



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of Waste Management

Origin of TENORM-containing Drill Cuttings and Treatment Sludges Generated at Well Sites and Wastewater Treatment Facilities in January – June 2013

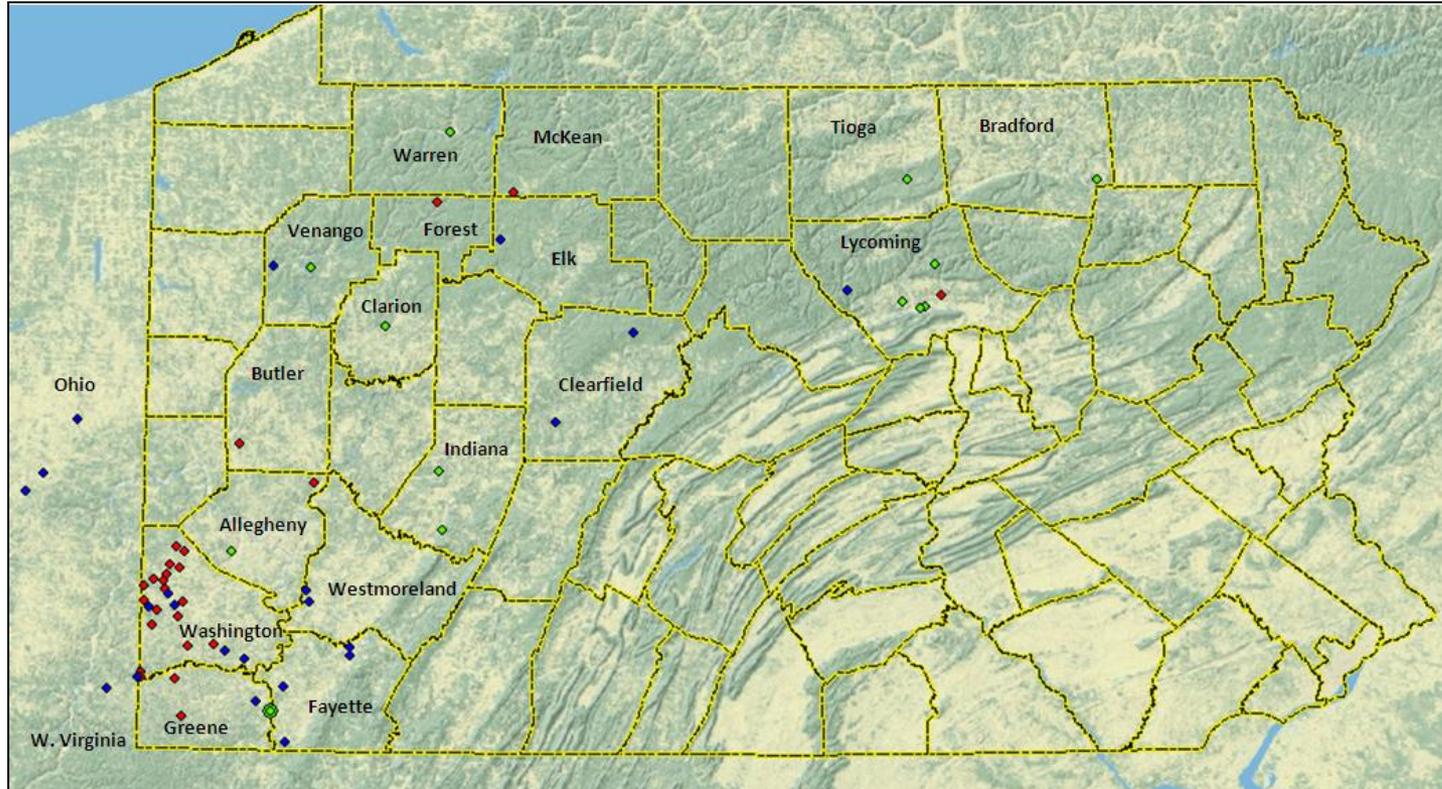
Note

The 374 oil and gas related waste loads in this presentation represent those loads that triggered radiation monitoring alarms at Pennsylvania landfills during the first half of the 2013 calendar year. These waste loads are only a subset of the total number of oil and gas waste loads accepted for disposal during the first half of 2013.

