BIOSOLIDS

Problem Properties

Legal/Environmental Support

Sick Soil and PFAS “Forever Chemicals”

Complaint

- 12/29/22
- Complainant advised neighbor is spreading sewage sludge/biosolids/fertilizer that has been smoking for days.
- Complainant advises the valley surrounding his property has filled up with smoke.
- Complainant advises the smoke is creating breathing problems for him, his wife and neighbors
- Complainant advises previous spreading of sewage sludge/biosolids has caused all the fish to die in his ponds and his neighbor's ponds
- Complainant believes the sewage sludge/biosolids has been causing him, his wife and animals to become physically ill

12/30/22

- On this date at approximately 1440 hours Detective D. Ames Environmental Crimes Investigator for Johnson County Constable's Office Precinct #4 arrived at the Subject Property located in Grandview, Johnson County, TX 76050. Upon arrival Detective Ames observed approximately12 -15 very large black piles of what appeared to be Sewage Sludge/Biosolids smoldering and putting off large plumes of smoke. The odor coming from the piles was a musty chemical smell. Detective Ames observed a green tractor scooping up the piles of Biosolids and dumping the material into a large yellow spreading vehicle. Detective Ames made contact with a male subject spreading the material; which later advised the product he was spreading was a product called Synagro Granulite Fertilizer. This "fertilizer" is made from Class A Biosolids/Municipal Wastewater Treatment Sludge from the City of Fort Worth.

Subject Property

Sewage Sludge/Class A Biosolids/Granulite Fertilizer from Synagro

Smoking Granulite Fertilizer AKA Class A Biosolids

Granulite Fertilizer/ Class A Biosolids being loaded into spreader for Land Application

Haze around piles

Smoking Class A Biosolids

Tractor loading spreader

Upwind of Smoking Class A Biosolids

Biosolids Fertilizer Label

SYNAGRO

GRANULITE™ FERTILIZER
4-4-0

Guaranteed Analysis:
Total Nitrogen (N) ..... 4.0 %
Available Phosphate (as P_2O_5) 4.0%
Soluble Potash (K_2O) 0.0%

RECOMMENDED APPLICATION RATES FOR BULK USE**

Nitrogen Requirement	Granulite Recommended
100 lbs./acre/year	2.5 tons/acre/year
125 lbs./acre/year	3.1 tons/acre/year
150 lbs./acre/year	3.75 tons/acre/year
175 lbs./acre/year	4.4 tons/acre/year
200 lbs./acre/year	5.0 tons/acre/year

Use above table or following formula to calculate application rates:

$$\frac{\text{lbs./acre of nitrogen needed by crop}}{40} = \text{tons/acre Granulite recommended}$$

** Rates based on 50% plant available nitrogen for the first growing season

Net Weight: BULK
Derived from: Municipal biosolids

This biosolids product meets the criteria of subsection §65.13-Waste Products Distributed as Fertilizers in the Texas Administrative Code, Title 4. Agriculture, Chapter 65, Commercial Fertilizer Rules (amended June 30, 2014).

Information about the components of this lot of fertilizer may be obtained by writing to Synagro Product Sales, 435 Williams Court, Suite 1000, Baltimore, MD 21220, or by telephone at (800) 573-5538

Molybdenum Warnings:

- Warning - Application according to the directions for use EXCEEDS the allowable limits of certain trace elements which can be applied to one acre of land in a calendar year.
- Warning - The application of fertilizers containing molybdenum may result in forage crops containing levels of molybdenum which are toxic to ruminant animals

AS WITH ALL FERTILIZER PRODUCTS, KEEP OUT OF REACH OF CHILDREN AND PETS. AVOID INGESTION AND INHALATION. DO NOT APPLY IN OR NEAR ANY PUBLIC OR PRIVATE WATER SUPPLIES INCLUDING WELLS, STREAMS OR LAKES. DO NOT APPLY TO FLOODED OR FROZEN LAND. STORE IN A COOL, DRY PLACE.

THIS PRODUCT MEETS THE U.S. EPA'S "EXCEPTIONAL QUALITY" STANDARDS. FOR OTHER USES NOT LISTED ON THIS LABEL, PLEASE CONTACT YOUR DISTRIBUTOR FOR ADDITIONAL INFORMATION

Produced by: Synagro of Texas-CDR, Inc. City of Fort Worth, TX Village Creek WRF Biosolids Management Facility
4500 Wilma Ln, Fort Worth, TX 76012

Guaranteed by: Synagro of Texas-CDR, Inc. 501 Woodall Rd., Decatur, AL 35601

Bulklabeltx.fw 8/1/2022

WARNING ON SYNAGRO GRANULITE FERTILZER

- Molybdenum Warnings:
- • Warning - Application according to the directions for use EXCEEDS the allowable limits of certain trace elements which can be applied to one acre of land in a calendar year.
- • Warning - The application of fertilizers containing molybdenum may result in forage crops containing levels of molybdenum which are toxic to ruminant animals ******Note*** Ruminant animals include but are not limited to cattle, buffalo, sheep, goats, deer and moose***
- AS WITH ALL FERTILIZER PRODUCTS, KEEP OUT OF REACH OF CHILDREN AND PETS. AVOID INGESTION AND INHALATION. DO NOT APPLY IN OR NEAR ANY PUBLIC OR PRIVATE WATER SUPPLIES INCLUDING WELLS, STREAMS OR LAKES. DO NOT APPLY TO FLOODED OR FROZEN LAND. STORE IN A COOL, DRY PLACE.
- The label shows the product was Produced by: Synagro of Texas-CDR, Inc. City of Fort Worth, TX Village Creek WRF Biosolids Management Facility 4500 Wilma Ln, Fort Worth, TX 76012

What The EPA Says About Biosolids

- **Basics of Biosolids**
- Biosolids are a product of the wastewater treatment process. During wastewater treatment the liquids are separated from the solids. Those solids are then treated physically and chemically to produce a semisolid, nutrient-rich product known as biosolids. The terms 'biosolids' and 'sewage sludge' are often used interchangeably.

