CORNUCOPIA
INSTITUTE

October 19, 2018
United States Department of Agriculture
Agricultural Marketing Service
National Organic Program
1400 Independence Avenue S.W.
Room 2642-South Building
Washington, D.C. 20250

Re: Petition for Rulemaking – Prohibition on the Use of Oil and Gas Wastewater in Organic Production and Handling

The Cornucopia Institute is a national non-profit engaged in research and educational activities supporting the ecological principles and economic wisdom underlying sustainable and organic agriculture. Through research and investigations on agricultural and food issues, The Cornucopia Institute provides needed information to family farmers, consumers, the media, and other stakeholders in the good food movement.

With the attached petition, The Cornucopia Institute hereby requests the United States Department of Agriculture (USDA) via the National Organic Program (NOP) to amend 7 CFR §205.105 (allowed and prohibited substances, methods, and ingredients in organic production and handling) to include a prohibition on the use of oil and gas wastewater and add a definition of "oil and gas wastewater" to 7 CFR §205.2.

As an alternative to this petition, a guidance explicitly stating that oil and gas wastewater – even treated oil and gas wastewater – is already prohibited under 7 CFR §205.105 as a synthetic substance or input.

It is important to protect both organic farmers and consumers by explicitly prohibiting the use of oil and gas wastewater from organic crop production. As per the Organic Foods Production Act of 1990, we would expect that the NOP would refer this petition to the National Organic Standards Board for discussion and refinement prior to adoption.

Thank you for considering this petition.

Sincerely,

Marie Buchanan

Marie Burcham, J.D.
Burcham@cornucopia.org
P.O. Box 126
Cornucopia, WI 54827
www.cornucopia.org

cc: Dr. Jennifer Taylor, Deputy Administrator National Organic Program

UNITED STATES DEPARTMENT OF AGRICULTURE,
NATIONAL ORGANIC PROGRAM

Petition for Rulemaking to Include Oil and Gas Wastewater as a Prohibited Substance for Irrigation and Livestock Watering in Organic Production and Handling

CITIZEN PETITION

I. INTRODUCTION

This rulemaking is necessary to mitigate concerns related to the use of oil and gas wastewater for organic crop irrigation. Right now, due to the uncertainty of the chemicals used in the oil and gas industry (and particularly hydraulic fracturingit is impossible to ensure that this water is free of prohibited substances including harmful chemicals and/or oil residue.

Organic certification does not currently set standards for source or quality of irrigation water. However, all agricultural inputs must meet criteria based on impact to human health, the environment, and other requirements under the Organic Foods Production Act (OFPA) and the United Sates Department of Agriculture's (USDA) organic regulations. When OFPA and its associated regulations were enacted, there was no agricultural use of oil and gas wastewater, so the current concerns were not addressed in the rules and regulations at that time.
There are many open questions regarding the safety and environmentally sound use of oil and gas wastewater on crops. The organic label should be prescriptive when it comes to protecting human health and the environment. Oil and gas wastewater must therefore be proven safe before it can be used to irrigate organic crops or otherwise be used in the production or handling of products carrying the organic seal.

Our justification for this rulemaking is summarized by the following factors:

1. Oil and gas wastewater is currently being used on agricultural crops. This activity is especially prevalent in California.
2. Scientists and policymakers are unsure of the exact blend of chemicals present in wastewater oil and gas extraction, as the oil companies consider this "proprietary information" and refuse to release it. Due to this uncertainty, it is difficult to properly test for chemicals that could be dangerous to humans, wildlife, and the environment. It is also impossible to test the potential of chemical residues appearing in food crops.

3. For those chemicals and distillates that we do know are found in oil and gas wastewater (such as heavy metals), a significant portion are shown to have carcinogenic, toxic, reproductive, developmental, and other deleterious effects on human health. These substances are not considered safe for human consumption and are not allowed in organic production.
4. The *cumulative and combined* effects of the chemicals and distillates found in oil and gas wastewater on human health or the environment have not been studied. However, the individual toxicity of the chemicals and distillates known to be found in oil and gas wastewater suggests the cumulative and combined effects to be severe.
5. The chemicals and distillates found in oil and gas wastewater would have unknown effects on the food supply of organic meat, eggs, or dairy products. the cumulative effects of consuming small amounts of harmful chemicals used in the oil and gas industry is not well understood.
6. Consumers expect organic farmers to be aware of their on-farm water quality. As described in 7 CFR §205.200 "...Production practices implemented in accordance with this subpart must maintain or improve the natural resources of the operation, including soil and water quality...." Land-based oil and gas operations have historically had negative impacts on surface and drinking water.
7. Many of the chemical additives used in the oil and gas industry are prohibited in organic production. It is likely that there are unknown chemicals found in oil and gas wastewater that are also prohibited but unable to be tested for. The law requires that "The handler of an organic handling operation must implement measures necessary to prevent the commingling of organic and nonorganic products and **protect organic products from contact with prohibited substances**."[1] [Emphasis added.]
8. Some of the general categories of compounds that we know are often found in oil and gas wastewater include: salts; metals including arsenic, lead, and mercury; traces of oil; highly dangerous chemicals including benzene, toluene, ethylbenzene, and xylenes; polynuclear aromatic hydrocarbons (PAHs); volatile organic compounds (VOCs); radionuclides; elevated levels of chloride and bromide. More specific concerns about these additives and dissolved compounds are discussed throughout this document.
9. Many other chemical constituents have not been studied and cannot be easily tested for or no tests exist. This means that even if oil and gas wastewater is “treated,” “processed,” or “purified” prior to crop application, it is impossible to test for its absolute safety.
10. Heavy metals are a common component of oil and gas wastewater. Heavy metals can accumulate in the edible parts of vegetables and grains, at levels that are cause for health concern when they are consumed regularly.
11. Water treatment of any kind, including sewage treatment plants does not, in some cases, remove all of the harmful additives and dissolved substances of oil and gas wastewater. This treated water has been shown to contain endocrine-disrupting chemicals, carcinogenic chemicals, and radioactive elements. Again, it is impossible to

[1] 7 USC §205.272(a)

accurately test the purity of treated water because many of the chemical components in oil and gas wastewater may be unknown or not be testable.

