Ongoing PFAS Investigations

Kerri Malinowski, Safer Chemicals

Chris Evans, Hydrogeologist

PFAS Site Investigation

Stone Site

UCMR3 testing requirements revealed the local Water District to have a production well with reportable amounts of PFOA/PFOS.

Water District testing of a monitoring well on farm property result in combined PFOA/PFOS measured at 140 ppt.

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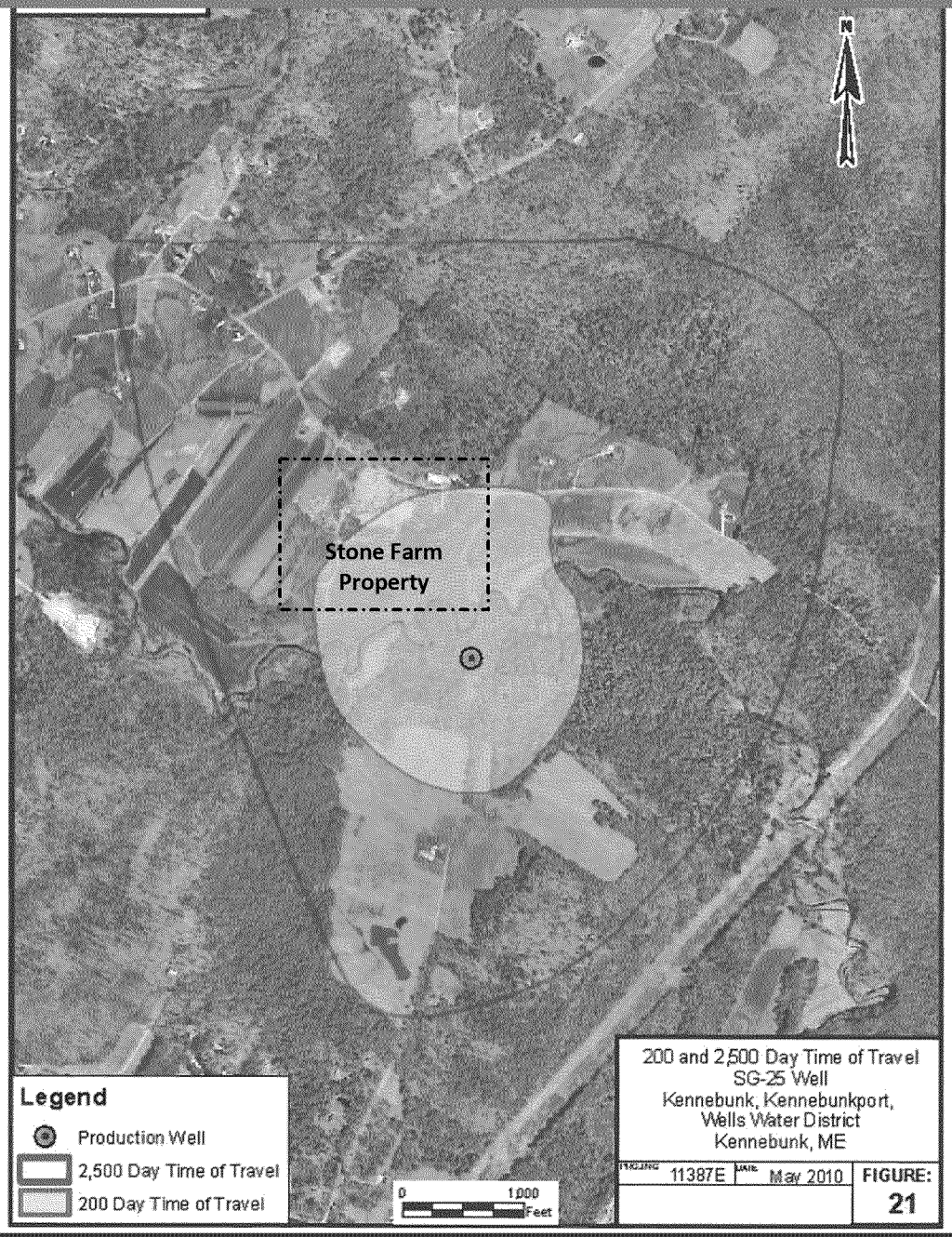

200 and 2,500 Day Time of Travel
SG-25 Well
Kennebunk, Kennebunkport,
Wells Water District
Kennebunk, ME

