OIL AND GAS REPORT FOR SLO COUNTY

Our county has a long history of problems associated with oil extraction. On a Federal and State level oil companies are often exempted from laws and regulations designed to protect valued resources such as water and air quality. State agencies have allowed local oil extractors to dispose of oilfield waste water in underground wells without proper environmental review or permits, endangering our water supplies.

CoProSloCo

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SAN LUIS OBISPO COUNTY'S OIL AND GAS WELLS

The current oil and gas operation in San Luis Obispo County, described below, pose a risk to the region's groundwater, surface water, air quality and health. A little known risk are the inactive or plugged wells that could be re-stimulated in the future using enhanced oil recovery techniques, once oil prices rise again.

Below are some facts, summarizing the oil and gas operation in San Luis Obispo County:

- 380 total oil and gas wells as of October 2017 (active, inactive, new)
- 298 total oil and gas wells as of October 2017 (active and new)
- 29 Class II wastewater injection wells, 7 are active, 7 are inactive, 15 are plugged
- 1 open pit wastewater pond
- No current hydraulic fracking at this time, but Monterey Shale covers a vast section on SLO County
- For the first 8 months of 2017, the AGOF has produced 384,498 barrels of oil, used 7,453,734 barrels of water
- For the first 8 months of 2017, the AGOF has used 3,617,191 barrels of water for water/steam for injection

As a comparison:

- Santa Barbara County has 1,482 active and new wells, 188 Class II wastewater injection wells (onshore)
- San Benito County has 28 active wells, 1 Class II wastewater injection well
- Monterey County has 1,540 active and new wells (as of 2016), 109 Class II wastewater injection wells (44 currently operating)

According to CA Frack Facts –

Unconventional oil development, including fracking, takes place in a variety of settings across California, from densely populated urban areas in Los Angeles, to state waters off the coast of Santa Barbara, to agricultural hubs in the Central Valley. To date, the vast majority of oil operations have been concentrated in Kern County, which produced 71% of California's oil in 2013.[1]

A large portion of California's crude oil reserves is thought to lie in the Monterey Shale, a 2,250 square mile rock formation that spans the San Joaquin, Los Angeles, and Monterey Basins. The U.S. Energy Information Association (EIA) originally estimated there could be between 13.7 and 15.4 billion barrels of technically recoverable oil. However, in 2014 the EIA drastic reduced their estimates by 95.6%, to 0.6 billion barrels of oil.

Well Stimulation Reporting

In accordance with regulations put in place after the passage of Senate Bill 4, the Division of Oil, Gas, and Geothermic Resources (DOGGR) requires oil companies to submit written notice before beginning well stimulation treatments, including fracking and acidizing. Based on these reports, DOGGR has developed a map that allows users to search for new well stimulation notices by location, well type, and a variety of other variables. Note that companies were not required to submit notices until January 1, 2014, and that SB 4 exempts several forms of enhanced oil recovery which will likely not show up in DOGGR's database.

History of Oil Threats in San Luis Obispo County

- 1926: Union Oil's Tank Farm Road oil storage facility was struck by lightning which set off a series of explosions and fires. This event, involving fourteen reservoirs and eight million barrels of oil, was the worst environmental disaster to hit the Central Coast. Flaming oil covered nine hundred acres of land and to starve the fire, a massive amount was pumped into the ocean.
- 1969: In nearby Santa Barbara Channel, Union Oil's offshore platform "Holly" blew out its safety valve and gushed oil into the ocean and beaches for eleven days before being capped. This gave rise to a national environmental movement which resulted in the creation of the Environmental Protection Agency in 1970.
- 1986: In response to the federal government's proposed leasing of offshore oil drilling permits, a citizen's initiative was passed by the voters of San Luis Obispo County to ban any onshore infrastructure (such as pipelines, storage, or pump stations) in support of offshore oil or gas development.
- 1988: California's worst oil spill, at the Union Oil Guadalupe oilfield, was uncovered by surfers and fishermen and reported by whistleblowers. Known about by company officials for decades but kept secret, up to nine million gallons of oil were leaked into the dune complex that straddles San Luis Obispo and Santa Barbara counties. It remains the largest oil spill in continental United States history and is still being cleaned up thirty years later. Executives and operators were originally charged with criminal violations, later reduced to civil charges.
- 1994: It was discovered by local Avila Beach residents that there was a massive oil spill under their homes and businesses. Over many decades, corroded pipes that ran under the town, from the hilltop tank farm to the Union Oil pier, had leaked over four hundred thousand gallons of toxic petroleum.
- 2014: Phillips 66 proposed to build a crude oil train terminal at its Nipomo Dunes refinery in San Luis Obispo County (the same location involved in the Unocal Guadalupe Dunes oil spill). They wanted to import Alberta tar sand oil in mile long oil tanker trains, despite thirteen documented negative and significant environmental and public health threats. A local and statewide grassroots opposition was successful in convincing the County Planning Commission and County Supervisors to deny the project.

http://www.hcn.org/articles/infographic-as-nebraska-regulators-ok-keystone-xl-decision-a-look-at-oil-spills

Where's the Oil in San Luis Obispo County?