- **Classes of Biosolids**
- Existing requirements and guidance help ensure that biosolids are processed, handled, and land-applied in a manner that **minimizes potential risk to human health**. Biosolids are divided into **"Class A" and "Class B" designations based on treatment methods**. The different classes have specified treatment requirements for pollutants, pathogens and vector attraction reduction, as well as general requirements and management practices. 40 CFR Part 503 treatment processes for Class A biosolids eliminate pathogens, including viruses. Generally, pathogens may exist when requirements are met under 40 CFR Part 503 for Class B biosolids, which is why EPA's site restrictions that allow time for pathogen degradation should be followed for harvesting crops and turf, for grazing of animals, and public contact.

EPA Guide to Part 503

Background on the Part 503 Rule

As regulation to protect public health and the environment from any reasonably anticipated adverse effects of certain pollutants that might be present in sewage sludge biosolids. This regulation, The Standards for the Use or Disposal of Sewage Sludge (Title 40 of the Code of Federal Regulations [CFR], Part 503), was published in the Federal Register (58 FR 9248 to 9404) on February 19, 1993, and **became effective on March 22, 1993**. This document will refer to the regulation as "the Part 503 rule" and also as "Part 503."

What 503 Rule Regulates

Pollutant Limits

Pollutant	Ceiling Concentration Limits for All Biosolids Applied to Land (milligrams per kilogram)[a]	Pollutant Concentration Limits for EQ and PC Biosolids (milligrams per kilogram)[a]	Cumulative Pollutant Loading Rate Limits for CPLR Biosolids (kilograms per hectare)	Annual Pollutant Loading Rate Limits for APLR Biosolids (kilograms per hectare per 365-day period)
Arsenic	75	41	41	2.0
Cadmium	85	39	39	1.9
Chromium	3,000	1,200	3,000	150
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum[b]	75	—	—	—
Nickel	420	420	420	21
Selenium	100	36	100	5.0
Zinc	7,500	2,800	2,800	140
Applies to:	All biosolids that are land applied	Bulk biosolids and bagged biosolids[c]	Bulk biosolids	Bagged biosolids[c]
From Part 503	Table 1, Section 503.13	Table 3, Section 503.13	Table 2, Section 503.13	Table 4, Section 503.13

[a] Dry-weight basis

[b] As a result of the February 25, 1994, Amendment to the rule, the limits for molybdenum were deleted from the Part 503 rule pending EPA reconsideration.

[c] Bagged biosolids are sold or given away in a bag or other container.

EPA Guide to Part 503

Restrictions for the Harvesting of Crops and Turf, Grazing of Animals, and Public Access on Sites Where Class B Biosolids Are Applied

Restrictions for the harvesting of crops* and turf:

1. Food crops, feed crops, and fiber crops, whose edible parts do not touch the surface of the soil, shall not be harvested until *30 days* after biosolids application.
2. Food crops with harvested parts that touch the biosolids/soil mixture and are totally above ground shall not be harvested until *14 months* after application of biosolids.
3. Food crops with harvested parts below the land surface where biosolids remain on the land surface for 4 months or longer prior to incorporation into the soil shall not be harvested until *20 months* after biosolids application.
4. Food crops with harvested parts below the land surface where biosolids remain on the land surface for less than 4 months prior to incorporation shall not be harvested until *38 months* after biosolids application.
5. Turf grown on land where biosolids are applied shall not be harvested until *1 year* after application of the biosolids when the harvested turf is placed on either land with a high potential for public exposure or a lawn, unless otherwise specified by the permitting authority.

Restriction for the grazing of animals:

1. Animals shall not be grazed on land until *30 days* after application of biosolids to the land.

Restrictions for public contact:

1. Access to land with a high potential for public exposure, such as a park or ballfield, is restricted for *1 year* after biosolids application. Examples of restricted access include posting with no trespassing signs, and fencing.
2. Access to land with a low potential for public exposure (e.g., private farmland) is restricted for *30 days* after biosolids application. An example of restricted access is remoteness.

EPA Guide to Part 503

PFOS,PFOA, and PFAS HAVE BEEN FOUND IN BIOSOLIDS

- In my research I also learned that **in 1993 when the EPA approved the 503 Rule under the federal Clean Water Act for the standards of use and disposal of sewage sludge; many chemicals used today did not exist or where not known about.** At the time there were only certain heavy metals the EPA focused on which included arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium and zinc. Since this time much has changed as we have become a more industrialized nation and new chemicals have been introduced into a myriad of commonly used products. **In 1993, PFAS (per- and polyfluoroalkyl substances, which include PFOS and PFOA, two of the most well-studied legacy PFAS) a group of thousands of toxic chemicals used in fire retardants, Teflon, adhesives and many other products, either did not exist or were limited in scope and use; making it very difficult if not impossible to have tested for them**. Several PFAS, including PFOA and PFOS, have now been linked to kidney cancer, testicular cancer, infertility, low testosterone levels and is suspected in thyroid cancer and other cancers according to the National Institute of Health and the National Cancer Institute

What are PFAS?

