas Production By Year in Houston County from 1993-2015](image)
The following figure also shows the decreasing trend in Oil and Gas Production in Houston. It shows that Oil Production have decreased from 2,197,233 barrels in 1993 to 327,662 barrels in 2015, a sharp decrease of 85%. Currently there are 33 producing operators and 216 producing Leases on File in Houston County. There are 2,256 Wells on File as per February 2015 statistics ("Houston County, TX Oil Wells, Operators, and Production Data," 2014).

The above figure shows the increasing number of drilling Permits approved over the years in Houston County. The two above figures depicts that while there is a decrease in the Oil Production over the years, there is increase in the number of Oil drilling activities, to satisfy the high oil demand.

Following are the top Producing Operators in Houston County, Texas:

- Anadarko E&P Onshore LLC
- Basa Resources, Inc.
- Burk Royalty Co., LTD.
- Energy & Expl. PRTNRS Oper., LP
- EOG Resources, Inc.
- Fair Oil, LTD.
- Houston Petroleum Company
- Parten Operating Inc.
- Petroquest Energy, L.L.C.
- Petroreal Inc.
- Ridge Petroleum Inc.
- Sem Operating Company LLC
- SND Operating, L.L.C.
- Trivium Operating, LLC
- XTO Energy Inc.
Mumbai

Figure 6: Existing and Proposed Oil and Gas Pipelines in India

Mumbai is an important centre for petroleum products. There are three pipelines mainly which goes to and from Mumbai – Mumbai to Mumbai High, Mumbai to Manmad and Mumbai to Pune (From the map\textsuperscript{10}(Chand, n.d.) above). There is also a gas pipeline which
goes from close to Mumbai coast in Arabian Sea to the north. The two main oil pipelines which start from oil fields close to Mumbai Coast are Mumbai High-Mumbai Pipeline and Mumbai Manmad Bijwasan Pipeline (MMBPL). The former one connects oilfields of Mumbai High and Gujarat with oil refinery at Koyali. There is 210 km long double pipeline which Mumbai with Mumbai High. It provides facilities for transporting crude oil and natural gas. Mumbai High is an offshore oil field 162 kilometres off the Mumbai coast in about 72 m of water. The operations at this oil field are run by India’s Oil and Natural gas Corporation (ONGC). The latter oil field is run by Bharat Petroleum Corporation Limited. It was started in 1998 and is now a 252 long petroleum product pipeline, running from Mumbai on the Arabian Sea coast to Manmad, in North-Eastern Maharastra.

**London**

In October 2014, London Local Energy\(^\text{11}\) (Grealy, 2014) (LLE) applied to Department of Energy and Climate Change (DECC) under the 14th License Round for an onshore exploration license in the areas of North, West and Central London. A licence is the first step in starting a drilling operation for shale oil or gas after which planning permission, permits from the Environment Agency, and approval from the Health and Safety Executive are also required. But this isn’t the first time that the capital has been seen as a potential oil and gas producer. According to the 1948’ World Oil Atlas, a 3,680 ft. deep dry hole was drilled at Willesden, which showed some potential for gas. It was one of two post-war attempts to drill in London.

LLE plans to make London as example for other urban areas in the world, which might have the possibility to have oil and gas resources beneath them. LLE’s geological advisors included a lengthy technical document as part of their application to the UK’s DECC. The LLE plan depends on using as little space as possible. London is crowded and land is expensive. Gas and oil simply would never work with the old paradigm of multiple single wells. This explains why there have been only two oil wells drilled in London. Companies think that modern geological and petroleum engineering science can help to find oil hubs in urban places like London also.