12. Recent articles and internet posts show that many consumers do not want food that has been exposed to oil extraction wastes products or fracking chemicals, regardless of how the water may be treated and/or processed after the oil and gas industry is done with it. Many consumers are aware that the oil and gas industry keeps its water additives proprietary.

Both the National Organic Standards Board (NOSB) and the National Organic Program (NOP) have failed to issue a guidance or clarification that oil and gas wastewater is a prohibited substance. Issuing a guidance to organic farmers and certifiers to make it clear that oil and gas wastewater is always inappropriate would cure this issue.

The Cornucopia Institute requests that the NOSB recommend a rulemaking to disallow the use of oil and gas wastewater in organic production and handling. To support this rulemaking, the term "oil and gas wastewater" should also be defined in the regulations.

II. REQUESTED ACTION

Pursuant to 5 U.S.C. § 553(e) and 7 C.F.R. § 1.28, we request that the USDA National Organic Program take the following actions and that the NOSB recommend the same:

A. Pass a resolution recommending rulemaking to add "oil and gas wastewater" to 7 CFR §205.105 (Allowed and prohibited substances, methods, and ingredients in organic production and handling) as follows (bolded text is the suggested addition):

   7 CFR §205.105. To be sold or labeled as "100 percent organic," "organic," or "made with organic (specified ingredients or food group(s))," the product must be produced and handled without the use of:

   (h) Oil and gas wastewater

B. Issue a rulemaking to define the term "oil and gas wastewater" in 7 CFR §205.2 as "a treated or untreated fluid byproduct of the oil and gas industry that is primarily composed of water but may contain known or unknown contaminants, distillates, and/or byproducts from the oil and gas industry."

III. LEGAL BASIS FOR PETITION

U.S. citizens have the right to petition the government to add, amend, or repeal rules under the Administrative Procedure Act (5 USC § 553(e)). Citizens may petition to amend the USDA rules as authorized under 7 CFR §1.28 and 9 CFR §392.

The Organic Foods Production Act of 1990, gives the USDA the authority to

regulate organic food. In addition to establishing national standards governing the production of organic products, the purpose of OFPA is to "assure consumers that organically produced products meet a consistent standard."[2] This petition will further that purpose.

The Secretary of Agriculture is charged with developing the organic certification program, which is designed to fulfill the stated purpose of OFPA and insure the integrity of the USDA organic label.[3] They are mandated to seek the advice of the NOSB when doing so.[4]

The Environmental Protection Agency (EPA) promulgated the Oil and Gas Extraction Effluent Guidelines and Standards (40 CFR Part 435) in 1979 and amended the regulations in 1993, 1996, 2001, and 2016. The regulations cover wastewater discharges from field exploration, drilling, production, well treatment, and well completion activities. These activities take place on land, in coastal areas, and offshore.

EPA has also established pretreatment standards for the Oil and Gas Extraction Category (40 CFR Part 435).[5] Direct discharges of oil and gas extraction wastewater pollutants from onshore oil and gas resources to have been regulated since 1979 under this law (primarily in Subpart C, the Onshore Subcategory). The limitations require zero discharge of pollutants into the waters of the United States. However, these standard do not prevent the intentional use of wastewater on agricultural crops. Instead, the intentional use of wastewater on agricultural products is within the scope of the USDA's authority.

OFPA also states that certified farms cannot "use natural poisons such as arsenic or lead salts that have long-term effects and persist in the environment…"[6] Some of the common substances found in oil and gas wastewater include heavy metals like arsenic and lead salts.

In addition, organic regulations require that organic production practices "must maintain or improve the natural resources of the operation, including soil and water quality."[7] Soil and water quality is, in turn, defined as: "observable indicators of the physical, chemical, or biological condition of soil and water, including the presence of environmental contaminants."[8] As described in the section on the factual grounds for the petition, many of the substances contained in oil and gas wastewater are considered environmental contaminants. These contaminants not only persist in the environment and can accumulate over time, but pose a risk to the health of human and wildlife populations.

---

[2] 7 USC § 6501(2)
[3] 7 USC § 6503(a)
[4] 7 USC § 6503(c)
[5] Environmental Protection Agency. 2017. "Oil and Gas Extraction Effluent Guidelines." Accessed June 12, 2017. https://www.epa.gov/eg/oil-and-gas-extraction-effluent-guidelines
[6] 7 USC § 6508(c)(1)
[7] 7 CFR § 205.200
[8] 7 CFR 205.2. *Soil and water quality.*

Sewage sludge, whose definition includes the "scum or solids removed in primary, secondary, or advanced wastewater treatment processes"[9], is already a prohibited substance in organic production and handling.[10] Including oil and gas wastewater in this list of prohibitions is the logical next step.

All of the above legal basis put the promulgation of a rule pertaining to oil and gas wastewater firmly in the USDA's purview.

IV. FACTUAL GROUNDS FOR PETITION

This rulemaking is necessary because the current and future use of oil and gas wastewater is incompatible with the organic label. Organic rules and regulations to not allow the use of inputs contaminated with prohibited substances, and oil and gas wastewater is exactly that.

Sources of Oil and Gas Wastewater

Wastewater from oil and gas operations – including hydraulic fracturing, or "fracking" – is created as a byproduct of the oil and gas industry.

