

# Oil Issues: A Citizen's Guide

## How one Santa Maria homeowner connected the dots

by Jane Baxter, citizen author

October 22, 2014 Version

For the latest digital copy of this report, go to: [www.sbcan.org](http://www.sbcan.org)

For feedback or questions, email the author at [jane.baxter@verizon.net](mailto:jane.baxter@verizon.net)

***Author's note:** I am a Santa Maria homeowner, resident, and voter. I drive a conventional car and heat and cook with natural gas. Until our renewable energy resources are further developed, I will be consuming petroleum products. However, I've long known that I don't support oil drilling and extraction taking place in oil fields located beneath important urban and agricultural public water sources. I knew very little about the local oil industry, and I wanted to understand what was at risk for me with the expansion of the Enhanced Oil Recovery techniques addressed in Measure P. I started educating myself and collecting relevant sources because I did not find all the information I sought in Yes or No campaign materials. This document is the result of that research and why I decided to vote Yes on Measure P. I want to share what I learned so that other voters can study this information and make their own decision.*

**"Oil Issues" provides specific and detailed information** on how oil expansion in Santa Barbara County could change the fabric of our communities and affect resources like our water, air, and health. This report provides comprehensive information in one place, helping the reader to find relevant information without having to spend hours on the internet. I researched peer-reviewed published science, oil industry documents, media accounts of oil boom impacts in other counties, and reviewed local press coverage of the issue.

**Know what's behind the sound bites:** Campaigns are won by good sound bites. However, if you are undecided on how to vote on Measure P and find yourself asking how will we "lose our water" or where does oil industry air pollution actually come from, then this is your kind of report. Also, with more background you can be more articulate in talking with others.

**Suggestions on using this report:** First you might make a copy of "Oil Issues" so you can forward the original on to others. If you are going to be working online, print out a copy of the Table of Contents for a quick desk reference as to page numbers of the various sections. With your work copy you can skim it in a few minutes or you can read it thoroughly and see how you connect your dots. I've provided links to reference documents and articles used in the report, so those interested can visit sources for further reading. If details are not your thing, look at the photos for a tour of Santa Barbara County oil sites you may never have seen.

**Pass "Oil Issues" along:** If you find this report informative, share it with friends and undecided voters as soon as possible by email. If you belong to an organization or church see if they will send it out as an email blast. Post the link to your Facebook page, send the link to contacts at LinkedIn, Twitter, etc. Help create more spokespersons who like me, appreciate factual back up. Go forth and discuss!

# Oil Issues: A Citizen's Guide

How one homeowner connected the dots

## Table Of Contents

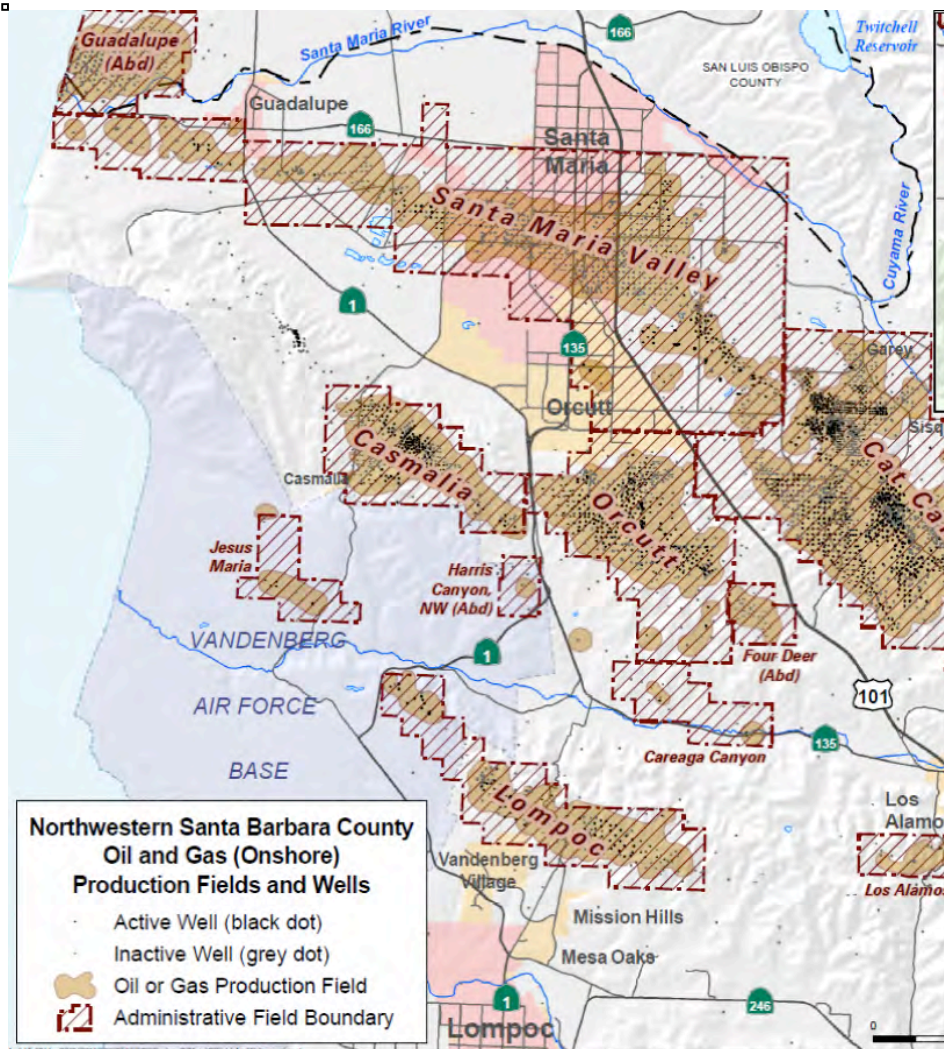
<b>Chapter 1: Background on Oil Industry and Extreme Techniques</b>	Page
1.1. Oil industry overview .....	3
1.2. An unsafe local oil history .....	11
1.3. Well failure research .....	12
1.4. Earthquake rates can increase from wastewater injection .....	19
<b>Chapter 2: Negative Impact of Extreme Techniques on our Resources</b>	
2.1. Risks of more groundwater contamination .....	22
2.2. Risks of more contamination of rivers, streams, and wetlands .....	24
2.3. Water allocation .....	25
2.4. Loss of groundwater recharge .....	27
2.5. Air pollution .....	28
2.6. Soil pollution .....	31
2.7. Noise pollution .....	33
<b>Chapter 3: Negative Impact of Extreme Techniques on our Health</b>	
3.1. Toxic waste disposal risks .....	35
3.2. Increase in health problems .....	36
<b>Chapter 4: Negative Impact of Extreme Techniques on our Economy and Community</b>	
4.1. Rising costs of water .....	38
4.2. Declining property values .....	38
4.3. Declining visual appeal .....	41
4.4. Impacts on agriculture and ranching .....	41
4.5. Deadly and costly traffic increase .....	43
4.6. Cost to county and cities .....	45
<b>Connecting the Dots</b>	
Conclusion .....	49

# Chapter 1

## Background on Oil Industry and Extreme Techniques

### 1.1. Oil industry overview

**What is out there?** According to 2013 state records, Santa Barbara County's 27 onshore oil fields contain 3,041 active wells. According to staff at the State of California Division of Gas, Geothermal, and Oil Resources (DOGGR) 1,358 of these use conventional techniques, and around 652 use some form of thermal pressurized "enhanced oil recovery" techniques. Information on what techniques the remaining 1,031 wells are using is not readily available. There are more than 100 active wastewater disposal wells in the county that dispose of millions of barrels of toxic fluids annually. The United States Geological Survey has determined that this type of well can cause earthquakes. The Seismology Laboratory of California Institute of Technology provided us with a local example when they found a correlation between "hydro-fracturing" in the Orcutt Oil Field and a 3.5 quake in 1991. (See chapter 4 of this document for more information.)



**How much oil?** According to DOGGR, there are approximately 22 onshore Santa Barbara County oil companies that annually produce a little over 40 million barrels of oil, and approximately 400 million barrels of toxic waste called "produced water."

According to the latest State of California website production statistics, in 2000, the oil/light liquid hydrocarbons (such as methane) produced in Santa Barbara County accounted for only 1% of all California oil. Santa Barbara County accounts for 0.7 % of California's natural gas production. (See: <http://www.sbcountyplanning.org/energy/information/oilGasProduction.asp>)

The bulk of the county's onshore oil activity takes



place in North County, near Santa Maria, Orcutt, Casmalia and Cat Canyon. In South County there is current oil production near Carpinteria, Summerland, and Goleta. There are many hundreds of abandoned oil wells throughout the county, with no regular oversight or monitoring program to detect emissions.

**Santa Barbara County produces natural gas:** Approximately 4 billion cubic feet of gas is produced "associated" with the oil extraction process in Santa Barbara County. This might be a surprising fact to those who think Santa Barbara County is just in the oil business. In 1999 (the last year that State of California figures were available) no gas was produced here that was not extracted with oil.

### **What happens to the gas?**

According to the local DOGGR office, a portion is burned with an open flame, and byproducts are emitted directly into the air. Some gas is sold, if the operation has access to rail lines or a gas pipeline connected to a gas processing and distribution facility like the one outside Goleta. Some gas is re-injected into a dedicated gas injection well, or it is cleaned up and used at the site to fuel oil pumps, steam generators, etc. In the scheme of things, Santa Barbara producing 4.5 billion cubic feet of natural gas a year is not a huge contribution to the market. The net natural gas produced from onshore oil fields in Santa Barbara County accounts for a mere 0.7 % of California's natural gas production. (See: <http://www.sbcountyplanning.org/energy/information/oilGasProduction.asp>)

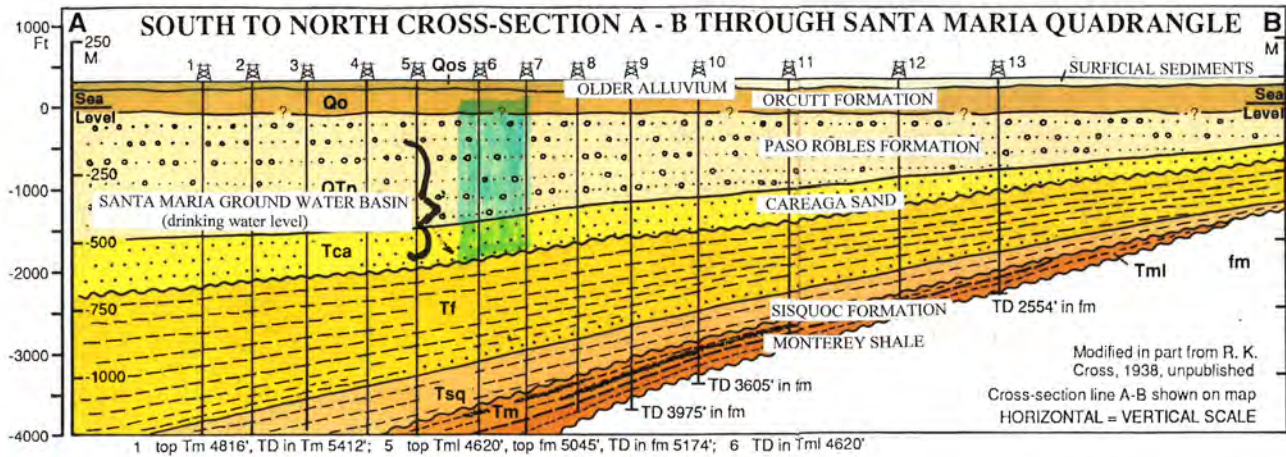


Non-odorized liquefied petroleum gas train leaving Guadalupe

However, it is significant to our local environment. Our natural gas—like our crude oil—is "dirty" and is referred to as "sour" gas. It contains significant amounts of hydrogen sulfide, a flammable gas that is soluble in water. The gas hub of Santa Barbara County is near Goleta where there is a large-scale gas storage operation with infrastructure and delivery pipelines.

**Gas and Health:** Exposure to the hydrogen sulfide found in our natural gas results in negative health effects. Hydrogen sulfide has a rotten-egg smell, but after a time, some people lose their awareness of the initially pungent odor. This undetectable danger adds to the health risk from overexposure. (Read more about hydrogen sulfide in terms for the layperson here: [http://www.ehow.com/list\\_5988370\\_health-chronic-low\\_level-hydrogen-sulfide\\_.html](http://www.ehow.com/list_5988370_health-chronic-low_level-hydrogen-sulfide_.html)) According to the New York State Department of Health, "People living near industries that emit hydrogen sulfide have an increased risk of eye irritation, cough, headache, nasal blockage and impaired neurological function compared to unexposed residents." Long-term exposure at a low concentration causes fatigue, low appetite, headache, lung irritation, blurred vision, insomnia, depression, decreased corneal reflex, poor memory and dizziness." (See New York Department of Health "Hydrogen Sulfide Chemical Information Sheet:" [https://www.health.ny.gov/environmental/chemicals/hydrogen\\_sulfide/](https://www.health.ny.gov/environmental/chemicals/hydrogen_sulfide/))

Santa Maria Cross Section  
 Geological Map of the Santa Maria and Twitchell Dam Quadrangles  
 By Thomas W. Dibblee, Jr., 1994



This represents the geology of a cross section of the Santa Maria Valley parallel to Highway 101. Oil companies have to drill through the Santa Maria groundwater basin to reach the Monterey Shale formation where the oil lies.

**Enhanced Oil Recovery (EOR) techniques:** Enhanced Oil Recovery (EOR) methods have been used in Santa Barbara County on a regular basis since the 1970s, but are used more and more as crude oil prices have increased. Today's complex processes, with a mix of extremely high pressure, high heat (550+ degrees Fahrenheit), polymers, and chemicals, bear little resemblance to early simpler techniques. A surprising number of wells have used fracking techniques over the past 20 years in a county where we are often told that the oil industry has not fracked. The types of EOR currently used here are "cyclic steam" (which uses a dual-purpose well that both injects and extracts), "steam flood" (in which an injection well is surrounded by five or more extraction "production" wells), and "water flood" (in which ambient-temperature water is injected deep below ground to force oil to the surface).

**The energy it takes to make energy:** Local oil production using Enhanced Oil Recovery techniques is an inherently energy inefficient process. Current EOR techniques used here are extremely energy-intensive and use diesel fuels, natural gas produced on-site, and other energy sources to produce steam, pressurize steam, pump oil, pump fluids into wastewater wells, and run separators. Of course, before this ongoing energy use, there is the initial massive expenditure of energy required to create a pad and to drill a mile deep into the earth. In the effort to extract the potential oil—which, when used, will contribute to greenhouse emissions—the industry uses extraordinary amounts of energy from sources that also contribute to our greenhouse emissions. Climate scientists rightly call this energy-inefficient situation a climate disaster. Additionally, because Santa Barbara oil is a heavy crude with a high sulfur content (also known as "dirty" crude), it takes considerable energy to process it enough to be used in products requiring low emissions.

**Enhanced Oil Recovery Risks Are Here Now:** With each new high-tech well drilled through the county's major drinking water aquifers, the risk of contamination through well failure is increased. The high-temperature and high-pressure techniques preferred by Santa Barbara County's new drillers have been linked to increasingly high rates of well casing failure.



Santa Maria Energy's pilot cyclic steam project in its Careaga Canyon lease in the Orcutt hills is shown in August 2012. Photo by Brian Bullock, Santa Maria Times.

CS Canada's Monthly Journal *Advances in Petroleum Exploration and Development* carried an article in Vol.5.N.1 2013 on this topic titled "The Technology for Improving Life of Thermal Recovery Well Casings." It stated: "**Casing failure is becoming increasingly prominent in thermal recovery wells.**" Through on-site survey and analysis the authors determined reasons for casing failure were "strength change by high temperature, cementing, and bad materials for casings." Enhanced Oil Recovery techniques require wastewater injection wells to deal with the millions of gallons of toxic water extracted with the oil. Recent research ties these types of wells to increased earthquake risk and groundwater contamination, both very serious issues to be considered.

**The oil industry evades any discussion of the risks** posed by steam injection casing failure, or of any chemicals/bacteria used in EOR techniques. However, there's one agency that makes them speak up about risks: The Securities and Exchange Commission.

