IN THE DISTRICT COURT OF PAYNE COUNTY
STATE OF OKLAHOMA

MATT MEIER, SHERYL MEIER and KAI BACH, on behalf of themselves and all others similarly situated,	§	
Plaintiffs,	§	**Case No.** CJ-2017-277
vs.	§	
CHESAPEAKE OPERATING, L.L.C.; DEVON ENERGY PRODUCTION COMPANY, LP; MIDSTATES PETROLEUM COMPANY LLC; NEW DOMINION, LLC; RANGE PRODUCTION COMPANY, LLC; SPECIAL ENERGY CORPORATION; and WHITE STAR PETROLEUM, LLC	§	
Defendants.	§	

CLASS ACTION PETITION

Plaintiffs Matt Meier, Sheryl Meier, and Kai Bach ("Plaintiffs") individually and on behalf of similarly situated owners of real property in Oklahoma, and for their causes of action against Defendants Chesapeake Operating, L.L.C., Devon Energy Production Company, LP, Midstates Petroleum Company LLC, New Dominion, LLC, Range Production Company, LLC, Special Energy Corporation, and White Star Petroleum, LLC (collectively "Defendants") state:

1) This is a class action lawsuit brought by and on behalf of Oklahoma citizens who have purchased earthquake insurance for property located in Oklahoma.

EXHIBIT 2

2) Since 2008, Defendants' operation of wastewater disposal wells (also known as "injection wells") has caused thousands of man-made earthquakes throughout large swaths of Oklahoma. Many Oklahomans have been forced to purchase earthquake insurance to provide protection against damage to their homes and property. These man-made earthquakes have caused earthquake insurance rates to soar. As the number of quakes in Oklahoma increased exponentially after 2008, so, too, did the number and cost of earthquake insurance policies written in the state.

3) Defendants are some of the largest operators of wastewater injection wells in the Arbuckle formation, the key injection formation responsible for Oklahoma's man-made earthquake swarm. Defendants' operation of wastewater disposal wells and the resulting earthquakes caused by such activity constitute public and/or private nuisances under Oklahoma law. Defendants have injured Oklahoma property owners who have been forced to purchase earthquake insurance or have paid higher rates for such coverage.

4) Plaintiffs bring this action on behalf of themselves and all other similarly situated Oklahoma citizens to recover damages caused by Defendants' activities. Were it not for Defendants' activities, Plaintiffs would not have been forced to purchase earthquake insurance coverage or pay artificially high earthquake insurance premiums.

PARTIES

Plaintiffs

5) Plaintiff Matt Meier is a citizen of Oklahoma and a resident of Garber in Garfield County, Oklahoma. Mr. Meier, along with his wife Sheryl Meier, purchased earthquake insurance to protect their home and property. Mr. Meier has suffered and

continues to suffer damages in the form of premiums paid for earthquake insurance. Mr. Meier would not have incurred such damages absent the conduct by Defendants.

6) Plaintiff Sheryl Meier is a citizen of Oklahoma and a resident of Garber in Garfield County, Oklahoma. Mrs. Meier, along with her husband Matt Meier, purchased earthquake insurance to protect their home and property. Mrs. Meier has suffered and continues to suffer damages in the form of premiums paid for earthquake insurance. Mrs. Meier would not have incurred such damages absent the conduct by Defendants.

7) Plaintiff Kai Bach is a citizen of Oklahoma and a resident of Carrier in Garfield County, Oklahoma. Mr. Bach purchased earthquake insurance to protect his home and property. Mr. Bach has suffered and continues to suffer damages in the form of premiums paid for earthquake insurance. Mr. Bach would not have incurred such damages absent the conduct by Defendants.

Defendants

8) Defendant Chesapeake Operating, L.L.C. is a domestic limited liability company existing and operating under the laws of the State of Oklahoma that does business in the State of Oklahoma. Chesapeake Operating, L.L.C.'s principle place of business is 6100 North Western Avenue, Oklahoma City, OK 73118.

9) Defendant Devon Energy Production Company, LP, is a domestic limited partnership existing and operating under the laws of the State of Oklahoma that does business in the State of Oklahoma. Devon Energy Production Company, LP's principle place of business is 333 West Sheridan Avenue, Oklahoma City, OK 73102.

10) Defendant Midstates Petroleum Company LLC is a foreign limited liability company organized under the laws of the State of Delaware that does business in

the state of Oklahoma. Midstates Petroleum Company LLC's principle place of business is 321 S. Boston Ave., Suite 1000, Tulsa, OK 74103.

11) Defendant New Dominion, LLC is a domestic limited liability company existing and operating under the laws of the State of Oklahoma that does business in the State of Oklahoma. New Dominion, LLC's principle place of business is 1307 S. Boulder Avenue, Tulsa OK, 74119.