Similarly another British energy company UK Oil & Gas Investments have found 8 billion barrels of shale oil in London’s commuter belt near the Gatwick Airport\(^\text{12}\) (“Explorer Says 8 Billion Barrels of Oil Found Near London Airport - Bloomberg Business,” n.d.). The new well in the Weald Basin indicates there may be as much as 158 million barrels of oil per square mile in the region. That suggests the entire basin may hold as much as 100 billion barrels of oil, ten times more than the earlier estimates. By comparison, Britain has pumped about 42 billion barrels of oil from the North Sea over the past 40 years. While U.S. developers have relied on hydraulic fracturing, or fracking, to break up the shale and release energy deposits, Weald Basin is estimated to be “naturally fractured” and so can be tapped using conventional horizontal drilling techniques.
4. Research Analysis

The four cities studied had various similarities and differences, and reflected about the oil industry and political scenario of the respective countries they are located in. The comparison between the cities is done based on the following factors:

a) Location of the oil fields: Both Los Angeles and Houston have a large number of oil derricks in plain sight, which are designed and architecturally camouflaged with windowless facades of office buildings, like movie sets on busy boulevards Recent reports estimate that 70% of the 5,194 active oil wells in LA are located within 1500 feet of sensitive land use areas like homes, schools, and hospitals. Northmore (Houston) which is the hub of oil drilling activities is as close as fifteen minutes by car from growing tall downtown towers.

On the other hand, Oil fields in Mumbai are located near the coast line of Arabian Sea, which inhabits a large population of Mumbai. London is still on its way of becoming a major urban oil field, where Oil Industry is targeting oil drilling activities in central, west and north London and near the airport. One of the major complications of drilling Weald Basin near the Gatwick Airport is the large scale drilling in a basin stretching over 4,180 square miles of land. This land lies in an environmentally sensitive area, having National Parks, Areas of Outstanding Natural Beauty, as well as nation’s second busiest airport.

b) Impact on the Community: The following factor includes health and social impacts on the community, types of the community living near by the drilling activities and the public response to the oil drilling.

In Los Angeles, oil drilling is taking place in the middle of urban communities where the potential risks to human health and safety are magnified by high population density. The increased use of high-intensity oil extraction techniques, like acidization and hydraulic fracturing, in such close proximity to homes and schools, has introduced new risks to the surrounding community. These methods involve hazardous chemicals and air toxins that can have significant impacts on human health, safety, and the environment, and disproportionately threaten Los Angeles’ most vulnerable communities. Residents and local organisations in Inglewood Oil Fields have expressed concerns about the environmental, health, and seismic effects of drilling in the community. The oil field is adjacent to residential areas and other urban land uses where emissions from the operations result in continuous human exposure. In 2006 noxious fumes – methane gas and hydrogen sulphide-leaked out from deep drilling sites in two separate incidents, forcing home evacuations and spurring years of litigation by local residents and community groups.

In South LA, due to the land acidization by AllenCo, residents began to experience respiratory problems, nosebleeds, headaches, nausea, and other symptoms. Since Freeport
McMoran Oil and Gas have taken over the Murphy Site in 2013, neighbours have complained of sickening fumes from the toxic waste incinerators at the 3-acre site and have reported suffering from respiratory problems, chronic nosebleeds, skin and eye irritation, and headaches. Similarly, residents in Jefferson Park have complained about the loud noises resulting from the round the clock drilling and are worried about the long term impacts of potential exposure to the acids used in the well stimulation treatments. Residents of Porter Ranch have complained of petroleum odors and loud noises from the trucks carrying chemicals to the drill sites, complained of the respiratory issues and chronic nosebleeds.

Sixty-seven percent of Angelinos who live within a quarter mile of an oil or gas well are Hispanic/Latino, and these communities often struggle with the negative health impacts of air pollution and toxic waste.