The vast majority of oil produced in San Luis Obispo County comes from the Arroyo Grande Oilfield. However, there are wells in the Russell Ranch Oilfield that are in our county. Also abandoned wells in many other places around the county and these abandoned wells could be re-activated in the future using enhanced recovery methods.

Arroyo Grande Oilfield - https://maps.conservation.ca.gov/doggr/wellfinder/#close

Russell Ranch Oilfield - https://maps.conservation.ca.gov/doggr/wellfinder/#close

Sentinal Peak Resources (present owner of Arroyo Grande Oilfield) - https://sentinelpeakresources.com/

Arroyo Grande Oilfield:

There are so many oil and gas wells in the Arroyo Grande Oilfield that the Department of Oil, Gas, and Geothermal Resources (DOGGR) online "Well Finder Map" looks like a swarm of bees clustered together. This oilfield is located near Pismo Creek and other groundwater sources.

The types of oil and gas extraction methods used at Sentinel Peak Resources Arroyo Grande Oilfield include mainly Cyclic Steam Injection, however if they decide to extract oil from the Monterey Shale, fracking will be the preferred method. There are also 29 Class II water injection well in the Arroyo Grande Oilfield, which 7 are active at this time. Wastewater injection wells are used to dispose of the "produced water" generated from various oil extraction techniques. There are many plugged or abandoned wells in the AGOF that could be re-stimulated using high intensity petroleum extraction techniques in the future when oil prices are higher.

- 29 total number of Class II wastewater injection wells
- 7 active Class II wastewater injection wells
- 7 inactive (idle) wastewater injection wells
- 15 plugged Class II wastewater injection wells

All of these Class II wastewater injection wells are located in the Arroyo Grande Oilfield

The map below shows the AGOF wastewater injection well located near Pismo Creek

http://www.arcgis.com/home/webmap/viewer.html?url=http://services.arcgis.com/jDGuO8tYggdCCnUJ/ArcGIS/rest/services/CA%20Class%20II%20Injection%20Wells/FeatureServer/1&source=sd

The following links are to articles pertaining to wastewater injection:

www.sanluisobispo.com/opinion/letters-to-the-editor/article67083077.html

www.sanluisobispo.com/news/local/article39062856.htm

https://www.biologicaldiversity.org/news/press_releases/.../oil-waste-08-03-2016.html

Information presented by the operators of the Arroyo Grande Oilfield San Luis Obispo County, California Edna Member, Dollie Sands, Pismo Formation Aquifer Exemption Application

Class and Well Type

• EPA Class II Injection

• Water Disposal

• Enhanced Oil Recovery

• Cyclic Steam

• Steam Flood

Exemption Justification

• CFR §146.4 Criteria for exempted aquifers

• (a) It does not currently serve as a source of drinking water

• (b) It cannot now and will not in the future serve as a source of drinking water because:

• (1) It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible

HISTORY:

Seeps in the Arroyo Grande oilfield were used by the Chumash Indians to seal their water craft (tomol) and their water carrying vessels. Gaspar de Portola wrote: “On May 12, 1770, we left these canyons and arroyo of San Ladislao and the rancheria of the Buchon and continued to the north, northeast. The stream of this canyon doesn’t run but is a marsh. In ¼ league {1 league = 2.6 miles} of walking we arrived at a group of hills very big and wide, and we crossed their slope and there were many outcrops of melted tar or chapopote, and we had to throw 200 sticks into the tar and then we crossed forward and in a league turned north in this broad canyon {Edna Valley}.”