11387E	May 2010	FIGURE: 21

MAINE

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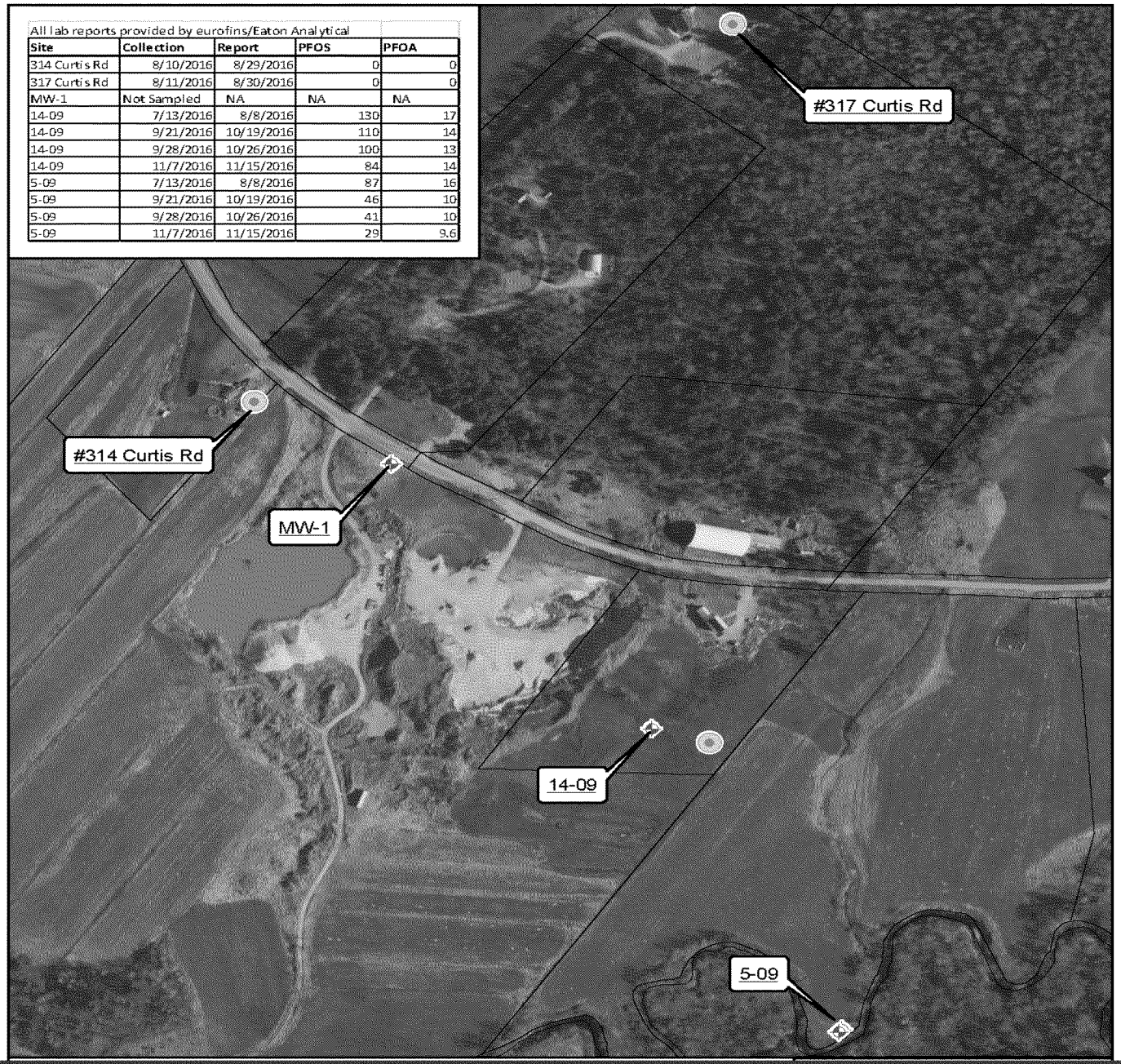
All lab reports provided by eurofins/Eaton Analytical

Site	Collection	Report	PFOS	PFOA
314 Curtis Rd	8/10/2016	8/29/2016	0	0
317 Curtis Rd	8/11/2016	8/30/2016	0	0
MW-1	Not Sampled	NA	NA	NA
14-09	7/13/2016	8/8/2016	130	17
14-09	9/21/2016	10/19/2016	110	14
14-09	9/28/2016	10/26/2016	100	13
14-09	11/7/2016	11/15/2016	84	14
5-09	7/13/2016	8/8/2016	87	16
5-09	9/21/2016	10/19/2016	46	10
5-09	9/28/2016	10/26/2016	41	10
5-09	11/7/2016	11/15/2016	29	9.6



PFAS Site Investigation

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PFAS Site Investigation

Dairy inspector and milk processor made aware of Water District's results.