**Risks must be disclosed:** Elizabeth Royte did some digging for her December 17, 2012 article in *The Nation*. She found that "although energy companies don't make a habit of telling potential lease signers about the environmental risks they might face, **the Securities and Exchange Commission requires them to inform potential investors.**" In a 2008 filing, Cabot Industries cited "well site blowouts, cratering and explosions; equipment failures; uncontrolled flows of natural gas, oil or well fluids; fires; formations with abnormal pressures; pollution and other environmental risks." (See <http://www.thenation.com/article/171504/fracking-our-food-supply>)

**Fracking in Santa Barbara County:** Prior to the passage of Senate Bill 4 in 2014, data on fracking and acidization was not collected. Fracking has been done in Santa Barbara County since around 1994. Although no formal records about fracking in Santa Barbara County were kept, regulatory agency staff recollect its use in the Four Deer Field. The June 1, 2011 *Santa Maria Times* article "Fracking for oil prompts questions about local oversight, contamination" references two fracking wells in the Careaga Canyon Oil Field near Vandenberg by Denver-based Venoco. Numerous recent articles refer to fracking in Steve Lyon's vineyard in Los Alamos. Perhaps as many as 24 total wells may have been fractured in Santa Barbara County to date, according to an industry insider who did not want to be named.



**No "acidization" or "acid matrix" wells have been developed here** that our local DOGGR office is aware of, without having kept records on these types of operations. However, the jury is still out as to whether those processes will work here.

**Will there be more fracking in Santa Barbara County?** The oil companies would like you to believe that there will be no more fracking due to Santa Barbara's geology not being conducive to the technique. In the past, we have often seen that the price of oil is what determines whether an extraction technique is viable. So it seems that fracking remains the sleeping giant in Santa Barbara County shale areas, and we will just have to wait to see what wakes it up. The following two quotes from oil industry reps make it clear that fracking seems to still be on the table:

Western State Petroleum Association's Tupper Hull is quoted in the August 23, 2012, *Santa Maria Sun* article "Boom or Bust?:" "There's certainly an interest in seeing whether hydraulic fracturing and directional drilling can be effective at developing the Monterey shale more extensively than it has been developed to date," Hull said. "But the jury is still out." Nick Ortiz, who works for the Western States Petroleum Association, is quoted in a June 26, 2014 piece from NPR affiliate radio station KALW, "Fracking California:" "It's an open question whether hydraulic fracturing is going to be the thing that unlocks the Monterey Shale and allows large-scale production." (See <http://www.santamariasun.com/cover/8655/boom-or-bust/> and <http://kalw.org/post/fracking-california-view-kern-county>)

**The California Council on Science and Technology study** "Advanced Well Stimulation Technologies in California" concluded:

"In California Monterey shale, the low-permeability extensive, and continuous shale layers are amenable to production with high volume hydraulic fracturing from long-reach horizontal wells."

(Section 4, *Prospective Application of Well-Stimulation Technologies in California*) (See: <http://www.ccst.us/publications/2014/2014wstES.pdf>)

### **Companies planning to drill soon with high-risk technology:**

Aera Energy (300 wells and county permit applications are expected soon)

This is not a local hometown company. They produce about 25 percent of California's gas and oil and are jointly owned by Shell and ExxonMobile with revenue of over \$5 billion in 2013. They have 1,400 employees. This is the same company that polluted groundwater in Kern County costing an almond grower his trees, his soil, and his irrigation source: in short, his livelihood.

ERG (220 wells with all the county permit applications received, but not yet approved)

This company is owned by China's "Gold Leaf Jewelry Company." ERG's management got ten Chinese investors to ante up nearly \$938 million to gain a 95 percent position in Texas-based ERG. According to a February 17, 2014 *Wall Street Journal* article "Chinese Retailer to buy U.S. Energy Firm," ERG's most significant assets are oil-producing leases on 20,000 acres in Cat Canyon. It is unlikely that these overseas investors care much about the impacts of oil extraction in Santa Barbara County.

Santa Maria Energy (SME) (136 wells with county permits already approved)

This company has "more than 7,700 potential drilling locations" according to a January 2014 interview with the *Pacific Coast Business Times* written when SME was seeking funding. These 136 wells are a drop in the company's future oil bucket. Because SME has a very well funded and well-honed public image, they frequently represent the oil industry to the public in North County.

Pacific Coast Energy Company LP. (PCEC) (96 wells with county permit applications received)

PCEC is a privately held entity headquartered in Los Angeles. This company owns 6,000 acres on Orcutt Hill, which is its largest operation and "a rich source of energy and vitality for the Santa Maria Valley." After required mitigation and purchase of offsets, the 96-well project will be allowed to produce 10,000 metric tons of greenhouse emissions. It will use 1.8 million gallons of fresh water (from the company's wells) in the drilling phase alone. Ninety new oil seeps have already started to flow since PCEC started cyclic steam drilling, with 54 of the seeps still uncontrolled at the time of their Environmental Impact Review for their new project.

Freeport-McMoRan (9 wells with county permit applications approved)

As a division of Freeport-McMoRan Copper & Gold Inc. (NYSE: FCX), Freeport-McMoRan Oil & Gas is headquartered in Houston, and is the fourth-largest oil and natural gas producer in California. In addition to onshore North County production, they have offshore production in California as well. This large, international mineral, oil and gas extraction corporation is best known for owning the largest gold mine in the world, where they sent 1 billion tons of waste downriver to the people of Indonesia.

PetroRock, LLC/Vaquero Energy, Inc. (56 wells with county permit applications already approved for the Cat Canyon Field)

This Cat Canyon Field project will use 8 million gallons of fresh water per year, not surprisingly just under the level of "significance" requiring additional review. Vaquero Energy is a privately held company from Bakersfield, founded in 2000. It is also a company listed in Solvang and Santa Maria as founded in 2007, under the same name with only two employees. Their online presence is minimal, vague, and confusing. PetroRock, LLC has no business profile and is listed as doing business at the same address as Vaquero Energy. The owner and president is Ken Hunter, Jr. (Ken Hunter, Sr., brought Santa Barbara County its only Superfund cleanup project, when he walked away from his Casmalia Toxic Waste Dump with a tidy profit, leaving taxpayers with a \$284 million dollar cleanup bill, plus reported death, cases of birth defects, and life-altering illnesses in Casmalia. Three years later he was building multi-million dollar golf courses, which Ken Hunter, Jr. now manages and seems to own.) Ken Hunter, Jr. received a 2005 Violation Citation from the Fair Political Practices Commission for failure to report political contributions in a timely manner. Hopefully future reporting practices will all be up to snuff with this company that is about to drill at a site located at the top of the huge Santa Maria Aquifer, which provides water to 12 cities, over 200,000 residents, thousands of businesses, and hundreds of square miles of agriculture.

Sources/Further Reading for above:

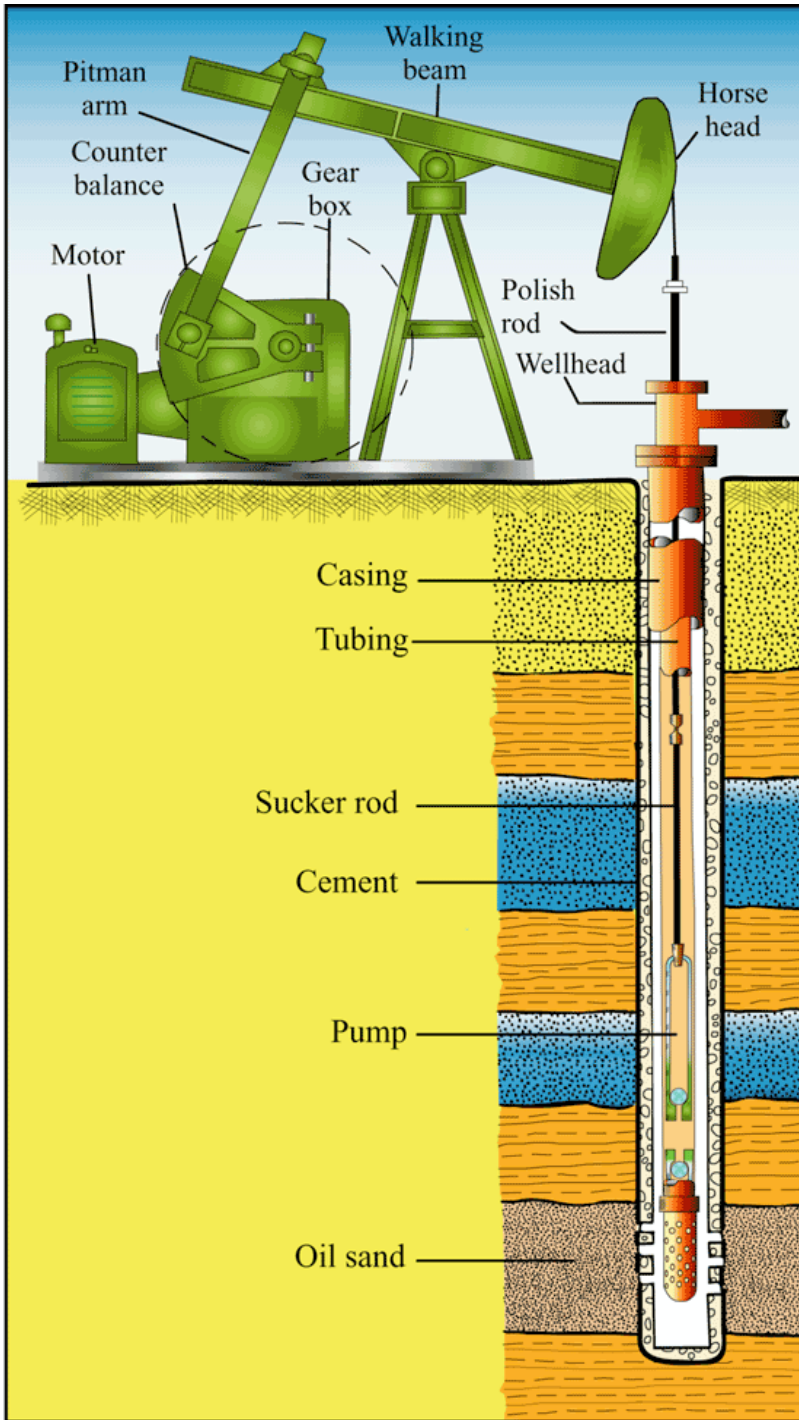
[www.vaqueroenergy.com/](http://www.vaqueroenergy.com/)

[www.myp.com/Santa-Maria,CA/Vaquero-Energy-Inc/profilehttp://www.bing.com/search?q=vaquero energy inc. %2B Santa Maria ca&qs=n&form=QBRE&pq=vaquero energy inc. %2B santa maria ca&sc=0-34&sp=-1&sk=&cvid=a17672fd52c347aca613d448620e94d3](http://www.myp.com/Santa-Maria,CA/Vaquero-Energy-Inc/profilehttp://www.bing.com/search?q=vaquero%20energy%20inc.%20Santa%20Maria%20ca&qs=n&form=QBRE&pq=vaquero%20energy%20inc.%20santa%20maria%20ca&sc=0-34&sp=-1&sk=&cvid=a17672fd52c347aca613d448620e94d3)

[www.yellowpages.com/solvang-ca/mip/vaquero-energy-inc-](http://www.yellowpages.com/solvang-ca/mip/vaquero-energy-inc-)



5892080http://www.bing.com/search?q=vaquero energy inc. %2B Santa Maria ca&q=n&form=QBRE&pq=vaquero energy inc. %2B santa maria ca&sc=0-34&sp=-1&sk=&cvid=a17672fd52c347aca613d448620e94d3  
 http://igorinternational.com/press/bksfld-oil-company-energy-names.php  
 http://www.bizapedia.com/ca/PETROCK-LLC.html  
 http://articles.latimes.com/1991-01-13/news/mn-384\_1\_toxic-waste  
 http://en.wikipedia.org/wiki/Casmalia\_Resources



This well diagram was created by DOGGR. Here are terms that help with understanding what is going on underground and where problems can occur:

**Well head:** includes the stuffing box, flow line, and various valves and pipes to direct the flow of oil and gas at the surface.

**Sucker rods:** transmit movement from the surface pumping equipment to the down-hole pump.

**Pump:** admits fluid from the producing oil sand into the tubing and lifts the fluid to the surface.

**Casing:** heavy steel pipe that lines the walls of the hole.

**Cement:** used to fill the space between the hole and the casing. Together with the casing, this prevents caving of the hole, prevents movement of fluids (water, oil, or gas) between rock layers, confines production to the well bore, and provides a means to control pressure.

**Tubing:** steel pipe of a smaller diameter than the casing, placed inside the casing string, to provide a path for the produced fluids to reach the surface.

**What's in our future?** As noted previously, there are over 20 oil companies extracting oil in Santa Barbara County and just one of these companies, Santa Maria Energy, "has more than 7,700 potential drilling locations, at three locations in Casmalia, Orcutt and just south of

Santa Maria. The highest historic number of new oil/gas wells for the entire five-county region in a year is around 200, according to Pat Able, District Deputy Director of the local office of DOGGR. So far in just this year, the County of Santa Barbara has received 817 new drilling permit applications of which 201 have already been approved. Digesting these figures: concerned citizens conservatively estimate Santa Barbara County's "Enhanced Oil Recovery Boom" could bring as many as 10,000 new wells in the next decade. To put that 10,000 number into perspective, Santa Barbara County would then have more than half the total new wells permitted in the entire shale-boom state of Pennsylvania since 2008 (nearly 16,000 wells).

**The "Shale Boom" can happen fast:** The New Yorker ran an article about Wyoming's oil boom in Sublette County that declared "...nothing had quite prepared the county for the current state of affairs." In Boomtown Blues: "How natural gas changed the way of life in Sublette County," Alexandra Fuller summarized the boom.

In the ninety years from 1910 to 1999, just over three thousand wells were drilled in Sublette County. Since 2000, almost eighteen hundred new wells have been added, and seven thousand more have been approved for drilling in the next ten years. (See: <http://www.newyorker.com/magazine/2007/02/05/boomtown-blues>)

**The "Shale Boom" is here:** From the millions of dollars of oil industry money spent to defeat Measure P and from the unprecedented number of current well permit applications, it's obvious that there are massive expansion plans on the part of Santa Barbara County oil operators. It looks like the oil shale boom has already arrived in Santa Barbara County.



Workers cleaning up at a 2008 Greka spill in Santa Maria.  
Credit: AP Photo/Damian Dovarganes

**Companies that value profits over safety have drilled here in the past and are drilling here now.** The local oil industry points to what they call "a few bad apples in the barrel." As we found with the eight million gallon Unocal spill, it only takes one bad apple to pollute a groundwater basin. (See details of the Unocal spill in Chapter 2, 2.1 of this report.) No matter how strict our federal, state, county, and city government regulations are, they will not stop accidents, unscrupulous management, well failure, unforeseen explosions, traffic collisions rupturing tankers transporting toxic wastes, the unavoidable health risks that come with oil expansion, or more employees covering up serious problems. Catherine Gautier, Professor Emerita, UCSB Geography Department, sees that, "Fortunately we have the option of renewables — energy from the sun and wind. These clean energy sources are cost-competitive today and have virtually no health, environmental or depletion downsides. They are the fastest-growing energy sources today, but we need to accelerate their development even more."

## 1.2. An unsafe local oil industry

**The unsafe history of oil extraction in Santa Barbara County** is well documented, but rarely discussed. Most long-term residents remember the Santa Barbara spill of 1969 during drilling from an offshore platform gone awry. That spill fouled 40 miles of coastline with huge impacts on marine mammals, aquatic wildlife, sea bird populations and the community in general. Few residents remember a much larger spill, the Guadalupe Dunes Diluent spill of 9 million gallons.

**The Guadalupe Diluent Spill is one of the largest in U.S. history:** The spill was centered along the border of Santa Barbara and San Luis Obispo counties and contaminated the wetlands and estuary of the Santa Maria River, acres of the unique Guadalupe Dunes ecosystem, the marine environment at the mouth of the river, and the Santa Maria Groundwater Basin a mile up from the ocean. This was caused by Unocal failures of high-pressure enhanced oil extraction project's infrastructure.

**Greka's numerous spills:** According to the March 27, 2008 issue of *USA Today*, "Broken pumps, busted pipes, overflowing ponds and cracked tanks at Greka installations have spilled more than a half-million gallons of oil and contaminated water since 1999, fouling the water, soil and air." These spills are discussed further in Chapter 2 in the section More Groundwater Contamination.

**Worker safety, leaks and seeps:** On October 15, 2013, Tom Bolton, Noozhawk Executive Editor, reported on the death of an oil-field worker from Bakersfield who died near Los Alamos, reflecting just how unsafe a workplace the oil industry can provide. Santa Barbara County APCD documents show that a Cat Canyon facility, prior to Greka's purchase, had a cancer risk from diesel particulate matter 8 times the national norm. A May 26, 2013 article in the *Santa Maria Times*, "Produced water leak travels mile over oil field" indicated a leak from a wastewater pipeline traveled across an oil field and into a creek bed. California Department of Fish and Wildlife officials supervised cleanup in that dry creek bed. On another front, operations by ERG are documented as causing more than 90 seeps near Orcutt.