Fracking is a method of extracting oil and gas that relies on massive inputs of water and chemicals to release the in-ground resources. The fracking process injects large quantities of sand, water, and chemicals into the ground at high pressure. This process releases trapped oil and natural gas. The wastewater produced by the fracking industry often includes remnants of oil and fracking chemicals, most of which are toxic. Some of the chemicals found to be of most concern (due to prevalence, toxicity, and lack of data) included propargyl alcohol, 2-mercaptoethyl alcohol, tetrakis hydroxymethyl-phosphonium sulfate, thioglycolic acid, 2-bromo-3-nitrilopropionamide, formaldehyde polymers, polymers of acrylic acid, quaternary ammonium compounds, and surfactants (e.g. ethoxylated alcohols).[11]

These chemicals are not allowed in organic crop production. Heavy metals and naturally occurring radioactive material from underground rock formations can also become dissolved in the wastewater. The EPA site accurately depicts the water cycle behind hydraulic fracturing.[12] Unfortunately, fracking tends to be a heavy water user.

Fracking isn't the only source of wastewater of concern. Many of the same chemicals found in fracking fluids are used in other oil and gas operations such as dryland oil extraction through traditional drilling. States may not have requirements to publicly disclose the type and amount of chemicals used in these other types of wells.

---

[9] 7 CFR § 205.2

[10] 7 CFR § 205.105(g)

[11] Camarillo MK, Domen JK, Stringfellow WT. December 1, 2016. "Physical-chemical evaluation of hydraulic fracturing chemicals in the context of produced water treatment." J Environ Manage. 2016 Dec 1;183:164-74. DOI: 10.1016/j.jenvman.2016.08.065. https://www.ncbi.nlm.nih.gov/pubmed/27591844

[12] United States Environmental Protection Agency. 2017. "Hydraulic Fracturing Water Cycle." Accessed June 8, 2017. https://www.epa.gov/hfstudy/hydraulic-fracturing-water-cycle

There are three main options for management and disposal of waste water from oil and gas operations: disposal into injection wells; reuse and recycling; and treatment. Of primary concern for this petition is the treatment and use of oil and gas wastewater on organic crops. There may be many additives or dissolved substances we cannot test for, making it difficult to know if water treatment is even effective. In addition, there is not enough information regarding the cumulative effects to human health and the environment from the use of this wastewater on organic crops.

Agricultural Uses of Oil and Gas Wastewater

There is no doubt that oil and gas wastewater is used on crops in the United States. An in-depth report produced by PSE Healthy Energy, UC Berkeley, Lawrence Berkeley National Laboratory, and the University of the Pacific details its findings regarding the chemical additives found in the water used – and potentially destined for crops and livestock – by the oil and gas industry.[13] The basis of this report was to analyze the use of oil and gas wastewater for agriculture, livestock watering, groundwater recharge, and possibly drinking water in California. The report notes that this industry wastewater has been used to irrigate food crops in the Cawelo Water District of California since the mid-1990s. This wastewater use was expanded to North Kern Water Storage District in the San Joaquin Valley of California around 2016.

Chevron has also supplied California's Cawelo Water District with treated, produced wastewater from its oil fields since the mid-1990s.[14] This source has constituted about half of Cawelo's water use in years before 2015.[15] Several major farming operations and brands are among the water district's customers, including one (Sunview) that sells organic raisins and grapes along with other produce.[16] These customers receive oil wastewater blended with water from other sources, so it is difficult to determine which agricultural commodities the wastewater irrigates and whether some products are represented as certified organic.

Oil and gas wastewater is and will be used for crop irrigation, especially as water resources become pressured by climate change and other factors threatening water security. The prevalence of use is of particular risk in areas that are arid or drought-ridden and have significant oil and gas activity. Currently California appears to be the agricultural area facing the highest risk of contamination from intentionally-applied wastewater due to their vibrant

[13] Seth B.C. Shonkoff, PHD, MPH, and Jeremy Domen, MS. October 4, 2016. "Hazard assessment of chemical additives used in oil fields that reuse produced water for agricultural irrigation." PSE Healthy Energy. https://www.psehealthyenergy.org/our-work/publications/archive/hazard-assessment-of-chemical-additives-used-in-oil-fields-that-reuse-produced-water-for-agricultural-irrigation-2/

[14] Heberger, M. and Donnelly, K. December, 2015. "Oil, Food, and Water: Challenges and Opportunities for California Agriculture." *Pacific Institute.* http://pacinst.org/wp-content/uploads/2015/12/PI_OilFoodAndWater_.pdf

[15] "Formal letter to request the USDA prohibit the use of wastewater from oil and gas drilling operations in organic food production." March 9, 2016. *The Cornucopia Institute and The Sierra Club*. https://www.cornucopia.org/wp-content/uploads/2016/03/organic-wastewater_160309.pdf

[16] Harkinson, J. July 24, 2015. "These Popular Fruit and Veggie Brands May Be Grown with Oil Wastewater." *Mother Jones.* https://www.motherjones.com/environment/2015/07/oil-wastewater-fruits-vegetables-farms/

organic agriculture market and continuing water resource issues, however other areas are likely at risk as well. In addition, drought will become common as global climate change progresses. Extreme weather conditions may push organic farmers, or irrigation districts serving them, to increasingly seek alternative water resources, including oil and gas wastewater.

The Environmental Working Group (EWG) has analyzed data from the state of California for the years 2013-2016. They found that farmers in parts of California's Central Valley irrigated 95,000 acres of food crops with billions of gallons of oil field wastewater possibly tainted with toxic chemicals.[17] Their report noted that: *"Kern County farmers have irrigated crops with oil field wastewater for four decades or longer, but these recently released reports provide the first detailed look at the makeup of the toxic cocktail that could be lurking in the water. However, a full assessment is impossible because companies withheld the identity of almost 40 percent of the chemicals as so-called trade secrets."*

In their report, EWG also notes the prevalent problem with conflicts of interest in evaluations of this wastewater use. The research and testing done on this issue were performed by consultants hired by Chevron or were crop tests by consultants hired by irrigation districts. Independent scientific studies are needed to determine whether it is safe to irrigate food crops with oil and gas wastewater, and those studies do not exist at the current time.