Figure 7: Oil Wells in Los Angeles from Division of Oil, Gas, Geothermal Resources Finder
In May 2014, an oil pipeline owned by the company Plains All American in Los Angeles, leaked\textsuperscript{14} ("Oil spill on streets of Los Angeles," 2014) due to its faulty valve and spilled an estimated 10,000 gallons (45,000 litres) of oil in the streets. According to the LA Fire Department (LAFD) statement a geyser shot crude oil 20 feet into the air and over an area half a mile (0.8km) in length. Due to the incident, four people reported breathing problems and two went to hospital, few commercial businesses were affected and a strip club was evacuated. The above-ground oil pipe broke near San Fernando Road, a major road in Los Angeles. Other problems have accompanied the bounty of oil, too. In 1985, a fiery methane gas explosion at a shopping complex across the street from the Farmer’s Market prompted the capping of wells. In 2003, lawsuits were brought against Venoco, Inc., with claims of increased cancer rates related to the drilling island at Beverly Hills High School, but were later dismissed. For projects such as the Westside subway extension, methane and hydrogen sulphide gases from petroleum reservoirs have required special tunnelling techniques and planning. More recently, residents of Baldwin Hills near the hilltop oil fields protested fracking (hydraulic fracturing) by PXP, reaching a regulation agreement in 2011, even as oil companies continue to seek new ways to mine the cache of oil and natural gas found in Southern California.

Houston is similar to Los Angeles in terms of noted health impacts on the communities’ living nearby. People have experienced respiratory problems, nosebleeds, headaches, nausea, and have complained of loud noises coming out of the drilling operations. Oil Fields in both Houston and Los Angeles have affected the economic prices on the land, where operations are taking place. Back in 1930, oil was drilled out of grassy pasture, known as the
Eureka Oil Field. Today this field is depleted of oil and resides a district of broken one-storey bungalows that rarely sells for more than $50,000.

Houston is quite hospitable in weighing approval for the new energy ventures of any size. Companies just need to pay a fee of $255 only and then they are allowed to drill more than 500 feet from city water wells and more than 1,000 feet from Lake Houston, get a permit from the Texas Railroad Commission and secure the permission of nearby residents. And because residents are entitled to royalties if oil is found, it is easy to drilling in such an area. Some geologists suggest that the location of the drilling rig has as much to do with the gap between rich and poor in Houston as with geology. If this practise is tried in a place like River Oaks (20 minutes’ drive from Northmore), where city’s wealthiest residents live, then the approval is not so easy.

![Houston, Texas Map of Oil & Gas Fracking Issues](image)

Figure 9: Houston Map of Oil & Gas Fracking Issues. Extracted from Drilling Maps, Blue Dots = Oil & Gas Health or Safety Issue Reported, Purple Dots = Power Plant
Oil fields in Houston like Los Angeles are near areas of people of color. Figure 9\(^\text{15}\)(“Houston, Texas Map of Oil & Gas Fracking Issues,” n.d.) shows that major oil operations and health and safety issues are near the central Houston and near the coastal areas. Figure 10\(^\text{16}\)(“Zoomable map: 2000 to 2010 demographic changes,” n.d.-b) shows those areas falls under communities of color areas. This depicts that Oil Drilling in both Los Angeles and Houston is also an Environmental Justice Issue.

In Mumbai, Oil Operations have affected the livelihood of fishermen. The Akhil Maharashtra Macchimar Kriti Samiti\(^\text{17}\)(Bandyopadhyay, 2015) (AMMKS- All Maharashtra Fisherman Association) has accused the Oil and Natural Gas Corporation (ONGC) of their continuous seismic activities which impairs the hearing abilities of fish, which eventually leads to their death. For the past five months, fishermen have been suffering heavily due to the insufficient catch, and many of them are on the verge of starving to death. Areas, where the survey is being conducted is out of bounds for fishermen till its completion, after which there isn't a lot left for them to catch. The AMMKS wants the oil company to compensate fishermen with Rs500 crore. This further shows that oil drilling affects the low-income communities and further deteriorates their condition.

Even though in London, oil drilling is still in planning, the neighbourhood near the planned drilling operation is also apprehensive of the whole plan as it is projected to affect the water quality due to the inflow of the chemicals in the water sources, and increase the seismic activities in the areas due to the drilling operations. So far a thousand of people have already signed a petition against LLE’s projected plan. The Green Party’s London has also objected to the fracking, reasoning that the companies are ignoring the risk of
contaminating ground water through the pumping of massive amounts of water and toxic chemicals under high pressure. Furthermore it is projected that swathes of London and the South East will be threatened with disruption, noise and pollution as thousands of fracking trucks pass through their neighbourhoods. Due to already present awareness among the people in London, public acceptance is the biggest obstacle for the operations.

c) Impact on the Environment: This includes effects on water, land and air and oil accidents reported.