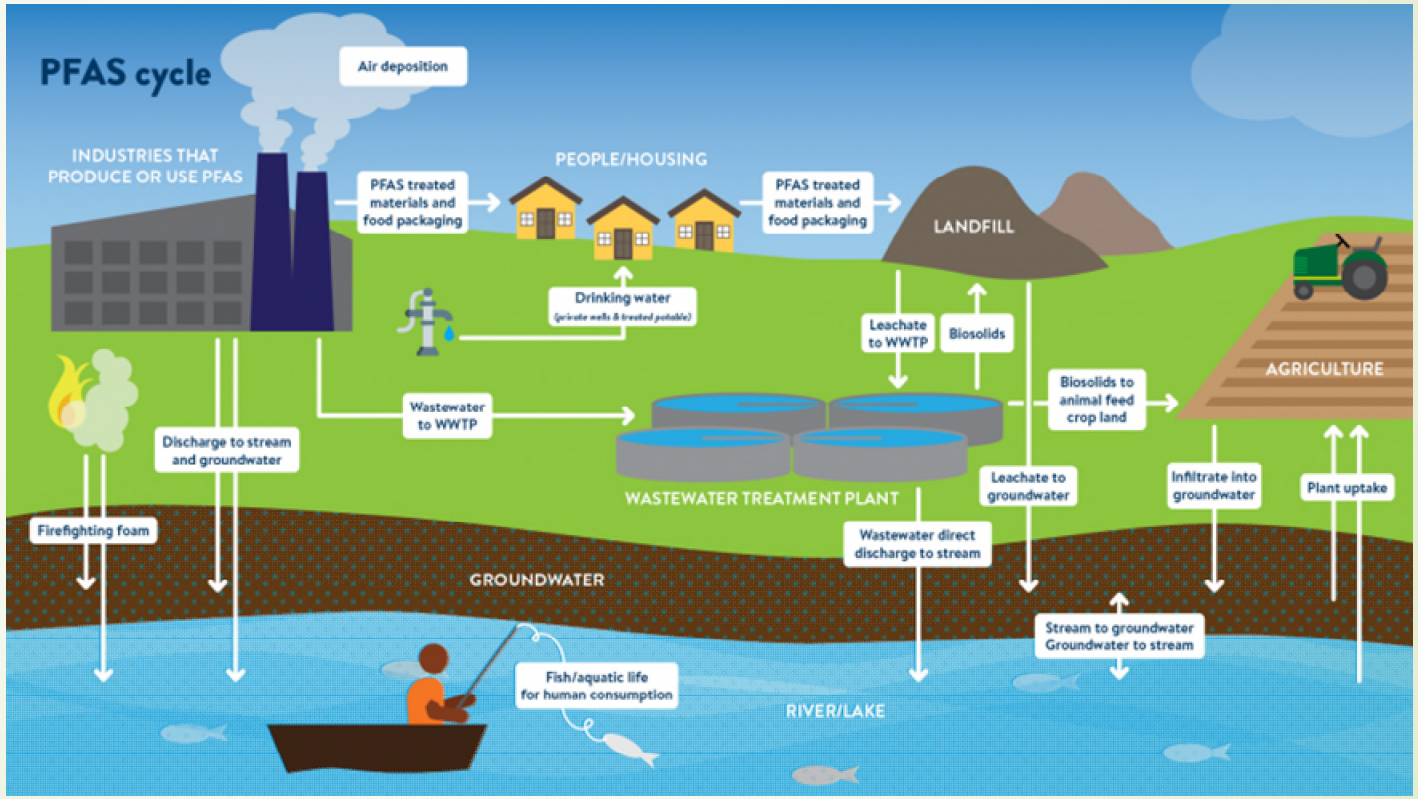
- PFAS is an acronym for per-and polyfluoroalkyl substances
- *Thousands* of substances (14,000+)
- All have carbon-fluorine “backbone” – one of the strongest bonds known in organic chemistry
- All are persistent (nicknamed “forever chemicals”); many are bioaccumulative; all tested are toxic
- Used as water and stain repellants; surfactants
- Ubiquitous

Dr. Bennett (PEER)

Three routes of exposure

- Ingestion
- Inhalation
- Dermal absorption

PFAS cycles through the environment repeatedly



Dr. Bennett (PEER)

How toxic are they?

- States regulate PFAS in **parts per trillion (ppt)**

How to grasp the concept of a ppt?

- 1 second in 317.1 centuries

- 1 drop of ink in 20 Olympic-sized swimming pools

Dr. Bennett (PEER)

In March of 2023, EPA proposed Maximum Contaminant Levels for six PFAS in drinking water

- 4 ppt for PFOA
- 4 ppt for PFOS
- Hazard Index proposed for a mixture of PFBS, HFPO-DA (GenX), PFNA, and PFHxA
- Important to note that the Maximum Contaminant Level Goal for PFOA and PFOS is ***zero***

Dr. Bennett (PEER)

EPA said there is *no* safe dose of PFOA or PFOS

- PFOS and PFOA are human carcinogens
- "PFOA and PFOS are likely to cause cancer (*e.g.,* kidney and liver cancer) and … there is ***no dose*** below which either chemical is considered safe…" (emphasis added)

Dr. Bennett (PEER)

PEER (Public Employees for Environmental Responsibility)

Meet Our PEER Team Members

Staff and Board

Tim Whitehouse
Executive Director
twhitehouse@peer.org

Tim Whitehouse has more than 25 years of experience working on a wide range of environmental issues with governments, businesses, nonprofit organizations, and community groups. His interest is in the intersection of science, policy, and the civil service. He believes in protecting employees who raise concerns about their workplace and in exposing undue influence on government for private gain. Tim was a senior attorney at the United States Environmental Protection Agency and was head of the Law and Policy Program at the North American Commission for Environmental Cooperation in Montreal, Canada. He has worked as a consultant for companies on environmental compliance issues, and with nonprofit organizations focusing on clean energy issues. Most recently, he was executive director of Chesapeake Physicians for Social Responsibility, a health advocacy group working to address climate change, toxics pollution, and nuclear disarmament issues. He holds a JD and BA from Emory University and an MA from New York University.

Kyla Bennett
Director of Science Policy
kbennett@peer.org

Northeast and Mid-Atlantic PEER's Director and PEER's Director of Science Policy, Kyla previously worked at EPA Region 1 for 10 years as a wetland permit reviewer and as the Region's Wetlands Enforcement Coordinator. Kyla first became involved with PEER in the mid-1990s, when she became a whistleblower herself. Kyla has a Ph.D. in ecology from the University of Connecticut and a law degree from Lewis and Clark Law School in Portland, Oregon. Her familiarity with science, the law, and the inner workings of state and federal governmental agencies enable her to assist public environmental employees throughout New England.