**The Greka Santa Maria Asphalt Refinery**, one of two large oil refineries that sit atop the Santa Maria Groundwater Basin a few miles west of Santa Maria, is also referenced in the *USA Today* article: "Of 21 refineries in California, Greka Oil & Gas Inc. is the fourth-smallest producer, but the state's biggest inland oil polluter, according to state officials."



**Greka Energy's long record of pollution:** From 1999 to 2007, the Santa Barbara Air Pollution Control District inspected Greka facilities 855 times and issued 298 violations. Company employees at Unocal and Greka have been found guilty of covering up spills, to the detriment of public safety. The March 19, 2011 *The Santa Barbara Independent* carried an article, "Greka and County Reach Historic Settlement," which recounted how Greka Energy was cited with more than 1,700 violations in the two months immediately following the approximately 150,000 gallon crude oil spill in late 2007.

**Soils polluted by Conoco Phillips, Chevron, Unocal, Union Oil, Anadarko Petroleum, and KerMcGee** have caused roughly 20 Santa Maria families to lose their homes, which were built on abandoned sumps. After the homes were destroyed, oil companies removed tons of toxic soil.

**An unnatural rise in earthquake frequency in 2013:** From 2000 to 2012 earthquakes averaged less than two per year within a 30-mile radius of Orcutt. In 2013 there were 58. This is an alarming increase. A study by the California Council on Science & Technology, Lawrence Berkeley National Laboratory Pacific Institute has documented the relationship between oil industry activity and a 1991 earthquake in Orcutt. Since then considerable research has been done on the relationship between oil industry wastewater injection wells and increase in earthquake frequency. This topic is discussed in detail at the end of this Chapter (1.4).

**"Best Management Practices" failed to protect the county:** All this contamination, pollution, and earthquake rate increase occurred despite widespread thinking that best management practices used at the time were more than safe. In the years to come, what will we think of the safety of currently accepted best management practices that the County Planning and Development Department trusts to protect county lives and resources?

**State Assembly member Das Williams recently asked,** "With a history like this, why do we believe that the future will be different, with so much more at risk?" Indeed, why should we believe it will be different? To do so is to adopt the tragically common attitude of the battered spouse who stays with their abuser, believing their claims that they will change. "Next time, honey, it will be different..." Putting faith in such claims causes history to repeat itself.

## **1.3. Well failure research alarming**

This is a most significant issue and there is a flood of research pertinent to Santa Barbara County oil extraction. Recent studies show well failure is more commonplace than once believed. What follows is a lay attempt to find credible industry sources of published studies and information.

### **1.3.1. Well failure due to cementing and casing issues**

All the wells in Santa Barbara County have cementing and casings, so well failure due to these two well components is a serious issue. The casing, as we showed in Oil Industry Overview, is the segmented, threaded, steel pipe that goes down the newly bored well hole. But first, let's clarify that a casing failure does not imply that groundwater was contaminated, although that could be the result of a casing failure. The space (minimally 1-2 inches) between the casing and the untreated sides of the well is pumped with cement to permanently set the casing in place and provide structural support, protect the steel from corrosion and keep pollutants encased. Poor quality cementing can impact casing strength safety.



**Duke University's Thomas Darrah**, who was the lead author on the major study *Noble Gases Identify the Mechanisms of Fugitive Gas Contamination in Drinking-Water Wells Overlying the Marcellus and Barnett Shales*, concluded that water problems were not due to enhanced oil extraction techniques but that “the contamination in these clusters stems from well-integrity problems such as poor casing and cementing.” Additionally, Robert B. Jackson, professor of environmental and earth sciences at Stanford and Duke, further clarified that: “People’s water has been harmed by drilling.” (See <http://nicholas.duke.edu/news/faultywells>)

**"Much of the industry has long known that if water contamination was found it was the result of poor cement jobs,"** said Vikram Rao, a former Halliburton chief technology officer. He was speaking as an individual and not as chairman of the Mining and Energy Commission in a *News Observer* interview about the Duke study.

(See <http://www.usatoday.com/story/money/business/2014/09/15/faulty-gas-well-pollute-water/15631955/> )

(See <http://www.newsobserver.com/2014/09/15/4153640/duke-scientists-fracking-didnt.html#storylink=cpy>)

**Cementing and casing problems closer to home:** In 2008 The Society of Petroleum Engineers published a report by Chevron regarding their well-casing problems involved in 370 cyclic steam injection wells in Kern County. They concluded that the 500-degree steam takes a serious toll on well casings. **69 of the 370 wells had well-casing problems.** (See <https://www.onepetro.org/conference-paper/SPE-114231-MS>)

**Another study focused on casing and cementing failure:**

According to Scott Anderson of the Environmental Defense Fund, The Energy Institute at the University of Texas at Austin released a major report titled, “Fact-Based Regulation for Environmental Protection in Shale Gas Development.”

Findings included: groundwater contamination occurs in conventional oil and gas operations from failure of well-bore casing and cementing (not just in EOR), that gaps remain in the regulation of well casing and cementing, and that subsurface uncontrolled fluid releases during construction and operation appear to be under-reported. The last finding raises the question whether here in Santa Barbara County we are

getting full disclosure of casing, cementing and other types of well failures. (See report summary at:

<http://blogs.edf.org/energyexchange/2012/02/16/if-the-problem-isnt-hydraulic-fracturing-then-what-is/>)



**Fixing cementing and casings is expensive and not all existing wells can be fixed:** A September 15, 2014 article in *USA Today* quoted Duke study co-author Rob Jackson, Stanford professor of environmental and earth sciences: "Well integrity is the most important issue for maintaining drinking water quality. While companies can retrofit many gas wells to ensure proper sealing such measures can be expensive and not all existing wells can be fixed." This conclusion is especially worrisome for Santa Maria Groundwater Basin users in 12 cities in two counties, because Greka Energy—with its history of taking short cuts—is drilling in their aquifer. (See this important study:

<http://www.usatoday.com/story/money/business/2014/09/15/faulty-gas-well-pollute-water/15631955/>)

**Oil industry seemingly unconcerned about cementing and casing failure:** Marcellus Drilling.com commented on the Duke University study in their article, "New study finds well casings not fracking cause methane migration" finding "It certainly doesn't sound like earth-shattering news..." (See: <http://marcellusdrilling.com/2014/09/new-study-finds-well-casings-not-fracking-cause-methane-migration/>)

**It is alarming that the oil industry** does not consider this "heads-up" significant, as it appears they have potential safety issues from something as pervasive as casing failure and cementing. To the layperson these seem to be significant issues, as they apply to virtually all types of oil industry wells.

**A layperson's observation about cementing issues:** Among other things, well cementing exists to keep escaping pollutants encased. Do you remember how easily water flowed "up hill" through your cement slab floor from a broken pipe embedded in it, to damage your flooring? That 4+ inch cement slab (which was able to be worked, finished, and air dried) seems to the layperson to be made of a porous product that cracks and seems neither waterproof nor chemical-proof. The public is putting a lot of hope on a thin layer of cement. The BP oil spill in the Gulf of Mexico four years ago was related in part to problems with cement that was supposed to act as a gas barrier in the well.

### **1.3.2. Failure of well casings: cyclic steam injection and steam flood**

This section discusses research on casing problems with "thermal oil recovery" techniques, like the cyclic steam and steamflood that are found throughout the Santa Barbara County oilfields. Cyclic steam is the well-of-choice for operators who have submitted the 818 permit applications to the County so far this year. Canada is a large center for thermal oil recovery and has published new studies on this topic. They define casing failure as a break or leak in a casing string that causes integrity loss so the wellbore can no longer hold pressure.



Steam injection wells at Pacific Coast Energy

**Casing failure is becoming increasingly prominent in thermal recovery wells:** In the Tang/Zhou comprehensive study, "Technology for Improving Life of Thermal Recovery Well Casing," published recently in Canada during 2013 in *Advances in Petroleum Exploration and Development*, the report conclusions included: "(1) Casing deformation and failure in thermal recovery wells is serious, the direct reason for casing failure is due to the expansion when it is heated, when the axial stress can not be

released, the axial stress becomes side stress and casing is deformed and cut. (2) The influencing factors of casing damage include strength change by high temperature, sand flow over of oil formation, poor cementing, unfavorable heat insulation and bad material for casing et al." One of the authors further explained what casing material issues were: "If there are micro pores or slits in casing, its thread does not meet the engineering requirements, or shearing strength and tensile strength are lower than the standard value, casing failure will happen during the long term steam injection after well completion."

The study also concluded that "Casing failure is becoming increasingly prominent in thermal recovery wells, which severely restricts the development effect of such reservoirs." (See: [www.cscanada.net/index.php/aped/article/download/j.aped...](http://www.cscanada.net/index.php/aped/article/download/j.aped...))

**A major Canadian Petroleum Association study looks at casing failure:** "Thermal Well Casing Failure Risk Assessment" was prepared for the Canadian Petroleum Association. The August 1992 comprehensive study of ten operators with 3,300 thermal wells and multiple casing failures runs over 150 pages in length. An attempt has been made to present a summary of the complex study results in an easily understood manner. Although this Thermal Oil Recovery analysis was done in oil sands of Canada, to the lay reader the study findings of uphole casing failure from external corrosion and thermal stress have significance for Santa Barbara County since both of those factors apply to our area's thermal wells. The study points out that there are numerous potential causes of casing failure that relate back to the complexity of thermal oil recovery and the impacts of up to 550 degree heat.

The study also pointed out that "cyclic steam wells operate under more severe conditions. They are more likely to have produced fluids escape because they use higher pressure than other thermal oil recovery techniques during their 15-75 day pressurized steam injection phase. Another key difference between these various thermal techniques is the issue that cyclic steam wells have more thermal temperature change cycles than other wells, causing additional casing stresses." This study did not address steam-related casing deformity or buckling if the damage still would hold pressure. They found that in many cases these damaged casings would operate successfully through additional cycles of steam stimulations.

**Casing failure analysis was separated into two categories:** Uphole (toward the top of the well casing) and downhole (deep in the well in the oil reservoir or above it).

This Texas wellhead was blown when the casing parted and "frac waters" flowed out of the wellbore for two weeks. Photo courtesy of the Environmental Defense Fund.



Uphole causes of casing failure identified by study: **Thermal stress** (reduced by new higher strength casings) includes: tension failure, compression failure, and burst failure. **Connection failure** can occur when the force of the steam injection process exceeding the strength of the connector. Although uncommon, damage during a well servicing operation can result in a casing failure if the connection was damaged sufficiently so that it is no longer strong enough to withstand the thermally induced stresses of steam stimulated operations. Another type of casing damage is over-torquing during the assembling of the casing sections. Though uncommon, leaking through the mated threads of the casing collar and pipe body may ultimately result in a casing failure.

The study finds there has been uphole casing failure from **Sulfide Stress Corrosion Cracking (SSCC)**, which is related to moisture and hydrogen sulfide in contact with the casing. Temperatures below 176 degrees Fahrenheit will accelerate this process. Steels that are susceptible to SSCC are no longer used in Canada.

**"External casing corrosion** is caused by a different electro-chemical potential between the steel of the casing and the soil or formation. The rate of this type of uphole casing failure increases slowly with the age of the casing. **This rate is not anticipated by the study to be more than a few percent of the thermal wells installed.** The high well temperatures can accelerate corrosion underway ... Heat can also boil away water that is resting against the casing allowing oxygen to reach bare steel." (Author's note: California soils are "generally corrosive" and Santa Barbara has some soil types that are rated even higher. Additionally, this study did not address the simultaneous process of bacterial corrosion.)

Downhole source of casing failure are identified by study: "These casing failures are almost always a direct result of the geo-mechanical forces generated by high pressure steam stimulation of the oil reservoir. These forces often cause a shearing motion along the sand/shale interface at the top of the producing reservoir and this lateral shear can cause horizontal displacements of up to 20cm in the producing reservoir. This process results in the buckling, collapse or complete shear separation of a casing string. **Since the geo-mechanical forces which cause these failures are so large, little can be done with a well's casing design to prevent this.**" This type of casing failure is the most prevalent in the study. (Author's note: How this Canadian experience with their sand/shale formation specifically applies to our Monterey Shale needs to be explained as well as the possibility of aquifer contamination.)

Failure Rates: Since the report authors concluded that downhole casing failure had no impact on the higher usable aquifers or other environmental resources, they separated the uphole and downhole statistics. Pre-1971 casing designed wells (with a combined uphole and downhole failure rate of 45%), for safety reasons, were all suspended or abandoned by the time of the study and were excluded from statistics.

Adding together both the "primarily 1970-79 casing designs" category (which had a considerably higher failure rate) and the improved "primarily 1980 to present casing designs" category, there was a uphole casing failure rate of 2.2% plus a downhole casing failure rate of 2.9%. The combined uphole and downhole rate failure was **5.15% of the total wells**. Based on current performance of the post 1980 wells and the retiring of the older less safe wells, the study suggests the future overall uphole casing failure rate should improve to .6% and downhole rates to 2.6%. (Find a downloadable pdf of full report at: <http://www.capp.ca/getdoc.aspx?DocId=108078&DT=NTV>)

A lay citizen interpretation of study results and implications for Santa Barbara County: The conclusions above that there will be an uphole casing failure rate in the future of 0.6% does not account for the



study's projected future "not more than a few percent of the thermal wells installed" increase in the rate of casing failure due to external corrosion (discussed above). Working with an arbitrary figure of 2.5% as our definition of "not more than a few," the total projected future uphole casing rate could be closer to 3.1%.

Of the 818 wells going through the permitting process this year alone here in Santa Barbara County, the hypothetical uphole casing failure rate of 3.1% would be approximately 25 wells having casing failure. Of those 25 hypothetical casing failures, it is unknown how many might result in ground water contamination.

Since cyclic steam extraction is the most common oil extraction method proposed in Santa Barbara County, perhaps our thermal well-casing failure rate might be even higher than those suggested in the study ... since the report found that "They (cyclic steam wells) are more likely to have produced fluids escape because they use higher pressure than other thermal oil recovery techniques during their 15-75 day pressurized steam injection phase." If the U.S. oil industry has similar data on casing failures for thermal oil recovery techniques, it was not found.

It is logical that to reduce well failure rates, corrosion should be minimized as much as possible by using the latest technology. Is the local oil industry installing and maintaining technology such as cathodic protection systems or similar technology, without which the likelihood of well failure increases?

### **1.3.3. Steam injection well casing appears to fail due to earthquake in Kern County**

John Cox, reporter for The Bakersfield Californian, covered the appearance of the sinkhole full of steam and boiling fluid that opened in the midst of a cyclic steam extraction site near Taft. Cox stated that "cyclic steam fracturing led directly or indirectly to the sinkhole." After the sinkhole claimed the life of an oilfield worker, Cox said that: "The industry is reluctant to abandon the particular method of steam injection that regulators suspect contributed to the sinkhole's formation." The article also pointed out that: "A steam injection well next to the sinkhole appears to have been sheared by seismic activity. At the time the article was published on October 3, 2011 Chevron had been unable to cap that well despite three attempts and more than \$2 million dollars." (See article at: <http://www.bakersfieldcalifornian.com/business:x65.158817/news-analysis-oil-industry-frets-over-sinkhole-controversy>.)

This article suggests that seismic activity could cause casing failure in steam injection wells. With dramatically increased seismic activity in the Santa Maria Valley, this possible finding could have implications for potential groundwater contamination.

### **1.3.4. Possible well failure in wastewater injection wells**

**Wastewater injection well problems recently identified: The San Diego Free Press article "Massive Dumping of Fracking Wastewater into Aquifers Shows Big Oil's Power in California" published October 10, 2014 confirmed that:** "The state's Division of Oil, Gas and Geothermal Resources (DOGGR) shut down 11 Kern County oil field injection wells and began scrutinizing almost 100 water wells that are potentially contaminated. The Environmental Protection Agency, which has ultimate legal authority over underground injection, ordered state officials to provide an assessment of the water-contamination risk within 60 days, and the letter from the state Water Board confirms that illegal

contamination has occurred at multiple sites." The article quoted The Center For Biological Diversity: "While the current extent of contamination is cause for "grave concern," the long-term threat posed by the unlawful wastewater disposal may be even more devastating. " (See full article at: [http://sandiegofreepress.org/2014/10/massive-dumping-of-fracking-wastewater-into-aquifers-shows-big-oils-power-in-california/#.VD\\_tPmd0zIU](http://sandiegofreepress.org/2014/10/massive-dumping-of-fracking-wastewater-into-aquifers-shows-big-oils-power-in-california/#.VD_tPmd0zIU))

The recent State of California Water Board finding that linked wastewater injection wells to the groundwater pollution problem in Kern County did not identify the cause of the contamination. The state's report due out in December should do that. The possibility of some type of well failure exists. If it does not exist, the practice of injecting of toxic oil industry wastewater below irrigation and drinking water aquifers might be at fault.