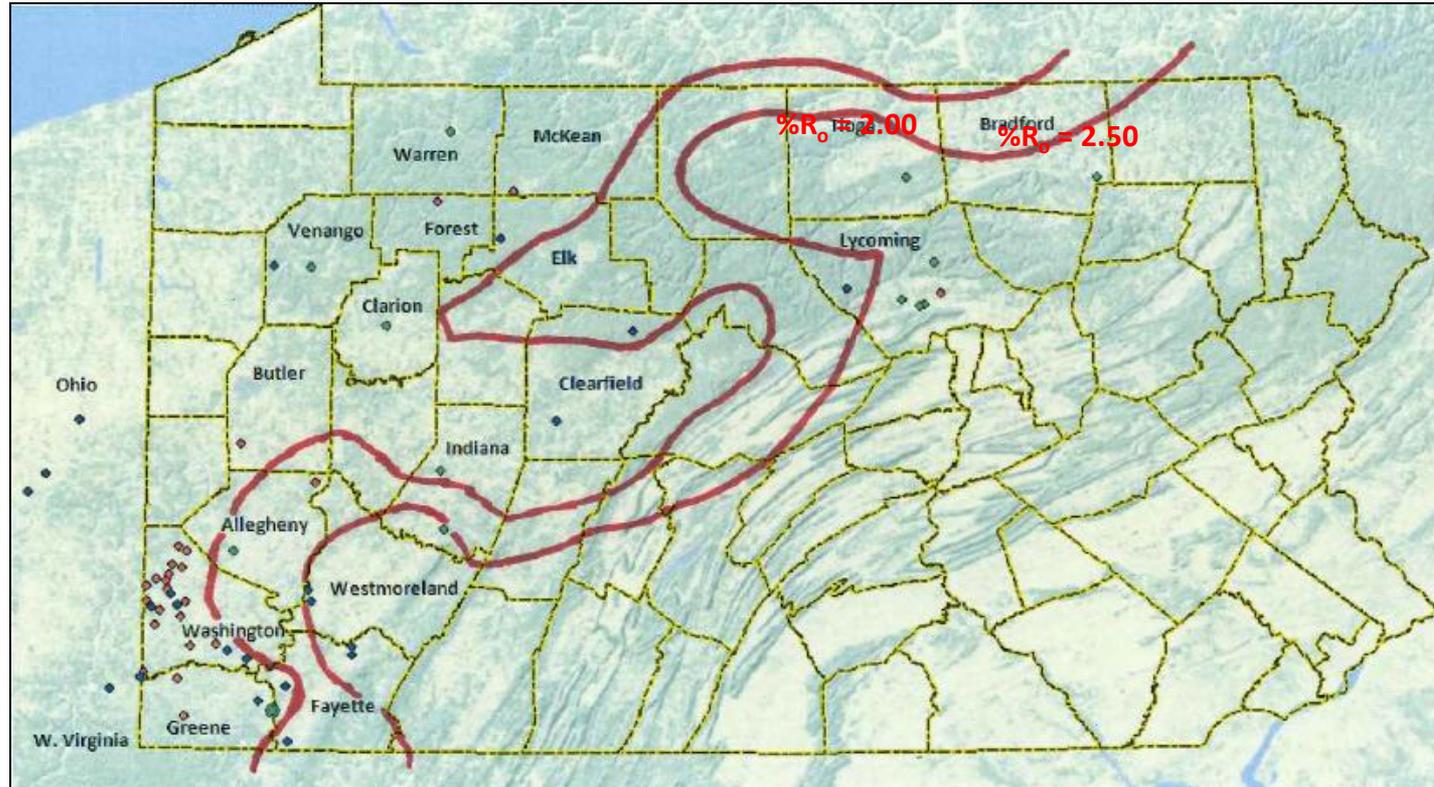
Compared to 2012...