12) Defendant Range Production Company, LLC is a foreign limited liability organized under the law of the State of Delaware that does business in the State of Oklahoma. Range Production Company, LLC's principle place of business is 100 Throckmorton, Fort Worth, TX 76102. Range Production Company, LLC can be served through its registered agent Corporation Service Company at 10300 Greenbriar Place, Oklahoma City, OK 73159-7653.

13) Defendant Special Energy Corporation is a domestic corporation existing and operating under the laws of the State of Oklahoma that does business in the State of Oklahoma. Special Energy Corporation's principle pace of business is 4815 S. Perkins Rd, Stillwater, OK 74074.

14) Defendant White Star Petroleum, LLC is a domestic limited liability company existing and operating under the laws of the State of Oklahoma that does business in the State of Oklahoma. White Star Petroleum, LLC's principle place of business is 301 NW 63rd St., Suite 600, Oklahoma City, OK 73116.

JURISDICTION AND VENUE

15) Jurisdiction in this Court is proper. This Court has personal jurisdiction over Defendants as they do substantial business in the State of Oklahoma, are headquartered in the State, and conduct business in this judicial district.

16) Venue is proper in this Court as a substantial part of the events or omissions giving rise to the claims set forth in this Petition occurred here.

FACTUAL ALLEGATIONS

Defendants Have Created a Swarm of Man-made Earthquakes in Oklahoma

17) Before 2008 and the advent of significant wastewater injection by oil and gas operators and other entities, Oklahoma earth was mostly still. According to the Oklahoma Geological Survey (OGS), an average year produced roughly one earthquake above a magnitude of 3.0 on the Richter scale.

18) Since 2008, Oklahoma property owners have witnessed an unparalleled rise in home-shaking earthquakes over large swaths of the state.

19) One way to measure the severity of an earthquake is through magnitude. Magnitude is related to the amount of seismic energy released at the hypocenter of the earthquake. It is based on the amplitude of the earthquake waves recorded on instruments that have a common calibration. The magnitude of an earthquake is thus represented by a single, instrumentally determined value.

20) Seismic waves are the vibrations from earthquakes that travel through the Earth; they are recorded on instruments called seismographs. Seismographs record a zigzag trace that shows the varying amplitude of ground oscillations beneath the instrument. Sensitive seismographs can detect strong earthquakes from sources anywhere

in the world. The time, location, and magnitude of an earthquake can be determined from the data recorded by seismograph stations.

21) The Richter magnitude scale was developed in 1935 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included in the magnitude formula to compensate for the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter scale, magnitude is expressed in whole numbers and decimal fractions.

22) Since the Richter Scale is logarithmic and not linear, a Magnitude 4 earthquake is approximately 10x more powerful than a Magnitude 3 earthquake. Similarly, a Magnitude 5 earthquake will be yet another factor of 10 stronger, or 100x more powerful than a magnitude 3 earthquake. A Magnitude 3.2 event would be 2x more powerful than a magnitude 3.0

23) People in their homes and offices can feel magnitude 3.0 earthquakes. Such quakes produce strong vibrations.

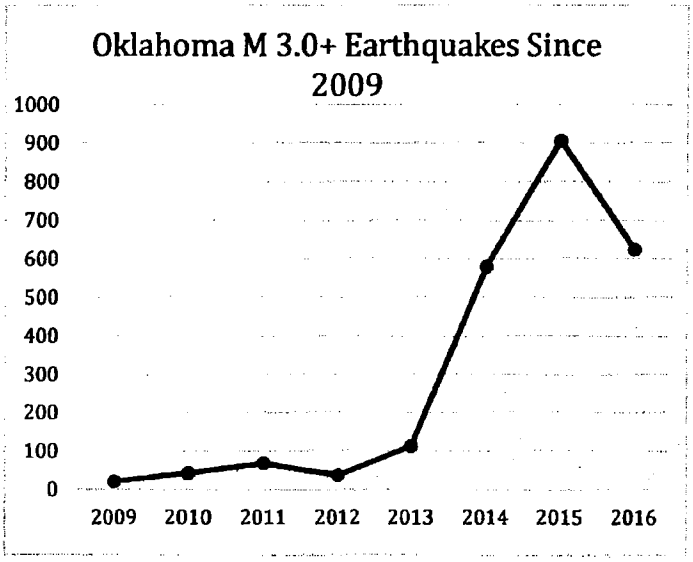
24) Historically, Oklahoma is not a hotbed of earthquake activity. Since the 1970's, the United States Geological Survey has maintained the Advanced National Seismic System (ANSS) to monitor and catalog all earthquakes of Magnitude 3 or greater across the United States, including Oklahoma. Prior to 2008, ANSS seismographs reveal Oklahoma averaged less than 2 Magnitude 3 earthquakes per year. After 2008, however, the number increased exponentially, with nearly two or more felt events occurring per day by 2014 (see chart, below).