Contaminants and Ancillary Substances Found in Oil and Gas Wastewater

The major component of oil and gas wastewater is simply water, something that in and of itself is harmless and necessary for organic production. However, the additives used in the oil and gas industry may pose known and unknown threats to humans at this time. In addition, the majority of the additives and contaminants would be banned from organic production due to either being synthetic substances not on the National List or on the List of *prohibited natural substances*).

Exact numbers and types of chemical additives used for hydraulic fracturing are unknown. The Pacific Institute notes 28% of the chemicals are completely unknown due to their alleged status as "trade secrets, confidential business information, or proprietary information."[18] The Pacific Institute also describes that for a third of the additives, acute toxicity information is unknown. For four-fifths of the additives, chronic toxicity information is unavailable.

Some of the general categories of compounds that we know are often found in oil and gas wastewater include:

---

[17] Tasha Stoiber, senior scientist. October, 2016. "Toxic Chemicals May Contaminate oil Field Wastewater Used to Grow Calif. Crops." Environmental working Group. http://www.ewg.org/research/toxic-chemicals-may-contaminate-oil-field-wastewater-used-grow-calif-crops#.WYHtV4TyuUk

[18] Matthew Heberger and Kristina Donnelly. December 9, 2015. "Oil, Food, and Water: Challenges and Opportunities for California Agriculture." *Pacific Institute.* http://pacinst.org/publication/oil-food-and-water-challenges-and-opportunities-for-california-agriculture/

- Salts
- Metals including arsenic, lead, and mercury
- Traces of oil
- Highly dangerous chemicals including benzene, toluene, ethylbenzene, and xylenes
- Polynuclear aromatic hydrocarbons (PAHs)
- Volatile organic compounds (VOCs)
- Radionuclides
- Elevated levels of chloride and bromide

Because the complete list of chemicals, additives, and dissolved substances found in oil and gas wastewater is both variable and unknown, it will be difficult to track and research *specific* effects. However, the data we have indicates variable toxicity and environmental persistence, effects on human health, and effects on crops and soil organisms. More research needs to be done before oil and gas wastewater is allowed in organic crop production. Until that time the *precautionary principle* should be used.

In general, based on a review by the EPA, the chemicals added to water used in fracking are intended to serve the following purposes:[19]

Proppants	Fluid foaming agents and energizers
Biocides	Stabilizers
Breakers and breaker catalysts	Viscosifiers
Friction reducers	Reducing agent
Crosslinkers and related additives	Acid inhibitors
Gelling agents and gel stabilizers	Fluid loss additives
Acids	Oxidizer
Corrosion inhibitors	Emulsifiers
Surfactants	Oxygen scavengers
Base fluid	Antifoaming agents
Scale control	Flow enhancers
Iron control agents	Tracers
Clay control	Sulfide scavengers
pH control	Sealers
Non-emulsifiers	Formation breakdown
Other/Multiples	Antisludge agents
Solvents	Antifreeze
Activators	Flowback control
Inhibitors	Fluid diverters
Resin curing agents	Delaying agents
Clean perforations	Proppant resin

[19] U.S. Environmental protection Agency. March, 2015. "Analysis of Hydraulic Fracturing Fluid Data from the FracFocus Chemical Disclosure Registry 1.0." https://www.epa.gov/sites/production/files/2015-03/documents/fracfocus_analysis_report_and_appendices_final_032015_508_0.pdf

These purposes describe the function of the additive in the hydraulic fracturing fluid, rather than the function of individual ingredients in the additive.

It is difficult or impossible to tell which of these chemicals, and in what concentration, a single quantity of oil and gas wastewater might contain. Some of the most dangerous compounds in oil and gas wastewater may not be additives, but rather may be elements of the extracted oil and gas itself. For example, high levels of benzene, a known carcinogen, are often present in wastewater.[20] The known common additives, lesser known additives, and compounds that dissolve into the water all pose some risk to humans and the environment.

The EWG detailed its findings on what chemicals and additives it found in a report titled *Toxic Stew: What's in Fracking Wastewater?*[21] This detailed research included findings that wastewater contained petroleum chemicals, heavy metals, and radioactive elements, plus high levels of dissolved solids. These substances included benzene, chromium-6, lead, and arsenic. The EWG noted that these substances are all listed under California's Proposition 65 as causes of cancer or reproductive harm. In addition, almost all of the samples tested contained benzene at levels ranging from twice to more than 7,000 times California's drinking water standard. The wastewater also carried radioactive radium in levels beyond what the state's public health goals consider safe and elevated levels of potentially harmful ions including nitrate and chloride. This research is illustrative of the serious risk posed by oil and gas wastewater – it is not something that has a place in organic agriculture.

The Environmental Protection Agency (EPA) conducted a study in 2018 that may be useful to any deliberation regarding the use of wastewater on organic crops.[22] The EPA's study was supposed to address questions such as how existing federal approaches to produced water management under the Clean Water Act can interact more effectively with state and tribal regulations, requirements, and policy needs, and whether potential federal regulations that would allow for broader discharge of treated produced water to surface waters are supported.