- 1880 – 1922 - 150,000 tons of tar sands mined from the surface
- 1906 – First oil well completed
- 1919 – Arroyo Grande oilfield designated by the State
- 1949 – Water Flood
- 1965 – Cyclic Steam
- 1980 – Steam Flood

CURRENT:

• ~560 wells drilled in total
• 260 wells in operation
• 19 million barrels of oil produced
• 5th largest field in District 3 by production
• Oil Production = 1,350 bbl/day
• Water Production = 29,750 bbl/day
• Water/Steam Injection = 11,700 bbl/day
• Water not returned to Reservoir = 18,050 bbl/day

The Risks of Wastewater Injection Wells

The danger of wastewater injection wells, especially for surrounding aquifers, are well known and detailed in many online articles. In general, wastewater injection wells may be comparable to fracking wells in terms of their risk to groundwater and their ability to trigger earthquakes. One sample article from ProPublica {1} states:

The boom in oil and natural gas drilling is deepening the uncertainties, geologists acknowledge. Drilling produces copious amounts of waste, burdening regulators and demanding hundreds of additional disposal wells. Those wells – more holes punched in the ground – are changing the earth's geology, adding man-made fractures that allow water and waste to flow more freely.

"There is no certainty at all in any of this, and whoever tells you the opposite is not telling you the truth," said Stefan Finsterle, a leading hydrogeologist at Lawrence Berkeley National Laboratory who specializes in understanding the properties of rock layers and modeling how fluid flows through them. "You have changed the system with pressure and temperature and fracturing, so you don't know how it will behave."

A ProPublica review of well records, case histories and government summaries of more than 220,000 well inspections found that structural failures inside injection wells are routine. From late 2007 to late 2010, one well integrity violations was issued for every six deep injection wells examined – more than 17,000 violations nationally. More than 7,000 wells showed signs that their walls were leaking. Records also show wells are frequently operated in violation of safety regulation and under conditions that greatly increase the risk of fluid leakage and the threat of ***water contamination.***

Structurally, a disposal well is the same as an oil or gas well. Tubes of concrete and steel extend anywhere from a few hundred feet to two miles into the earth. At the bottom, the well opens into a natural rock formation. There is no container. Waste simply seeps out, filling tiny spaces left between the grains in the rock like the gaps between stacked marbles.

An additional risk of wastewater injection wells is their potential for triggering earthquakes. A Scientific American article describes this phenomenon in places like Oklahoma where earthquakes used to be rare {2}:

In the area near Prague, OK, where wastewater from oil and gas production has been injected down disposal wells for decades, a series of earthquakes broke out following the massive magnitude 8.8 earthquake off the coast of the Maule region of Chile in 2010. For months the grounds in OK periodically shook, culminating in a destructive 5.7 magnitude quake in November 2011.

Injecting Wastewater into Protected Aquifers

The US EPA has delegated oversight of California's wastewater injection wells to DOGGR. In 2015, the EPA alerted DOGGR to the fact that many of California's Class II wastewater injection wells are injecting into protected aquifers with less than 10,000 TDS (total dissolved solids) and ordered DOGGR to take emergency measures to bring the wells into compliance with the US Safe Drinking Water Act.

State Regulators Send Aquifer Exemption Proposal to U.S. EPA - Posted 2/8/2016 (from an article found on the DOGGR website)

The California Department of Conservation/Division of Oil, Gas, and Geothermal Resources ("Division") and State Water Resources Control Board on February 8, 2016 submitted a proposal to the U.S. Environmental Protection Agency requesting to expand an aquifer exemption designation for the Dollie sands of the Pismo formation in the Arroyo Grande oil field. The field is in unincorporated San Luis Obispo County near the intersection of Ormonde Road and Price Canyon Road. The proposed aquifer exemption would allow the State, in compliance with the federal Safe Drinking Water Act, to approve Class II injection into the identified area, either for enhanced oil recovery or for injection disposal of fluids associated with oil and gas production.

[County Oilfield Aquifer/Zone Well Type Presentation to Water Boards Submitted to Water Boards Concurrence with Water Boards Received Public Comment Period Public Hearing Submission to U.S. EPA Region 9 Approval by U.S. EPA Region 9 San Luis Obispo Arroyo Grande Dollie Sands, Pismo Formation Water Disposal and Enhanced Oil Recovery 7/29/2015 8/4/2015 8/7/2015 8/20/2015 - 9/21/2015 Courtyard Marriot 1605 Calle Joaquin Road San Luis Obispo, CA 93405 September 21, 2015 4pm - 7pm.]

Oil and Gas Production Operations, Including Those Enabled by Fracking, Use Limited Water Supplies that should be Preserved for Agricultural and Municipal Uses.

Water is a valuable and limited commodity in San Luis Obispo County.