Milk processor analyzes milk samples

Storage tank at the farm:	PFOS 1420 ppt
	PFOA ND
Comingled milk sample:	PFOS 175 ppt
	PFOA ND

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PFAS Site Investigation

Property owner tests residential drinking water:

PFOS 43 ppt
PFOA 13 ppt

Residential Drinking Water Sample Analysis				
Laboratory Parameters Reported in ppt	Dec	January	May 2	May 30 Post Filtration System
PFOS	43	42	30	ND
PFOA	13	8.94	5	ND

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PFAS Site Investigation

Site history

Local paper mill licensed for land application of bioash and sludge at site.

(1983-85 applied 44.6 dry tons sludge and 26.8 dry tons bioash)

Two local waste water treatment facilities permitted to spread biosolids on site.

Total volume sludge spread on site 1992-2004

2,643 cubic yards

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PFAS Site Investigation

DEP Phase I Sampling and Analysis Plan

12 Soil, 2 Surface Water, Residential DW, Milk, Hay

Initial data collection in January. Based on those results collected additional soil, manure, and milk in February.

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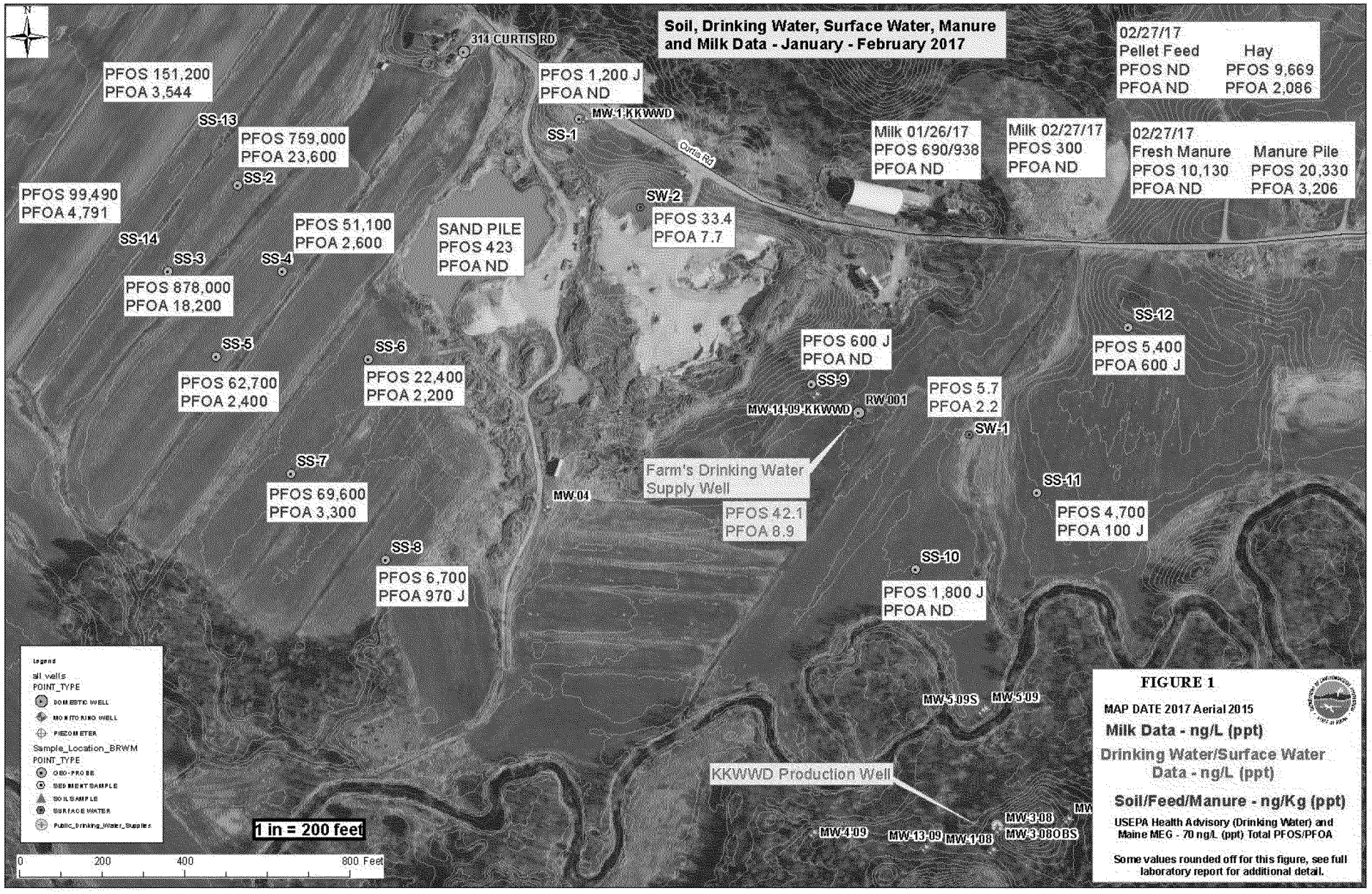
Soil, Drinking Water, Surface Water, Manure and Milk Data - January - February 2017
314 CURTIS RD
PFOS 151,200
PFOA 3,544
SS-13
PFOS 759,000
PFOA 23,600
SS-2
PFOS 99,490
PFOA 4,791
SS-14
SS-3
SS-4
PFOS 878,000
PFOA 18,200
PFOS 51,100
PFOA 2,600
SAND PILE
PFOS 423
PFOA ND
PFOS 1,200 J
PFOA ND
MW-1-KKWWD
SS-1
Curtis Rd
SW-2
PFOS 33.4
PFOA 7.7
Milk 01/26/17
PFOS 690/938
PFOA ND
Milk 02/27/17
PFOS 300
PFOA ND
02/27/17
Pellet Feed
PFOS ND
PFOA ND
Hay
PFOS 9,669
PFOA 2,086
02/27/17
Fresh Manure
PFOS 10,130
PFOA ND
Manure Pile
PFOS 20,330
PFOA 3,206
SS-5
PFOS 62,700
PFOA 2,400
SS-6
PFOS 22,400
PFOA 2,200
PFOS 600 J
PFOA ND
SS-9
MW-14-09-KKWWD
RW-001
PFOS 5.7
PFOA 2.2
SW-1
SS-12
PFOS 5,400
PFOA 600 J
SS-7
PFOS 69,600
PFOA 3,300
MW-04
Farm's Drinking Water Supply Well
PFOS 42.1
PFOA 8.9
SS-11
PFOS 4,700
PFOA 100 J
SS-8
PFOS 6,700
PFOA 970 J
SS-10
PFOS 1,800 J
PFOA ND
MW-5-09S
MW-5-09
KKWWD Production Well
MW-4-09
MW-13-09
MW-1-08
MW-3-08
MW-3-08OBS
Legend
all wells
POINT_TYPE
DOMESTIC WELL
MONITORING WELL
PIEZOMETER
Sample_Location_BRWM
POINT_TYPE
GEO-PROBE
SEDIMENT SAMPLE
SOIL SAMPLE
SURFACE WATER
Public_Drinking_Water_Supplies
1 in = 200 feet
0
200
400
800 Feet
FIGURE 1
MAP DATE 2017 Aerial 2015
Milk Data - ng/L (ppt)
Drinking Water/Surface Water Data - ng/L (ppt)
Soil/Feed/Manure - ng/Kg (ppt)
USEPA Health Advisory (Drinking Water) and Maine MEG - 70 ng/L (ppt) Total PFOS/PFOA
Some values rounded off for this figure, see full laboratory report for additional detail.