Meet Our PEER Team Members

Monica I. Mercola
Staff Counsel
mmercola@peer.org

Monica received her law degree from Brooklyn Law School where she developed an interest in the connection between civil rights issues and environmental issues and was published in the Brooklyn Law School Journal of Law and Policy. Previously, she studied Philosophy at Northeastern University. Prior to joining PEER, Monica has worked at Earthjustice as a Summer Law Clerk and at a variety of state and federal agencies including the New York State Department of Environmental Conservation. Monica enjoys biking around New York City, going to the farmer's market, and making paella.

Commentary and Publications by Monica »

Paula Dinerstein
General Counsel
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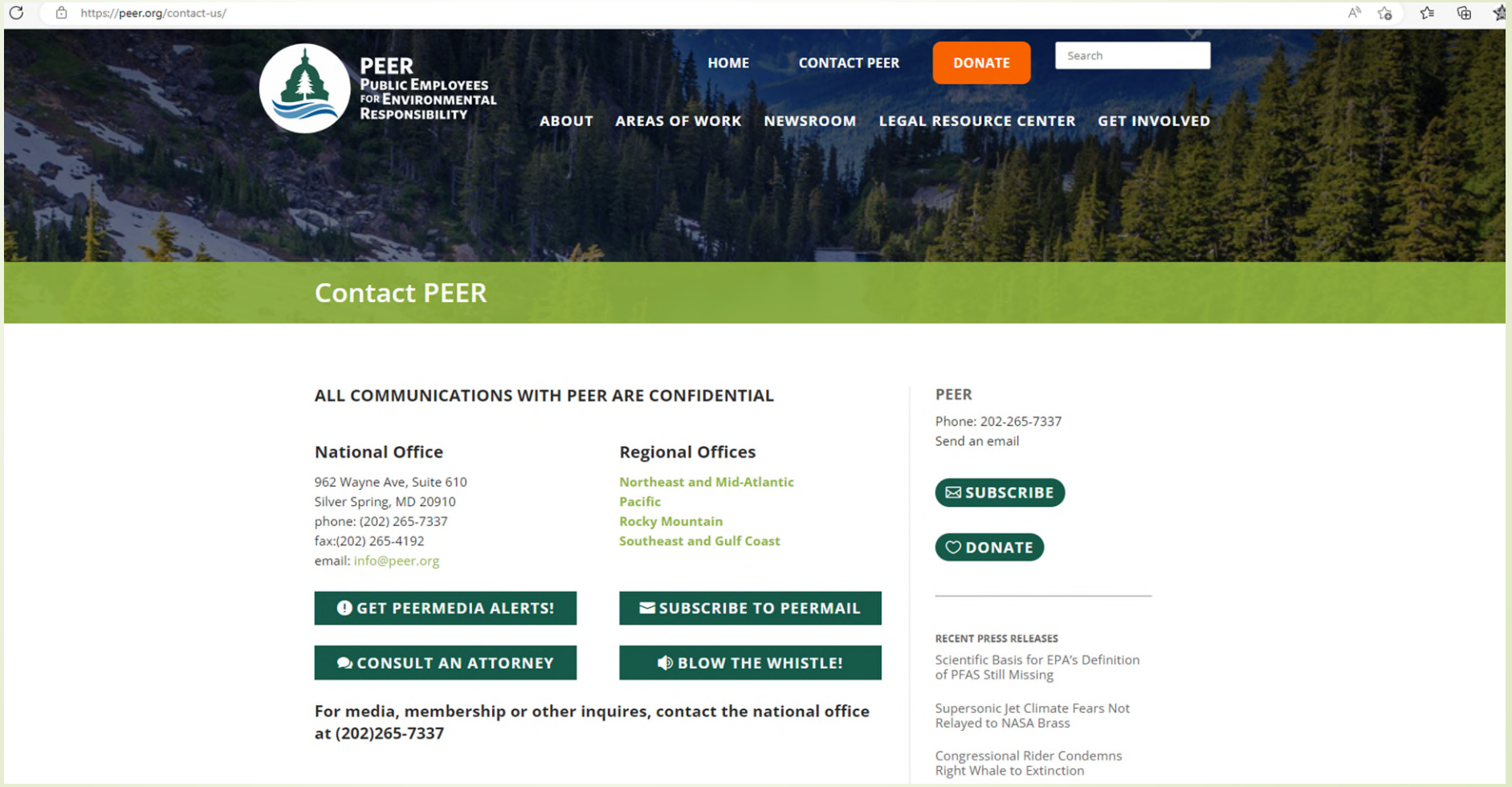
Paula has been with PEER since 2006. She represents PEER in whistleblower, environmental and FOIA cases. She received her law degree from the George Washington University National Law Center. Prior to joining PEER, she clerked for a federal district court judge in Washington DC and then practiced with small public interest-oriented law firms. Her work included representation of States and advocacy groups in energy and environmental matters, including pesticides and organic food standards.

Elizabeth Duan
Communications & Office Associate
eduan@peer.org

Elizabeth Duan received her bachelor's degree from the University of Pittsburgh, where she studied political science and gender, sexuality, and women's studies. Before joining PEER, Elizabeth coordinated events for nonprofit Women's Learning Partnership and taught gender studies at Emerson Preparatory School. She has also taught writing at Sidwell Friends School Summer Camp, and organized with New Virginia Majority, Education Reform Now, and Democrats for Education Reform in the Washington, DC area.