25) In 2009, there were 50 detected earthquakes in Oklahoma. In the first sign of what would become a matter of immense concern for Oklahoma citizens, 19 of those earthquakes were magnitude 3.0 or greater.

26) Since that time, the number of Magnitude 3.0 or greater earthquakes has increased exponentially, as the chart and graph below indicate:

OKLAHOMA EARTHQUAKES SINCE 2009

Year	Number of Earthquakes At or Above Magnitude 3.0
2009	19
2010	41
2011	67
2012	35
2013	110
2014	579
2015	904
2016	623



27) In the past 8 years, Oklahoma has become the most seismically active state in the lower-48 states, surpassing California by as much as a factor of 7 and attaining a level of seismic activity that was heretofore unprecedented.

28) Scientists and state authorities have identified a single culprit for Oklahoma's earthquake epidemic: the oil and gas industry.

Oil and Gas Production and Wastewater Injection

29) Waste fluids are a by-product of many oil and gas extraction operations. Oil and gas wells, especially older wells in older fields, produce significant amounts of wastewater. The contents of wastewater vary, but usually consist of spent hydraulic-fracturing fluid or formation brines that come to the surface at the same time as the oil and gas that is extracted. Importantly, wastewater must be contained because it often has a salinity (salt) level hundreds of times higher than salt water and will therefore destroy all vegetation and life in rivers or lakes if it escapes onto the surface.

30) When waste fluids are disposed, they are often injected deep underground into high-permeability formations, usually deeper than the production reservoirs, for permanent sequestration and isolation from oil or gas reservoirs and drinking-water aquifers. The wells in which these fluids are disposed are known as injection wells, wastewater wells or salt-water disposal wells.

The Link Between Wastewater Injection and Oklahoma's Earthquakes

31) The United States Geological Survey ("USGS"), a division of the United States Department of the Interior, houses the Nation's preeminent experts in geologic mapping, monitoring, and analysis of natural resources. Its goal is to provide impartial scientific geological analysis for the benefit of the Nation. According to the USGS, wastewater wells can induce earthquakes in four ways: (1) the injection of fluids raises pore-fluid pressure within a fault thereby weakening the system towards failure, (2) the injection of fluids fills and compresses fluids within pore spaces causing deformation (poro-elastic effects), (3) the injection of fluid that is colder than the rock into which it is being injected causes thermo-elastic deformation, and (4) the injected fluid adds mass to the injection formation. Historic observations indicate that increased fluid pressure within faults most strongly influences whether injection will induce earthquakes, and these observations have also been confirmed by well-understood geological principles of rock failure and, when available, numerical models.

32) The injected fluids do not need to travel the entire distance from the injection well to a fault for the injection to affect the fault's behavior. Injection can affect a fault's behavior by increasing subsurface fluid pressure, thereby changing the stresses on subsurface rocks. These pressure and stress changes can be transmitted much greater

distances than the fluids themselves, just as a child standing on a trampoline will cause springs holding the trampoline in place several feet away to extend due to the added weight. The increase in the fluid pressure and change in stress that is initiated at the injection well is transmitted to the fault without the fluid traveling the full distance between the well and fault.

33) Nonetheless, when fluids do move, due to variances in the permeability of the earth, fluids may sometimes travel significant distances from an injection well to a fault line, even if the well itself is not located near the fault line itself.

34) As a result, injections anywhere within an underground formation contribute to changes in the underground stress regime that are transmitted to fault lines, causing earthquakes. This is because fluid injections anywhere in the formation have the ability to change the underground fluid pressure, the temperature of the rock, or the properties of a fault. As these changes are transmitted to a fault, they counteract the stresses holding the fault closed (the normal stress), resulting in a lower effective stress. With lower effective normal stress clamping a fault, the frictional resistance to slip is lower and the fault is more prone to slip.

35) Defendants are some of the largest operators and/or users of wastewater injection wells in the Arbuckle formation, and are the source of the fluids that have caused Oklahoma's earthquake swarm. By injecting millions of barrels of wastewater below the Arbuckle, Defendants have directly caused the unprecedented rise in Oklahoma earthquake activity.

Scientific Consensus

36) Multiple scientific studies have established a causal link between the injection of production wastewater into the Arbuckle via disposal wells and earthquakes in Oklahoma. Furthermore, according to the USGS and multiple peer-reviewed university studies, hydraulic fracturing, long-term wastewater injection, and enhanced oil recovery have all induced earthquakes in the United States and Canada in the past few years. Research has shown that wastewater disposal is responsible for the vast majority of the increase, including the largest and most-damaging induced earthquakes. Wastewater disposal is responsible for this change because of the duration of injection, the magnitude of the fluid pressure increase, and the size of the region affected by injection.

37) The earthquake rate increase in Oklahoma corresponds to a doubling of the wastewater disposal rate in the state from 1999 to 2013.

