

Per- and polyfluoroalkyl substances (PFAS) and New Mexico: What Do We Know?

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Why worry about PFAS?

1. Bioaccumulate: chemicals build up in the body at a rate faster than the body can get rid of them

2. Persistent in the environment

- Known as the forever chemical
- Do not biodegrade under normal environmental conditions

3. Persistent in the human body: Measured by half-life which is how long it takes for the concentration of a chemical to decrease by half

- Half life of PFOS = 5.4 years
- Half life of PFOA = 2.3-3.8 years
- Half life of PFHxS = 8.5 years

4. Health effects largely unstudied for most compounds: There are over 4,000 known PFAS chemicals

- PFOS/PFOA most commonly studied

5. Health effects are varied and uncertain

ATSDR*: Potential health effects

1. PFOS, PFOA, PFHxS, PFNA have been most extensively studied. Some, but not all, studies in humans have shown that certain PFAS may:

- affect growth, learning, and behavior of infants and older children
- lower a woman's chance of getting pregnant
- interfere with the body's natural hormones
- increase cholesterol levels
- affect the immune system
- increase the risk of cancer

2. Scientists are still learning about health effects of exposures to mixtures of PFAS.

3. Laboratory animals exposed to high doses of one or more of these PFAS tend to show changes in liver, thyroid, and pancreatic function, as well as some changes in hormone levels. Because animals and humans process these chemicals differently, more research will help scientists fully understand how PFAS affect human health.

*<https://www.atsdr.cdc.gov/pfas/health-effects.html>

Where is PFAS found?

Food packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water. Milk, when crops or drinking water for cows are PFAS-contaminated

Commercial household products, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).

Workplace, including production facilities or industries (e.g., chrome plating, electronics manufacturing or oil recovery) that use PFAS.

Drinking water, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).

Living organisms, including fish, animals and humans, where PFAS have the ability to build up and persist over time.

How does PFAS get into the body?

- Drinking contaminated municipal water or private well water
- Drinking contaminated milk
- Eating fish caught from water contaminated by PFAS (PFOS, in particular)
- Accidentally swallowing contaminated soil or dust
- Eating food that was packaged in material that contains PFAS
- Using some consumer products such as non-stick cookware, stain resistant carpeting, and water repellent clothing.

What calculations are used to protect health?

Reference Dose (RfD)

- A reference dose is an estimate of the amount of a chemical a person can ingest daily over a lifetime that is unlikely to lead to adverse health effects
- Based on animal studies, a reference dose was developed for PFOA and then uncertainty levels were applied to protect our most vulnerable populations
- The reference dose for PFOA and PFOS is 20 ng/kg/day. This means a person can consume 20 ng of PFOA or PFOS per kilogram of body weight everyday without long-term health effects.

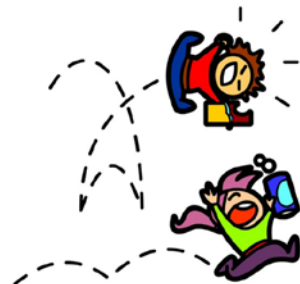
Health Advisory (HA)

- A health advisory is calculated for drinking water using a **reference dose** and average water consumption
- The health advisory for PFOA and PFOS in drinking water is 70 parts per trillion (ppt)
- A health advisory does take into account other exposures to chemicals such as in air, dust, food and consumer products

80
kilograms
with
caffeine



vs.



23
kilograms
with
caffeine

Reference Doses and Health Advisory

ATSDR

- The RfDs for PFOA and PFOS for children are lower than those established by the EPA
- ATSDR has converted their RfDs into Minimal Risk Levels for drinking water for children. The levels for children are:
 - 21 ppt for PFOA
 - 14 ppt for PFOS
 - 140 ppt for PFHxS
 - 21 ppt for PFNA