Contact Info Peer.org



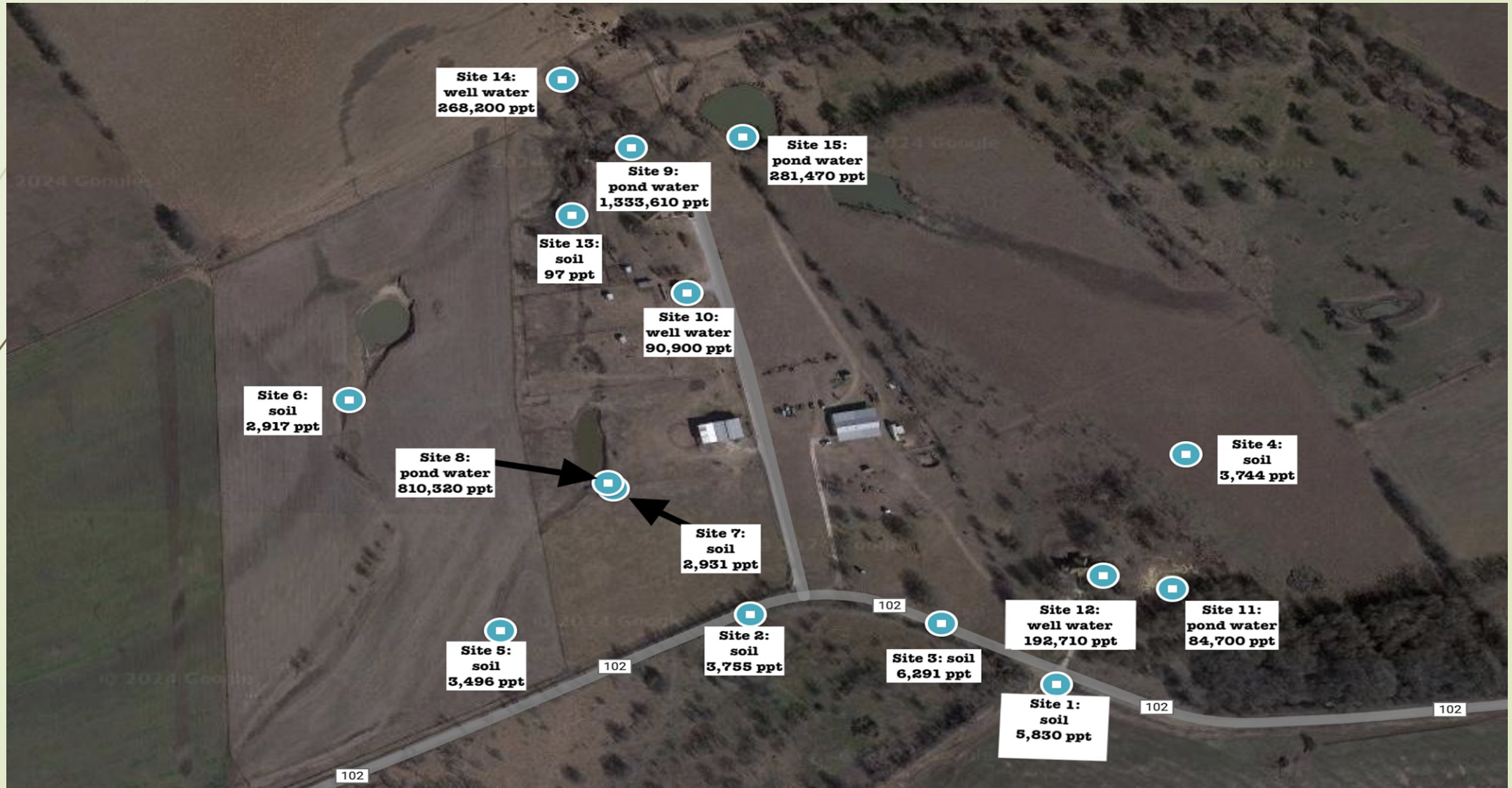
Dr. Amanda Beckman Collecting Pond Water Sample

Dr. Amanda Beckman Collecting Soil Sample

Dr. Beckman running Well Water prior to sample collection

Dr. Beckman running Well Water prior to sample collection

Test Sites
Water & Soil



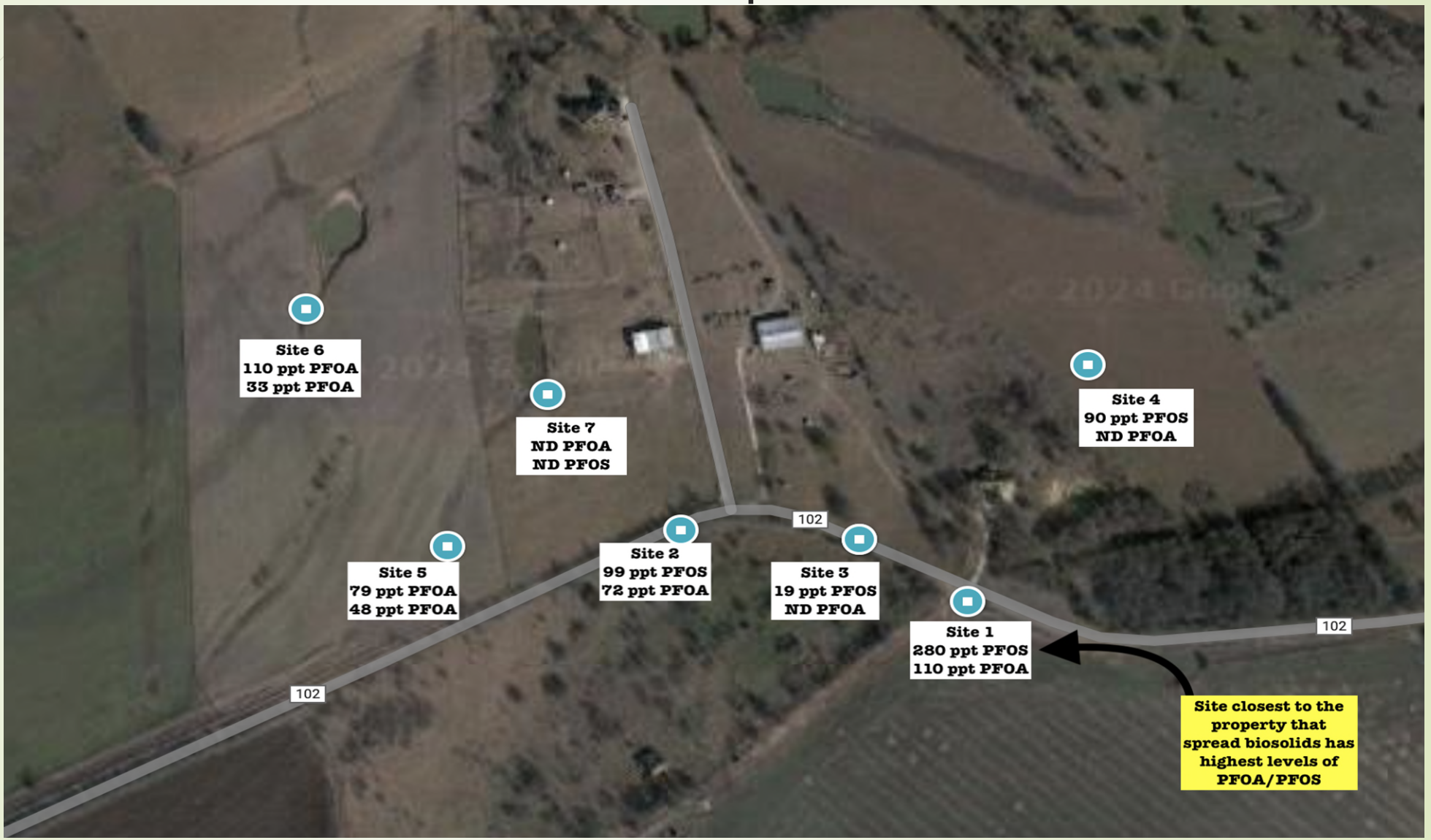
32 PFAS Were found on two properties across from Subject Property