Oil and Gas Wastewater's Inappropriateness for Organic Production and Handling

Oil and gas wastewater poses a threat to human and environmental health. It is also incompatible with organic agriculture because:

[20] Susan Phillips. 2014. "New study shows gas workers could be exposed to dangerous levels of benzene." StateImpact, a reporting project of NPR member stations*, August 14.* https://stateimpact.npr.org/pennsylvania/2014/08/28/new-study-shows-gas-workers-could-be-exposed-to-dangerous-levels-of-benzene/

[21] Tasha Stoiber, EWG Senior Scientist and Bill Walker, EWG Consultant. March 10, 2015. "Toxic Stew: What's in Fracking Wastewater?" Environmental Working Group. http://www.ewg.org/research/toxic-stew#.WYH9m4TyuUk

[22] Environmental Protection Agency website. 2018. "Study of Oil and Gas Extraction Wastewater management." Accessed October 10, 20198. https://www.epa.gov/eg/study-oil-and-gas-extraction-wastewater-management#self

- The use of oil and gas wastewater on some operations and not others conflicts with the OFPA provision that the purposes of the organic rules to "assure consumers that organically produced products meet a consistent standard…"

- Its application to certified land should violate §205.202(b), but there is no guidance or regulatory affirmation of that fact.[23]

- Its application would disrupt requirements in the soil fertility and crop nutrient management practice standard (§ 205.203), particularly the requirement that producers are encouraged to manage crop nutrients and soil fertility to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.[24]

- Its use conflicts with the organic ideals to protect biodiversity and promote sustainability. The OFPA Preamble to the Final Rule establishing the NOP states: "[t]he use of 'conserve' [in the definition of organic production] establishes that the producer must initiate practices to support biodiversity and avoid, to the extent practicable, any activities that would diminish it. *Compliance with the requirement to conserve biodiversity requires that a producer incorporate practices in his or her organic system plan that are beneficial to biodiversity on his or her operation*"[25] [emphasis added]. In addition, the 2001 NOSB Principles of Organic Production and Handling state: "Organic agriculture is an *ecological production management system that promotes and enhances biodiversity,* biological cycles, and soil biological activity" [emphasis added].[26]

Summary of Research into Toxicity of Substances Found in Oil and Gas Wastewater Components

The EPA's *Analysis of Hydraulic Fracturing Fluid Data from the FracFocus Chemical Disclosure Registry* details the most common reported additives, their frequency of use, and their purposes in five of the major counties where fracking takes place.[27] As already noted, the process of extracting oil and gas on land-based systems ultimately incorporates other chemicals and naturally-occurring elements into the wastewater that are not accounted for in this list.

---

[23] Requires that any field or farm parcel from which harvested crops are intended to be sold, labeled, or represented as "organic," must: "Have had no prohibited substances, as listed in § 205.105, applied to it for a period of 3 years immediately preceding harvest of the crop…"

[24] 7 CFR §205.203(d)

[25] 76 FR 80563

[26] NOSB Principles of Organic Production and Handling. Adopted October 17, 2001. Article 1.1.

[27] U.S. Environmental protection Agency. March, 2015. "Analysis of Hydraulic Fracturing Fluid Data from the FracFocus Chemical Disclosure Registry 1.0." https://www.epa.gov/sites/production/files/2015-03/documents/fracfocus_analysis_report_and_appendices_final_032015_508_0.pdf

U.S. Geological Survey (USGS) scientists surveyed and characterized wastewater and waste solids produced during on-land oil and gas development.[28] As part of this work, byproducts from municipal and industrial wastewater treatment facilities that receive wastewater from oil and gas activities are being identified and quantified. USGS notes that these wastewaters often have very high concentrations of salts, metals, naturally occurring radioactive materials (NORMs), and organic compounds.

Other reviews concerning the risks and toxicity of oil and gas wastewater include:

- The EPA has reviewed oil and gas wastewater's impact on drinking water resources.[29] This includes a review of spills related to hydraulic fracturing activity.[30] Oil and gas activity can also affect the water availability in an area.[31] Overall, the EPA's reviews show that the oil and gas industry seriously affects water resources, no matter its destination.

- The Natural Resources Defense Council (NRDC) reviewed the risk factors in the state of California related to oil and gas activity.[32]

- A review of California's legal background dealing with hydraulic fracturing notes that fracking fluid often contains chemicals listed as hazardous pollutants under the Clean Water Act (CWA) or regulated under the federal Safe Drinking Water Act (SDWA) for risks to human health.[33] The substances regulated under the SDWA include chemicals such as benzene, lead, and methanol. The report also goes on to illustrate how some ingredients are known or possible human carcinogens.

- U.S. Geological Survey collected some preliminary data from oil and gas wastewater samples in California's Central Valley.[34] Wastewater is actively being used in California by farmers in desperate circumstances due to prolonged periods of drought. The data revealed high levels of vanadium, chromium, and selenium. Vanadium, a metal, is

[28] U.S. Geological Survey. 2018. "Characterization of Waste Materials." Accessed April 13, 2018. https://toxics.usgs.gov/investigations/uog/more_uog/characterization.html

[29] United States Environmental Protection Agency. 2017. "EPA's Study of Hydraulic Fracturing and Its Potential Impact on Drinking Water Resources." Accessed June 8, 2017. https://www.epa.gov/hfstudy

[30] United States Environmental Protection Agency. 2017. "Review of State and Industry Spill Data: Characterization of Hydraulic Fracturing-Related Spills Fact Sheet" Accessed June 29, 2017. https://www.epa.gov/hfstudy/review-state-and-industry-spill-data-characterization-hydraulic-fracturing-related-spills-0

[31] United States Environmental Protection Agency. 2017. "Case Study Analysis of the Impacts of Water Acquisition for Hydraulic Fracturing on Local Water Availability Fact Sheet." Accessed June 29, 2017. https://www.epa.gov/hfstudy/case-study-analysis-impacts-water-acquisition-hydraulic-fracturing-local-water-0

[32] "Drilling in California: Who's at risk?" *Natural Resources Defense Council.* October, 2014. https://www.nrdc.org/sites/default/files/california-fracking-risks-report.pdf

[33] Michael Kiparsky and Jayni Foley Hein. April, 2013. "Regulation of Hydraulic Fracturing in California: A Wastewater and Water Quality Perspective." Wheeler Institute for Water Law & Policy Center for Law, Energy and the Environment UC Berkeley School of Law. https://www.law.berkeley.edu/files/ccelp/Wheeler_HydraulicFracturing_April2013.pdf

[34] Zoe Schlanger. 2015. "In California, Farmers Rely On Oil Wastewater To Weather Drought." *Newsweek,* April 6. http://www.newsweek.com/2015/04/17/california-farmers-rely-oil-wastewater-weather-drought-319648.html

classified as "possibly carcinogenic" by the International Agency for Research on Cancer, and the others are heavy metals associated with human health issues.