Residual Waste Code	2012 TENORM Load Totals Jan-Jun	2013 TENORM Load Totals Jan-Jun
810s from Well Sites	100	128
804s from Well Sites	154	103
804s from WWTPs	270	143
All other RWCs	116	121
Total:	640	495
Total % Difference:	22.7%	

2013: Origin of 810s and 804s



2013: Origin of 810s and 804s



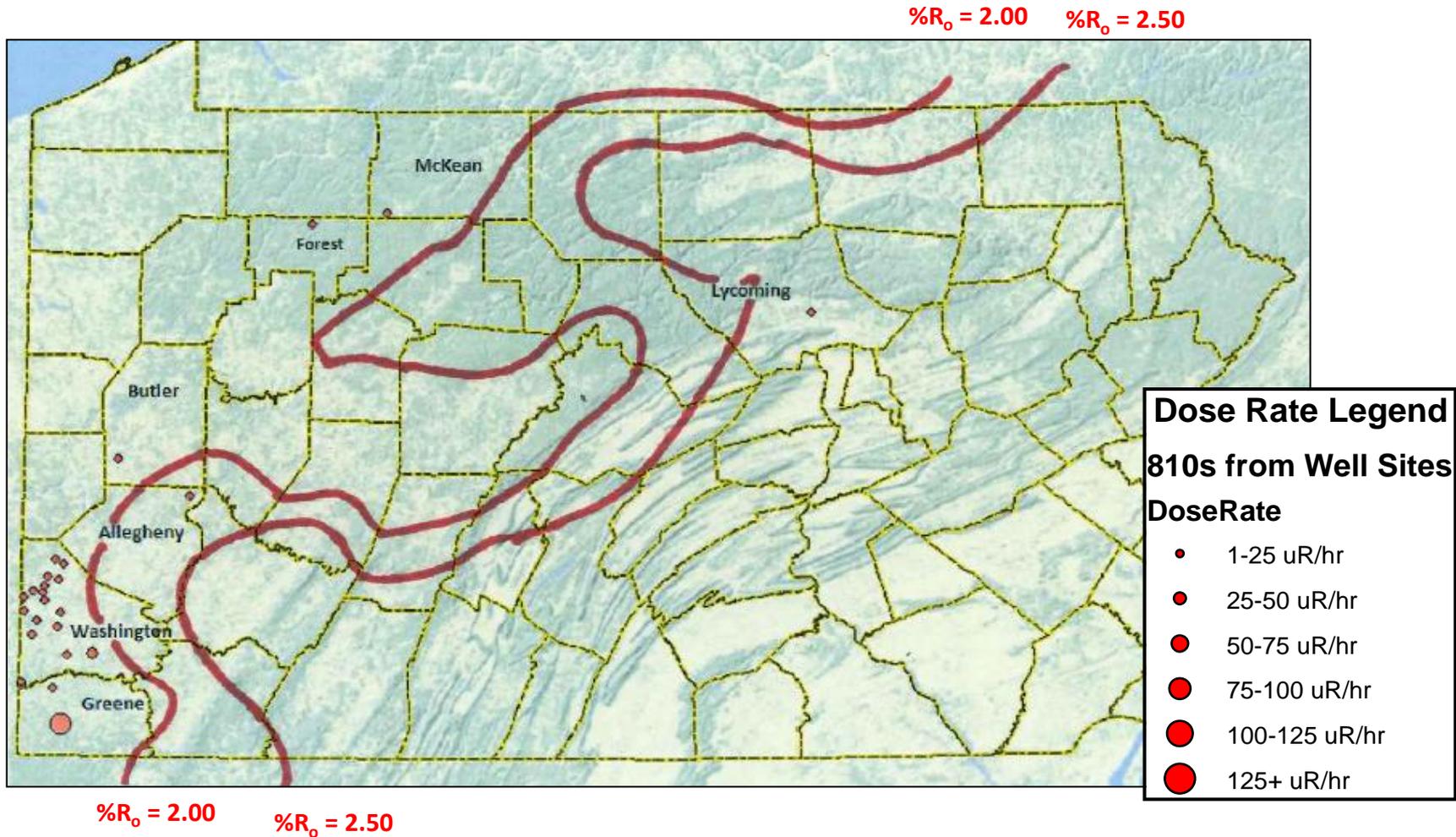
$\%R_o = 2.00$ $\%R_o = 2.50$

- 810 (Well)
- 804 (Well)
- 804 (WWTP)

2013: Origin of 810s and 804s by County

810s from Well Sites		804s from Well Sites		804s from Out of State	
County	Loads	County	Loads	County	Loads
Allegheny	13	Allegheny	15	Carroll, OH	14
Butler	2	Bradford	3	Columbiana, OH	1
Forest	1	Clarion	2	Marshall, WV	3
Greene	3	Clearfield	5		
Lycoming	1	Elk	3		
McKean	1	Fayette	54		
Washington	107	Greene	3		
		Indiana	26		
		Lycoming	43		
		Tioga	5		
		Venango	13		
		Warren	6		
		Washington	27		
		Westmoreland	23		
Total:	128	Total:	246	Total:	18