Expanding oil and gas productions operation in San Luis Obispo, including those using fracking and other well stimulation treatments, will increase water consumption. According to a 2013 study by the University of CA, Berkeley, fracking in CA often requires hundreds of thousands of gallons per well. A study by the California Council on Science and Technology showed that approximately 90 percent of water used in well stimulation operations could instead be used for irrigation or domestic use. The AGOF uses 22 barrel (1 barrel equals 42 gallons) of water for every 1 barrel of oil recovered.

Forestalling water shortages in the County becomes especially challenging during drought conditions like those we are currently experiencing. Residents are already dealing with unprecedented increases in water rates and anticipate further rate increases. San Luis Obispo voters want to ensure that our limited water supplies are preserved for local farmers and residents, not for fracking or expanded oil and gas production.

Many oil and gas production operations, including those using well stimulations treatments; mix, transport, and store toxic and hazardous chemicals such as those used in fracking or acidizing fluid.

The wastewater and chemicals from these operations threaten to contaminate San Luis Obispo County's water supply through improper storage or disposal, surface spills, breaks in well casements or by any number of other tragedies. Water and soil contamination poses a health risk both to humans and to livestock and wildlife.

Given the County's heavy reliance on groundwater and the importance of clean surface water, oilfield contamination could have devastating impacts on agriculture, our local economy, and our water supplies. San Luis Obispo County residents are unwilling to accept the increased risk of water pollution posed by fracking and other well stimulation treatments including wastewater injection and wastewater disposal ponds.

This Initiative will reduce these risks by banning fracking and other well stimulation treatments, phasing out oil and gas including wastewater injection and the use of wastewater disposal ponds, and banning new oil and gas wells.

News:

https://www.eenews.net/stories/1060065209

https://riveroflostsouls.com/2017/10/24/on-oil-milkshakes-movies-albert-b-fall-and-ryan-zinke/

http://www.sciencemag.org/news/2017/12/fracking-linked-low-weight-babies

New Levels of Scrutiny

In a state mired in drought, every water-consuming practice has come under closer examination. The oil industry is no different. The industry, in fact, is swimming in water — salty water from deep within the Earth, that is.

California's oil fields produce 15 barrels of briny, chemical-laden water for every barrel of oil. Most of that water is reinjected into oil wells to maintain pressure and boost production. But a quarter of the waste is discarded, pushed at high pressure into aquifers that the EPA has deemed sufficiently salty to be used as trash cans.

But regulators at the Division of Oil, Gas, and Geothermal Resources, a branch of the Department of Conservation, erred. They approved waste injection into aquifers that were supposed to be protected.

The deepest concerns surround 178 Category 1 wells. These are wells that injected oil-field waste into aquifers that contain water with less than 3,000 milligrams per liter of total dissolved solids (TDS) and do not have naturally occurring hydrocarbons. These aquifers are too salty to drink from — the federal standard for TDS is 500 milligrams per liter — but pure enough that they could conceivably be used in the future. There is no evidence that an injection well has contaminated water supplies currently used for drinking.

Of the 33 wells that were shuttered on October 15, all but two are located in Kern County. Twenty-one of the wells were actively injecting oilfield waste.

Oil companies are seeking an exemption from the EPA for 35 of the 178 category 1 wells. Their justification: these wells are injecting waste into aquifers that do in fact contain hydrocarbons. Because they are seeking an exemption, these wells received an extended deadline for closure: February 15, 2017. That is the same date that an additional 297 wells that are illegally injecting into aquifers with a higher TDS concentration — between 3,000 milligrams per liter and 10,000 milligrams per liter — are required to close.

“If they want to continue injecting into those wells, they have to bring us information as to why the state should apply for an exemption,” Don Drysdale, Department of Conservation spokesman, told Circle of Blue. Though California manages its Underground Injection Control program, the EPA is in charge of declaring aquifers exempt from the rules.

Once a company submits the required information, the Department of Conservation will determine whether it is sufficient to forward to the EPA. Drysdale said the department will consider a number of factors: the presence of hydrocarbons, for example, or indications of arsenic, boron, or other elements more harmful than salt.

Eighty-three of the 178 wells are in the middle of a dispute between the EPA, which says the aquifers they are using should be protected, and the state, which claims that the aquifers are salty enough to be used for disposal wells. Unless the EPA grants an exemption, they will be shut down by December 31, 2016.

Pits Still a Problem

Green groups are pleased that the state is finally taking action, but are disappointed with the timeline. They would also like to see the state take stronger action to address unlined pits, another means of disposing oilfield waste. Unlined pits allow the wastewater to seep into shallow groundwater where it could contaminate domestic wells.