38) A March 2013 study investigated the earthquakes in and around Prague, Oklahoma in 2011 and found a correlation between the injection wells operated by certain operators and the earthquakes devastating the town in November of 2011. *See* Keranen, K.M., Savage, H.M., Abers, G.A., Cochran, E.S. 2013, *Potentially induced earthquakes in Oklahoma, USA: Links between wastewater injection and the 2011 M 5.7 earthquake sequence.* GEOLOGY, Mar. 25, 2013.

39) The USGS also recently issued a statistical analysis showing that the recent increase in Oklahoma's earthquakes are not the result of natural seismic changes. Instead, wastewater injection wells are the most likely culprit. The survey also warns that the rise in seismic activity has raised the chance of a damaging magnitude 5.5 or greater in the state. *See Record Number of Oklahoma Tremors Raises Possibility of Damaging*

Earthquakes, USGS-Oklahoma Geological Survey Joint Statement on Oklahoma Earthquakes, Oct. 22, 2013; updated May 2, 2014.

40) On July 3, 2014, the authoritative journal *Science* published a peer-reviewed study showing a sharp increase in central Oklahoma seismicity since 2008. The study linked the earthquakes to wastewater injection operations in central Oklahoma. *See* Keranan, et al., *Sharp increase in central Oklahoma seismicity since 2008 induced by massive wastewater injection*, SCIENCE Vol. 345, 448–451, 451 (July 3, 2014) ("Sharp Increase").

41) Additional studies confirm both the link between wastewater injection wells and the unprecedented increase in Oklahoma earthquakes, and that injection wells can trigger earthquakes miles away from the injection location. *See* Wiengarten, et al., *High-rate Injection is Associated with the Increase in U.S. Mid-Continent Seismicity*, SCIENCE Vol. 348, 1336–40 (June 18, 2015) ("High-Rate Injection") *available at* http://science.sciencemag.org/content/348/6241/1336; *see also* Goebel, et al., *The 2016 Mw5.1 Fairview, Oklahoma Earthquakes: Evidence for Long-Range Poroelastic Triggering at >40 km From Fluid Disposal Wells*, EARTH AND PLANETARY SCIENCE LETTERS 472, 50–61 (2017).

42) The idea that wastewater injection causes earthquakes is not new; it has been recognized and studied by scientists for decades. Well-known examples of water injection into wells causing earthquakes have occurred in Colorado, Texas, India, and China. *See* William L. Ellsworth, *Injection-Induced Earthquakes*, SCIENCE 341, (2013) available at http://science.sciencemag.org/content/341/6142/1225942.

43) The USGS and the Oklahoma Geological Society (OGS) have conducted research quantifying the changes in earthquake rate in the Oklahoma City region, assessing and evaluating possible links between these earthquakes and wastewater disposal related to oil and gas production activities in the region. In a joint statement, the USGS and OGS identified wastewater injection as a contributing factor to the 2011 earthquake swarm and damaging magnitude 5.6 event.

44) In February 2015, the USGS found that "[l]arge areas of the U.S. that used to experience few or no earthquakes have, in recent years, experienced a remarkable increase in earthquake activity that has caused considerable public concern as well as damage to structures. This rise in seismic activity, especially in the central U.S., is not the result of natural processes." Significantly, the USGS also noted that "[d]eep injection of wastewater is the primary cause of the dramatic rise in detected earthquakes and the corresponding increase in seismic hazard in the central U.S." Notably, the Arbuckle formation is the deepest formation where injection occurs in the basin and is at the injection depth closest to earthquake hypocenters.

45) In April 2015, an OGS report found that it is "very likely" oil and gas companies injecting wastewater into deep underground disposal wells triggered most of the dramatic increase in earthquakes in the state.

46) Recently, in a year-end review for 2014, the U.S. Environmental Protection Agency (EPA) noted that many experts concluded that a connection exists between disposal well location, injection volume and rates, and seismic activity. EPA Region 6 End of Year Review of UIC Program for 2014 (transmitted on Sept 29, 2015). The EPA was concerned by the continued upward trend in earthquakes and recommended

a reduction in the volumes of waste injected into the Arbuckle formation, which is the most critical stratum. *Id.* EPA further recommended more assessment and mapping of the Arbuckle formation and its connection to basement rock. *Id.*

47) Based on publicly available data, the causation link is inescapable. Before 2009, Oklahoma experienced less than two earthquakes per year having a magnitude greater than 3. In 2013, there were 110. In 2015, that number was up to 904 earthquakes. In other words, Oklahoma went from have less than two M 3.0 or greater earthquakes per year, to having almost three such earthquakes *per day* in 2015. In that period of time, the rate of magnitude-3 or larger earthquakes in north-central Oklahoma has been nearly 300 times higher than in previous decades. *See* Doyle Rice, *'Reawakened' faults could trigger big Okla. Earthquakes*, USA Today, Mar. 19, 2015, available at https://www.usatoday.com/story/news/nation/2015/03/10/oklahoma-earthquakes-fault-lines/24702741/.