APPENDIX 1

TEXAS PFAS RESULTS: Texas PFAS results in soil, pond water, tap water, and biosolids (reported in ppt)

PFAS (in ppt)	Site 2	Site 6 Gully	Site 5 Gully	Site 3 Easement	Site 1 Easement	Site 4 East pasture	Site 8 Sample 1-A	Site 12 Sample 1-A	Site 7 Pond bank	Site 11 Sample 1-A	Site 10 Sample 1-A	Site 9 Sample 1-A	Site 13 Sample 1	Site 14 Sample 1A	Site 15 Sample 1A	Sample 16 Biosolids
PFOS	99	110	79	19	280	90	1300			510		1300			490	13,000
PEPA	160	190	64	34												
NMeFOSA	140			58					190			1800				
PFOA	72	33	48		110		3000			1800		390			1400	560
PFDA	42	30	33	56	110	32	2000			570		650				1,600
PFDoA (aka PFDoDA)					55											690
PFBA	42						9600	1800		5700	3500	9100	28	3100	900	
PFNA	52		39	77	72	46	1000			570					380	320
PFPrA	3100	2500	3200	2600	5100	3000	770,000	180,000	2600	65,000	72,000	1,300,000	56	260,000	260,000	
HFPODA (aka GenX)						540	530									
6:2 FTCA	48	54	33	18		36	1200		29			1300				280
PFPeA				42	49		5500			1800		4300			2800	170
PFHxA				42			4300			1200		6800			1200	680
NMeFOSE				3300					33							1,100
PFHpA				45			2800			870		1300			1400	
PFHxS												330				300
Hydrolyzed PSDA					54											
PFBS							2800			440		2600			480	
PFDOS							310									
FOSA (PFOSA)							3700	1300		490	1400	500				260
PFO2HxA							480			2200		360			8800	
PMPA							1300			2800	900	1700				
R-EVE							500									
PFMOAA								510		750	1100					
PFO3OA																
PEPA								9100	31		12000			5,100		
7:3 FTCA									48							2,400
PFPrS												500				
R-PSDA												680				
PFODA													13			170
PFMOBA															820	
PFO4DA															2800	
6:2 FTS																420
8:2 FTS																410
NEtFOSAA																720
NEtFOSE																660
NMeFOSAA																1,600
PFDS																310
PFHxDA																190
PFNS																110
PFTreA																200
PFUnA or PFUnDA																380
8:2 FTCA																140
8:2 FTUCA																280
6:2 FTUCA																660
5:3 FTCA																8,000

Soil Samples



Test #16 Synagro Sample "Stocking Stuffer"

Dr. Bennett's Review of Test #16 Synagro Sample Results

- These results are shown in Appendix 2 of Dr. Bennett's Report.
- **Twenty-seven individual PFAS were found in the biosolids sample**
- **Thirteen (13) of the (27) PFAS found in the biosolids were also found in the soil and water samples on the subject or (Reporting Parties) properties.**
- Dr. Bennett advised each load of biosolids could result in different PFAS being present at various concentrations.
- For example: Municipal Waste/Biosolids can be affected by commercial activity on a daily basis. Depending on what activity is occurring on a particular day; that activity can directly affect municipal waste and thereby affect processed biosolids. What may be present in a single sample one month, may not be present the following month. Each month the varieties and concentrations of PFAS could change.

Appendix 2 Dr. Bennett's Report

Appendix 2: **PFAS in biosolids (reported in ppt)**

PFAS	ppt
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	420
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	410
NEtFOSAA	720
NEtFOSE	660
NMeFOSAA	1,600
NMeFOSE	1,100
Perfluorodecanesulfonic acid (PFDS)	310
Perfluorodecanoic acid (PFDA)	1,600
Perfluorododecanoic acid (PFDoA)	690
Perfluorohexadecanoic acid (PFHxDA)	190
Perfluorohexanesulfonic acid (PFHxS)	300
Perfluorohexanoic acid (PFHxA)	680
Perfluorononanesulfonic acid (PFNS)	110
Perfluorononanoic acid (PFNA)	320
Perfluorooctadecanoic acid (PFODA)	170
Perfluorooctanesulfonamide (PFOSA)	260
Perfluorooctanesulfonic acid (PFOS)	13,000
Perfluorooctanoic acid (PFOA)	560
Perfluoropentanoic acid (PFPeA)	170
Perfluorotetradecanoic acid (PFTreA)	200
Perfluoroundecanoic acid (PFUnA or PFUnDA)	380
7:3 FTCA	2,400
8:2 FTCA	140
6:2 FTCA	280
8:2 FTUCA	280
6:2 FTUCA	660
5:3 FTCA	8,000