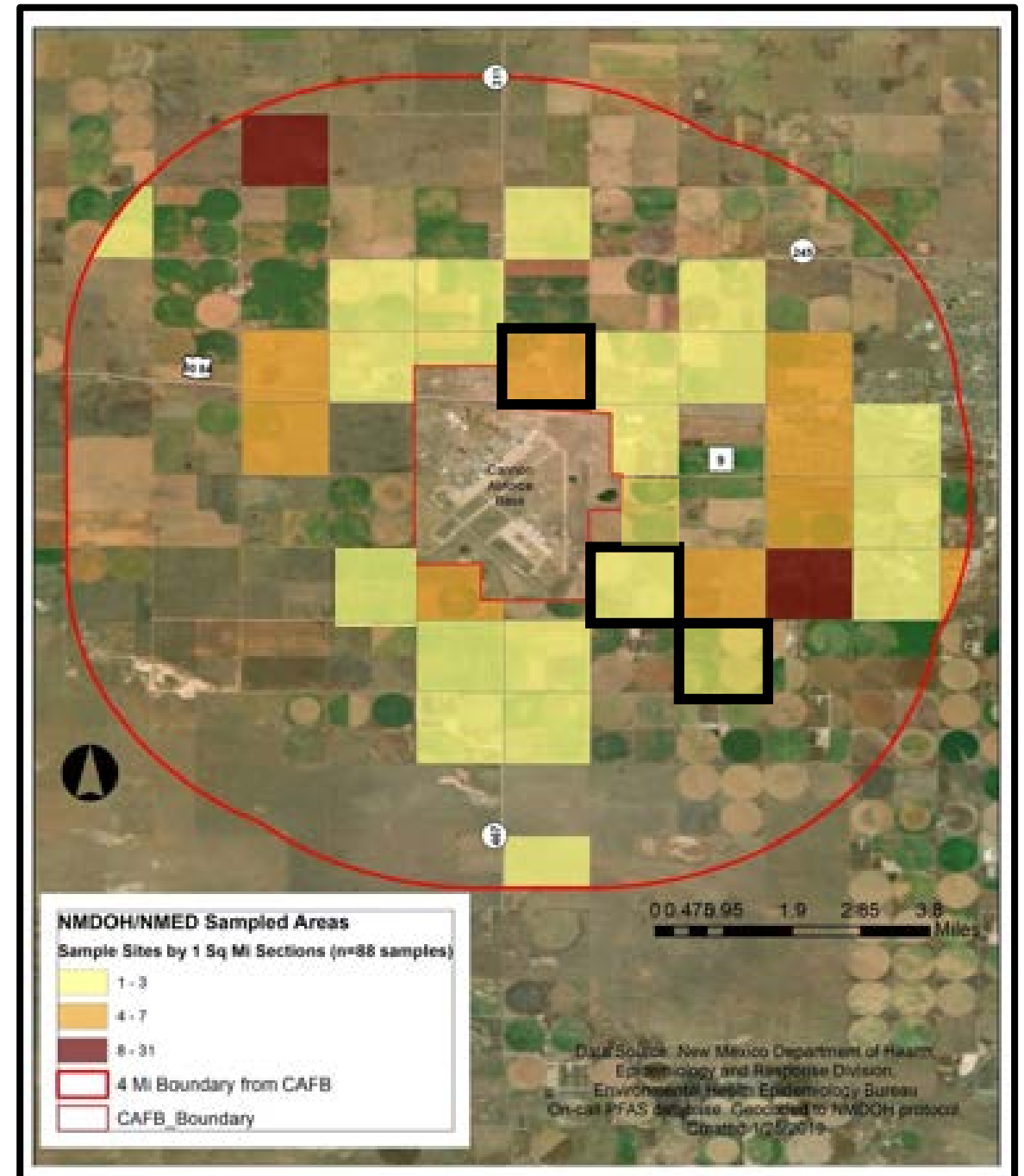
EPA

- Established RfDs for PFOA + PFOS that lead to a Health Advisory of 70 ppt in drinking water

 1 in 32,000
second years 

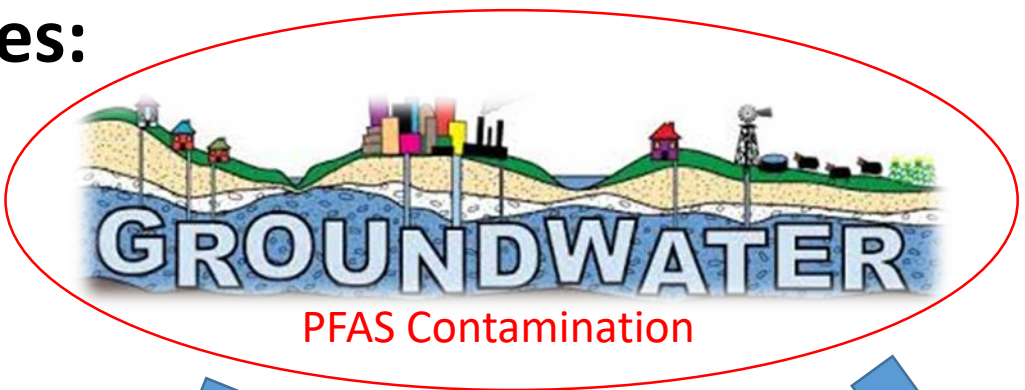
Summary of DOH/NMED Testing

- ✓ DOH leveraged its federal Environmental Public Health Tracking grant to offer private well testing to residents within a four-mile radius of Cannon Air Force Base (CAFB)
- ✓ 96 private wells were tested around CAFB. All except 2 wells and one water system were non detect. The areas with detections are outlined in black.



The unique problems facing dairies:

PFAS are excreted through the milk, feces, and urine of dairy cows.