PFAS Site Investigation

Phase I Soil Sample Results

LABORATORY PARAMETERS Reported in ng/kg (ppt)	SS-5	SS-7	SS-10	SS-11	SS-12	SS-13	SS-14	SAND-01 (PIT)
PFOA	2,430	3,340	ND	101	600	3,540	4,790	ND[1] (<97)
PFOS	62,700	69,600	1,800	4,700	5,400	151,000	99,500	423
PFBA	-	-	-	-	-	212	247	ND
PFPeA	-	-	-	-	-	238	270	ND
PFHxA	-	-	-	-	-	305	415	ND
PFHpA	134	255	ND	200	ND	364	522	ND
PFNA	396	452	ND	308	184	524	575	ND
PFDA	-	-	-	-	-	569	987	ND
PFUnA	-	-	-	-	-	196	300	ND
PFDoA	-	-	-	-	-	228	396	ND
PFOSA	-	-	-	-	-	2,300	2,020	106
PFHxS	ND	ND	ND	ND	ND	ND (200)	232	ND

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PFAS Site Investigation

Phase I Sample Results

LABORATORY PARAMETERS Reported in ng/kg (ppt)	Fresh Manure	Aged Manure	Pellet Feed	Hay
PFOA	ND	3,206	ND	**2,086**
PFOS	**10,130**	**20,330**	ND	**9,669**
PFBA	2,512	2,512	-	-

LABORATORY PARAMETERS Reported in ng/kg (ppt)	Residential DW December	Residential DW January	Milk Tank Dec	Milk Tank January	Milk Tank February
PFOA	13	8.94	ND	ND	ND
PFOS	43	42.1	**1420**	**690** (split 938)	**300**

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PFAS Site Investigation

Maine CDC develops an action level for **PFOS** in cow's milk.