48) As discussed in a recent study, "this seismicity appears to be associated with increases in saltwater disposal that originates as 'flow-back' water after multistage hydraulic fracturing operations." F. Rall Walsh III and Mark D. Zoback, *Oklahoma's recent earthquakes and saltwater disposal*, SCIENCE ADVANCES, 18 June 2015 available at http://advances.sciencemag.org/content/1/5/e1500195 ("Disposal Study").

49) Importantly, as mentioned above, the risk comes not only from the increased frequency of earthquakes, but also the likelihood that those earthquakes will continue to be more severe. USGS scientists warn that the smaller earthquakes induced by the injection of production wastes are reawakening long-dormant, 300-million-year-old fault lines across Oklahoma. The faults could trigger much higher-magnitude, and

consequently more destructive earthquakes than the smaller ones that have plagued the state in recent years. *See* Doyle Rice, *"Reawakened" faults could trigger big Okla. Earthquakes*, USA Today, Mar. 19, 2016, available at https://www.usatoday.com/story/news/nation/2015/03/10/oklahoma-earthquakes-fault-lines/24702741/. According to USGS scientists, these reawakened faults in central Oklahoma could produce earthquakes as powerful as magnitude-5 and 6. *Id.* A USGS geologist stated, "Many faults are reactivating, with as many as 17 magnitude-4 earthquakes in 2014." *Id.* In 2011, one even reached magnitude-5.4 near Prague, Oklahoma.

50) USGS geophysicist Daniel McNamara compared the fault lines in the Fairview and Edmond areas, which recently experienced 4.1 and 4.8 magnitude earthquakes, to the fault around Prague. "I don't know what to say frankly. It's incredible. I've never seen anything like it in the world," stated McNamara. "The working theory we have going on right now is just after decades of wastewater injection, (we) basically have a fault system throughout Oklahoma that's critically stressed... Basically a lot of faults are at a position where it just takes a little bit of added stress to cause them to move into failure." http://www.koco.com/news/usgs-expert-ive-never-seen-anything-like-it-anywhere-in-the-world/37323746 (January 8, 2016).

51) The OGS determined in the spring of 2015 that "the majority of recent earthquakes in central and north-central Oklahoma are very likely triggered by the injection of produced water in disposal wells" and that "seismologists have documented the relationship between wastewater disposal and triggered seismic activity." *See* http://earthquakes.ok.gov/what-we-know/.

52) The USGS fully supports this conclusion. For example, an article in The New Yorker recently quoted USGS geologist William Ellsworth in reporting that "[d]isposal wells trigger earthquakes when they are dug too deep, near or into basement rock, or when the wells impinge on a fault line. Ellsworth said, 'Scientifically, it's really quite clear.'" Rivka Galchen, Weather Underground, The New Yorker, Apr. 13, 2015 available at http://www.newyorker.com/magazine/2015/04/13/weather-underground.

53) In 2015, two earthquakes of greater-than-magnitude-4 occurred on the same day; further evidencing the higher frequency of more serious earthquakes in the areas of concern. A magnitude 4.4 earthquake hit northern Oklahoma on October 10, 2015, which a USGS seismologist said "had all the hallmarks of an induced quake" and "seem[ed] to be part of an ongoing swarm of induced quakes in the area." *Oklahoma Earthquake likely caused by wastewater injection. seismologist says*, The Guardian, Oct. 10, 2015, available at https://www.theguardian.com/us-news/2016/jan/01/oklahoma-earthquakes-oil-gas-industry-wastewater-injection.

54) On the same day, a magnitude 4.5 earthquake hit near the major oil storage and pipeline area near Cushing, roughly midway between Oklahoma City and Tulsa. See Michael Wines, *New Concern Over Quakes in Oklahoma Near a Hub of U.S. Oil*, The New York Times, Oct. 14, 2015 available at https://www.nytimes.com/2015/10/15/us/new-concern-over-quakes-in-oklahoma-near-a-hub-of-us-oil.html?_r=0. Cushing is the location of the world's largest and most important crude oil storage hub. Scientists reported, in a paper published online in September 2015, that a large earthquake near the storage hub "could seriously damage storage tanks and pipelines." Dr. McNamara, the lead author of that study, stated that the

recent earthquake continued a worrisome pattern of moderate quakes, suggesting that a large earthquake is more than a passing concern. "When we see these fault systems producing multiple magnitude 4s, we start to get concerned that it could knock into higher magnitudes," he said. "Given the number of magnitude 4s here, it's a high concern." *Id.*

55) USGS scientists have also said that a magnitude 7 quake cannot be ruled out. *U.S. Maps pinpoint earthquakes*, The New York Times, Apr. 23, 2015, available at https://www.nytimes.com/2015/04/24/us/us-maps-areas-of-increased-earthquakes-from-human-activity.html.