Sample #17-1 Sample#17-2 Catfish West Pond

Sample #18 Week Old Calf

Excerpts from DR. Bennett's Report PFAS in Catfish and Beef Samples #17, #18 & #19

- Shortly after an application of biosolids on the adjacent farm, the catfish on one of the subject (Reporting Parties) property, experienced a massive fish kill. Although those fish were disposed of and are no longer available, two replacement fish were tested for PFAS levels.
- A newborn calf died suddenly on the second subject property at approximately one week of age. Tests were conducted on the meat of this calf. These results are found in Appendix 3.
- The levels of PFOS in the fish are staggering (74,000 ppt and 57,000 ppt, respectively). To put this in perspective, EPA stated in March of 2023 that, "there is ***no dose*** below which either … [PFOA or PFOS] is considered safe…" for consumption (emphasis added). These fish should not be eaten. Note that in the US, fish tested between 2013 and 2015 had median levels of PFAS of 11,800 ppt.
- Although the PFAS levels in the calf were much lower, it still had concerning levels of PFAS (including PFPrA) in its meat. Given that the calf was still nursing and would have received the majority, if not all, of its nourishment from its mother. It is likely that fully grown cattle will have much higher levels of PFAS.
- In comparison, PFAS found in a stillborn calf were entirely from the mother (via the placenta) (Appendix 4). The stillborn calf's liver had 660,000 ppt of PFOS, which is extremely high, and indicates that the adult cows are exposed to very high levels of PFAS in their water and forage.
- It is likely that fully grown cattle will have much higher levels of PFAS in their flesh.

Appendix #3 Dr. Bennett's Report

Appendix 3: PFAS levels in catfish and calf

PFAS (in ppt)	Fish #1	Fish #2	Calf
PFHxS	120		
PFHpA	150		
PEPA	190		
PFOS	74,000	57,000	320
PFBA			480
PFPrA			2,400

Necropsy Photo of Deceased Stillborn Calf Sample #19

Necropsy Photo of Deceased Newborn Calf

Necropsy Photo

Necropsy Photo

TVMDL Texas A&M Veterinarian Medical Diagnostic Laboratory

Test: Metal & Mineral Panel (ICP/MS) **Specimen:** Liver :: Dry Weight
Specimen split from original Liver

Test		Result	Units
Cobalt (ICP/MS)	Dry Wt Basis	None Detected, < 0.10	ug/g
Copper (ICP/MS)	Dry Wt Basis	86.47	ug/g
Iron - Feed or Tissue (ICP/MS)	Dry Wt Basis	2,695.93	ug/g
Manganese (ICP/MS)	Dry Wt Basis	10.18	ug/g
Molybdenum (ICP/MS)	Dry Wt Basis	2.65	ug/g
Selenium (ICP/MS)	Dry Wt Basis	7.95	ug/g
Zinc (ICP/MS)	Dry Wt Basis	78.92	ug/g
Arsenic (ICP/MS)	Dry Wt Basis	None Detected, < 0.10	ug/g
Cadmium (ICP/MS)	Dry Wt Basis	None Detected, < 0.10	ug/g
Lead (ICP/MS)	Dry Wt Basis	None Detected, < 0.10	ug/g
Thallium (ICP/MS) [2]	Dry Wt Basis	None Detected, < 0.10	ug/g

Should be above 125

above 1000 is High

above 6 is Toxic

below 120 is very low

Footnotes

2: Please refer to the attached reference intervals for metals and minerals interpretation.

The copper concentration is Below Normal, the iron concentration is Above Normal, the selenium concentration is in the Toxic range, and the zinc concentration is DEFICIENT. The other values appear to be within normal ranges for neonates.

TVMDL Texas A&M Veterinarian Medical Diagnostic Laboratory

Liver (*Dry weight basis*) – Determined gravimetrically

Analyte	Bovine Normal Range (adults and growing calves)	Bovine Normal Range (neonates)	Units	Deficient	High	Toxic	Calf ↓
Cobalt	0.10 - 0.40	0.06 - 0.40	ug/g dwt	< 0.02	-	> 20.00	
Copper	50 - 600	125 - 650	ug/g dwt	< 40	-	> 1000	86.47
Iron	140 - 1000	160 - 1000	ug/g dwt	< 120	-	> 35,600	2,695.93
Manganese	5 - 15	3.5 - 15	ug/g dwt	-	-	-	
Molybdenum	1 - 4	0.6 - 3	ug/g dwt	-	-	> 8.0	
Selenium	0.7 – 2.5	1.5 – 3.5	ug/g dwt	< 0.68	-	> 6.00	7.95
Zinc	90 - 400	120 - 400	ug/g dwt	< 80	-	> 1000	78.92
Arsenic	0.02 - 1.60	< 1	ug/g dwt	-	> 4	> 8	
Cadmium	0.08 - 4	< 4	ug/g dwt	-	5.6 - 36	> 100	
Lead	< 4	< 4	ug/g dwt	-	> 8.0	> 20	
Thallium	< 0.2	< 0.2	ug/g dwt	-	0.64 - 92	-	
Dry wt. fraction	25 - 34	18 - 29	%				

TVMDL Texas A&M Veterinarian Medical Diagnostic Laboratory

HISTOPATHOLOGY

Test: Histopathology - Postmortem 9 or More Tissues **Specimen:** Tissue :: Fixed

Number of Tissues	11
Section/Slides	24/14

Histopathologic Diagnosis

Brain (Cerebrum, Hippocampus, Cerebellum, Brainstem): Moderate, multifocal meningeal melanosis (incidental).
Heart: No significant findings observed.
Liver: Mild, multifocal hepatocellular vacuolation, lipid type with congestion and minimal centrilobular necrosis with hemorrhage (slide 11).
Lung: Diffuse atelectasis; Moderate, multifocal intra-alveolar fibrin with intraseptal edema and extramedullary hematopoiesis.
Spleen: Moderate congestion.
Kidney: Mild medullary congestion.
Rumen: No significant findings observed.
Omasum: No significant findings observed.
Abomasum: No significant findings observed.
Small intestine: Mild eosinophilic enteritis.
Colon: Mild autolysis; No significant findings observed.