Most of oil drilling sites in Los Angeles has reported presence of hazardous chemicals in the water, and toxins in the air. This is due to the oozing toxic waste from the incinerators, and gases like methane and hydrogen sulphide leaking out from the drilling sites. Methane is a greenhouse gas which deteriorates air quality and increases the global warming problem. Los Angeles Fire Department raised that due to the oil accident near the San Fernando Road mentioned before, it was possible for oil to seep under manhole covers in the area. At the Murphy Site, Freeport McMoran Oil&Gas has been for a number of zoning abuses and air quality and health infractions. In January 2013, South Coast Air Quality Management District (SCAQMD) inspectors visited the site and recorded methane readings of 20,000 ppm—400% higher than the legal limit. A concentration of methane at 50,000 ppm is explosive. These oil drilling sites are subjected to high seismic activities thus putting a large amount of population into risk. Further the drilling activities increases this risk in places like California, which already resides on fault line. Houston has seen similar problems pertaining to air and water and land. Besides, oil drilling has decreased the productivity of the land in Houston. Oil drilling eventually leads to the land to be devoid of any soil nutrients, broken and barren.

In Mumbai, oil drilling and spills have affected the aquatic ecosystem. Fishes loses their hearing abilities due to the survey seismic activities and eventually dies. Seismic surveys are used to locate offshore oil and gas deposits below the ocean floor. It involves the use of sonic cannons or airguns to shoot compressed air to the ocean floor, creating sound waves that map oil and gas reserves. Exploration involves blasts every 10-12 seconds in areas for weeks or months on end. Each blast is nearly 252dB, which is 1,00,000 times louder than a jet engine, and reverberates through the ocean and the auditory organs of sea creatures. The Oil &Natural Gas Corporation has been carrying out this survey for the past five months at various locations along Maharashtra’s coastal line. In the past three months, there were 32 instances of dead dolphins. The sea biotic life which is alive, have detected presence of accumulated toxic content in their body. The soil quality near the coasts is also affected due to the chemicals. Recently on June 14, 2015, flames (“Mumbai: Fire breaks out in oil pipeline during repairs,” 2015) shot up from an oil pipeline through the Mumbai Port Trust compound when a leakage in the Hindustan Petroleum Corporation Limited (HPCL) pipeline was being repaired. The fire is believed to be brought up from the residual fuel in the pipeline. Although there were no casualties or damage to property due to the incident, but
such incidents certainly worsened the air quality of the area and if the place is as densely populated as Mumbai then the impact is maximized.

London is still in the process but fracking is already estimated to affect the ground water quality due to the toxic chemicals inflow in the water sources. Furthermore, seismic activities in the areas nearby are predicted to increase as the drilling process has caused some minor earthquakes in the past.

d) Response of the Oil Industry and Government Officials:

Oil Industry in all the four cities are concerned that oil production is not keeping up with high demand due to falling oil quantities in existing sources. This is one of the big reasons of rapid increase in oil drilling activities in urban areas, as companies are drilling any and every place where it can be feasible to tap the oil potential. The statistics from Houston Oil Production showed that there has been 85% decrease in Oil Production in last 22 years while the number of drilling Permits approved over the years has shoot up. In Los Angeles, after over 250 official complaints and repeated protests, Environmental Protection Agency (EPA) investigated AllenCo only to fall ill while inspecting the site. Following their visit, the EPA temporarily shut down the site and fined AllenCo $99,000. AllenCo and the Catholic Church are currently working to reopen the site. AllenCo has also come under scrutiny from the L.A. City Attorney’s Office and the South Coast Air Quality Management District. In November 2014, Freeport applied to drill two new wells and re-drill one existing well at the Jefferson site. The application was withdrawn in January 2014 amidst community outcry and dropping oil prices, however oil extraction at the existing wells continues. Freeport also applied to expand its operations into a neighbouring park near Murphy site, which is currently on hold by the Planning Department.