56) The Future Hazards study confirms that more severe earthquakes are likely as a result of ongoing injection of production wastes into the ground through high-rate disposal wells. It states that earthquake clusters associated with long fault structures could give rise to magnitude 5 to 6 earthquakes. Examples include earthquakes associated with the Nemaha fault near Jones, in the Medford and Stillwater regions, and between Langston and Guthrie. Another example is the area around Cushing. The paper concludes that the increased seismicity poses an elevated hazard to infrastructure and the regional population. According a recent paper, the Cushing area earthquakes are associated with reactivated faults that cut into the Arbuckle formation and a subsidiary fault called the Wilzetta-Whitehall. McNamara et al., McNamara, D., at al., *Efforts to monitor and characterize the recent increasing seismicity in central Oklahoma*, THE LEADING EDGE June 2015 available at https://scits.stanford.edu/sites/default/files/tle340606282e1.pdf. That paper notes that most of the earthquakes do not lie along known fault structures, but there may be other fault structures that are being reawakened by the injection that are

associated with these earthquakes. *Id.* The most recent paper notes that earthquake activity in this area has been above forecast and that "[i]nclusion of all recent Oklahoma earthquakes in the NSHM [hazard model] significantly increases ground shaking estimates and earthquake hazard ..., which would result in serious implications for infrastructure design standards. McNamara et al., *Reactivated faulting near Cushing, Oklahoma: Increased potential for a triggered earthquake in an area of United States strategic infrastructure*, GEOPHYSICAL RESEARCH LETTERS (October 23. 2015) available at http://onlinelibrary.wiley.com/doi/10.1002/2015GL064669/pdf.

57) Thus, the injection of large volumes of production wastes into the ground in Oklahoma is causing large numbers of moderate strength earthquakes and is responsible for the overwhelming majority of felt earthquakes in the state.

58) These earthquakes have already caused considerable physical damage and mental disquiet. A series of shocks over magnitude 5 in 2011, the largest of which was magnitude 5.6 in the Prague area of Oklahoma, destroyed at least 16 homes and collapsed an historic spire at Benedictine Hall at St. Gregory's University. Rivka Galchen, Weather Underground, The New Yorker, Apr. 13, 2015 available at http://www.newyorker.com/magazine/2015/04/13/weather-underground. Repairing the spire cost about five million dollars.

59) In spite of these scientific studies, the oil and gas industry insists that Oklahoma has naturally occurring seismicity, that their operations are not causing the earthquakes, and that recent reports linking injection well operations to Oklahoma quakes are not based upon good science.

Defendants' Awareness of the Causal Link Between Injections and Earthquakes

60) Although the Oklahoma-focused studies cited above are relatively recent, researchers funded by the oil and gas industry have known for decades that operators must closely monitor pressures in injection wells to make sure that injections do not lead to fault failures. *Cf, e.g.*, Van Everdingen, A. F. in *Subsurface Disposal in Geologic Basins: A Study Of Reservoir Strata* (ed. Galley, J. E.) 32–42 (American Assoc. Petroleum Geologists Memoir 10, 1968).

61) As reported in Scientific American, "In 1969 Chevron Oil allowed the USGS to use one of its wells to more closely study the effects of fluid pressure on faults. The well was in a seismically active zone of the Rangely oil reservoir in Colorado, and Chevron had been injecting water into the well to stimulate petroleum production. USGS scientists turned the injections on and off and followed the fluid pressure as it migrated through deep rocks. They came up with the exact injection pressure required to trigger quakes. When the pressure exceeded that level, earthquakes rumbled; when the pressure fell below the level, they quieted down." Kuchment, A., "*Drilling for Earthquakes*", Scientific American (Mar. 28, 2016), *available at* https://www.scientificamerican.com/article/drilling-for-earthquakes/.

62) In addition, the U.S. National Academy of Science issued a report on induced seismicity in 2012 noting the risk of earthquakes inherent in wastewater injection. This report, written by the premier scientific research body of the United States, included not just academics but industry experts. All drew the same conclusion: wastewater injection at high levels, particularly near basement rock, can and often does lead to earthquakes. *See* INDUCED SEISMICITY POTENTIAL IN ENERGY TECHNOLOGIES,

National Academy Press (2012), *available at*

https://www.nap.edu/catalog/13355/induced-seismicity-potential-in-energy-technologies.

Defendants Conduct Continues to Harm Oklahomans

63) Defendants operate wastewater injection wells in Oklahoma. These injection wells have caused the earthquakes occurring Oklahoma, and proximately caused damages to Plaintiffs and the putative Class.

64) Since 2008, Defendants have injected huge amounts of production wastes via disposal wells. The total volume of production wastes injected has gone from 2 billion barrels in 2009 to over 12 billion barrels in 2014.