**Industry well failure statistics:** Not surprisingly, the *USA Today* article referenced earlier said an industry group raised questions about the Duke University study, which is referenced above. Katie Brown, spokeswoman of Energy In Depth, a program of the Independent Petroleum Association of America, which represents natural gas and oil producers, claims, "Well integrity failures are 'exceedingly rare,' occurring in a fraction of 1% of wells."

Brown's figure might well come into question in light of recent research that suggests widespread problems in the cementing and casings in wells and the specific findings on heat related challenges to steam injection well casings. Additionally, a 1% chance of polluted water does not sit well with Santa Barbara County vintners who continue to say any risk to their water supply is too much. (See: <http://www.usatoday.com/story/money/business/2014/09/15/faulty-gas-well-pollute-water/15631955/>)

A parted casing could result in a spill of oil or other contaminants that could last for weeks or longer until the well is plugged. This could pollute a major aquifer and here in Santa Barbara County we are highly dependent on our aquifers for urban and agricultural needs. The papers cited in this chapter offer techniques to help reduce the incidence of casing failures, but none claim that casing failures can be eliminated.

In a Santa Maria Times opinion piece, UCSB Climate Scientist Catherine Gautier concluded: "A major concern, and perhaps my biggest one, is the risk of contamination of our aquifers, together with the reality that once contaminated, they cannot easily be remedied, and certainly not within a few years. A mistake with our water resources cannot be erased. Contaminated underground water is irreversible in my lifetime and probably that of my children as well. Remediating water contamination is usually through dilution. But California lacks excess water to dilute anything."

As Jerry Connor articulated in his July 10, 2014 *Santa Maria Times* column, "Geology and Unconventional Oil Extraction:" "North County proponents of cyclic steaming argue that the oil being produced lies far below the groundwater we use for farming and urban uses. But even the slightest risk is too much, and because of the geology of the area, there is some risk. **If our aquifer is contaminated, it would be the ruin of Santa Maria Valley's livability and agricultural productivity. Since these intensive extraction methods put our water at risk, we want to see these methods banned now to avoid damage that cannot be undone if failures occur in spite of the best efforts of the oil and gas producers.**"

(See: [http://santamariatimes.com/news/opinion/editorial/commentary/geology-and-unconventional-oil-extraction/article\\_4635f667-8ec7-5cf6-91cf-7f27759d6e06.html](http://santamariatimes.com/news/opinion/editorial/commentary/geology-and-unconventional-oil-extraction/article_4635f667-8ec7-5cf6-91cf-7f27759d6e06.html))

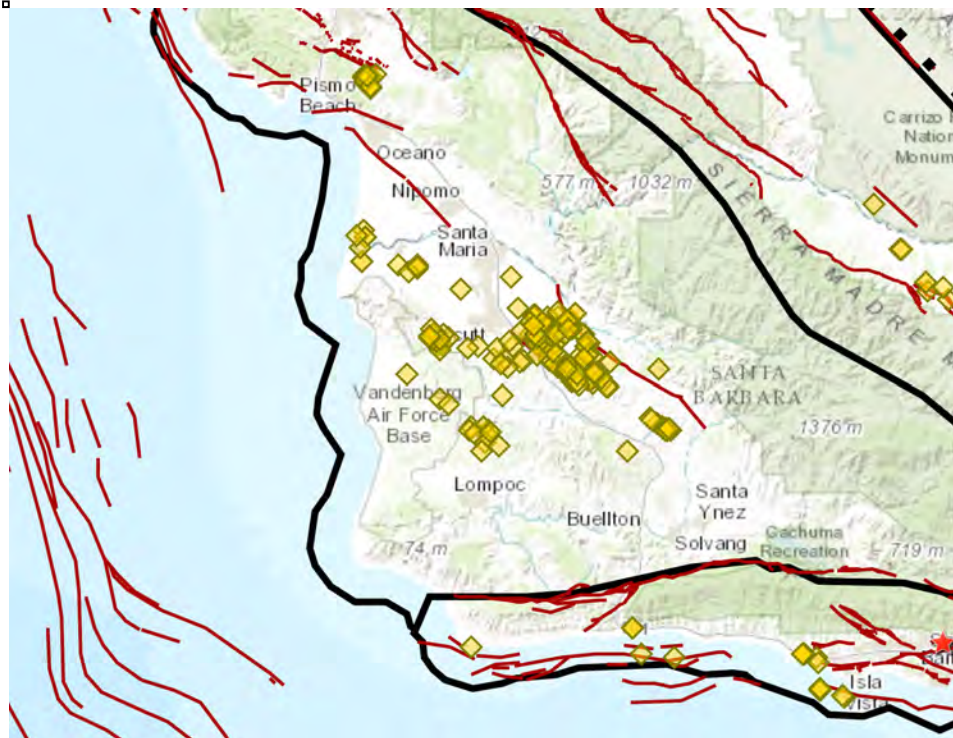
## 1.4. Earthquakes rates can increase from wastewater injection

The United States Geological Survey (USGS) has determined that wastewater injections done by the oil and gas industry can be responsible for an increase in earthquakes. Santa Barbara County has over 100 (and possibly as high as 240 from one verbal estimate) of these wastewater injection sites. In a recent Denver KUSA-TV 9NEWS interview Arthur McGarr, a USGS researcher who worked on the USGS study, commented: "We weren't very surprised. The earthquakes coincided pretty much with the time and history of the waste water injection in some fairly high volume wells." McGarr continues:

**Two things lead scientists to the wastewater injection conclusion:** 1. The proximity of the earthquakes to these very high volume injection wells was quite a substantial tip off. 2. USGS researchers also noticed a remarkable increase in the rate of detected earthquakes in the same area, compared to what had been reported decades before. There was approximately a one-year time delay when injections started and when the earthquakes began to be noticed.

Find the full text of the posting of "USGS: Oil, gas at fault for Colorado earthquake" from KUSA-TV 9NEWS here: <http://www.9news.com/story/news/local/2014/09/18/oil--gas-industry-at-fault-for-colorado-earthquake/15853795/>

Map of north county earthquake faults and wastewater injection wells



The United States Geological Survey explained how injection of wastewater at depth causes earthquakes: Earth's crust is pervasively fractured at depth by faults. These faults can sustain high stresses without slipping because natural "tectonic" stress and the weight of the overlying rock pushes the opposing fault blocks together, increasing the frictional resistance to fault slip. The injected wastewater counteracts the frictional forces on faults and, in effect, "pries them apart," thereby facilitating earthquake slip. See <http://www.usgs.gov/faq/categories/9833/3426>

**Orcutt area oil-related quakes:** In a recently released study by the California Council on Science and Technology for the BLM, authors referenced a 1991 earthquake in Orcutt, which was specifically attributed to oil production.

To our knowledge, in only one published paper (Kanamori and Hauksson, 1992) was a California earthquake greater than magnitude 2 linked to oilfield fluid injection. In that case, the authors attributed the occurrence of a very shallow event to injection at the Orcutt oilfield in the Santa Maria basin. This event was anomalous in that it radiated much lower energy at much lower dominant frequencies than normal earthquakes of similar size. (See: Study by the California Council on Science & Technology, Lawrence Berkeley National Laboratory Pacific Institute, dated August 28, 2014, titled “Advanced Well Stimulation Technologies in California” at: [http://ccst.us/projects/fracking\\_public/BLM.](http://ccst.us/projects/fracking_public/BLM.))

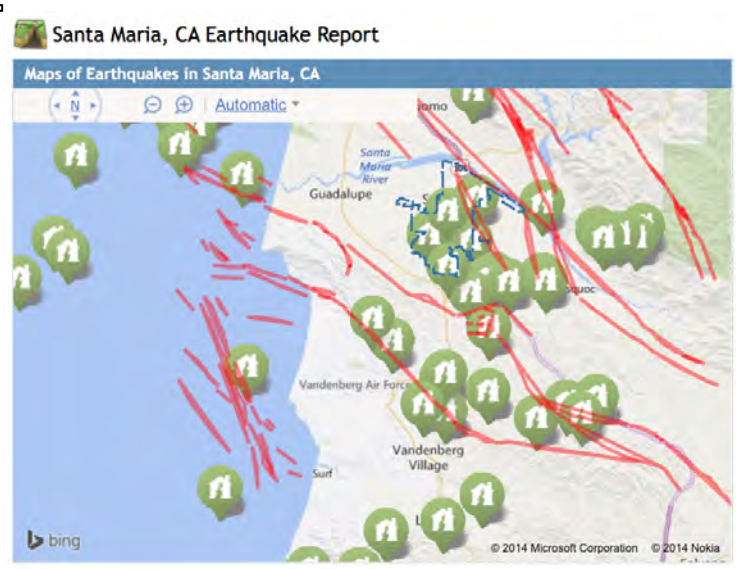
Likewise, the August 2014 *Bulletin of the Seismological Society of America* reported on the same January 1991 quake, where inquiries into operations in several oil fields in the area revealed the hydrofracturing was done in the Orcutt field from about 9-11 a.m. on January 31 and the earthquake occurred in the afternoon. (See entire bulletin article at: <http://bssa.geoscienceworld.org> )

The map below shows Orcutt area faults and nearby injection well sites. You can visit the associated website and use their interactive maps to easily find the area near your home.

<http://bssa.geoscienceworld.org/content/current>

**Suspiciously high current earthquake rates in Santa Maria Valley:** Using a seismological database (created to address the Due Diligence & Housing Compliance sections of a Real Estate Purchase Contract and inform homeowners) to view historical earthquake activity within a 30-mile radius of Orcutt, one may observe that there has been a significant increase in local earthquake frequency. From 2000-2012 there averaged fewer than two earthquakes a year. Yet in 2013 alone, there were 58 quakes recorded within that same area. (The Homefacts webpage allows prospective homeowners to research Hazardous Substances,

Environmental Issues, Geological Conditions, Water Quality, Convicted Offenders, Local Schools, Crime, etc. Their databases are used by other national websites. (See: <http://www.homefacts.com/city/California/Santa-Barbara-County/Orcutt.html>)



**Statistically, 58 earthquakes in one year is a major increase** from two and reflects what the USGS study previously discussed: the remarkable increase in the rate of detected earthquakes in close proximity to wastewater injected areas.

**Where are these earthquakes?** This USGS map above reflects quake distribution in the North County area in oil-active Cat Canyon, Orcutt, Casmalia, and south Santa Maria.



**Why worry?** Homeowners facing increased earthquake activity risk cracked foundations, chimney issues, sewer line displacement, stucco cracks, and structural damage. Community infrastructure damage would result in costs of repairing aging water and sewer system lines, road damage, sidewalk cracks, plus damage to public buildings. Regular homeowners insurance does not cover earthquake damage, natural or man-made by oil companies. Business owners risk inventory loss as well as structural damage. Repair costs from even moderate quakes could be expensive, but there are more important worries.

**A major earthquake could damage area oil industry facilities and extraction operations** that could lead to water basin pollution. Houses can be rebuilt, but tainted aquifers last lifetimes. The potentially problematic oil well cementing and casings on 3,000 new and older wells, the 62 miles of 30-inch crude pipelines that traverse the county above our aquifers, the complex production infrastructures above ground as well as their underground storage tanks, could all potentially fail from increasing seismic events. Despite the latest in earthquake safety equipment, a big quake could result in possible contamination of our water, air, and soil, with disastrous consequences for the economic health of the county and the physical health of its citizens.

(See <http://www.9news.com/story/news/local/2014/09/18/oil--gas-industry-at-fault-for-colorado-earthquake/15853795/>)



**The huge Phillips 66 Santa Maria Refinery sits atop the Santa Maria Valley Groundwater Basin not far from earthquake faults** and is where crude oil is brought into the facility by large-scale pipelines from suppliers all over California's Central Coast region. The product produced at Santa Maria is sent by pipeline to the refining facility in Rodeo, CA. These major pipelines may be at risk of damage from earthquakes caused by wastewater injection. The complex infrastructure, which processes 44,500 barrels of crude oil daily, could cause irreversible groundwater contamination, if

damaged by a quake. This major oil facility is less than 20 miles from the seismically active Orcutt area and also is located in an area of active faults.

**The Greka Santa Maria Asphalt Refinery** likewise sits atop the Santa Maria Groundwater Basin and is another major earthquake-vulnerable complex.

Although the oil industry likely has layers of redundant systems to shut down operations after pipeline or well ruptures, the community is still concerned about risk of groundwater contamination from earthquake damage to industry wells, facilities and pipelines. What will be the industry resources to adequately deal with the after effects of "the big one" with multiple well failures, pipe breaks, and other problems at a time of simultaneous community upheaval from possible fires, lack of water pressure, structure damage, and injury, etc.

# Chapter Two

## Negative Impact of Extreme Techniques on our Resources

### 2.1. Risk of more groundwater contamination

**A diluent-enhanced operation has already led to groundwater contamination in the Santa Maria's Groundwater Basin:** In North County, residents were lucky that one of the nation's major oil industry spills, The Unocal Guadalupe Dunes Spill (1950-1994), contaminated the Santa Maria Valley groundwater basin, the Santa Maria River and 360,000 cubic yards of soil a mile from Guadalupe, close to where the groundwater basin drains into the ocean.

**Scope of the huge spill:** According to Stuart Leavenworth, in his April 27, 2003 article in the Sacramento Bee "Dunes' spills still focus of cleanup," the site was 2,700 acres and the spill involved 8 million gallons of a diesel-like substance, known as diluent, used to help pump the thick crude out of the earth. The seaward movement kept pollutants from dispersing inland, in which case the spill could have ruined groundwater supplies for residents and businesses of the 12 cities in Santa Barbara and San Luis Obispo Counties. Agriculture from Orcutt to Pismo Beach could have been cut off from basin irrigation water if the spill had happened further up the watershed. (See full copy here: [http://www.sacbee.com/static/live/news/projects/denial/text\\_c1\\_s1.html](http://www.sacbee.com/static/live/news/projects/denial/text_c1_s1.html))



**This spill was twice as big as the 1969 Santa Barbara offshore spill.** According to Richard Paddock, LA Times staff writer who wrote a comprehensive article "Painstaking Efforts Expose State's Largest Oil Spill: Unocal admits problems over 40-year period. Firm is taking more extensive cleanup measures." He further reported on March 21, 1995, that the Guadalupe Spill was ranked number four, right below the Exxon Valdez spill, in total volume among the top 25 U.S. Spills. Read full article here: [http://articles.latimes.com/1994-03-21/news/mn-36782\\_1\\_oil-spill](http://articles.latimes.com/1994-03-21/news/mn-36782_1_oil-spill)

**Unocal employee criminal cover up.** Stuart Leavenworth, in his April 27, 2003 article in the Sacramento Bee indicated that it went undetected for 44 years due to an ongoing cover up by Unocal employees and because there were no drinking water wells that close to the beach to detect the toxins. 145 miles of pipe on the site leaked in 90 or more places. (A full overview report is here: [http://www.sacbee.com/static/live/news/projects/denial/text\\_c1\\_s1.html](http://www.sacbee.com/static/live/news/projects/denial/text_c1_s1.html))

**How much went into our water:** The "Final Restoration Plan for Natural Resources Impacted by the Guadalupe Oil Field Diluent Release," dated August 2001, conservatively estimated "12.1 million

gallons of free phase diluent existed in the subsurface at the water table.” The report further stated: "Another 88,700 gallons of diluent existed in the subsurface which included 77,000 gallons held in the soil of the vadose zone, 9,000 gallons dissolved in groundwater, and 2,700 gallons sorbed to the soil in the saturated zone."

(See <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=17291&inline=true>)

## **Oil Industry groundwater contamination comes from many areas:**

### **1. Above ground:**

As in the case of the Guadalupe Spill, toxics may leak from oil storage or toxic wastewater storage tanks, from failed pipes and connections, or as a result of processing equipment leaks, rupture of trucks for crude or chemical transport, well blow-out at the surface, on-site chemical mixing, etc.

While faulty well construction is a major concern, surface spills have caused an even higher number of groundwater contamination cases attributable to oil and gas development. A recent study commissioned by the Groundwater Protection Council (GWPC) determined that **roughly 70% of nearly 400 cases of groundwater pollution that was caused by oil and gas industry, over two decades in Texas and Ohio, stemmed from mistakes made at the surface** rather than from downhole problems.

([http://blogs.edf.org/energyexchange/2012/03/13/root-causes-of-water-pollution-from-oil-and-gas-operationsrations/?\\_ga=1.37019043.2070319279.1411253101#sthash.zsW0QPxF.dpuf](http://blogs.edf.org/energyexchange/2012/03/13/root-causes-of-water-pollution-from-oil-and-gas-operationsrations/?_ga=1.37019043.2070319279.1411253101#sthash.zsW0QPxF.dpuf))

### **2. Just below the ground:**

Oil pipelines, some as large as 30 inches in diameter, run just underground and have the potential to break and leak, allowing toxics to migrate down to the groundwater basin. Large-scale oil refinery and processing plant delivery pipelines are at risk of rupture, whether from earthquakes, aging materials, construction accidents or by other means. As discussed earlier, pipeline leaks have already occurred in the county.