The uptake of PFOA into plants is directly proportional to the PFOA concentrations in irrigated soil (1)



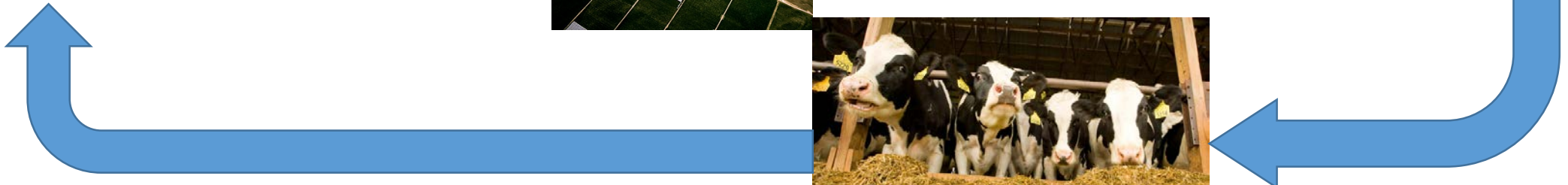
NMED GWQB can regulate for some PFAS through the Ground Water Discharge Permit required for dairies



A milking cow can eat 100 pounds of feed per day

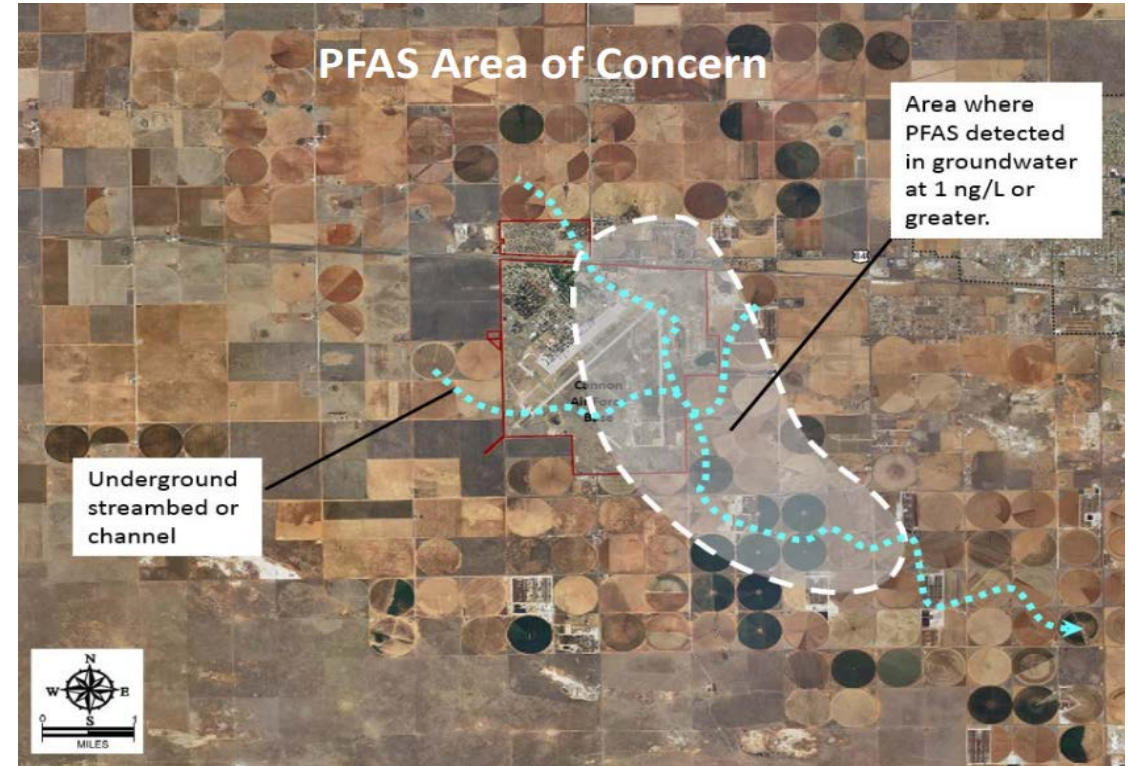


One dairy cow drinks 30 to 50 gallons of water per day



Dairy Testing

- 6 dairies in the PFAS area of concern defined by NMED
- One dairy has already been forced to stop selling milk
 - Has stopped pumping water which could impact the defined plume
- 4 dairies agreed to allow DOH to test water after treatment systems had been installed on 4/30/2019



Setting action levels for PFAS in milk

Action levels for PFOS in cow's milk

	Age group (years, male and female combined)				
	1-2	3-5	6-11	12-19	20+
Action level (nanograms/Liter, ng/L)*	210	400	710	1,510	2,700

* Calculated values rounded to nearest 10.

Maine

- 2017: Maine CDC requested to evaluate level of PFOS in cow's milk
- Maine CDC recommended non-enforceable action levels taking into account:
 - EPA's toxicity information (RfD of 20 ng/kg/day)
 - Milk intake for various age groups (data from CDC and FDA)
 - Background exposure or other potential exposure sources

Mitigation Strategies and Recommendations



There are no treatments to reduce the amount of PFAS in the body



Reduce exposure to PFAS: drink treated or bottled water if private well water contaminated



Dairies should: a) ensure cows have uncontaminated drinking water b) test milk for PFAS until below screening level