There are 619 active pits operating around Kern County and the southern Central Valley, according to the Central Valley Regional Water Quality Control Board. The pit operators must receive permits or be shut down by December 2016.

Clean Water Action petitioned the state in August to shut down two oilfield waste facilities in Kern County that the regional board acknowledges have violated their permits and polluted groundwater. Both sites, which include a total of 33 waste pits, are operated by Valley Water. The state must respond to that petition by November 27.

The timeline for closing down improperly permitted wells comes from an agreement between the EPA, the Department of Conservation, and the State Water Resources Control Board, Drysdale said. Because there is no evidence of drinking water contamination, injection was allowed to wind down rather than be immediately shuttered.

Wastewater Injection, Cyclic Steam Injection, and Fracking will Increase the already HIGH RISK of Earthquakes in San Luis Obispo County.

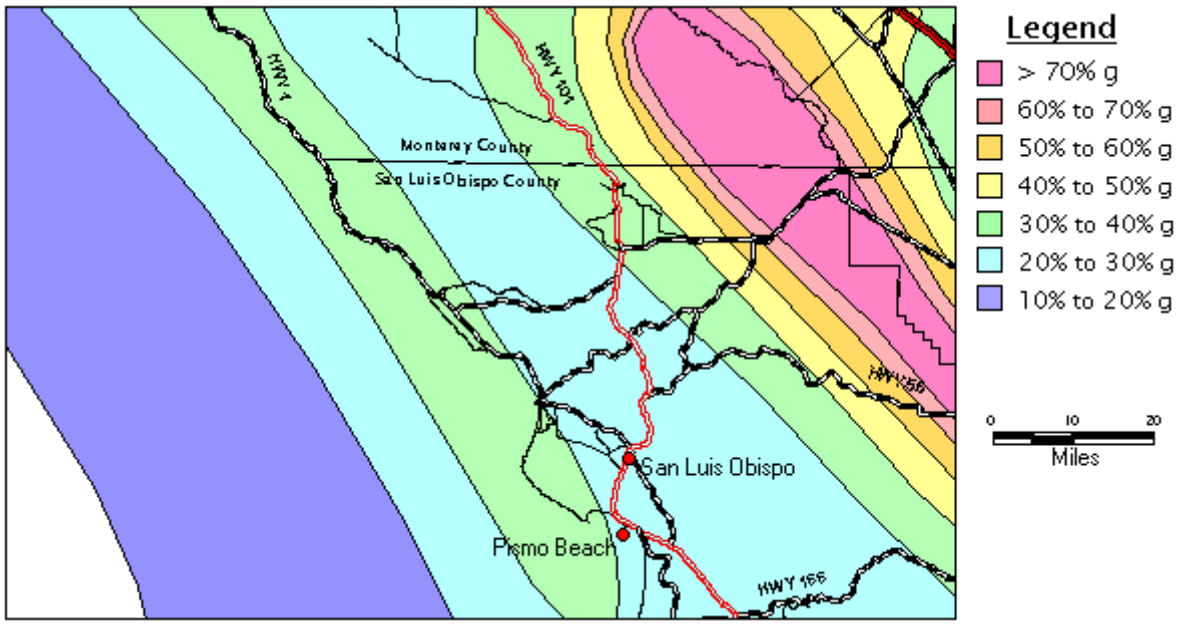
Seismic activity is a matter of particular concern in San Luis Obispo County. Major active geologic faults, including the San Andreas Fault, run through the County including one that runs directly through Price Canyon and numerous other faults have been mapped in the region.

Oil and gas production operations using fracking and other well stimulation treatments, including cyclic steam and wastewater injection wells have been shown to induce and/or exacerbate earthquakes. The risk of increased seismic activity in San Luis Obispo County from these activities threatens public health and safety and the built environment, including oil and gas infrastructure. County residents do not accept this heightened risk.

Probabilistic Seismic Hazards

Peak Ground Acceleration Atlas

San Luis Obispo 1 x 2 Degree Sheet



The information shown on this map is not intended to be used for site specific seismic hazards analyses, but for the illustration of regional patterns of shaking hazard.