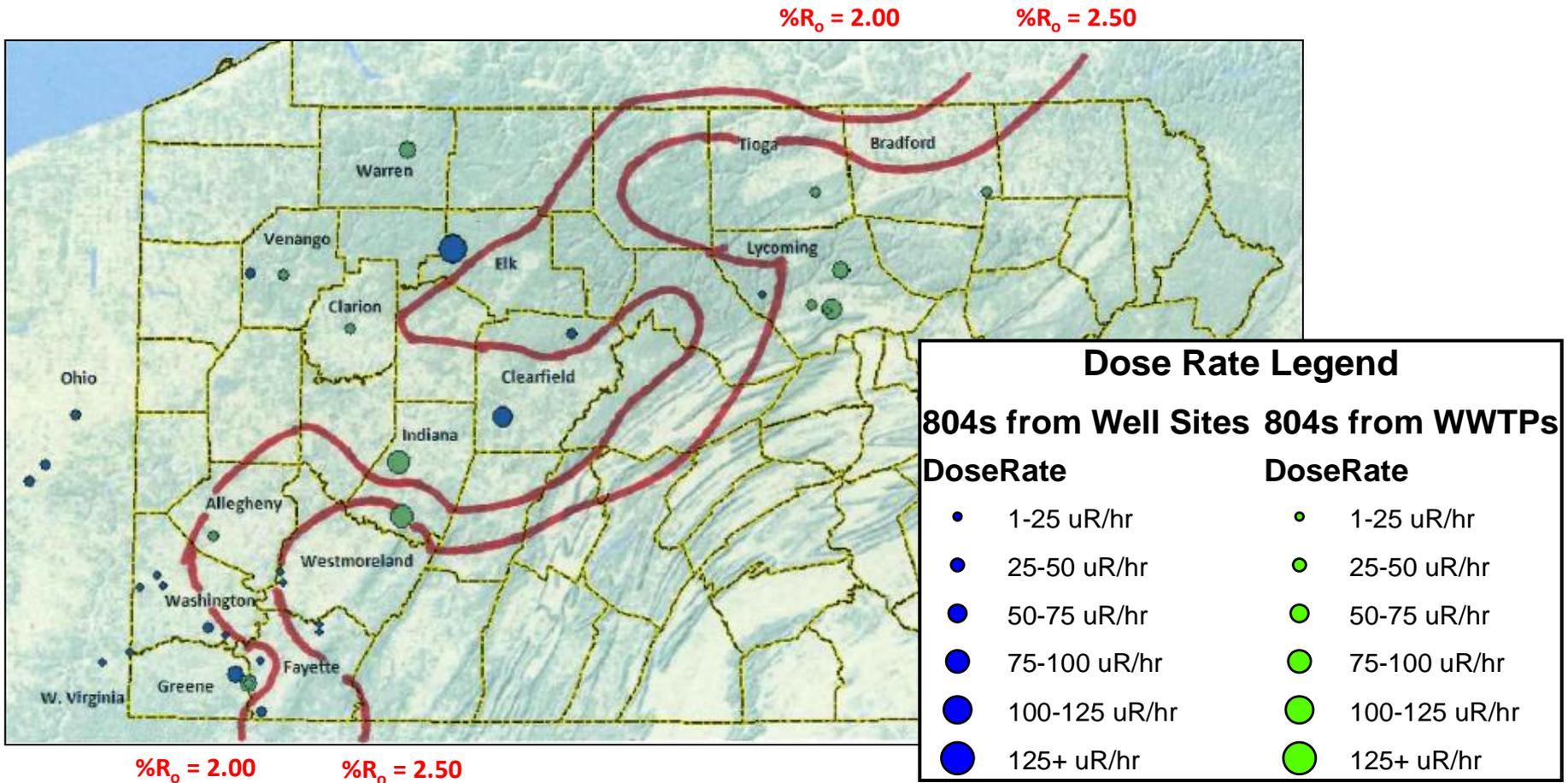
2013: Well Site 810 Dose Rate ($\mu\text{R/hr}$) Ranges