### **3. Deep below ground:**

There can be leakage or a blowout in any of the sub-surface geological layers above, at, or below the groundwater basin. Several recent studies found contamination occurs as a result of improper original cementing of the well (a widespread problem) or faulty, thermally stressed or corroded well casings. These risks are further exacerbated by the corrosive nature of some of our local soils. During a well failure the release of oil and toxic produced wastewater into drinking water aquifers can occur under tremendous pressure, leading to broad contamination. Wastewater injection wells have recently been linked to groundwater contamination and are discussed below.

### **4. From the ocean:**

More drafting of the coastal aquifers from expanded enhanced oil recovery could lower the water tables and can cause possible saltwater intrusion. Ted Johnson, Chief Hydrologist for the Water Replenishment District of Southern California in an agency document "Battling Seawater Intrusion in the Central and West Coast Basins, clearly explained the process

"Salt water intrusion is the movement of ocean water into fresh water, causing contamination of fresh groundwater from salt. In coastal areas where groundwater is used for potable or agricultural purposes, such as the Central and West Coast Basin (CWCB), intrusion can be a serious problem resulting in the shut down of wells or necessitating expensive desalination

treatments." (See: WRD Technical Bulletin Volume 13, Fall 2007, <http://www.wrd.org/engineering/seawater-intrusion-los-angeles.php>)

**Wastewater injection wells recently linked to groundwater pollution:** The recent October 11, 2014 Reuters article, "California aquifers contaminated with billions of gallons of fracking wastewater" released new state Water Board findings that wastewater injection wells contaminated aquifers in Kern County. This finding is significant to us, as the county has a growing number of these wells used in conjunction with steam injection throughout county aquifers, such as the large Santa Maria Groundwater Basin. These are the same type of wells that can be linked to increased earthquake rates. Reuters further reported, "According to documents obtained by the Center for Biological Diversity, the California State Water Resources Board found that at least nine of the 11 hydraulic fracturing wastewater injection sites that were shut down in July upon suspicion of contamination were in fact riddled with toxic fluids used to unleash energy reserves deep underground. Despite these damning findings, the extent of wastewater pollution is still undetermined, as the Central Valley Water Board has thus far only tested eight water wells of the more than 100 in the area (under suspicion), according to the documents. Half of those tested came up positive for containing an excessive amount of toxic chemicals." (See full report: <http://rt.com/usa/194620-california-aquifers-fracking-contamination/>)

**One well blowout could cause big problems:** The Santa Maria Groundwater Basin supports over 200,000 water users. Santa Barbara County residents from Guadalupe, Santa Maria, Orcutt, Sisquoc, Garey, Tanglewood, and Casmalia use this water source. In San Luis Obispo County the cities of Nipomo, Pismo Beach, Arroyo Grande, Grover Beach, Oceano, and other small communities use the same water source. One major oil well blow out (some have run for weeks elsewhere) in the Santa Maria Valley Groundwater Basin could impact water being drafted from drinking water wells serving one or more of 12 cities, their residents, their business, and any one of the ranchers or farmers located on top of the 288 square mile basin.

**Recommendations for groundwater basins in Santa Barbara County:** Future water planning processes should include an analysis of projected long-term oil industry water needs to determine if water is a limiting factor in future oil development. Current ongoing monitoring of groundwater should include widespread testing for oil industry contaminants. Annual reports and analysis for the groundwater basins should include assessment of risks to water in the groundwater basin, and the risks related to oil industry activities in and above these aquifers must be addressed. The broader question we need to address in Santa Barbara County is if we should be putting urban and agricultural groundwater at further risk by additional oil drilling.

## 2.2. More contamination of rivers, streams, and wetlands.

**Spills in rivers, stream and wetlands are not popular.** For residents and homebuyers who enjoy the outdoors, the frequent news coverage of new spills by Greka Oil Company into area streams is not a strong selling point for our area. Neither is the past pollution of the Guadalupe Dunes wetlands and estuary and the Santa Maria River by Unocal. (See April 27, 2003 *Sacramento Bee* article, "State of Denial," for more information on the latter: [http://www.sacbee.com/static/live/news/projects/denial/text\\_c1\\_s1.html](http://www.sacbee.com/static/live/news/projects/denial/text_c1_s1.html))

Current use of complex and risky oil drilling techniques has already led to too many surface water contaminations. Greka alone has been cited with 21 spills into area waterways in just 5 years. A March



27, 2008 *USA Today* article (“Little oil company creates big problems” by Noaki Schwartz, Associated Press, quoted Steve Edinger, assistant chief of Fish and Game, as saying “Right now I can’t think of anybody that is worse than Greka. They are the biggest inland oil pollution problem we are dealing with across California. Nobody has our attention like Greka.” The *USA Today* article also notes that over a period of nine years, “the Santa Barbara County Fire Department has responded at least 400 times to oil spills and gas leaks at Greka Oil & Gas Inc.” (See: [http://usatoday30.usatoday.com/news/nation/2008-03-27-2157900458\\_x.htm](http://usatoday30.usatoday.com/news/nation/2008-03-27-2157900458_x.htm))



**During the Guadalupe Dunes spill,** the wetlands and estuary of the Santa Maria River were contaminated by Unocal with millions of gallons of a petroleum product toxic to aquatic wildlife.

**Summary:** If this past performance is an indicator of future performance, our streams, rivers, and surface waters are at risk from expansion of risky oil techniques.

## 2.3. Water allocation

**Homeowners want to know if future water rationing will limit their landscaping and household uses.** And any future homebuyer wants to know if there will be adequate water supplies for their new residence. We are in the midst of California's worst drought since the beginning of recorded weather data in 1895. With the possibility of up to 10,000 possible new wells, there has been no discussion of how the intensive water needs of those wells will be met. As mentioned above there is no adequate water allocation process in progress to set priorities for a limited, publicly owned commodity that crosses the city/county boundaries. Such a process would need to balance residential, agricultural, and non-oil business usage while it addresses oil industry expansion goals. The Santa Maria Valley Groundwater Basin stands to lose a great deal from poor planning that could lead to overdrafting and saltwater intrusion from the ocean. If basin levels drop below sea level, that would be a significant problem for farmers not wanting to irrigate using water with high levels of salinity, for water managers trying to provide customers with quality water, and citizens paying the bill for solutions. **Does our region have adequate water to support up to 10,000 potential new wells?**

**There is a finite amount of water available in North County** for our urban residential needs, our agricultural irrigation, and the needs of the area's growing diverse business community. Relegating a

disproportionate amount of the public's fresh and recycled water resources to one tiny sector of the business community—a sector already known for excessive water usage—understandably raises a red flag with many residents.

**Recycled water belonging to the public** is a byproduct of sewage treatment and has traditionally been used in North County for groundwater recharge, while at the same time providing agriculture with valuable irrigation water in a win-win arrangement. In this time of drought, state water allocations have been drastically reduced in North County by more than 85%. At the same time during this drought, next to no groundwater recharge is resulting from releases from Twitchell Dam. Farmers and ranchers regret that there is no current infrastructure for them to gain access to recycled municipal water. **Meanwhile, Santa Maria Energy can afford to build a 16-inch, 8-mile-long water line.** The line will link their 136-well project (with a \$120.7 million price tag) to the Laguna Wastewater Treatment Facility near Orcutt, while providing public user access along the line as a concession to the community. This SME project proposes to use 100,000,000 gallons of this viable water per year that will never recharge our groundwater in the future. Groundwater recharge in this time of drought and climate change is a significant issue, and water planners need to study the implications of taking water out of the groundwater cycle. They need to implement new groundwater recharge options as our population grows.

**In the future this allocated water will not be available to agriculture** when their needs increase. As oil companies continue to deplete fresh water from area aquifers, farmers' **irrigation wells become less efficient and more costly to operate.**



**Farmers Compete for water:** With water becoming an increasingly scarce resource, farmers in oil-boom areas are out priced in buying water. Clearly there is a need for water allocation planning on the part of water managers here to avoid these problems, seen in other oil boom counties.

A September 5, 2012 article in *The International New York Times* (“For Farms in the West, Oil Wells Are Thirsty Rivals,” by Jack Healy, discussed the plight of people like Peter V. Anderson who grows corn and alfalfa on the parched plains of eastern Colorado:

In average years, farmers and ranchers like Mr. Anderson say they pay about \$30 for an acre foot of water — equal to about 326,000 gallons — a price that can rise to \$100 when water is scarce. Right now, oil and gas companies in parts of Colorado are paying as much as \$1,000 to \$2,000 for an equal amount of treated water from city pipes.

(Available here: <http://www.nytimes.com/2012/09/06/us/struggle-for-water-in-colorado-with-rise-in-fracking.html?pagewanted=all&module=Search&mabReward=relbias%3Aw>



A tanker filling up at a hydrant in Colorado to supply a drill site. Oil-industry water tankers can be seen locally in Cat Canyon, filling up from a similar Golden State Water Company hydrant. Credit: Matthew Staver for *The New York Times*

## 2.4. Loss of groundwater recharge

**Fresh public water used by oil companies** is directly drawn from our aquifers by oil company-owned water wells, or taken directly from public water sources at fire hydrants or other hook-up locations. That water, which is then injected into the earth as steam, becomes tainted by whatever drilling chemicals and drilling mud additives are used. In addition, this once-viable water now also picks up naturally occurring toxic heavy metals and other material found deep in the earth. **Without expensive and energy-consuming treatments** (like reverse osmosis which is not currently used in Santa Barbara County) this once good water can never be used again for community and agricultural needs. It is important to note that a small percentage of fresh water is used by the oil industry for dust control and staff use onsite at oil operations, which does recharge groundwater.

**Exactly how is water lost?** We have a fixed amount of fresh viable water on the earth, in the ocean, rivers, lakes, glaciers, and below ground in water basins. You can never add to that, but the oil industry subtracts from it annually by injecting millions of gallons of "good public water resources" at 5,000 feet or more below the ground level in production wells or in oil company wastewater injection wells.

**If injected a mile down, water does not ever migrate to the surface again** to evaporate, form clouds or fog, and come back to our soil as fog, mist, dewdrops, or rain. (That is, unless there is well casing failure, earthquake, or wellhead mishap, in which case we will have another oil-industry disaster to add to the county's history.) When dry creeks and rivers start to flow, they are recharging our groundwater. Likewise, fresh well water used by farmers for crops and wastewater used for irrigation both contribute to the natural groundwater recharge cycle. Yet the fresh and recycled water used for oil extraction is permanently trapped deep below ground where it won't recharge our groundwater reserves, provide



residents with household water, support local business, grow crops, or nourish livestock. It won't help relieve drought conditions. Today's uncertain climate, reduced recharge, and drastic cutbacks to the state water project, provide even more reasons why the public can't afford to permanently lose water in this manner.

**Recycled water from our sewage treatment plants:** As discussed above under the topic of Water Allocation, the oil industry is starting to utilize large amounts of our recycled water. The bulk of this too is injected down wells and lost to the groundwater recharge cycle. In this time of drought and uncertain weather can we afford to be losing this public resource from the groundwater recharge cycle that belongs to all citizens and should be managed for the public good?

**Read more about how oil-extraction impacts the water cycle:**

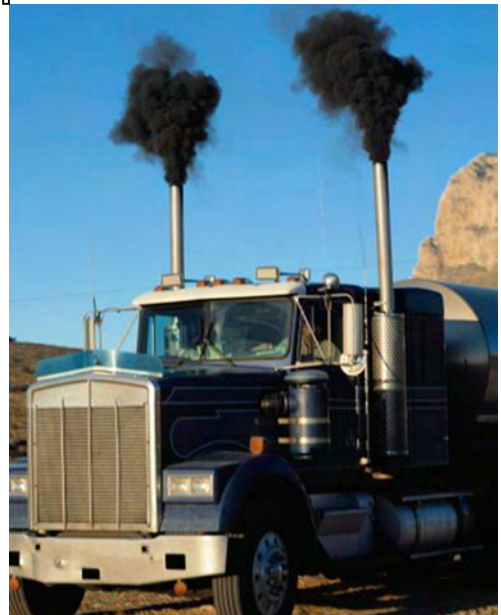
“Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption” Dara O’Rourke (Department of Environmental Science, Policy, and Management at UC Berkeley) and Sarah Connolly (Department of Urban Studies and Planning at MIT), *Annual Review of Environmental Resources*, August 14, 2003, downloadable from:  
<http://www.atmosph.physics.utoronto.ca/people/lev/ESSgc2/11469763.pdf>

## 2.5. Air pollution

**Clean air is one of Santa Barbra County's great real estate selling points.** It would vanish if we let North County and Carpinteria, Summerland, and Goleta turn into another Bakersfield, with its polluted air.

**Cyclic steaming and air pollution:** According to *Santa Barbara Independent's* June 26, 2014 article "The Anatomy of Cyclic Steaming: What's the Hot and Bother over Next Election's Biggest Issue?" the process is "much more 'carbon intensive' than traditional drilling, which can emit a quarter of the emissions of a cyclic-steaming operation for the same number of wells. While pipelines for oil and water — as is the case with Santa Maria Energy's project — can help reduce transportation-related emissions, the gas-powered steam generators required for the process can pump thousands of metric tons of carbon dioxide into the air. (Santa Maria Energy's 136 wells **will likely emit 88,000 metric tons annually, equivalent to the emissions from more than 18,000 cars.**" (See: <http://www.independent.com/news/2014/jun/26/anatomy-cyclic-steaming/>)

**Processes that cause air pollution** include site construction, drilling of wells, producing oil once the wells are in, oil storage and processing facilities, storing and dispensing fuels, oil transfer, oil transport, concrete mixing, soil moving causing dust, and even from the last phase of oil industry's activity: abandoned wells that have been capped (according to a new study).





**Equipment that emits air pollution includes:** Giant steam generators, large construction equipment, generators, flare stacks, drilling rigs, oil pumps, fire pumps, a multitude of engines, condensation tanks, big rigs, tankers, cement trucks, compressors, separator systems, etc. The Earthwork website below details the types of toxins that comes from such a variety of sources. (See: [http://www.earthworksaction.org/issues/detail/sources\\_of\\_oil\\_and\\_gas\\_air](http://www.earthworksaction.org/issues/detail/sources_of_oil_and_gas_air))

**Air pollution travels:** "During windless periods (especially in areas of thermal inversion), project-related odors (and therefore pollutants) may be detectable at more than a mile from the source." See "Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption" Dara O'Rourke (Department of Environmental Science, Policy, and Management at UC Berkeley) and Sarah Connolly (Department of Urban Studies and Planning at MIT), *Annual Review of Environmental Resources*, August 14, 2003, downloadable from: <http://www.atmosph.physics.utoronto.ca/people/lev/ESSgc2/11469763.pdf>

**Abandoned wells:** There are many hundreds of abandoned wells throughout Santa Barbara County, yet there is no regular monitoring program for air pollution leakage. A groundbreaking study in Pennsylvania showed some degree of deadly methane leakage in all 18 abandoned wells studied.

**Methane is a potent greenhouse gas and can also lead to death by asphyxiation.** In Santa Maria, homes sit with abandoned wells in front, side or back yards. This is a yet-to-be-measured source of air pollution in Santa Barbara County's previously drilled areas. In another study, Google Earth joined forces with the Environmental Defense Fund, using new Google technology to track methane leaks as the Google trucks drove through communities. The study showed a significant increase in leakage based on the age of the pipes involved. This has implications for our old abandoned wells that go unmonitored and continue to be degraded by corrosion. Google Earth has been invited to come to Santa Barbara County to detect methane leaks from abandoned well sites here.

Further reading on methane leaking and tracking:

June 20, 2014 *Climate Progress* article by Joe Romm, "Up To a Million Abandoned Wells In Pennsylvania Spew Heat-Trapping Methane":

<http://thinkprogress.org/climate/2014/06/20/3451380/abandoned-pennsylvania-wells-spew-methane/>  
Environmental Defense Fund page, "Natural gas: Local leaks impact global climate":

<http://www.edf.org/climate/methanemaps>



Photo by Steve Miller of Santa Maria Energy's flare used to burn off unneeded natural gas.

**Flaring:** This process is still taking place in Santa Barbara County. According to Earthworks, the Ventura County Air Pollution Control District has estimated that **the following air pollutants may be released** from natural gas flares: benzene, formaldehyde, polycyclic aromatic hydrocarbons (PAHs, including naphthalene), acetaldehyde, acrolein, propylene, toluene, xylenes, ethyl benzene and hexane. Researchers in Canada have measured more than 60 air pollutants downwind of natural gas flares.