Often the oil companies would promise the rig to be only temporary and for short term and in case they find an opportunity for oil production at the site, they would install a production wellhead which is less noise and pay them the royalties. But it is difficult to determine of how much payments homeowners will receive with rights to royalties from mineral exploration as it depends on whether the oil is found at a particular location and in what quantity. According to a survey released in January by the Texas Alliance of Energy Producers, (a group supported by the state’s energy industry) 83% percent of respondents said they would be in favour of oil or natural gas drilling on their land if they were paid for it. This is making easier for the oil company to start the oil drilling practises with false promises to the residents. Also companies are easily able to penetrate the low-income areas due to easy and fast negotiation.

In Mumbai, after AMMKS asked ONGC to payback the fishermen for taking away their only source of income, the company refuted all the claimed allegations. Due to high lobbying of the oil industry with the government and corruption, it is easier to ignore the communities’ interests and break environmental regulations at such places. ONGC claims that it prioritizes
environmental aspect over anything else. They showcase that all its technology is brought into use only after it is ensured that there will be no environmental causality.

One of the other reasons given by the Oil Companies in all the four cities to continue oil drilling or discover new drilling spots is its ability to contribute to the city’s economy. In London, PPE argues that putting a production well pad into five acres of a location like the 2500 acre Park Royal Industrial Estate or similar isn’t going to cause any more noise and trucks than most of the existing tenants. They may be able to drain under the entire 200 square kilometre area of the license area from a single location. They then plan to sell the gas into a market expected to remain north of $6 Million BTU (British Thermal Unit) at a worst case scenario through existing pipeline networks. They predict that their business will reduce trucks, noise and pollution from several existing industrial uses and pay more taxes. LLE believes that Londoners can protect rural areas by responsibly using the energy under our own feet instead of disrupting the countryside with power lines, pipelines, windmills or solar farms. Even the London Mayor²⁰(Gosden, 2014), Boris Johnson supports the exploitation of shale reserves so that London could have supply of electricity on its own. Further the mayor believes that British households should be given ownership of the oil and gas beneath their homes so that they have a commercial interest in supporting fracking. According to him, the law has to be amended so that the mineral rights belong to the landowner rather than the companies. Currently, the Government grants licences to companies to explore for and produce oil and gas, while the owners of the land beneath which it lies have no right to share in the proceeds unlike Houston. This arrangement further perpetuates fuelling opposition to fracking and causes “paralysis” for companies in attempts to explore for shale oil and gas.

British Geological Survey²¹(Hope, 2013) also corroborates that with the right geology, technology, and a bit of public acceptance, there could be a frack pad in London. According to Dr Nick Riley, Team Leader for Unconventional Gas at the British Geological Survey, the explosion in London’s population has put pressure on the city’s infrastructure and power generation and hydraulic fracturing could be the solution to the problem. Also, as number of companies is already drilling for conventional fuels around some of the UK’s largest cities, it seems feasible for the companies, to drill in London too. One of the UK’s leading onshore oil and gas explorers, iGas, drills for gas on the outskirts of Liverpool and expects to get around 180 billion cubic feet of natural gas from its Four Oaks well alone. It’s not the only one: Rathlin Energy has a number of wells dotted around Hull and Alkane Energy has ten gas projects operating around Nottingham. British Geological Survey argues that if an area is too densely populated to fit a vertical drill, companies can always go in sideways, raising the tantalising prospect of under-house drilling.
5. Conclusion

Today Oil Industry is facing huge shortage of oil in the existing sources. To combat the energy security due to increasing demand, companies are drilling in and every place, where there is oil potential. Even though Urban Drilling is everywhere, the Environmental Justice communities, which includes people of colour and low-income communities are more vulnerable to its impact. These communities are already facing socio-economic problems and Drilling adds on to their cumulative burdens, thus further deteriorating their condition. Also Companies are easily able to initiate drilling in low-income areas than in the rich communities due to easy and less expensive negotiation.