2013: Well Site 810 Average Dose Rates ($\mu\text{R/hr}$)

County	Township	Average Dose Rate ($\mu\text{R/hr}$)	# of Loads	Range ($\mu\text{R/hr}$)
Allegheny	Fawn	14.2	13	4.7 - 23.7
Butler	Jackson	21.7	2	15.1 - 29.1
Forest	Kingsley	18.2	1	16.1 - 20.3
Greene	Jackson	83.7	2	74.3 - 93.4
Greene	Morris	12.5	1	12.0 - 13.0
Lycoming	Upper Fairfield	22.6	1	20.6 - 24.6
McKean	Wetmore	20	1	18.4 - 21.5
Washington	Amwell	31.5	9	10.6 - 106.1
Washington	Blaine	12.4	9	4.7 - 20.3
Washington	Buffalo	13.4	3	6.8 - 19.2
Washington	Cross Creek	10.4	15	2.6 - 18.6
Washington	Donegal	12.5	11	5.9 - 18.7
Washington	Hopewell	14.2	2	4.2 - 42.0
Washington	Independence	11.6	8	6.1 - 17.2
Washington	Morris	15.2	3	10.0 - 26.0
Washington	Smith	13.4	24	6.4 - 23.4
Washington	West Finley	11.1	23	3.6 - 26.0

2013: Well Site and WWTP 804 Dose Rate ($\mu\text{R/hr}$) Ranges



2013: Well Site 804 Average Dose Rates ($\mu\text{R/hr}$)

County	Township	Average Dose Rate ($\mu\text{R/hr}$)	# of Loads	Range ($\mu\text{R/hr}$)
Clearfield	Ferguson	80.6	4	40.4 - 136.0
Clearfield	Girard	37.2	1	28.9 - 45.5
Elk	Highland	164.5	3	103.0 - 331.0
Fayette	Bullskin	22.7	17	3.4 - 70.0
Fayette	Redstone	15.5	4	9.6 - 31.5
Fayette	Springhill	26	1	6.7 - 45.3
Greene	Cumberland	55.4	3	11.0 - 102.0
Lycoming	Cummings	20.6	1	19.2 - 22.0
Venango	Frenchcreek	27.6	1	22.7 - 32.5
Washington	Deemston	24.9	4	4.6 - 64.3
Washington	Hopewell	17.7	3	11.2 - 22.3
Washington	Independence	12.3	1	10.0 - 14.6
Washington	West Bethlehem	45.6	19	3.6 - 90.8
Westmoreland	South Huntingdon	23.5	6	16.1 - 31.2
Westmoreland	Sewickley	18.4	17	6.3 - 49.6
Out-of-State				
Ohio	Carroll County	37.5	14	24.9 - 80.8
Ohio	Colombiana County	32.4	1	27.4 - 37.4
West Virginia	Marshall County	13.5	2	9.6 - 18.6
West Virginia	Marshall County	14	1	13.2 - 14.7

2013: WWTP 804 Average Dose Rates ($\mu\text{R/hr}$)

County	Township	Average Dose Rate ($\mu\text{R/hr}$)	# of Loads	Range ($\mu\text{R/hr}$)
Allegheny	Collier	27.3	15	6.1 - 101
Bradford	Tuscarora	39.7	3	25.0 - 58.0
Clarion	Clarion	38.5	2	30.0 - 42.0
Fayette	German	52.7	26	17.8 - 116.4
Fayette	Masontown	42.8	6	22.7 - 85.1
Lycoming	Gamble	65.2	5	22.5 - 96.4
Lycoming	Old Lycoming	43.3	37	10.3 - 208.0
Tioga	Blossburg	37.7	5	14.3 - 58.6
Venango	Franklin	48.7	12	29.0 - 74.0
Indiana	Burrell	121.3	24	30.0 - 204.0
Warren	Warren	54.7	6	44.5 - 67.7
Indiana	Creekside	107.3	2	86 - 134

Conclusions

Drill Cuttings (810s)

- 89% of waste loads originate west of the %R₀ 2.00 line
 - 99% Originate west of the %R₀ 2.50 line
- Shale thickness = 88% (0-50 Feet)
99% (100 Feet or less)
- Shale Depth = 89% (5,000-6,000 Feet)
100% (4,000-7,000 Feet)



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Questions?