Managing the Seismic Risk Posed by Wastewater Disposal

Mark D. Zoback, PhD., Professor of Geophysics - Stanford University

Step 1: Avoid Injection into Active Faults Aside from plate boundaries where large earthquakes occur with regularity, earthquakes also occur in brittle rocks nearly everywhere within continental interiors around the world as a result of natural geologic processes. It is thus no surprise that fluid injection occasionally triggers earthquakes. In fact, building dams for surface reservoirs occasionally triggers small- to moderate-sized earthquakes even though resultant pore pressure increases at depth are extremely small. Modern 3-D seismic imaging methods are sufficiently advanced that we can identify faults capable of producing potentially damaging earthquakes at depth. Faults large enough to produce damaging earthquakes — say, those above magnitude 6.0 — should be easily detectable as part of geologic characterization studies of potential injection sites because they are associated with slip on faults that are many tens of kilometers in size. Smaller faults may be harder to detect, but will only produce small earthquakes that might be felt locally but will not cause damage. We also know a lot about the relationship between the orientation of potentially active faults and the ambient stress field in a given region. This also enables us to identify (and avoid) potentially problematic faults prior to injection. Potentially active faults can be identified because the relationship between the orientation of active faults and the regional stress field is well known from basic principles of structural geology and rock mechanics. In other words, only faults of certain orientations are potentially activated during injection in a given area. The earthquakes apparently triggered by fluid injection at Guy, Ark. occurred on northeast trending, near vertical faults, consistent with what would be expected from knowledge of the regional stress field and quite similar to the trend of active faults in the New Madrid Seismic Zone immediately to the east. Had these faults been identified during site characterization studies carried out as part of the permitting process, this site would not have been used for injection.

Step 2: Minimize Pore Pressure Changes at Depth Rocks in the upper part of Earth's crust contain pre-existing pore space, fractures and flaws. These void spaces are normally filled with freshwater near Earth's surface (in the upper 1 kilometer or so) and filled with saline brines at greater depths. Injecting fluids into the subsurface will increase the pressure in these voids, depending on the rate it is injected and the volume of pore space available to accommodate the injected fluids. It should be pointed out that injection always occurs at depths where the injected fluids are isolated from near-surface water supplies. To minimize the potential for injection to trigger seismicity, it is obviously a good idea to minimize the pore pressure perturbations associated with injection. This can be accomplished in a variety of ways. The best way, of course, is to minimize the injected volume of fluid. Consider the case of the disposal of flow-back waters following hydraulic fracturing associated with shale gas development in the Marcellus Formation of the northeastern U.S. Typically, 25 to 50 percent of the water used during hydraulic fracturing flows back and needs to be disposed of. However, because it has been difficult to find suitable injection sites in this region (and quite expensive to haul water great distances to already operating injection wells), it is common practice to recycle flow-back water by using it in subsequent hydraulic fracture operations rather than disposing of it in injection wells. In the Marcellus, nearly all of the water is recycled. That certainly minimizes the pore pressure perturbations. Another way to reduce the pressure buildup associated with injection is to utilize highly permeable regional saline aquifers to dispose of wastewater. These aquifers can accommodate large volumes of injected fluids without experiencing significant pressure changes. The Ellenburger Formation in Texas is regionally extensive and highly permeable — one reason why many of the approximately 50,000 permitted wastewater disposal wells in the state have operated for so long, essentially without the occurrence of triggered seismicity. In cases where saline water is used for hydraulic fracturing, it is possible to reinject the water that flows back after fracturing into the same formations. When flow-back water is injected into the same saline aquifers from which the water used for hydraulic fracturing was produced, pressure in the aquifers decreases over time as more

water is produced for hydraulic fracturing than injected following flow-back. Alternatively, weak, poorly cemented and highly permeable sandstone formations would also be ideal for injection. Such formations deform plastically and do not store elastic strain energy that can be released in potentially damaging earthquakes. No earthquakes have been triggered in the 15 years during which a million metric tons per year of carbon dioxide from the Sleipner gas and oilfield in the North Sea has been injected into the Utsira sand, a highly porous, regionally extensive saline aquifer. Obviously, cases will arise where well-cemented, less permeable and more brittle formations must be used for injection. In those cases, care must be taken to avoid large pore pressure changes. This can be done through modeling prior to injection once the permeability and capacity of the injection intervals have been determined. Well-established procedures have been developed over many decades by petroleum engineers to do this.

Step 3: Install Local Seismic Monitoring Arrays Potentially active faults that might cause large and damaging earthquakes should be identifiable during the site characterization phase of permitting potential injection wells. Because smaller faults can escape detection, seismic monitoring arrays should be deployed in the vicinity of injection wells when there is a cause for concern that injection might trigger seismicity. The locations and magnitudes of naturally occurring earthquakes are routinely determined on a real-time basis in numerous seismically active regions around the world. The instrumentation, data telemetry and analysis techniques used to accomplish this monitoring are well developed and easily implemented at relatively low cost. By supplementing regional networks with local seismic arrays near injection wells, accurate locations of earthquakes that might be triggered by injection can be used to determine the locations and orientations of the causative faults. Although small faults cannot cause large earthquakes, even small earthquakes felt by the public will be a cause for concern and should be monitored.

