Reaction to the study what needs to be looked at next.

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Southwest Pennsylvania Environmental Health Project

Human exposure timeline with UNGD activities and human health risk

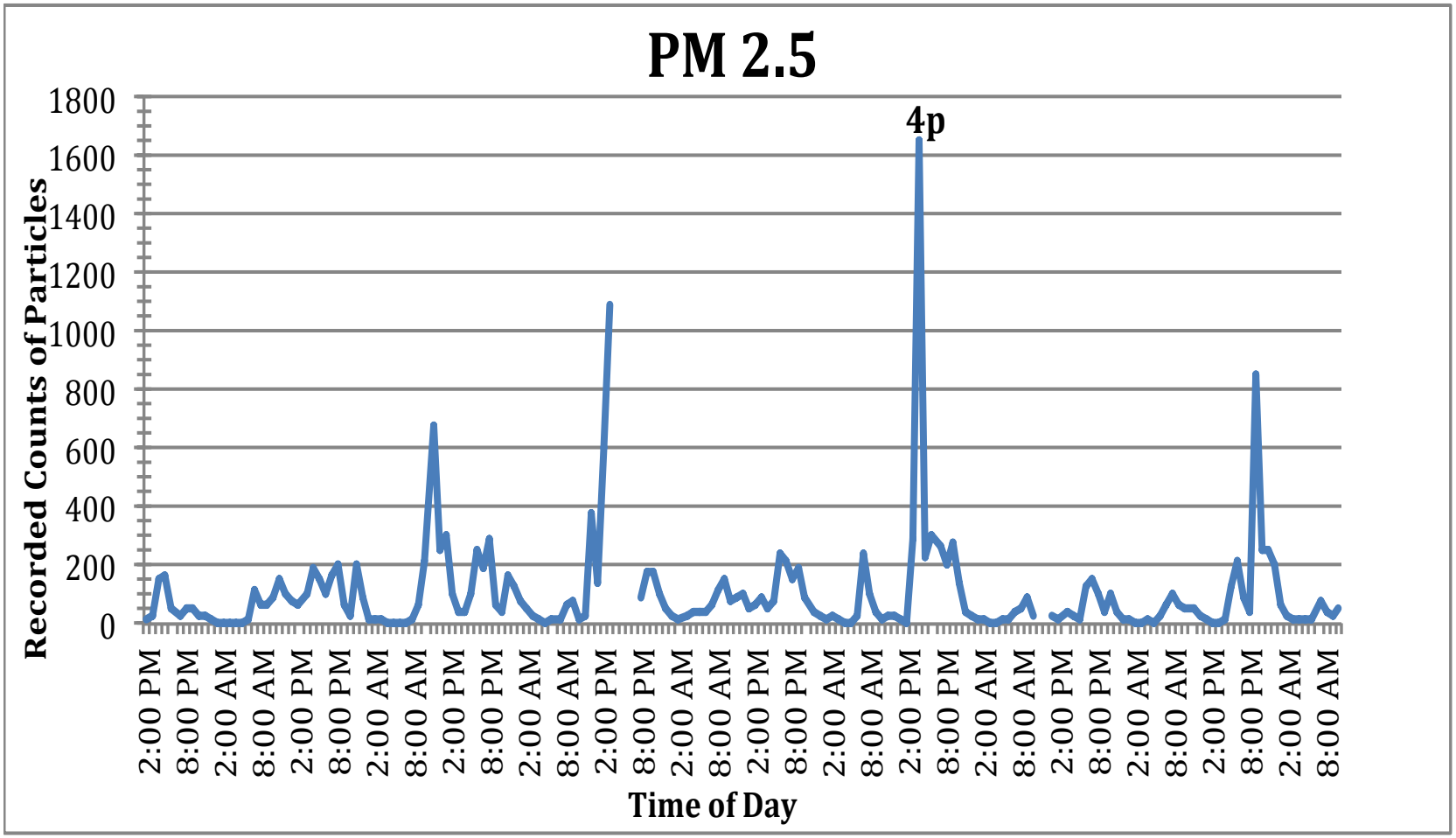
(0 is none and 10 is certain)

Site activities	Diesel fumes	Frac fluids	Drilling fluids	Produced water	Biocides	Gas volatiles	Radio activity	Human exposures outdoors	indoors	Food	water
Pad preparation	7	0	0	0	0	3	0				
Vertical drilling	7	0	8	0	4	4	7	Yes	yes	No	Yes
Frac drilling	10	10	8	0	4	3	8	Yes	yes	No	Yes
Frac process	10	10	0	0	7	4	0	Yes	yes	No	Yes
Well Finishing	5	8	7	10	7	10	9	Yes	yes	yes	Yes
Flaring	3	8	7	10	7	10	9	Yes	yes	yes	Yes
Frac ponds	3	7	7	10	10	10	10	Yes	yes	no	Yes
Gas processing											
(dehydrators)	3	2	0	6	4	9	7	yes	yes	no	no
(condensers)	0	2	0	0	4	9	7	Yes	yes	no	no
Compressor stations	10	0	0	0	0	9	8	yes	yes	Yes	no
Pipe line venting	0	0	0	0	0	9	8	yes	yes	yes	yes
Pipe line failures	0	0	0	0	0	9	9	yes	yes	yes	yes
Service traffic	8	0	0	8	0	3	0	yes	yes	no	no
Spills	5	4	4	8	6	6	9	yes	yes	yes	yes
Disposal sites	5	0	3	10	10	10	10	yes	yes		
Metering stations	2	0	0	0	0	9	8	yes	yes	no	no