**A cancer "footprint" six times that of normal** national averages was detected in a Cat Canyon oil production facility in 1991. This operation (now the Greka-owned Cat Canyon oil facility) has been listed by the Santa Barbara County Air Pollution Control District as a **"significant risk facility."** The following pollutants were emitted during oil processing, storage, and transfer at this facility at the time of the reports: Acetaldehyde,

aluminum arsenic, ammonia, antimony, barium, benzene, Beryllium, 1,3-butadiene, Cadmium, carbon tetrachloride, Chlorobenzene, chloroform, cobalt, copper, p-dichlorobenzene, 1,1-dichloroethane, 1,2 chloropropane, 1,3-dichloropropene, ethylbenzene, thylene dibromide, ethylene dichloride, Formaldehyde, hexavalent chromium, hexane, hydrogen sulfide, manganese, hydrogen sulfide, manganese, mercury, methanol, methylene chloride, phthalene. nickel, polycyclic aromatic hydrocarbon (PAH), propylene, selenium, styrene, toluene, 1,1,2,2-tetrachloroethane, 1,1,2-trichloroethane, vanadium, vinyl chloride, xylene, and zinc. (Toxicity data is available for each of these pollutants in the county's Air Pollution Control District website:  
[http://www.sbcapcd.org/airtoxics/GrekaSRS/CatCanyon/greka\\_cat.htm](http://www.sbcapcd.org/airtoxics/GrekaSRS/CatCanyon/greka_cat.htm))

**Air pollution mitigation credits don't help out here:** Santa Maria Energy (SME) estimates that for fifty years it will be emitting 85,000 Metric tons of greenhouse gasses annually from just the 136 permitted wells in the Orcutt area. Under new government rulings, very large oil projects approved by the county are required to offset their considerable greenhouse gas pollution with the purchase of mitigation credits. The air pollution created in our Santa Barbara oil fields will be mitigated elsewhere in the United States. SME will be required to pay this "air quality debt" by purchasing on the national open market "air quality credits" for various projects that will improve air resources. Those could be buying new school buses for Yuba City or a toxic gas recovery system for a landfill in Fort Worth, Texas. This concept might work globally, but it doesn't provide a local remedy for the folks in North County breathing the toxic air.

**Noxious fumes and odors already cause health problems and lower the quality of life** for area residents. Residents in Mission Hills near Lompoc or the families in the mobile home park and low-income housing west of Broadway near Newlove in Santa Maria live adjacent to oil facilities, and they know oil-related air pollution and the related health issues firsthand.

Sending air pollution where? Petroleum coke, or petcoke is a byproduct of refining heavy crude and is produced from our Santa Barbara high sulfur heavy crude oil locally at the Phillips Santa Maria refinery. It is a high carbon product and is sometime called "dirty coal" and has small dust-like particles, which cause health problems when inhaled. In the January issue of Oil Change carried an article "Petroleum coke: The Coal Hiding in the Tar Sands" which concluded, "Petcoke is like coal, but dirtier. A ton of petcoke yields on average 53.6 percent more CO2 than a ton of coal." (See full article at: <http://priceofoil.org/2013/01/17/petroleum-coke-the-coal-hiding-in-the-tar-sands/Donate>)

According to John Upton, reporting for [desmogblog.com](http://desmogblog.com), an award winning green news source used by Huffington Post,



New York Times and others, "Due to state and federal restrictions on burning petcoke that make it nearly impossible to sell domestically, most of it is sold overseas. California exports 128,000 barrels of petcoke every day, mostly to China, where it is burned as a fuel source for electricity." (See full report at: <http://www.desmogblog.com/2014/04/14/why-isn-t-petcoke-regulated-public-health-threat>)

Reuters' John Kemp reported on June 17, 2014 in his article "U.S. petcoke exports surge as demand at home falls:" The fastest-growing markets have been China (which has taken around half of the total increase); Japan (forced to boost fossil-fuel power production following the Fukushima nuclear disaster); and Turkey (where electricity demand has been surging). (See entire article at: <http://www.reuters.com/article/2014/06/17/us-usa-refineries-petcoke-kemp-idUSKBN0ES16020140617>)

Conclusion: Oil related air pollution in Santa Barbara County is a complex, multifaceted issue. Mitigation sends air pollution solutions out of our area ... while we breathe the pollution here ... while at the same time we are likely sending air pollution abroad to cause smog elsewhere.

## 2.6. Soil pollution

**In the context of all these other problems**, oil-related soil pollution might not seem like a big issue. That is not the case for the approximately two-dozen Santa Maria homeowners who had their new homes condemned and destroyed because they were built on oil-contaminated soil. The "remediation process" has not been easy for these homeowners who have lost a big part of their lives. Mark Spencer, who covered this story for the *Santa Maria Times* in July of 2006, reported: "Santa Barbara County staff members have said there are more than 300 of these remediation sites in the Santa Maria Valley."

(Read Spencer's article, "Sunrise neighbors struggle," here: [http://santamariatimes.com/news/local/sunrise-neighbors-struggle/article\\_fb42b92b-1e0e-5e14-9a7e-5f342f1b2ac8.html](http://santamariatimes.com/news/local/sunrise-neighbors-struggle/article_fb42b92b-1e0e-5e14-9a7e-5f342f1b2ac8.html))

**A ConocoPhillips website explains in a matter-of-fact manner:** "There are some homes where sump material is in the yard area only and doesn't extend under the house. These yards can be cleaned without removing



This is the most recent "House Scrape" in Santa Maria.  
How well have the sound walls worked?



the homes. In some cases, the sump may be under the house. ConocoPhillips may purchase these homes, remove them, excavate the affected **soil** and then make the clean lots available for construction of new homes." **This sounds like an easy, painless process ... but what if you happen to love one of these polluted homes?** (Read about home demolishing in, "Investigating a Former Sump" here: <http://smvsumps.com/investigating.html>)

**According to *Santa Maria Sun* article** "Is the ground making him sick?" Gonzalo Garcia, Chevron's government relations officer stated, "Chevron was responsible for the demolition of five homes and the subsequent cleanup operations in the Sunrise Hills neighborhood, and another six in 'Park Villas 2.'" The article went on to state, "In Sunrise Hills, for about the last five years, various companies have been going from door to door and either buying and demolishing homes or ripping up people's backyards to remove the contaminated dirt. As a result, the neighborhood resembles a patchwork of suburban homes mixed with empty lots and piles of dirt where houses once stood." Other companies who have had to deal with soil pollution near homes in Santa Maria are Unocal, Union Oil, Anadarko Petroleum and KerMcGee.

(Read Spencer's article, "Sunrise neighbors struggle," here:

[http://santamariatimes.com/news/local/sunrise-neighbors-struggle/article\\_fb42b92b-1e0e-5e14-9a7e-5f342f1b2ac8.html](http://santamariatimes.com/news/local/sunrise-neighbors-struggle/article_fb42b92b-1e0e-5e14-9a7e-5f342f1b2ac8.html))

(See *Santa Maria Sun* article: "Is the ground making him sick?" November 9, 2006 by Kirsten Flagg, here: <http://archive.santamariasun.com/index.php?p=showarticle&id=2068>

Unocal had to remove 360,000 cubic yards of contaminated soil during the cleanup of the Guadalupe Dunes Spill. The removal further impacted fragile and rare dune habitat. (Read more on "Photos from the Vault," an archival news site for the *San Luis Obispo Tribune*:

<http://sloblogs.thetribunenews.com/slovault/2012/03/dont-frack-on-me-lessons-from-unocals-guadalupe-pollution-settlement/#storylink=cpy> )



**Avila Beach, a nearby victim of oil soil contamination, had its entire downtown torn down and rebuilt by Unocal.** The company then hauled tons of oil-contaminated toxic underlying soil away to the unlined Santa Maria community solid waste facility, creating another potential environmental oil nightmare, say concerned residents. The California Planning and Development Report of July 1998 indicated that "the contamination problem in Avila Beach was discovered in 1989, when a **local resident was digging a basement and hit oil** . . . About the same time, fumes from the pollution in another basement caused an explosion." Martha Bellise of the Associated Press described the aftermath of the soil contamination in June of 1999: "a smelly, 40-foot-deep sand pit as big as half a football field and encased by corrugated metal has replaced the colorful boardwalk."



### Further Reading:

“Unocal Reaches Deal on Avila Beach,” July 1, 1998, by Larry Sokoloff, from *California Planning and Development Report*, available here: <http://www.cp-dr.com/node/1312>

“Beach front ripped out for petroleum spill cleanup,” June 8, 1999 by Martha Bellisle, from *Amarillo Globe News*, available here: [http://amarillo.com/stories/060899/usn\\_LA0766.001.shtml](http://amarillo.com/stories/060899/usn_LA0766.001.shtml)

**Toxic soils can a be deadly:** Chevron, ConocoPhillips, Unocal Corporation, Union Oil Company of California, Kerr McGee Corporation, and Anadarko Petroleum Corporation were all named in a suit related to a **Sunrise Hills leukemia case of an 18-year-old young man**, after he played and dug in his tainted backyard all his life. Here’s the oil industry response, from Chevron's Gonzalo Garcia: “These things are not a risk to human health. What they are is more of a nuisance issue and a property-value issue . . . What we’ve been trying to do is clean these things up even though there’s no legal requirement to do so.” That provides little solace for the family of Scott Chenoweth. Due to gag orders the oil companies place on settlement recipients, there is no public information on the outcome of the suit or about Scott's health. (See *Santa Maria Sun* article: “Is the ground making him sick?” November 9, 2006 by Kirsten Flaggs, here: <http://archive.santamariasun.com/index.php?p=showarticle&id=2068>)

It seems that monthly we read in the news about North County oil spills from trucks, broken pipelines, or faulty oil facilities that seep toxics into healthy soil, changing it for our lifetimes and endangering our health.

## 2.7. Noise pollution

**A very loud, often 24-hour noise nuisance results from oil industry operations.** From the initial use of heavy equipment to move earth, shape a pad site, erect and cement a drilling rig, to the operation of that rig and the traffic that supplies the well site with materials, tools, etc. via semi trucks, oil production is a noisy business. Ongoing production phase noise comes from steam generators, compressors, separation facilities, diesel pumps, dust abatement activities, and more. The burning-off of gas is especially noisy. The ongoing movement of heavy vehicles can result in frequent-to-continuous noise.

To surrounding neighbors and oil field workers, some of those noises are irritating and offensive, and some of them are harmful. Addressing noise in the workplace, Dr. Mandira's presentation "Noise pollution in petroleum industry" concluded noise has implications for health, which are often overlooked and can be as serious as air or water pollution:

**Short-duration exposure to high noise levels** may cause discomfort, irritation and problems in speech communications, whereas, long duration exposure to high noise levels may cause mental problems, permanent or temporary disorders, efficiency loss, nervous disorders and gastric disorders. A general effect of noise is that it causes fatigue, insomnia, and sleep disturbances that lead to other side effects.

The comprehensive review "Noise pollution in petroleum industry" also looked at local animal impacts and found **for wildlife and livestock, noise pollution can have serious adverse effects**. If a habitat becomes noisy, researchers see a decline in migratory birds. Deer may also be affected. The high intensity of noise such as vibrations emanating from heavy machinery can cause shattering of window glasses, loosening of the plaster in house walls, and cracking in walls.

(For additional information see "Noise pollution in petroleum industry" here:  
<http://www.slideshare.net/mechportal/noise-pollution-in-petroleum-industry-drmandira>)

### **Noise and Health Impacts:**

According to the planning document "Oil and Gas Drilling/Development Impacts" issued by the Tribal Energy and Environmental Information Clearinghouse: "Noise can change the physiological state by speeding up the pulse and respiratory rate. It can impair hearing either permanently or temporarily. Medical evidence suggests that noise can cause heart attacks, hypertension, deafness, etc. If the effects of noise tend to persist for longer duration, they may cause disturbance in an individual's total personality make-up. Because of these noise-related health impacts many municipalities, where drilling is allowed, require the use of sound-baffling materials around a well site. Yet these work with limited success." (See full report at: <http://teeic.indianaffairs.gov/er/oilgas/impact/drilldev/index.htm>)

**In Denver, oil companies are trying to mitigate their noise pollution** with the construction of noise buffer walls. Bruce Finely discusses this in the *Denver Post* article "Oil and gas industry building giant walls to try to ease impact". Made of earthen-color fabric on steel frames up to 32 feet high and 800 feet long, the walls shield industrial machinery from a high school and wetlands greenbelt in Greeley, prairie homes in Windsor, and kids riding bikes and skateboards in Mead. Previously, oil and gas companies tried to ease impact of industrial operations near people by stacking hay bales and shipping containers around engines. Beyond cutting noise by 20 to 30 decibels, the fabric walls partially block the glare of floodlights and dust clouds during companies' multi-month period of drilling and hydraulic fracturing. (See "Oil and gas industry building giant walls to try to ease impact" here:  
[http://www.denverpost.com/breakingnews/ci\\_25859469/oil-and-gas-industry-building-giant-walls-try](http://www.denverpost.com/breakingnews/ci_25859469/oil-and-gas-industry-building-giant-walls-try))



For people who live in rural areas, the arrival of a new, industrial noise source can greatly disturb the natural environmental soundscape and has even driven some residents from their homes. The Earthworks "Oil and Gas Noise" report contains other observations on oil and gas noise, including the fact that "landowners often complain about noise levels associated with natural gas compressors. The noise level varies with the size of the compressor and distance from the compressor; and it changes with shifts in wind direction and intensity." In some wind conditions, compressors may be heard as far away as four miles. The site quotes a Wyoming homeowner who complained of "constant noise" which "drives people to the breaking point." (See:  
[http://www.earthworksaction.org/issues/detail/oil\\_and\\_gas\\_noise#.VDSHC9R4qEx](http://www.earthworksaction.org/issues/detail/oil_and_gas_noise#.VDSHC9R4qEx))

Local residents may wish to consider whether they and their children want to live, work, or go to school upwind or downwind from new wells.

# Chapter 3

## Negative Impact of Extreme Techniques on our Health

### 3.1. Toxic waste disposal risks

**The oil and gas industry in the United States alone creates more solid and liquid waste than all other categories of municipal, agricultural, mining, and industrial wastes combined.** Oil and gas drilling and pumping produce most of the sector's waste. The types of wastes described below all have health consequences resulting from exposure.

**EPA exempts oil waste from standards: Since the 1980s, wastes generated during the exploration, development, and production of crude oil and natural gas, are categorized by EPA as "special wastes" and are exempt from federal hazardous waste regulations under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This loophole was a Bush-era exemption, granted as a concession to the oil lobby.**

**Oil industry wastes fall into three categories:**

**3.1.1. Produced water:** The majority of the waste from the industry is the hazardous and toxic effluent known as *produced water*. Surprisingly, ten times more produced water than oil is pumped up the well during production. It is extracted along with oil from deep underground, and is at least four times saltier than ocean water and often contains quantities of toxins such as benzene, xylene, toluene, and ethyl benzene. Extremely toxic heavy metals, from our deep geological formations, such as barium, arsenic, cadmium, chromium, and mercury, mix with injected water or steam and are thus found in produced water when it is extracted from a mile or more below ground. Up at ground level it is "cleaned up" in a process that creates another concentrated toxic waste stream: tank sludge. Fresh or recycled urban water is often added to the now cleaner, but still toxic, produced water and is sent back down the well as steam.



**Where does it go?** Over 90% of onshore produced water is then recycled and re-injected into wells to increase the flow of oil. The remaining produced water is injected into deep wastewater wells. This disposal option, as discussed earlier, is tied to increased seismic activity near wastewater injection wells. Both disposal means are permissible under the previous mentioned exemption for oil industry wastes.

**3.1.2. Drilling wastes:** Less than 2% of these wastes are drilling fluids, of which about two-thirds are drilling muds. About 65% of drilling mud is fresh water, 21% is salt water, 3% is oil, 2% is polymer, and the remainder is composed of "unspecified materials." Luckily, the onshore discharge of untreated drilling fluids into surface waters is prohibited by effluent guidelines promulgated under the Clean Water Act.

**3.1.3. Associated wastes:** Although associated wastes constitute less than 1% of total wastes, they are most likely to contain a range of chemicals and naturally occurring materials that are of concern to health and safety. About half of the associated wastes are aqueous, and the remainder range from slurries to sludge and solids. Locally these wastes accumulate during the drilling process, and are either re-

injected deep underground, stored, and then transported through our communities to out-of-county hazardous waste sites.