Step 4: Establish Modification Protocols in Advance following precedents established to deal with earthquakes triggered during the development of enhanced geothermal systems, operators and regulators should jointly establish operational protocols for injection sites located in areas where there is concern about the potential for triggered seismicity. These protocols are sometimes referred to as “traffic light” systems.

Green means go: Once operational protocols and local seismic networks are in place and injection begins at agreed-upon rates, operators would have a green light to continue unless earthquakes begin to occur that appear to be related to injection. The occurrence of seismicity would be a cautionary yellow light. Once seismicity occurs, operators would slow injection rates and study the relationship between the seismicity and injection. Should seismicity cease, operations could potentially continue at reduced injection rates. In fact, it was demonstrated 40 years ago at Rangely that earthquakes could be turned on and off by modulating the injection rate and resultant increase in pore pressure at depth. With such protocols in place, the potential occurrence and associated response to triggered seismicity are pre-defined and known to all parties.

Step 5: Be Prepared to Alter Plans or Abandon Wells In the same way that it’s important to plan for the possibility of triggered seismicity in advance, we have to be prepared to reduce injection rates, or even abandon wells if triggered seismicity cannot be stopped by limiting injection rates. That would be the red traffic light: Seismicity has been detected that appears to be associated with a fault potentially capable of producing a moderate-sized earthquake. In the case of the Arkansas triggered earthquakes, as well as a series of quakes thought to have been caused by wastewater injection in the Barnett Shale in Texas near the Dallas-Fort Worth metro area in 2008, the seismicity abated once injection in the problematic wells was terminated. Overall, it is important for the public to recognize that the risks posed by injection of wastewater are extremely low. In addition, the risks can be minimized further through proper study and planning prior to injection, careful monitoring in areas where there is a possibility that seismicity might be triggered, and operators and regulators taking a proactive response if triggered seismicity were to occur.

Expanding Oil and Gas Production Operations in Sand Luis Obispo County is Inconsistent with our Agricultural Heritage and Rural Character.

San Luis Obispo County takes pride in its agricultural heritage, the reputation of its agricultural products and its wineries. Residents choose to live in San Luis Obispo County over neighboring urban areas because if the County's quiet, slower pace of life and its pastoral atmosphere.

According to the California Agricultural Statistics Review 2014-2015 San Luis Obispo has a ranking of 15th in the state of CA total value of production. Our commodities being grapes (wine), strawberries, cattle and calves, and vegetables. The total production in 2016 adds up to $915 M.

Details on the following pages.

http://www.slocounty.ca.gov/getattachment/c4ee944c-b14f-4a1e-acf3-f8560ff59cac/2016-Annual-Crop-Report.aspx

http://www.sanluisobispo.com/news/local/article68494287.html

http://www.sanluisobispo.com/news/local/article46646830.html

http://www.sanluisobispo.com/news/local/article44579415.html

https://www.biologicaldiversity.org/news/press_releases/2015/oil-and-gas-12-17-2015.html

http://www.tolosapressnews.com/oil-drilling-in-arroyo-grande-oil-field-challenged/

https://www.newtimesslo.com/sanluisobispo/oil-water-and-rocks-freeport-mcmoran-wins-one-battle-in-price-canyon-drilling-war/Content?oid=2937686

Tourism is the largest industry next to agriculture in the San Luis Obispo County, and wine tourism links these two key industries together.

Tourism keeps San Luis Obispo County's local communities economically vibrant, growing at a 3.3% rate year over year. Industry earnings generated by travel and tourism spending reached its highest number yet, at $470 million, in 2014.

Jobs also increased at 2.7% over 2013 and total tourism-related jobs in San Luis Obispo County reached an all-time high of 17,160 persons employed, making up approximately 10.5% of total employment in the County.

Positions include divisions of accommodations, food service, arts, entertainment, recreation, retail, and transportation.

Local and State Tax Receipts totaled $125 million in revenue generated by travel spending, reflecting an 8% and 2.9% increase over 2013 respectively. San Luis Obispo County has also recorded an approximate 15% average increase in Transient Occupancy Tax for the 2014-15 fiscal year.