- Tests in 2015 supplied by Chevron found benzene, a carcinogen, at higher concentrations than what is allowed in California drinking water.[35] The state had not set a standard for benzene in irrigation water. The report also noted finding toluene and xylene, two volatile organic compounds. These materials would probably volatilize out of any final products, but they are toxic to the environment and farmworkers.

- The EWG notes that "benzene is just the tip of the iceberg" when it comes to toxic chemicals found in oil and gas wastewater.[36] In addition to benzene, their analysis found chromium-6, lead, arsenic, and high levels of radioactive radium. As noted in a 2016 op-ed written by an organic farmer located in California's Monterey County, state regulators do not adequately test wastewater for all of the 450 chemicals that may be used in oil production, not to mention substances that simply become dissolved through the oil extraction activity.[37]

- The Ohio Ecological Food and Farm Association (OEFFA) has reviewed multiple organic producers impacted by fracking and oil and gas infrastructure in past comments. In general, a number farms have been forced to go out of business due to nearby fracking activity and/or contamination of their irrigation water. In the OEFFA comments to the NOSB for the fall of 2015 and spring of 2016, they detailed impacts of fracking on organic farmers and consumers. At that time OEFFA asked the NOSB to issue a clarifying statement that fracking wastewater containing prohibited substances cannot be used as irrigation water in organic systems. Neither the NOP nor the NOSB has issued any such statement.

In relation to California's use of oil and gas wastewater, it appears that only a few questionable, industry-funded studies have been conducted to date. One study was conducted by a consultant to a water district in southern California due to the concern about the oil and gas wastewater that was being used in agriculture at the time.[38] That study draws conclusions based only on four water samples collected on one day.

---

[35] "TECHNICAL REPORT: RECLAIMED WATER IMPOUNDMENTS SAMPLING." June 15, 2015. Chevron U.S.A. Inc. Kern River Oil Field Kern County, California. 93308. Prepared by Amec Foster Wheeler Environment & Infrastructure, Inc.
http://www.waterboards.ca.gov/centralvalley/water_issues/oil_fields/information/disposal_ponds/chevron/2015_0615_com_chevron_cawello.pdf

[36] Shannon Van Hoesen. 2015. "California's Fracking Wastewater Is Full of Toxic Chemicals." Environmental Working Group, March 10. http://www.ewg.org/release/california-s-fracking-wastewater-full-toxic-chemicals#.WYH8TYTyuUk

[37] Jamie Collins. 2016. "State should stop the use of oil wastewater for farm irrigation." *The Sacramento Bee,* September 16. http://www.sacbee.com/opinion/op-ed/soapbox/article102250392.html

[38] "Irrigation Water Quality Evaluation Cawelo Water District Bakersfield, California." April 7, 2016. Enviro-Tox Services, Inc.

Laboratories analyzed two samples each of grapes, pistachios, and almonds. No root vegetables were tested, despite root vegetables being more susceptible to absorbing pollutants from soil. In addition, the study focused on testing for petroleum hydrocarbon residue and not the multitude of other chemical components often found in wastewater. The study concluded that "…water quality analytical data shows that irrigation water provided by the District may contain traces of petroleum-derived compounds such as long-chain hydrocarbons. However, detected petroleum hydrocarbons were found at concentrations that are well within drinking water standards and do not pose a threat to irrigated plants, food safety or to human health." The prescriptive nature of organic agriculture requires that we protect consumers from these risks, even if the scope of the risk is unknown.

The second study was conducted by a consultant with intrinsic bias, as it was sponsored by the oil companies themselves (the California Resources Corporation).[39] This study assessed exposure to those chemicals that have drinking water standards through eating the crops but not from working in the fields. No soil samples were analyzed to verify the numerous assumptions used to model and calculate health risks.

Conflicts of interest should be a serious concern when evaluating data regarding the safety of oil and gas wastewater. For example, Chevron has downplayed the amounts of chemicals in the wastewater, saying they are insignificant. That claim ignores the fact that some of the chemicals are hazardous in very small amounts. As the EWG notes, chemicals such as benzene have a California state legal limit in drinking water of just one part per billion (about a drop of water in an Olympic-sized swimming pool).[40] To complicate this issue, only some of the chemicals often found in wastewater actually have listed safe drinking water standards.

Summary of Research into Human and Environmental Health Impacts of Oil and Gas Wastewater Components

The following summarizes some of the research available regarding the environmental and human health impacts of substances that are likely present in oil and gas wastewater:

- There is evidence showing that plants uptake at least some of the chemicals and heavy metals we know are commonly found in oil and gas wastewater.[41] There has been no

http://www.waterboards.ca.gov/centralvalley/water_issues/oil_fields/food_safety/data/studies/cawelo_irrstudy.pdf

[39] "Development of Risk-Based Comparison levels for Chemicals in Agricultural Irrigation Water," April, 2016, Environmental Resources Management. http://www.waterboards.ca.gov/centralvalley/water_issues/oil_fields/food_safety/data/studies/erm_riskassrpt.pdf

[40] Tasha Stoiber, senior scientist. October, 2016. "Toxic Chemicals May Contaminate oil Field Wastewater Used to Grow Calif. Crops." Environmental working Group. http://www.ewg.org/research/toxic-chemicals-may-contaminate-oil-field-wastewater-used-grow-calif-crops#.WYHtV4TyuUk

[41] Harkness J, *et al.* January 14, 2015. Iodide, bromide, and ammonium in hydraulic fracturing and oil and gas wastewaters: environmental implications." *Environ. Sci. Technol. 49* (3), pp 1955–1963. DOI: 10.1021/es504654n. http://pubs.acs.org/doi/abs/10.1021/es504654n

research regarding the cumulative uptake or accumulation in crops based on repeated applications of wastewater.