Values for daily milk intake based on body weight

Action level for PFOS in cow's milk					
	Age Group (years)				
	1-2	3-5	6-11	12-19	20+
Action level ng/L (ppt)	**210**	400	710	1,510	2,700

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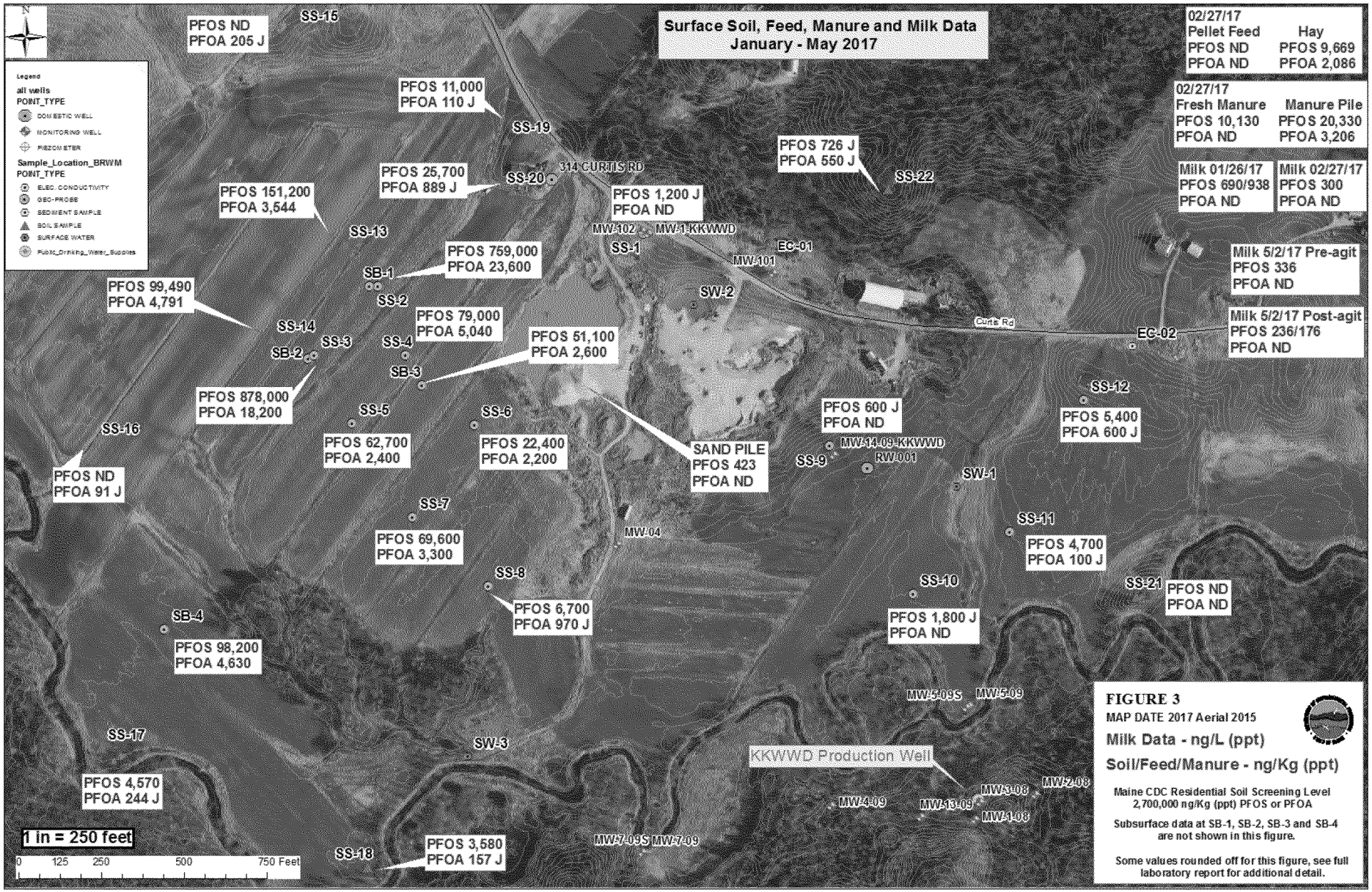
PFAS Site Investigation

Phase II Sampling and Analysis

added soil boring, surface water, ground water, milk, and soil profile electrical conductivity logs

Phase II map results

ED_001556_00002643-00014



MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION www.maine.gov/dep

PFAS Site Investigation

Phase II Sampling and Analysis

Soil boring results

LABORATORY PARAMETERS Reported in ng/kg (ppt)	SS-2/SB1 0-12"	SB1 12-24"	SB1 24-36"	SS-3/SB2 0-12"	SB2 12-24"	SB2 24-36"	SB2 14.5-15 Feet
PFBS	ND[1] (<500)	ND (<510)	ND (<510)	ND (<480)	ND (<500)	ND (<500)	ND (<500)
PFHpA	1,620 J	254 J	157 J	1,480 J	397 J	202 J	ND (<250)
PFHxS	403 J	ND (<510)	ND (<510)	313 J	ND (<500)	ND (<500)	ND (<500)
PFOA	23,600	2,430	2,140 J	18,200	4,350 J	2,060	ND (<120)
PFOS	759,000	28,500	14,800	878,000	65,800	17,200	ND (<500)
PFNA	1,670 J	ND (<500)	ND (<260)	1,250 J	ND (<250)	ND (<250)	ND (<250)