65) The Disposal Study confirms that "the significant increases in SWD [Production Waste disposal] increase pore pressure in the Arbuckle Group, which spreads out away from the injection wells with time, eventually triggering slip on critically stressed faults in the basement." It also confirms "[i]njection of large volumes of saltwater into the Arbuckle group appears to be triggering the release of already stored strain energy in crystalline basement."

66) Thus, scientific studies support that injection of production wastes induces earthquakes and that Defendants' injection of production wastes is causing the earthquakes that have impacted Plaintiffs and the putative Class.

67) As a direct and foreseeable result of Defendants' conduct, Oklahomans have been forced to purchase earthquake insurance to protect their homes and property.

68) As a further direct and foreseeable result, those Oklahomans who purchased earthquake insurance before 2009 are now paying significantly more for their coverage as a result of Defendants conduct.

69) As the number of quakes in Oklahoma increased exponentially after 2008, so, too, did the number and cost of earthquake insurance policies written in the state. The value of coverage, usually offered as an add-on to standard homeowners' policy, spiked to $19 million in 2015 from less than $5 million in 2009, according to the Insurance Information Institute, a trade group.

70) The huge number of earthquakes in Oklahoma has caused some earthquake insurance companies to hike their premiums by as much as 260 percent in the last three years alone, and many companies have ceased writing new insurance policies.

71) Plaintiffs and the Class they seek to represent have brought this suit to recoup their costs of obtaining and maintaining earthquake insurance coverage since 2009.

CLASS ALLEGATIONS

72) Plaintiffs reallege each of the preceding paragraphs, and by this reference incorporates each such paragraph as though set forth here in full.

73) Plaintiffs bring this action, on behalf of themselves and all others similarly situated, as a class action pursuant to 12 O.S. § 2023.

74) The class that Plaintiffs seek to represent is defined below:

> All citizens of Oklahoma who purchased or maintained earthquake insurance for their homes or property from 2008 through the time the Class is certified, Class notice has been delivered to the Class, and Class members have had the opportunity to opt out. Excluded from the Class are Defendants and their directors, officers, employees and agents, and the judicial officer presiding over this case and his/her immediate family members, and any member of the Class that files a timely exclusion.

75) Plaintiffs reserve the right to amend the Class definition if discovery and further investigation reveals that the Class should be expanded or otherwise modified.

76) Plaintiffs reserve the right to establish subclasses as appropriate.

77) This action is brought and properly may be maintained as a class action pursuant to 12 O.S. § 2023 and satisfies the requirements those provisions.

Numerosity

78) In recent years, thousands of earthquakes have been triggered across Oklahoma. These earthquakes are continuing across the state of Oklahoma.

79) The Class is sufficiently numerous and scattered across Oklahoma making joinder of all members of the Class in a single action impracticable, and therefore, the resolution of their claims through the procedure of a class action will be to the benefit of the parties and the Court.

Commonality

80) Plaintiffs' claims raise issues of fact or law that are common to the members of the putative Class. These common questions include, but are not limited to:

a) whether Defendants' operations caused earthquakes in Oklahoma;

b) whether Defendants owed a duty to the Plaintiffs and the members of the putative Class and whether that duty was breached;

c) whether Defendants' conduct amounted to a public nuisance;

d) whether Defendants' conduct amounted to a private nuisance;

e) whether Defendants' conduct is an ultra-hazardous activity;

f) whether Defendants' operations were negligently performed;

g) whether Plaintiffs and the putative Class Members have suffered damages caused by Defendants' operations; and

h) whether a judgment including punitive damages is appropriate.

Typicality

81) Plaintiffs' claims are typical of the claims of the other members of the Class they seek to represent because Defendants' wastewater injection operations have caused damages to Plaintiffs and the putative Class Members in a similar manner.

Adequacy

82) Plaintiffs are interested in the outcome of this litigation and understand the importance of adequately representing the Class.

83) Plaintiffs will fairly and adequately protect the interests of the Class sought to be certified.

84) Plaintiffs are adequate representatives of the Class because they have no interests that are adverse to the interests of the members of the Class. Plaintiffs are committed to the vigorous prosecution of this action and, to that end, Plaintiffs have retained counsel who are competent and experienced in handling class-action and complex tort litigation and who are qualified to adequately represent the Class.

Predominance

85) Questions of law or fact common to the members of the Class predominate over questions affecting only individual members.

Superiority

86) A class action is superior to other available methods for the fair and efficient adjudication of the controversy. The predicate issues relate to Defendants'

wastewater injection operations, actions and activities, and whether these activities pose a public or private nuisance, are an ultra-hazardous activity, and/or were negligently performed. The focus of this action will be on the common and uniform conduct of Defendants in conducting their wastewater injection operations.

87) Absent class action relief, the putative Class Members would be forced to prosecute thousands of similar claims in different venues around the State of Oklahoma. Such an event would cause tremendous amounts of waste of judicial resources, but the prosecution of these claims as a class action will promote judicial economy.