Further Reading on Associated Wastes:

“Associated Wastes Reports Executive Summary, January 2000,” available from EPA website:

<http://www.epa.gov/solidwaste/nonhaz/industrial/special/oil/execsum.pdf>

**Summary:** With expansion of oil drilling, Santa Barbara residents will be coexisting with more oil industry toxic waste, especially on our roads. Trucks will be hauling oil industry waste products such as intensely toxic "associated wastes," toxic tank sludge, produced water if injection wells are not available on site, possible future fracking fluids and acid, pipe scales containing toxic heavy metals, and chemicals used in drilling muds. More wastes will be injected into wastewater injection wells for permanent underground storage with the possibility of aquifer contamination issues.

### 3.2. Increase in health problems

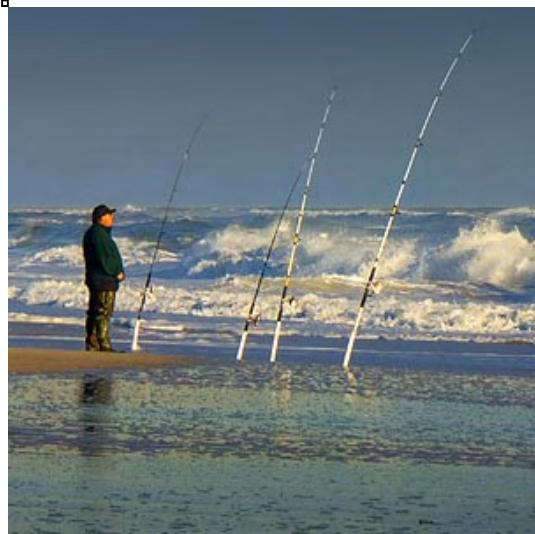
**Oil exploration, drilling, and extraction can lead to a range of acute and chronic health impacts.**

Air and water are the primary pathways of exposure to chemicals and other harmful substances, which are inhaled, ingested, and absorbed through the skin. It is surprising and disturbing to learn that drinking water standards do not even exist for many oil-related contaminants (such as methane).

Further Reading:

Earthworks “Public Health and Gas Development” page: <http://health.earthworksaction.org>

See also this study, mentioned elsewhere: “Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption” Dara O’Rourke (Department of Environmental Science, Policy, and Management at UC Berkeley) and Sarah Connolly (Department of Urban Studies and Planning at MIT), *Annual Review of Environmental Resources*, August 14, 2003, downloadable from: <http://www.atmosp.physics.utoronto.ca/people/lev/ESSgc2/11469763.pdf>



**Gee, I was only fishing:** Santa Barbara county fishermen and surfers don't stop to question if their weekend recreational pursuits will have long lasting health effects from oil pollution. Mark Massara, a Sierra Club attorney said of the Guadalupe Dunes spill: "Unocal officials ignored oil leaks into the ocean at Guadalupe for years while surfers and fishermen were exposed to contamination." (See: <http://articles.latimes.com/1999/nov/22/news/mn-36391>)

**Overview:** Health hazards, caused by oil industry activity, can come from fishing, surfing, exposure to heat, polluted air, noise, vibration, and hazardous materials, including: asphalt, asbestos, aromatic hydrocarbons, arsenic, hexavalent chromium, nickel, carbon monoxide, coke dust, hydrogen sulfide, lead alkyls, natural gases, petroleum, phenol, and silica.

**According to the above-mentioned study in *Annual Review of Environmental Resources*, health impacts from exposure to these materials are:**



1. Severe burns or skin and eye irritation from high levels of benzene and hydrogen sulfide fumes, which may lead to dermatitis, bronchitis, and chemically induced pneumonia;
2. Headaches and mental disturbances from carbon-monoxide exposures;
3. Chronic lung disease from long-term exposures to coke dust, silica, and hydrogen sulfide.
4. Psychosis and peripheral neuropathies from exposures to lead alkyls used as gasoline additives
5. Increased cancer risks from exposures to carcinogenic materials such as benzene, xylene, arsenic, and hexavalent chromium.



**The study reports that additional risks occur** “through exposure to naturally occurring radioactive materials (which apparently we do not have in Santa Barbara County, but are widespread elsewhere) and toxic heavy metals brought to the surface during drilling (which we do have), as well as through the bioaccumulation of oil, mercury, and other products in mammals and fish that humans consume.” This finding could affect the local ranching economy, as it has in other oil boom areas. The study continues to explain that oil spills also threaten

human health through illness and injury during the spill, during cleanup, and through consumption of contaminated fish or shellfish. Drinking water supplies can also be contaminated through spills. But as Burger notes, “There are remarkably few studies of the health responses of local people exposed in the months following a spill.” In one study in Scotland following an oil spill, community members reported increased health problems, including increased psychiatric symptoms.

**Oil refineries can create health risks not just to surrounding communities**, but particularly to their own facility workers. The risk posed by explosions (with their associated injuries and fatalities), and chemical leaks and spills are obvious causes for concern. Yet many of the substances used in routine daily extraction work cause adverse dermatologic and pulmonary reactions. As the *Annual Review* study explains:

The most common dermatologic conditions are contact dermatitis and acne, but other conditions include keratotic facial and neck lesions, neoplastic change from exposure to oil and sunlight, and acquired perforating disease and calcinosis of the hands and fingers. Adverse pulmonary reactions to hard metal (a mixture of tungsten carbide and cobalt used for oil well drilling bits) include asthma, hypersensitivity pneumonitis, and interstitial pulmonary fibrosis.

Again, the whole report is available for download here:

<http://www.atmosp.physics.utoronto.ca/people/lev/ESSgc2/11469763.pdf>

**Pets also impacted:** There has been little research in the area of risks posed to domestic animals, but our family pets aren’t immune to the health effects of exposure to dangerous chemicals. An initial study shows disturbing trends. (See page 11 of Earthworks study downloadable here:

<http://www.earthworksaction.org/files/publications/Health-Report-Full-FINAL-sm.pdf>)

**Oil industry representatives are often quoted** “dismissing claims of health impacts as ‘personal anecdotes’ and isolated incidents. Directly impacted people are frequently told that what they experience is a random occurrence and that some other source—traffic, lifestyle choices, family disease history, household products—is to blame,” as Earthworks’ Oil and Gas Accountability Project authors have noted (in study cited above).

# Chapter 4

## Negative Impact of Extreme Techniques on our Economy and Community

### 4.1. Rising costs of water

As water hungry drilling techniques tap water from our aquifers, groundwater levels will drop. According to the Santa Maria Groundwater Basin's 2013 Annual Report, levels are already in decline in North County. With lower water levels, there will be increased water pumping costs to bring fresh water from farther down to the surface. These costs will be passed on to the public as higher utility fees. No homeowner wants to see his or her water bills going up. Water users near coastal oil fields need to bear future costs of desalination from saltwater infiltration, should water tables drop from increased oil industry water usage.



As discussed earlier, in other oil-boom counties, agriculture and ranching end up having to compete with oil for water, at higher rates. Photo of pump jacks next to a strawberry field in the Santa Maria Valley by Jeanne Sparks.

### 4.2. Declining property values

Homebuyers want to know if they have a safe and permanent source of drinking water before buying a new home. Oil well failure and spills put our water supplies and the future values of residential and business properties at risk. In April of this year, *Forbes* carried the article "Pollution Fears Crush Home Prices Near Fracking Wells." The article detailed that **just the perception of possible drinking water pollution caused home values to drop**. Santa Maria real estate professionals are glad that no one seems to remember that their aquifer has already been polluted by the oil industry. (See: <http://www.forbes.com/sites/jeffmcmahon/2014/04/10/pollution-fears-crush-home-prices-near-fracking-wells/>)

**Home Values at Risk:** November 13, 2013 *EcoWatch* (a major web outlet for environmental news) posted a comprehensive look at drilling: “Fracking the American Dream: Drilling Decreases Property Value.” The article reports on how:

Drilling conflicts are almost always described in the context of their impacts on air, water and health. But increasingly, as the drilling boom sweeps the country, another part of the drilling story is starting to bubble up in drilling hotspots like Colorado, Pennsylvania, New York, Wyoming and Texas. Increasingly, oil and gas development is butting up against, and often trampling, the bedrock American principles of property rights and the value of one’s home. (See: <http://ecowatch.com/2013/11/13/fracking-american-dream-drilling-decreases-property-value/>)



The appeal of living in Mission Hills residences near Lompoc is lessened by oil industry signs across the street warning of chemicals known to cause cancer, birth defects or other harm

**Your mortgage and insurance could become problematic with drilling:** Ed Leefeldt is an award-winning investigative journalist who has worked for Thomson Reuters, Bloomberg, and Dow Jones. He looked at the impacts of drilling on homeownership in his article “Homeowners: How Do Mineral Rights and Fracking Affect You?” Leefeldt found that:

Homeowners should weigh the promise against the peril, because the peril falls directly on you. Hydraulic fracturing on your property or in your neighborhood could affect your mortgage, your property values and your home insurance. Nationwide Insurance garnered national publicity when it said it would refuse to cover risks associated with fracking. But Robert Hartwig, president of the Insurance Information Institute (III), which represents property insurers, says that's the position of the whole industry. If your mortgage is guaranteed by a federal guarantor - Fannie Mae, Freddie Mac, FHA - you should be aware that they have regulations that may affect your mortgage. These include having an active well or planned drilling within 300 feet of an existing property. (See: <http://www.hsh.com/finance/real-estate/homeowners-mineral-rights-fracking.html>)

**Banks and Federal Agencies are refusing to finance property with or even just near drilling.** Roger Drouin’s August 16, 2013 *Grist* article on fracking’s impact on real estate observes:



Lawyers, realtors, public officials, and environmental advocates from Pennsylvania to Arkansas to Colorado are noticing that banks and federal agencies are revisiting their lending policies to account for the potential impact of drilling on property values, and in some cases are refusing to finance property with or even just near drilling activity.

The article deals with concerns in Bradford County, PA that **the fracking boom could lead to a housing bust**. The *Grist* article above quotes Bob Benjamin, a Bradford County broker and appraiser, who says that now when he fills out an appraisal for a lender, “he has to note if there is a fracked well or an impoundment lake on or near the property.” “I’m having to explain a lot of things when I give the appraisal to the lender,” Benjamin says. “They are asking questions about the well quite often.” Nationally, “lenders are becoming much more cautious about underwriting mortgages for properties near fracking, even ones they would have routinely financed in the past.” *Grist* also relates that a landowner in Madison, NY received a jolt when an **insurance company refused to renew a homeowner’s policy because there is a conventional gas well on the property**. (See the full report at: <http://www.damascuscitizensforsustainability.org/2013/08/fracking-boom-could-lead-to-housing-bust/>)

#### **Homebuyers will not want to buy into Santa Barbara County communities with:**

- Future drinking water supplies at risk of contamination, leading to water rationing and higher water costs
- 24-hour noise pollution in neighborhoods near wells
- Poor air quality
- Fear of tainted soil below their homes
- Proliferating man-made earthquakes
- Oil-industry related health issues
- Worn-out roads from heavy oil truck damage
- Huge oil trucks in heavy traffic
- An influx of transient oil workers detached from the community
- Increased crime rates
- Oil-related visual blight
- High taxes to pay for increased oil-related government costs
- Blazing industrial lights shining in their windows

**Other Oil Counties Report:** Based on experiences in other oil-boom counties, home values and county residential and business property tax revenues can both drop in the wake of a big North County oil boom, as



Photo by Mike Lee, E&E Publishing

oil companies walk away from industrialized communities with profits. These same factors will influence business growth in North County. This topic is covered in over a dozen recent articles if one does an internet search of "property values + oil drilling."



### 4.3. Declining visual appeal

**If oil operations significantly expand as planned, this issue will take many forms.** Visual blight would impact future real estate values, tourism, and the ability for North County to attract new economic partners. The further industrialization of North and South County communities diminishes their aesthetic appeal and will have significant impacts.



**We stand to lose our night sky to industrial strength lighting.** Our rural vistas will be diminished by large areas of exposed earth, dust, and heavy equipment, 32 foot-high noise-barrier walls adjacent to residential neighborhoods, and—if drinking water aquifers are contaminated—thousands of ugly water storage tanks in front of North County homes. What will become of our community and its local economy when we have dirt roads and drilling pads invading our beloved vineyards, grazing land, and agricultural fields? When the cyclists on our quiet picturesque country roads are replaced with oil trucks, and our tourist wine trails dotted with derricks? When our vistas with clear blue skies are transformed into smoggy views? When sparkling coastal panoramas have oil storage tanks and derricks in the foreground?



### 4.4. Impacts on agriculture and ranching

**Interrelated issues:** You have already read about impacts to our agricultural and ranching economy in sections on noise pollution, air pollution, water allocation, groundwater contamination, traffic, health, declining visual appeal, and new costs to counties and cities. These oil-related issues for ranchers and farmers are complex, interrelated and important.

**As in France, where vintners led the fight for the nation's ban on fracking,** vintners in Santa Barbara County are also concerned with the future problems they will face with more high tech oil recovery. Mikael Sigouin, local owner of Kaena Wines summed up the underlying concern of Santa Barbara County vintners who have sorted through the issues when he said, "In the wine industry, we need access to clean water. If there is any risk of water contamination, it's not worth the risk."



**New groundwater contamination information:** Kern County ranchers and farmers are still celebrating over the recent October 11, 2014 state findings released in a Reuters article, discussed earlier in more detail under the "More Groundwater Contamination" chapter. Titled "California aquifers contaminated with billions of gallons of fracking wastewater," the State Water Board findings linked oil wastewater injection wells with aquifer damage.

In Santa Barbara County, agriculture and ranching lands can share space with wastewater injection wells and Water Board findings have possible implications for future toxic wastewaters injected underground in Santa Barbara County wells. (See full report at: <http://rt.com/usa/194620-california-aquifers-fracking-contamination/>)

**Vintners who signed on to the Measure P's ban** on future extreme oil extraction techniques agreed that if the oil industry carries out its plans to drill thousands of these unconventional extraction wells, they would lose their distinction as a beautiful region that is desirable to visit, and their position in the marketplace could be degraded. Likewise area farmers and ranchers know that the oil industry currently directly employs fewer than 0.2% of Santa Barbara County workforce (a few hundred). If there is significant growth in Enhanced Oil Production, some new jobs would definitely be created in the oil industry, but at what risk to the 36,000 current jobs in agriculture, tourism and wine.

**What could change with oil expansion?**

- Traffic that endangers workers and tourists and detracts from a once quiet countryside
- Dust related crop and herd health problems
- Loss of water will bring an end to it all for those who draft out of contaminated aquifers.
- Heavy metals affecting herd health
- Loss of tranquility
- Competing with big oil for water resources
- Tourist leave, looking elsewhere for that Santa Barbara Wine County charm
- Less attractive "wine trails"
- Industrialization of rural charm



Earthquakes destroying valuable wine reserves

Mortgage and insurance issues  
Fragmentation of open space, rangeland, vineyards and farms by dirt roads  
Industrial lights blocking out the night sky and shining in the ranch house windows  
Wildlife impacts that diminish one of the nice perks of rural living  
Health issues for humans, pets, and livestock from air and water pollution  
Smells and noise that change "country life" into "industry interface life"

## 4.5. Deadly and costly traffic increase

**Traffic issues:** Oil expansion will bring associated increases in heavy truck traffic, bringing more frustration and inconvenience to residents and future homebuyers. With the coming oil expansion, we can expect to see an increase in taxpayer expense for road repair due to damage by heavy oil equipment and heavy and sometimes illegally overweight trucks, increases in accidents and traffic fatalities, an increase in traffic noise, problematic dust on rural roads, headlight glare at night in nearby residences, and an increased risk of toxic waste released due to accidental rupture of tankers.

**What makes up all this noisy, polluting, heavy-duty oil traffic:** Monstrous drilling rigs with huge booms and casings, oil field flatbeds, trucks with cementing equipment, trucks hauling tons of drilling mud, unending cement trucks, wireline trucks, chemical transport trucks, crews of "roughnecks" and tons of gear to be augured, huge trucks pulling trailers bearing monster diesel engines and huge pumps, large "workover" rigs, lots of really big oil tankers moving crude oil day in and day out going south on Highway 101 going to Santa Paula and north to Nipomo.