Comments

Necropsy findings are relatively non-specific and do not point to an obvious cause of the stillbirth. There are minimal areas of necrosis within centrilobular areas of the liver. Ischemia is highly likely, but a toxin cannot be entirely excluded. The eosinophils could represent parasitic exposure likely coming from the cow. Multiple diagnostics are still pending on this case. Results will be sent to you as they become available.

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Veterinary Pathologist

Sample #19
Stillborn Calf Results

Appendix 4: PFAS levels in stillborn calf

PFAS (in ppt)	Stillborn calf tissue	Stillborn calf liver
NEtFOSAA	170	
NMeFOSAA	170	
PFHxDA	110	
PFODA	160	
PFTrDA	130	
7:3 FTCA	180	
8:2 FTCA	110	
10:2 FTCA	140	
8:2 FTUCA	130	
10:2 FTUCA	190	
NMeFOSE		310
PFDA		250
PFHxS		1,300
PFOA		98
PFPeA		210
6:2 FTCA		130
NVHOS		110
PMPA		110
MTP		710
PFOS		610,000

Excerpts from DR. Bennett's Report

- **Conclusion from Dr. Bennett.** The PFAS levels found on the reporting properties are of concern. PEER believes that the amount of PFAS found could have caused the fish kill on the property, may also be contributing to or causing the deaths of the cows, and that the application of biosolids on the adjacent property is causing these high levels of PFAS. It is critical to note that each subsequent application of biosolids will increase the levels of PFAS in these soils and waters, and exacerbate existing problems. Finally, and perhaps most importantly, the well water is unsafe and should not be consumed without filtration.

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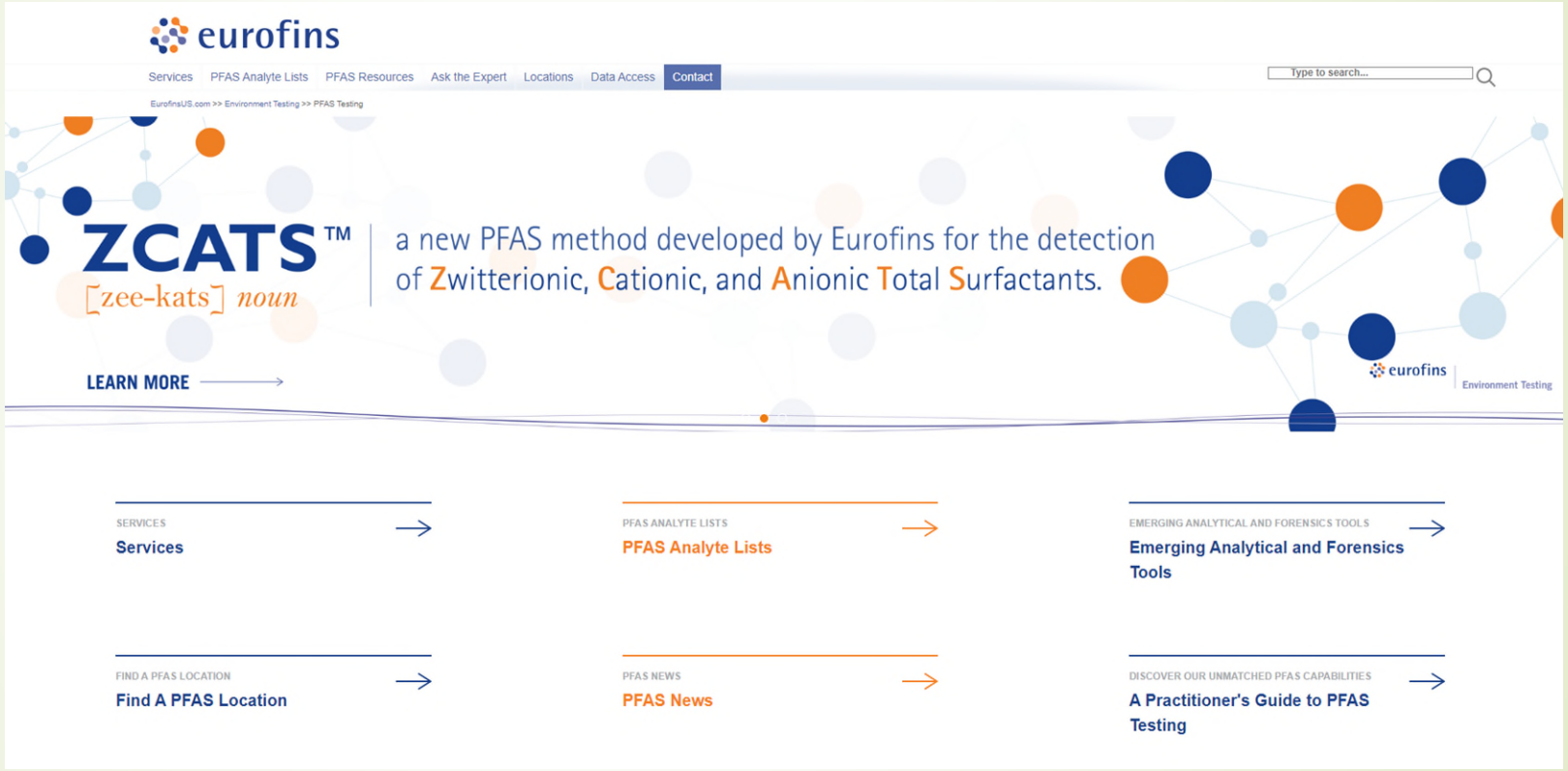

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