Oil Drilling sites have reported health impacts on the neighbourhoods living nearby. Communities have complained of respiratory problems, nosebleeds, headaches, nausea, increase in cancer rates, and loss in abilities of hearing and smell. Besides this, there is oozing toxic waste from the incinerators which gets mixed with water bodies, thus increasing the toxicity of ground water. There has been explosive increase in Methane Concentration, which being a Green House Gas, adds into the existing global warming and climate change problem. Further the areas where the drilling is conducted are left devoid of any soil nutrients and are prone to high seismic activities. This affects the prices of that land area. Oil Drilling in the middle of urban communities further magnifies the potential damage due to high population density of the area.

The case study of the four cities showed that Urban Oil Drilling is a growing issue and is contributing to already existing problems of pollution, global warming and poverty. It thus requires further attention and awareness among the communities, scientists, businesses and the government. Besides, as London is still on its way of having oil drilling, it can surely learn from Los Angeles, Texas and Mumbai to prevent the disastrous impacts of oil drilling in urban areas. But as the demand for Oil is going up and energy sector largely depends on non-renewable, it is challenging to deal with this issue.
6. References


This is a webpage by United Nation Statistics Division on the Standards and Methods approved by the Statistical Commission to assist national statistical authorities and other producers of statistics in the collection, compilation and dissemination of data. It contains the methods of defining ‘locality’, ‘Urban’ and ‘Rural’. Because of national differences of ways of definitions, each country should have its own definition on what is an urban and a rural area.

Background

Freeport-McMoran Oil & Gas


The above link is a detailed description of FCX’s Oil and Gas Operations mentioned in its Annual Report 2013. It contains the financial status of the company, distribution of its reserves and sales by region and its further expansion plans.


This reference lists out the Board of Directors of Freeport-McMoRan, executive officers for its specific operations.


The above webpage is extracted from the company’s website. It lists out the company’s oil and gas offshore and onshore basins in California, with a detailed description of the properties and the company’s ownerships of those basins. The company has more ownership on the onshore basins than on the offshore. One of its major operational areas is in Los Angeles.

Los Angeles

The above blog written by Cher Preston, details the urban oil field locations in Los Angeles, existing till today. Most of these oil fields are camouflaged in offices and are near schools, public areas etc. Some of the oil fields like beneath City Hall and Staples Centre have been exhausted long back, and such areas require costly renovations for the land redevelopment.


The above webpage details urban oil extraction hotspots in Los Angeles. Los Angeles is the nation’s urban oil field, where drilling have been conducted since early 20th century without notifying the nearby residents or having new permits. The page describes the impacts of oil drilling and residents’ concerns for major Oil Fields areas in Los Angeles. Freeport is one of the major operators in LA, and is on continuous attack of the residents. Residents have complained of breathing, and hearing difficulties, skin and eye irritations and headaches. Some of the oil fields have been detected with high above-legal limits of methane. In spite of the noticeable dangers of oil drilling in urban areas, companies continue to expand its operations.


The above GIS Map by Division of Oil, Gas & Geothermal Resources Well Finder, shows all the oil and gas wells in California in the records and the related information of Notices and Permits of those wells.


The above news piece by Simon Romero is about the Oil Drilling situation in Houston. It details how the residents are currently facing problems, and the reason of existence of oil drilling in Houston. Rapid Drilling in urban areas is because of shooting oil demand. Companies tend to negotiate with the neighbourhoods by promising to give them compensation. Generally the neighbourhood fall into the trap of such negotiation, as the compensation depends on whether the oil has been found at the particular site and the quantity of oil found. It is easier to negotiate in the areas of low income than the high-income areas.