**On January 25, 2012, *Businessweek* ran the article “North Dakota Oil Boom Brings Blight with Growth as Costs Soar.”** The author noted the worrisome discrepancy between what pre-oil-boom roads were built to withstand and the extraordinary load they later carried: "The gravel road that borders Dave Hynek’s North Dakota farm is designed to carry 10 tractor-trailer trucks a day. In a recent 24-hour period, about 800 passed by." (See <http://www.businessweek.com/news/2012-02-01/north-dakota-oil-boom-brings-blight-with-growth-as-costs-soar.html>)

**The same problem of industrial traffic affects oil-boom counties in Texas. Trucks are too heavy for the roads they are on.** As the article "The Poor Roads of the Oil Boom" in the publication *Country* indicates: "Most overweight trucks associated with oil drilling weigh up to 84,000 pounds, though some weigh almost twice that. Unfortunately, most county roads are built to withstand only 58,000 pounds. This is problematic because each well built requires about 1,184 loaded trucks — the equivalent of 8 million cars." DeWitt County Judge Daryl Fowler was interviewed by *Country* about his Texas oil boom county's roads: "Where we can, we are going in and adding gravel to the edges of our existing roads and armoring them up to accommodate the wide trucks coming in and out, so they are not running in the ditches." But many of the roads are just too narrow to survive the traffic and can't be widened without obtaining additional right-of-way space from landowners." (See "The Poor Roads of the Oil Boom," April 24, 2013, in County: <http://www.county.org/magazine/features/Pages/April%202013/The-Poor-Roads-of-the-Oil-boom.aspx>)

**Oil traffic safety issues** can run the gamut: exposure to hazardous wastes from ruptured tankers hauling oil chemicals, or toxic waste; being caught in an oil vehicle explosion accident; health concerns as heavy diesel truck traffic generates more air pollution; or injury and death from collision.





**A study by the National Institute for Occupational Safety and Health** addresses an important issue: vehicle crashes are the single biggest cause of fatalities to oil and gas workers. Studies have shown accidents are often caused by sleep-deprived drivers, a salient problem for the oil industry because they fought for and received regulatory loopholes which exempt them from safety limits on how many hours an oil truck driver can work.

**Ranching communities in South Dakota have seen their lifestyle disappear** in the wake of an oil-boom transformation. A 2013 article reporting on the degraded county road systems commented: “In McKenzie County, ranchers used to drive cattle along the country roads. “That way of life is kind of gone,” said Ronald Anderson, chairman of the McKenzie County Commission.” (See “Oil Boom: Bakken truck traffic has N.D. counties scrambling to fix roads” by Mike Lee, E&E Publishing: <http://www.eenews.net/stories/1059988537>)

**Repair and new road cost:** With the possibility of up to 10,000 new wells on the way, the speed of oil development in North County will far outpace the capacity of the county and Cities of Santa Maria, and Lompoc to build and repair roads and bridges, and to install more traffic signals or hire extra traffic officers.

**Other oil-boom areas have experienced these problems,** including communities in North Dakota. As noted in an October 9, 2013 article, a study by a transportation research firm estimated that “it will take \$348 million every two years to maintain the oil-producing counties' roads.” This study covers four main counties and a few others with less oil development. (See “Oil Boom: Bakken truck traffic has N.D. counties scrambling to fix roads” by Mike Lee, E&E Publishing: <http://www.eenews.net/stories/1059988537>)

Of course, increased traffic doesn't just impact our roads: it also adds to air pollution, which impacts our personal health, leading to increased personal and public health costs.

**Increased oil related traffic volume:** Operators working the Cat Canyon field already have numerous oil tankers entering Highway 101 at Palmer Road and heading north. With Santa Maria Energy's 100 new wells about to go online, there will be soon be a huge increase of oil tanker trucks transporting crude oil on Highway 101 entering at Betteravia, en route to the Santa Maria Phillips refinery. Using the figure of 8 million equivalent car trips for the construction of each well cited above, there would be an increase of 800 million equivalent car trips.



If a fair portion of SME's 7,700 potential new wells sites in North County are developed (and the other producers join in), consider the traffic nightmare waiting to happen along major corridors like Highway 101, Highway 1, Clark, Betteravia, and Main



Street in the Santa Maria Valley, as well as on our quiet rural country roads. Oil development in the Carpinteria, Summerland, and Goleta areas will make already bad traffic situations worse.

**Currently the oil industry ships gas by rail** from the Greka Santa Maria Asphalt Refinery and the Phillip's 66 Santa Maria Refinery (which is seeking further rail connection). This might be beneficial for local traffic, but at the same time rail transport creates "oil train" safety issues of urban area rail spills or explosions along the coast rail route. Pipelines in the planning stage have their risks and construction impacts, but if built, could absorb some tanker traffic.

**Long-range traffic planning needed:** From the experiences of other oil boom counties, oil traffic will grow to the point that it will become a major community concern. Piecemeal planning in each project EIR does not allow the study of cumulative effects that these counties suddenly had to face too late. Santa Barbara County needs develop an integrated Caltrans, county, and cities long-range traffic master plan that will cap maximum heavy truck traffic at safe levels.

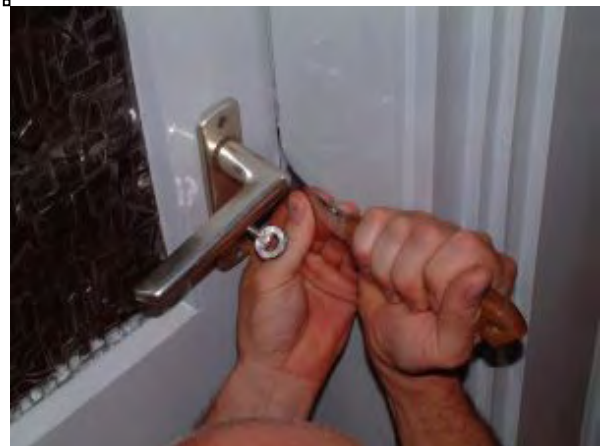
## 4.6. Cost to county and cities

**Studies of oil-boom counties find they are facing new challenges.** The possible costs to Santa Barbara County from expansion of Enhanced Oil Extraction would be both economic with new costs and social with changes that go to the very heart of our communities. There is ample reporting on how shale gas development dramatically denigrates the way of life in communities across the country. It puts strain on local infrastructures, bringing increased crime and drug use, and adding burdens to law enforcement and local social services.

**Oil boom county finds change comes with new tax dollars:** In the February 5, 2007 issue of The New Yorker, the article "Boomtown Blues: How natural gas changed the way of life in Sublette County" references a report by Ralph Boynton, the Sublette County Attorney:

The report shows the Sublette, Wyoming **crime rate rising by 30%** from 2004 to 2005; air quality and the quality of life have also been affected. With the arrival, since 2000, of nearly 3,000 roughnecks, **off-rig boredom has increased** and this helps explain some of exploding crime rate. Fueling all this is the growing use of **methamphetamines**-primarily crystal meth, the roughneck's drug of choice. Area rancher Freddie Botur said of the oil companies "They've ripped the roots out of the very thing they say they care about: community values, family values, property rights." (See:

<http://www.newyorker.com/magazine/2007/02/05/boomtown-blues>)



**Crime:** Studies from oil-boom areas show that crime rates and law enforcement costs skyrocket during an oil boom. Prostitution increases are said to be the result of the influx of many single men, following the oil jobs away from their homes and families. The May 24, 2011 *PR Newswire* article "Increased Gas

Drilling Activities Bringing New Challenges to Local Governments in Pennsylvania” provides an example of these changes in Pennsylvania:

In Bradford County, Pennsylvania’s most heavily drilled county in the 3-year-old rush to tap the Marcellus Shale, the stream of men from Texas, Oklahoma, Louisiana and elsewhere has been accompanied by increases in arrests, traffic violations, protection-from-abuse orders and warrants issued for people who don’t show up in court, law enforcement officials said.

Pennsylvania State Police Commissioner Frank Pawlowski stated that:

Police reports coming out of the northern tier include arrests because of drug use and trafficking, fights involving rig workers, DUIs, and weapons being brought into the state and not registered properly ... We’ve even encountered situations where drilling company employees who have been convicted of a sexual assault in another state come here to work and do not register with our Megan’s Law website. Each of these issues is unacceptable and places an even greater burden on our law enforcement and local social programs meant to help those in need. (See: <http://www.prnewswire.com/news-releases/increased-gas-drilling-activities-bringing-new-challenges-to-local-governments-in-pennsylvania-94774764.html>)

(For a detailed resource on social impacts to oil-boom communities, visit the “Catskill Mountainkeeper” page “Social Impact of Gas Drilling”:

<http://www.catskillmountainkeeper.org/our-programs/fracking/whats-wrong-with-fracking-2/4513-2/>)

**Oil workers' drug use causes safety concerns:** The New Yorker published the aforementioned “Boomtown Blues” article after Alexandra Fuller did in-depth interviews with long-time residents and oil boom workers. Additionally, Fuller interviewed psychologist Dean Kohrs who studies the boomtown phenomenon “A boomtown, he explained, experiences an increase in crime, drug use, violence, and cost of living, and a decrease in just about everything good, except money.” Fuller observed:

There is no doubt that methamphetamine had made it into the community before the current boom, but the injection of a large testosterone-heavy workforce, assigned to tough and repetitive work, and the lack of anything else to do in the area have made a small-town problem a big deal. Roughnecks are often required to remain unnaturally alert for twelve hours at a time, two weeks in a row, away from friends and family (about seventy-five percent of the gas-field workers are from outside the region)—a state of affairs that has led people who might not ordinarily be tempted to try meth to use it simply to stay awake.

Oilfield worker Levi Licking, now clean, opened up to Fuller talking feely about drug use on the rigs and the problems it causes: He said that the real problem with meth use on the rig is the potential for accidents provoked by meth users operating recklessly. “A couple of weeks ago, I showed up on a rig and I got out of my truck and looked at the roughnecks that were there and they were fucked up—I mean big time, just going jammin’, crammin’,” he said. “I walked over, got in my truck, called my supervisor, and I told him, ‘Look, I don’t think it’s safe to work here.’ The old boy thought he could run the situation and keep everybody safe.” Fuller reported that, “Licking and the Kid (a co-worker) both told me that there is no real incentive for the bosses on the rigs to clean up the drug use. ‘If they did, they’d have no one left working,’ the Kid said, and, anyway, he added, meth just comes with the roughneck culture, so why panic now?” (Read this in depth article at:

<http://www.newyorker.com/magazine/2007/02/05/boomtown-blues>

**Fuller's findings about drug usage among Wyoming oil workers brings up concerns here in Santa Barbara County** about expansion of oil drilling increasing the risk of truck drivers using drugs trying to stay awake driving Highway 101 or blow out valves being overlooked by a bored "high" employee.



**Affected rural communities** have found themselves dealing with types of crime more commonly associated with urban areas. Organized drug trafficking and prostitution rings top the list, government attorneys say.

Further reading on oil-boom-related crime:

[www.nytimes.com/2013/12/01/us/as-oil-floods-plains-towns-crime...](http://www.nytimes.com/2013/12/01/us/as-oil-floods-plains-towns-crime...)

[www.thecrimereport.org/.../2013-12-crime-in-oil-country--plains](http://www.thecrimereport.org/.../2013-12-crime-in-oil-country--plains)

<http://www.bing.com/search?q=oil+booms+%2B+crime+increase&form=MSNH14&ref=a6d73d687cf440f7ad7bc7bf493fefac&pq=oil+booms+%2B+crime+increase&sc=0-20&sp=-1&qsn&sk=&cvid=a6d73d687cf440f7ad7bc7bf493fefac>

[missoulain.com/.../crime-booms-in-montana-dakota-oil-](http://missoulain.com/.../crime-booms-in-montana-dakota-oil-fields/article...)

<http://www.bing.com/search?q=oil+booms+%2B+crime+increase&form=MSNH14&ref=a6d73d687cf440f7ad7bc7bf493fefac&pq=oil+booms+%2B+crime+increase&sc=0-20&sp=-1&qsn&sk=&cvid=a6d73d687cf440f7ad7bc7bf493fefac>

[cnsnews.com/news/article/bakken-oil-booms-and-so-does-crime-plains](http://cnsnews.com/news/article/bakken-oil-booms-and-so-does-crime-plains)

<http://www.earthworksaction.org/library/detail/blackout#.VCmn9Gd0xCE>

Pennsylvania's **oversight of the gas and oil industry is falling far short of the demands posed by surging development**, according to a year-long study by Earthworks, a nonprofit community and environmental advocacy group. (See *Black Out In The Gas Patch: How Pennsylvania Residents are Left in the Dark on Health and Enforcement* published August 7, 2014, and downloadable from: <http://www.earthworksaction.org/library/detail/blackout#.VDRaUSldXDG>)

**Housing markets change** with out-of-area workers arriving looking for cheap lodging. Students, seniors, low-income families, and the unemployed in our communities compete with temporary oil drillers for the limited affordable housing available locally, as those rental rates increase. Workers also arrive in RV rigs or trucks with trailers, overwhelming local RV and mobile home parks, often displacing long-term senior and low-income community members as those rates rise.

**Land use:** The Offices of Indian Energy and Economic Development created a very comprehensive report to help tribes nationwide in energy planning processes titled "Oil and Gas Drilling/Development Impacts." According to this report, "land use impacts would occur during the drilling/development phase if there are conflicts with existing land use plans and community goals." The study further described (as noted elsewhere in this report) that, "existing land use would be affected by intrusive impacts such as increased traffic, noise, dust, and human activity, as well as by changes in the visual landscape."

**For Santa Barbara County**, the development of oil and gas facilities on the dramatic scale currently anticipated would change the character of the Santa Barbara landscape from a rural to an industrialized

setting. As the study notes, “in particular, these impacts could affect recreationists seeking solitude or recreational opportunities in a relatively pristine landscape” (like the one our area now offers to tourists). This detailed study further identified “that ranchers or farmers could be affected by loss of available grazing or croplands, potential for the introduction of invasive and noxious plants that could affect livestock forage availability, and possible increases in livestock/vehicle collisions.” Additionally, “the change in landscape character could discourage hunters [and OHV enthusiasts] who prefer a more remote backcountry setting.” At the same time, an expanded road system can create opportunities for illegal activities. (In an agricultural area like our own, one imagines this would include crop theft.) “Most land use impacts that occur during the drilling and development phase would continue throughout the life of the oil and gas field. Overall, land use impacts could range from minimal to significant depending upon the extent of the development.” (See <http://teeic.indianaffairs.gov/er/oilgas/impact/drilldev/index.htm>)

**Local ecosystem destruction can occur:** A study for the BLM, “Advanced Well Stimulation Technologies in California,” (downloadable here: [http://ccst.us/projects/fracking\\_public/BLM.php/](http://ccst.us/projects/fracking_public/BLM.php/)) determined that “the physical alteration of environments from exploration, drilling, and extraction can be greater than from a large oil spill.” According to a comprehensive review done by the Offices of Indian Energy and Economic Development, “impacts to ecological resources would be proportional to the amount of surface disturbance and habitat fragmentation. Vegetation and topsoil would be removed for the development of well pads, access roads, pipelines, and other ancillary facilities. This would lead to a loss of wildlife habitat, reduction in plant diversity, potential for increased erosion, and potential for the introduction of invasive or noxious weeds. In Santa Barbara County, oil expansion will bring miles of new rural dirt oil roads crisscrossing agricultural fields, open space, and grazing lands. Adverse impacts to fish and wildlife could occur during the drilling/development phase, resulting from erosion, dust, and runoff; noise; the introduction and spread of invasive nonnative vegetation; exposure to contaminants; interference with behavioral activities and increased harassment and/or poaching; and the general modification, fragmentation, and reduction of habitat.”



Unocal project manager for cleanup, Gonzalo Garcia, inspects sensitive plants and the wildlife area impacted by the Guadalupe diluent spill.

Further Reading:

“Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption” Dara O’Rourke (Department of Environmental Science, Policy, and Management at UC Berkeley) and Sarah Connolly (Department of Urban Studies and Planning at MIT), *Annual Review of Environmental Resources*, August 14, 2003, downloadable from:

<http://www.atmosph.physics.utoronto.ca/people/lev/ESSgc2/11469763.pdf>



### **Some of the increased costs to the county and cities:**

- Road repair due to heavy truck traffic, especially on rural roads not designed for heavy truck traffic
- New roadways, traffic lights, and other infrastructure expenses
- Crime and traffic enforcement staff for increased enforcement and investigations
- Social services cost
- Homeless services for displaced low-income seniors and families
- Repair of oil-related earthquake damage to public water and sewer lines
- County health costs for increased oil-related health problems
- APCD staff to monitor increased oil air pollution for increased inspections and investigations
- Groundwater monitoring costs due to higher risk of contamination and more frequent testing needs
- Water delivery costs due to lower aquifer levels
- Judicial costs for prosecuting increased oil-related crimes
- Costs of drinking water desalination due to seawater infiltration from oil overdrifting

**With this scenario the county will lose property tax income** as the oil-boom problems cause North County property values to drop. Covering these extra costs will fall to the taxpayers, overly burdened by a tax structure that allows the oil industry to put overwhelming strain on the public infrastructure that we support.

## **In Conclusion**

It appears that the oil boom of the 21st century has already started in Santa Barbara County. There is little or nothing we can do at this point about the myriad risks and pollution that exist from our current oil extraction in Santa Barbara County. However, *we can Vote Yes On Measure P* to curtail future expansion of the risky oil extraction techniques that place so much in jeopardy.