EXPOSURES ARE HIGHLY VARIABLE

SWPA-EHP
SOUTHWEST PENNSYLVANIA ENVIRONMENTAL HEALTH PROJECT

A one-week sample of Dylos results for a house monitored in March 2013



SWPA-EHP
Southwest Pennsylvania Environmental Health Project

Summary of peak PM2.5 count values for each house, given in number of hours, % total hours, times of day, and maximum peak value.

(Median 50 cts/0.01ft3)

6 hour average: night, morning, afternoon, evening

House	Number of hours with peaks	% of total hours with peaks	Times of day of peaks*	Maximum Peak Value
1	12	8.5	N	2711
2	11	5	M, N	756
3	3	2.5	M	171
4	1	0.5	N	201
5	8	2.5	A, E	556
6	11	7.7	A, E, N	576
7	31	8.7	M, A, E	1654
8	29	15	M, A, E	991
9	9	12.6	M, E, N	1057
10	23	32	M, A, E, N	844
11	7	16	M, E	3846
12	2	1.4	E	203
13	3	4.3	M	164
14	57	34.3	M, A, E, N	1761

12 Emissions of concern for immediate toxic responses

1. Barium, Arsenic

2. Fluoride salts*

3. VOCs *

4. PAHS

5. BTX*

6. Methylene chloride, (halogenated alkanes)*

7. Acetaldehyde/Formaldehyde

8. Fine particulate matter*

9. Carbon monoxide

10. Glycols*

11. Silica dust*

12. Radium and radioactive decay products*

The Health Issues

Category	Researcher/author
Behavioral/mood /stress *	SWPA (on-going) Earthworks (2012) Ferrar et al. (2013) Subra (2009) Perry (2013) Resick (2013)
Birth Outcomes *	Hill (2012) McKenzie (2014)
Cancer risk	McKenzie (2012)
Dermal *	SWPA (on-going) Earthworks (2012) Subra (2009)
Ear, nose, mouth, throat *	Earthworks (2012) Subra (2010) Subra (2009)
Eye *	SWPA (on-going) Earthworks (2012) Bamberger & Oswald (2012) Subra (2010) Subra (2009)

Category	Researcher/author
Gastrointestinal *	Earthworks (2012) Bamberger & Oswald (2012) Ferrar et al. (2013)
High Blood pressure	Subra (2010)
Muscle/joint pain	Earthworks (2012) Subra (2010) Subra (2009)
Neurological *	SWPA (on-going) Bamberger & Oswald (2012) Subra (2010) Subra (2009)
Respiratory *	SWPA (on-going) Earthworks (2012) Bamberger & Oswald (2012) Subra (2009)

EHP Pilot Data:
Human Health Impacts

common complaints from the client population:

- Anxiety/Stress
- Nervous system including headaches and dizziness
- Cardiac symptoms
- Urinary symptoms
- Eye and throat irritation
- Low birth weights and APGAR Scores
- Reproductive concerns

Conclusions

- People are exposed to toxics through air, water and soil.
- The exposures are periodic and intense for several hours.
- Regulatory Air and water screening will not detect the hazard.

- Most likely acute physical symptoms “rash”, headache/ fatigue, respiratory, nose bleeds, GI, depression.
- Biomonitoring methods need to be developed.

- Interventions and support at the patient level help coping.
- Individuals must monitor their health and exposure status.
- Sense of community trust and social capital is destroyed.
- Federal, State and Local public health and environmental agencies are not able to effectively respond. ***The Public Health Process has become rule bound, restricted to standard environmental tests of air and water and research health protocols.***

What needs to be looked at next?

1. Start with Steinzor, Subra and Sumi (2013) “New Solutions”
   a. Look at pattern of health effects
   b. Look at the exposure findings
   c. Compare to other studies and reports
2. The impact of the Non Disclosure Agreements
3. The capacity of the county Health Districts to respond to personal outbreak reports
4. Proximity to schools, hospitals etc.
5. Housing options for the poor.
6. Training of medical providers
7. Can there be disclosure when there are multiple sub contractors? (R8 to R13)
8. Air emissions R19 a-e Illustrates the scope the limitations
9. Drinking water threat cannot be addressed using present methodology.
10. Social disruption goes beyond the traffic impacts and set back distances

Help individuals at risk

- Real time air and water monitors.
- Devices to remove particulate and gases from home air.
- Provide an air model to determine periods of high risk.
- Management guidance for cleaning homes.
- Warning signs of health effects.
- Worry and anxiety support systems.
- Access to immediate safe locations.
- Need to know conditions the make them susceptible to injury.
- Clear understanding of the limitations of government to assist them.