However, there is also evidence that wastewater from oil exploration may contain substances that can alter the health and diversity of soil organisms.[42] In addition to the known harmful effects of oil and gas wastewater on ecosystems, it is reasonable to assume that wastewater would have a negative effect on soil microorganisms. Even if treated, the incomplete list of additives means that it will be difficult to track whether the wastewater has some components that are not appropriate for organic agriculture from a biological standpoint.

- One study found that oil and gas wastewater had high chloride, bromide, iodide, and ammonium levels.[43] The study went on to catalog the negative impacts bromide, iodide, and ammonium have on the environment. Of particular concern are stream ecosystems. Overall, their findings indicated that discharge and accidental spills of oil and gas wastewater pose risks to both human health and the environment. The very manufacturing process that creates oil and gas wastewater has serious impacts on the environment. On-farm effects of nearby or adjacent oil and gas operations have previously been brought to the attention of the NOP and NOSB by the Ohio Ecological Food and Farming Association and Food and Water Watch.

- One study found that nonylphenol polyethoxylates (NPEOs) accumulate in bean plants.[44] These chemicals are endocrine disruptors and may be found in oil and gas wastewater.

- Recent research shows that low levels of some of the chemicals listed most frequently in the disclosures by oil and gas companies are endocrine disruptors which can have serious effects on hormone functions.[45,46]

---

[42] Ferreira RN, et al. December, 2015. "Effects of Wastewater from Oil Exploration on Soil Mesofauna." *Bull Environ Contam Toxicol.* 95(6):777-83. doi: 10.1007/s00128-015-1671-9. https://www.ncbi.nlm.nih.gov/pubmed/26450598

[43] Harkness J, *et al.* January 14, 2015. Iodide, bromide, and ammonium in hydraulic fracturing and oil and gas wastewaters: environmental implications." *Environ. Sci. Technol. 49* (3), pp 1955–1963. DOI: 10.1021/es504654n. http://pubs.acs.org/doi/abs/10.1021/es504654n

[44] Sjöström AE, Collins CD, Smith SR, Shaw G. Epub April 22, 2008. "Degradation and plant uptake of nonylphenol (NP) and nonylphenol-12-ethoxylate (NP12EO) in four contrasting agricultural soils." *Environ Pollut.* 156(3):1284-9. Doi: 10.1016/j.envpol.2008.03.005. https://www.ncbi.nlm.nih.gov/pubmed/18433956

[45] Christopher Kassotis, *et al*. Epub October 14, 2015. "Endocrine-Disrupting Activity of Hydraulic Fracturing Chemicals and Adverse Outcomes After Prenatal Exposure in Male Mice." Endocrinology. 156(12):4458-73. doi: 10.1210/en.2015-1375. https://www.ncbi.nlm.nih.gov/pubmed/26465197

[46] Tasha Stoiber, senior scientist. October, 2016. "Toxic Chemicals May Contaminate oil Field Wastewater Used to Grow Calif. Crops." Environmental working Group. http://www.ewg.org/research/toxic-chemicals-may-contaminate-oil-field-wastewater-used-grow-calif-crops#.WYHtV4TyuUk

- Another study concluded that oil and gas wastewater, when used in irrigated agriculture, may affect soil microorganisms.[47] Specifically, the research indicated that the diversity of functional mesofauna could be negatively impacted. This research indicates that oil and gas wastewater could have far-reaching effects on soil health.

- There has been significant research into how vegetables and other crops uptake heavy metals and pose a threat to human health. One study was designed to investigate the potential human health risks associated with the consumption of okra contaminated with toxic heavy metals from a wastewater irrigation source.[48] This research indicated that vegetables irrigated by contaminated water were a strong potential pathway of human exposure to slow poisoning by heavy metals. Similar research concluded that heavy metal contamination of the food chain poses a serious risk to human health, finding that vegetables cultivated alongside wastewater use contained levels of heavy metals that exceeded health guidelines.[49] Other research in India indicated that long-term wastewater irrigation resulted in accumulation of heavy metals in vegetables which, in turn, posed strong potential health risks to consumers of those vegetables.[50]

- Another study acknowledged that excess application of drilling fluid can increase soil salinity and restrict plant growth.[51] This use can ultimately create "dead zones" where soil and plant biology are destroyed. The study worked on ways to correct the damage caused by the cumulative application of the wastewater by planting Bermuda grass, among other techniques.

- One study in 2016 assessed the carcinogenicity of chemicals used in oil and gas development. [52] The researchers used International Agency for Research on Cancer (IARC) monographs, though the majority of compounds identified were not evaluated by IARC and therefore could not be reviewed in the research. Forty-nine of the water-specific pollutants were known, probable, or possible human carcinogens. A total of 17

---

[47] Ferreira RN, et al. December, 2015. "Effects of Wastewater from Oil Exploration on Soil Mesofauna." *Bull Environ Contam Toxicol.* 95(6):777-83. doi: 10.1007/s00128-015-1671-9. https://www.ncbi.nlm.nih.gov/pubmed/26450598

[48] Balkhair K and Ashraf M. January, 2016. "Field accumulation risks of heavy metals in soil and vegetable crop irrigated with sewage water in western region of Saudi Arabia." *Saudi J Biol Sci.* 23(1): S32–S44. Published online October 9, 2015. doi: 10.1016/j.sjbs.2015.09.023. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4705247/

[49] Adeel Mahmood A and Malik RN. January, 2014. "Human health risk assessment of heavy metals via consumption of contaminated vegetables collected from different irrigation sources in Lahore, Pakistan." Arabian Journal of Chemistry 7(1): 91-99. http://www.sciencedirect.com/science/article/pii/S1878535213002025