Tourism continues to keep local communities economically viable, create jobs and support local businesses.

See charts on following page.

https://www.visitsanluisobispocounty.com/upload/files/FY2014-15%20Annual%20Report.pdf

http://www.labormarketinfo.edd.ca.gov/county/slo.html

https://www.bls.gov/eag/eag.ca_sanluisobispo_msa.htm

Name	Location	Industry	# of Employees
Ami Sierra Vista Radiology	San Luis Obispo	Physicians and Surgeons	500-999
Arroyo Grande Community Hospital	Arroyo Grande	Hospitals	250-499
Atascdero State Hospital	Atascdero	Hospitals	1000-4999
Cal Poly State San Luis Obispo	San Luis Obispo	Schools, Universities, Colleges	1000-4999
California Mid-State Fair	Paso Robles	Concert Venues	500-999
Child Abuse and Neglect Child	San Luis Obispo	Business Management Consultants	250-499
County Office of Education	San Luis Obispo	Schools	250-499
Cuesta College	Paso Robles	Schools, Universities, Colleges	500-999
Department of Social Services	San Luis Obispo	Government Offices - US	500-999
Diablo Canyon Nuclear Power	Dialblo Canyon	Power Plants	1000-4999
Ernie Ball Inc	San Luis Obispo	Musical Instrument Manufacturer	250-499
French Hospital Medical Center	San Luis Obispo	Hospitals	250-499
Glenair Incorporated	Paso Robles	Communications Consultants	1000-4999
Medi-Ca lEligibility Information	San Luis Obispo	Government Offices - County	500-999
Mental Marketing	Templeton	Advertising Agencies & Counselors	500-999
Morro Bay Art Assoc Gallery	Morro Bay	Art Galleries and Dealers	250-499
Pacific Gas and Electric Company	San Luis Obispo	Power Company	1000-4999
San Luis Obispo County EMS	San Luis Obispo	Government Offices - County	1000-4999
San Luis Obispo County Social Svcs	San Luis Obispo	Government Offices - County	250-499
San Luis Obispo Sheriffs Dept	San Luis Obispo	Sheriff	250-499
Sierra Vista Regional Medical Center	San Luis Obispo	Hospitals	500-999
Social Services Department	San Luis Obispo	Government Offices - County	250-499
Trust RCM	San Luis Obispo	Billing Services	500-999
Twin Cities Community Hospital	Templeton	Hospitals	250-499
William Randolph Hearst Memorial	San Simeon	Non-Profit Organization	250-499
Sentinel Peak Resources	Arroyo Grande	Oil and Gas Production Operations	Less than 200

San Luis Obispo County's Smart Growth Principles call for a Transition to Renewable Energy.

The County's General Plan adopts Smart Growth Principles that direct San Luis Obispo County to proactively conserve energy resources by decreasing reliance on environmentally costly energy sources and encouraging use of alternatives.

The General plan identifies several priority actions that will contribute to the sustainability of the County's natural resources and quality of life, including conserving water, reducing greenhouse gas emissions, and increasing use of renewable energy sources. It also recognizes that these actions are intimately connected because production of energy from fossil fuels causes significant harm to the environment.

The General Plan states that San Luis Obispo County seeks to provide a framework for transitioning from non-renewable fossil fuel energy sources to environmentally sustainable, renewable energy supplies that do not degrade ecosystems.

The County has abundant renewable resources that can be and are used to generate energy, including wind and solar power, and only a small portion of these resources are currently used.

San Luis Obispo County renewable energy goals include having an environmentally sustainable supply of energy for all County residents and businesses, increasing the use of local renewable energy. The County needs to decrease its reliance on fossil fuels and secure a larger portion of its energy from renewable sources to meet these goals.

http://www.slocounty.ca.gov/Departments/Planning-Building/Forms-Documents/Plans/General-Plan.aspx

Other articles that may be of interest on this subject:

https://www.democracynow.org/2017/12/1/gop_quietly_moves_to_open_arctic

https://www.texasmonthly.com/energy/new-study-offers-proof-north-texas-earthquakes-fracking-related/

http://www.chicagotribune.com/news/nationworld/ct-epa-mining-pollution-20171201-story.html

https://www.nytimes.com/2017/12/02/business/tax-bill-offers-last-minute-breaks-for-developers-banks-and-oil-industry.html?smid=fb-share

http://www.ceh.org/news-events/press-coverage/content/video-kids-near-fracking-sites-risk-permanent-brain-damage-study/

https://www.ecowatch.com/public-lands-fracking-2516878619.html