88) The prosecution of separate actions by individual members of the Class would create a risk of:

a) inconsistent or varying adjudications with respect to individual members of the Class which would establish incompatible standards of conduct for the Defendants; and

b) adjudications with respect to individual members of the Class which would as a practical matter be dispositive of the interests of the other members not parties to the adjudications or substantially impair or impede their ability to protect their interests.

89) Plaintiffs are not aware of any difficulty that will be encountered in the management of this litigation which should preclude its maintenance as a class action.

CAUSES OF ACTION

Count 1 – Public Nuisance

90) Plaintiffs reallege each of the preceding paragraphs, and by this reference incorporates each such paragraph as though set forth here in full.

91) Defendants' conduct constitutes a public nuisance.

92) Plaintiffs and the putative Class have property rights and are privileged regarding the use and enjoyment of their homes, businesses, and land. Defendants' actions and operations, as described above, have unlawfully and unreasonably interfered with those rights and privileges.

93) Plaintiffs and the putative Class have suffered a special injury because they have been forced to acquire or maintain earthquake insurance because of Defendants' conduct.

94) Plaintiffs and the putative Class have suffered harm and damages because of Defendants' creation of a public nuisance, including:

a) The value of premiums paid to obtain earthquake insurance coverage; and/or

b) The excess amount required to maintain earthquake insurance coverage after 2009.

Count 2 – Private Nuisance

95) Plaintiffs reallege each of the preceding paragraphs, and by this reference incorporates each such paragraph as though set forth here in full.

96) Defendants' conduct constitutes a private nuisance.

97) Plaintiffs and the putative Class have property rights and are privileged regarding the use and enjoyment of their homes, businesses, and land. Defendants'

actions and operations, as described above, have unlawfully and unreasonably interfered with those rights and privileges.

98) Plaintiffs and the putative Class have suffered harm and damages because of Defendants' creation of a private nuisance, including:

a) The value of premiums paid to obtain earthquake insurance coverage; and/or

b) The excess amount required to maintain earthquake insurance coverage after 2009.

Count 3 – Ultrahazardous Activities

99) Plaintiffs reallege each of the preceding paragraphs, and by this reference incorporates each such paragraph as though set forth here in full.

100) Defendants' actions described above constitute ultra-hazardous activities that involve a high degree of risk of serious harm to a person or the chattels of others, the risk cannot be eliminated by exercising the utmost care, and is not a matter of common usage.

101) As a direct and proximate result of Defendants' ultra-hazardous activities, Plaintiffs and the putative Class have sustained damages, which are the direct and proximate result of Defendants' ultra-hazardous or abnormally dangerous activities, to which Defendants are strictly liable, including:

a) The value of premiums paid to obtain earthquake insurance coverage; and/or

b) The excess amount required to maintain earthquake insurance coverage after 2009.

Count 4 - Negligence

102) Plaintiffs realleges each of the preceding paragraphs, and by this reference incorporates each such paragraph as though set forth here in full.

103) Defendants owed a duty to Plaintiffs and the putative Class to use ordinary care not to operate or maintain their injection wells in such a way to cause or contribute to seismic activity. Defendants, experienced in these operations, knew or should have known of the connection between injection wells and seismic activity, and acted in disregard of these facts.

104) Defendants breached their duty to Plaintiffs and the putative Class to use ordinary care and not to operate or maintain their injection wells in such a way to cause or contribute to seismic activity.

105) As a direct and proximate result of these acts, omissions, and fault of the Defendants, the Plaintiffs and the Class have suffered damages and injuries reasonably foreseeable to the Defendants, including:

a) The value of premiums paid to obtain earthquake insurance coverage; and/or

b) The excess amount required to maintain earthquake insurance coverage after 2009.

PUNITIVE DAMAGES

106) Defendants' actions, in knowingly causing seismic activity because of their injection well operations, constitute wanton or reckless disregard for public or private safety, and thus, subject to a claim for punitive damages, for which Plaintiffs and the putative Class seek an amount sufficient to punish the Defendants and to deter them and others similarly situated from such conduct in the future.

DEMAND FOR JURY TRIAL

107) Plaintiffs and the putative Class they seek to represent respectfully demand a trial by jury.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs and the Class pray that this Court enter a joint and several judgment against Defendants and in favor of Plaintiffs and the Class, awarding Plaintiffs and the Class the following relief:

i) An Order certifying the Class as requested in this Petition;

ii) An Order appointing as Class Counsel the undersigned counsel for Plaintiffs and the putative Class;

iii) Compensatory damages;

iv) Punitive damages;

v) Awarding attorneys' fees, expenses, and costs;

vi) Pre-judgment and post-judgment interest; and

vii) All other relief to which Plaintiffs and the Class are entitled or that the Court deems just and proper.

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