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PFAS Site Investigation

Phase II Sampling and Analysis

LABORATORY PARAMETERS Reported in ng/kg (ppt)	SB3 0-12"	SB3 12-22"	SB4 0-12"	SB4 12-24"	SB4 24-36"	SB4 11-12 Feet
PFBS	ND (<500)	ND (<510)	ND (<500)	ND (<500)	ND (<490)	ND (<500)
PFHpA	330 J	ND (<260)	186 J	ND (<250)	ND (<250)	194 J
PFHxS	271 J	ND (<510)	ND (<500)	ND (<500)	ND (<490)	ND (500)
PFOA	5,040	1,820 J	4,630 J	1,080 J	141 J	**2,070**
PFOS	79,000	7,980	98,200	21,800	ND (<490)	**64,200**
PFNA	650 J	ND (<260)	332 J	ND (<250)	ND (<250)	218 J

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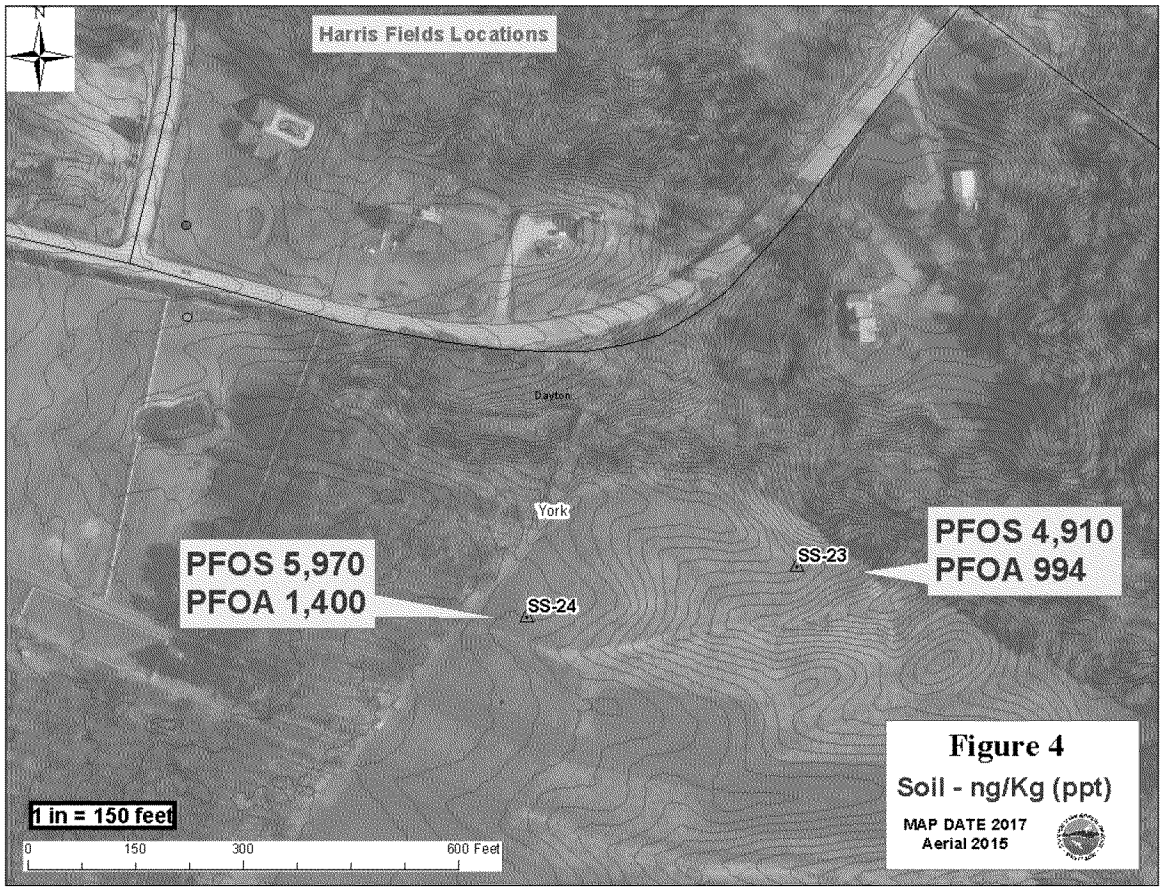
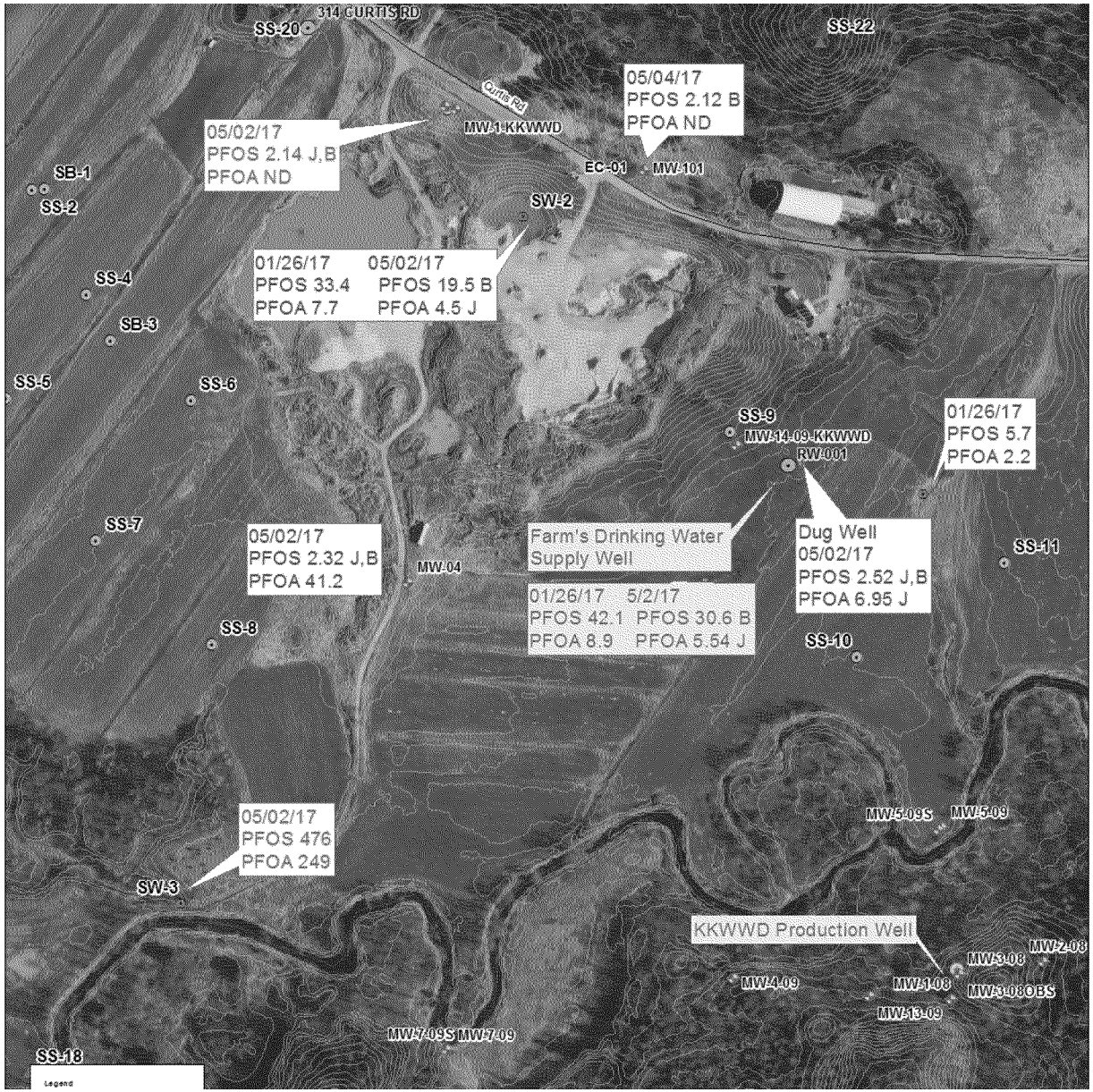
PFAS Site Investigation

Identified location that received biosolids from the generator with commercial inputs during the same time period.



Phase II

Water Sample Results



PFAS Site Investigation

Phase II Sampling and Analysis

Milk analysis results over time

LABORATORY PARAMETERS Reported in ppt	Milk Tank Sample 11/25/16	Milk Tank 1/26/17	Milk Tank 1/26/17	Milk Tank 2/27/17	Milk Tank 5/02/17	Milk Tank 5/02/17	Milk Tank DUP	Milk Tank 5/30/17	Milk Tank 7/25/17
PFBS	ND (<100)	ND	ND	ND	ND	ND	ND	ND	ND
PFHpA	ND (<50)	ND	ND	ND	ND	ND	ND	ND	ND
PFHxS	ND (<50)	ND	ND	ND	ND	ND	ND	ND	ND
PFOA	ND (<50)	ND	ND	ND	ND	ND	ND	ND	ND
PFOS	**1420**	**690**	**938**	**300**	**336**	***236***	***176***	**226**	**279**
PFNA	ND (<50)	ND	ND	ND	ND	ND	ND	ND	ND

PFAS Site Investigation

Water District shut down production well mid-February and is attempting to find an appropriate filtration system.