[50] Chopra AK, Pathak C. July, 2015. "Accumulation of heavy metals in the vegetables grown in wastewater irrigated areas of Dehradun, India with reference to human health risk." *Environ Monit Assess.* 187(7):445. doi: 10.1007/s10661-015-4648-6. https://www.ncbi.nlm.nih.gov/pubmed/26092239

[51] D.C. Wolf and K.R. Brye. 2012. "Bermudagrass Growth in Hydraulic-Fracturing-Drilling-Fluid-Contaminated Soil." Dept. of Crop, Soil, and Environmental Sciences, University of Arkansas, Fayetteville, AR. https://dl.sciencesocieties.org/publications/meetings/download/poster/2012am/72956

[52] Elliott E, et al. January 15, 2017. "Unconventional oil and gas development and risk of childhood leukemia: Assessing the evidence." Science of The Total Environment 576:138-147. https://doi.org/10.1016/j.scitotenv.2016.10.072. https://www.ncbi.nlm.nih.gov/pubmed/27783932

water additives also showed evidence of increased risk for leukemia/lymphoma, including benzene, 1,3-butadiene, cadmium, diesel exhaust, and several polycyclic aromatic hydrocarbons.

- In an analysis of more than 1,000 chemicals in fluids used in and created by hydraulic fracturing, researchers found that many of the substances have been linked to reproductive and developmental health problems.[53,54] Unfortunately, the majority had undetermined toxicity due to insufficient information on the chemicals and their interactions. The researchers here urged further study to evaluate potential threats from the chemicals found in wastewater.

- Another review found significant linkages between developmental and reproductive effects on human health and the chemicals commonly associated with oil and gas operations.[55]

Treating Oil and Gas Wastewater Does Not Make It Appropriate for Use in Organic Production

Treating, or "processing," oil and gas wastewater and allowing only treated wastewater to be used in organic agriculture is not a viable alternative. One study found that many of the identified hydraulic fracturing chemicals are treatable. However, data was missing for 24 of the 193 chemical additives identified. They noted that the chemicals they found to be of most concern (due to prevalence, toxicity, and lack of data) included propargyl alcohol, 2-mercaptoethyl alcohol, tetrakis hydroxymethyl-phosphonium sulfate, thioglycolic acid, 2-bromo-3-nitrilopropionamide, formaldehyde polymers, polymers of acrylic acid, quaternary ammonium compounds, and surfactants (e.g. ethoxylated alcohols).[56] These chemicals are not allowed in organic crop production. There may also be other chemicals that this study was unable to identify or that may be new on the market and kept as proprietary information by the oil and gas companies.

[53] Elliott EG, et al. January 6, 2017. "A systematic evaluation of chemicals in hydraulic-fracturing fluids and wastewater for reproductive and developmental toxicity." J Expo Sci Environ Epidemiol. 2017 Jan;27(1):90-99. doi: 10.1038/jes.2015.81. https://www.ncbi.nlm.nih.gov/pubmed/26732376

[54] Michael Greenwood. 2016. "Toxins found in fracking fluids and wastewater, study shows." *Yale News*, January 6. http://news.yale.edu/2016/01/06/toxins-found-fracking-fluids-and-wastewater-study-shows

[55] Webb E, Bushkin-Bedient S, Cheng A, Kassotis CD, Balise V, Nagel SC. 2014. "Developmental and reproductive effects of chemicals associated with unconventional oil and natural gas operations." Rev Environ Health. 2014;29(4):307-18. DOI: 10.1515/reveh-2014-0057. https://www.ncbi.nlm.nih.gov/pubmed/25478730

[56] Camarillo MK, Domen JK, Stringfellow WT. December 1, 2016. "Physical-chemical evaluation of hydraulic fracturing chemicals in the context of produced water treatment." J Environ Manage. 2016 Dec 1;183:164-74. DOI: 10.1016/j.jenvman.2016.08.065. https://www.ncbi.nlm.nih.gov/pubmed/27591844

Another recent study showed that even when wastewater is treated, many harmful elements remain.[57,58] Researchers found that waterways where treated wastewater was disposed were contaminated with endocrine-disrupting toxins (specifically nonylphenol ethoxylates); polycyclic aromatic hydrocarbons (carcinogens); and elevated levels of radium. The researchers concluded that regulators should enact tighter regulations governing the treatment of wastewater in order to protect human health and the environment.

V. CONCLUSION

Organic consumers expect their organic produce to be produced in a manner that is free from harmful chemicals. If oil and gas wastewater is not prohibited from use in organic production, this foundational marketing axiom of organic agriculture will be challenged. Without consumer trust in the organic label, it may fail.

Very little independent scientific research has been done on this type of irrigation water and how it interacts with crops, soil, and surrounding bodies of water. There are too many unknowns associated with oil and gas wastewater. These unknowns pose a risk to environmental and human health.

It is likely that farmers have considered treated wastewater a "natural" substance that would otherwise be allowed in organic production without a guidance or change to the organic regulations. This water is often marketed by the industry as "clean" or "pure" despite insufficient testing. The need to prohibit the use of oil and gas wastewater is urgent, especially since it is currently in use and the demand for such water is bound to increase in the future.

We ask that both the NOSB and NOP support this petition for rulemaking.

[57] "Treated Fracking Wastewater Contaminated Watershed With Radium and Endocrine Disrupters, Study Finds." July 17, 2017. E360 Digest. http://e360.yale.edu/digest/treated-fracking-wastewater-contaminated-watershed-with-radioactive-material-and-endocrine-disrupters-study-shows

[58] Burgos W, *et al.* July 12, 2017. "Watershed-Scale Impacts from Surface Water Disposal of Oil and Gas Wastewater in Western Pennsylvania." *Environ. Sci. Technol.*, Article ASAP. http://pubs.acs.org/doi/abs/10.1021/acs.est.7b01696