The above webpage by texas-drilling.com details Oil Wells and Production, drilling permits approved from 1990-2014, Oil Production in Barrels from 1993-2015, top producing operators, top producing leases and other Oil Industry data of Houston, County. The graphs showed that while the oil production have gone down over the years, the number of drilling permits approved have increased, showing the rampant increase in drilling operations by the companies, to combat energy security.

Mumbai


The article lists out the important pipelines in India, the companies operating those pipelines, amount of oil transported through those pipelines.

London


The above article by Nick Grealy is about the prospect of shale gas operation in London. The article is written by London Local Energy employee, and thus promotes the company’s operation and its view point behind drilling in London. LLE wants to make London self-sustainable of oil source, instead of depending on rural areas or other regions. It plans to set forth London as an example for other urban areas in the world, who have the possibility of oil and gas resources beneath them. The article has tried to clear off the misperceptions about oil drilling, ignoring the issue on its impact on the community and the environment.


The Bloomberg news article is about UK Oil & Gas Investments Plc oil explorations near London Airport. The following site- the Horse Hill well is estimated to have 8 Billion barrels of Oil. The current ongoing debate in UK is on whether UK should tap its global shale boom. While the government is showing full support to develop the resources, the opposition mainly from the Green Party, neighbourhoods, and environmentalists is concerned about the impact on the community and environment. While UK accepted to ban fracking in national parks and beauty spots, they rejected the moratorium of banning hydraulic fracturing, which has been temporary approved by Scotland and Wales. The government is keen on tapping the oil potential to boost the economy, with paying little attention on its impact.
Research Analysis


The map visualizes race/ethnicity trends in Los Angeles, from 2000 to 2010. A large part of Los Angeles, especially North-West is inhabited by Latino/Hispanic Community in 2010. There has been increase in number of Asian population from 2000 – 2010.


The above news article is on Oil spill of 10,000 gallons on Los Angeles streets in April 2014. The spill occurred near San Fernando Road, one of the major road in Angeles and had seeped under manhole covers in the area. While article reports some people to have breathing problems, the overall impact of the spill on the ground water quality and the air quality is not looked upon.


Drilling Maps have mapped Oil and Gas Fracking Issues in Houston. The map shows locations of Renewable, Drilling, Refinery, and Power Plant, Reported Health and Safety Issues in Houston. While there are no spots of renewable in Houston, there is an abundance of Oil Drilling spots, showing how Oil Drilling is done on a massive scale in this urban city.


The map visualizes race/ethnicity trends in Houston, from 2000 to 2010. A large part of the people of color lives in central Houston.


The above DNA news writes about the deteriorating condition of the fishermen in Mumbai due to Oil and Natural Gas Corporation operation in Mumbai Oil Field. Due to ongoing seismic survey by the company in waters, fishermen are unable to have a sufficient catch, thus getting affected economically. The article focuses on the affects of operations on the fishermen community and their response, however doesn’t pay much attention on the decreasing number of aquatic fauna.

The news piece talks about the Mumbai oil pipeline leakage, which caused fire and affected the traffic, as the vehicular movement in the area had to be stopped. Clearly the news piece shows how a small incident can create large disturbances, if it occurs in a heavy traffic and populated area.


The news article talks about how the mayor of London, Boris Johnson wants the ownership of shale gas and oil to be given to the households. The mayor believes that laws should be changed such that the mineral rights belonged to the landowner and not to the crown. This is one of the big reasons of why people don’t support drilling underneath their land. Johnson’s views clashes with other ministers who have rejected calls for individual landowners to get a share of the proceeds from the fracking beneath them. The article depicts the contrasting views of the political environment in London on the fracking issue, however still supporting fracking in London.


The following blog by Mat Hope talks on the possibility of shale gas source in London. It gives views of the Mayor and the British Geological Survey, which supports shale gas operation in London. It shows how with the right technology and drilling methodology, fracking can be successful in London. However there are major challenges related to the public acceptance who is concerned about the impact of such operations on the community and the environment.