Measureable amounts in aquifer have increased.

Currently purchasing water from neighboring town to make up for lost volume.

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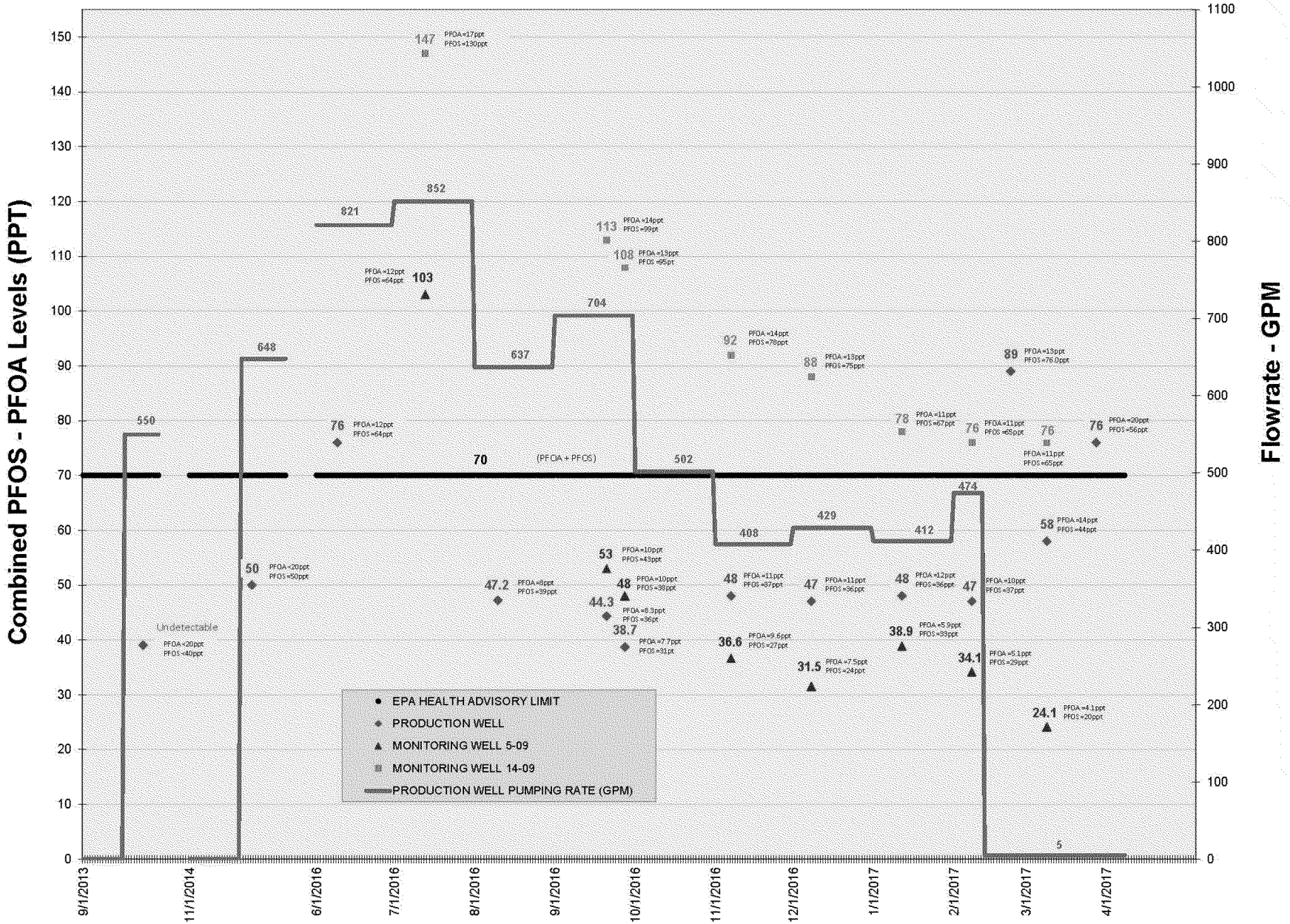
PFOS - PFOA Level Tracking



PFAS Site Investigation

Data Interpretation and Working Hypothesis

Material applied to the surface of farm property has led to long term contamination of the soil.

Hay harvested from these fields is contaminated and when fed to the dairy cows is a major source contributor to the PFOS measured in their milk.

There are likely several original sources of PFAS. Analysis of historical inputs is challenging. Unclear whether this property is a major source of contamination to aquifer located below it.

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