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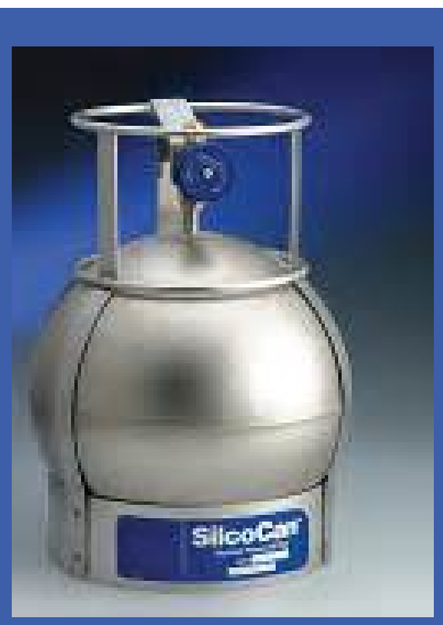
Feet

Datum: NAD83 StatePlane Montana

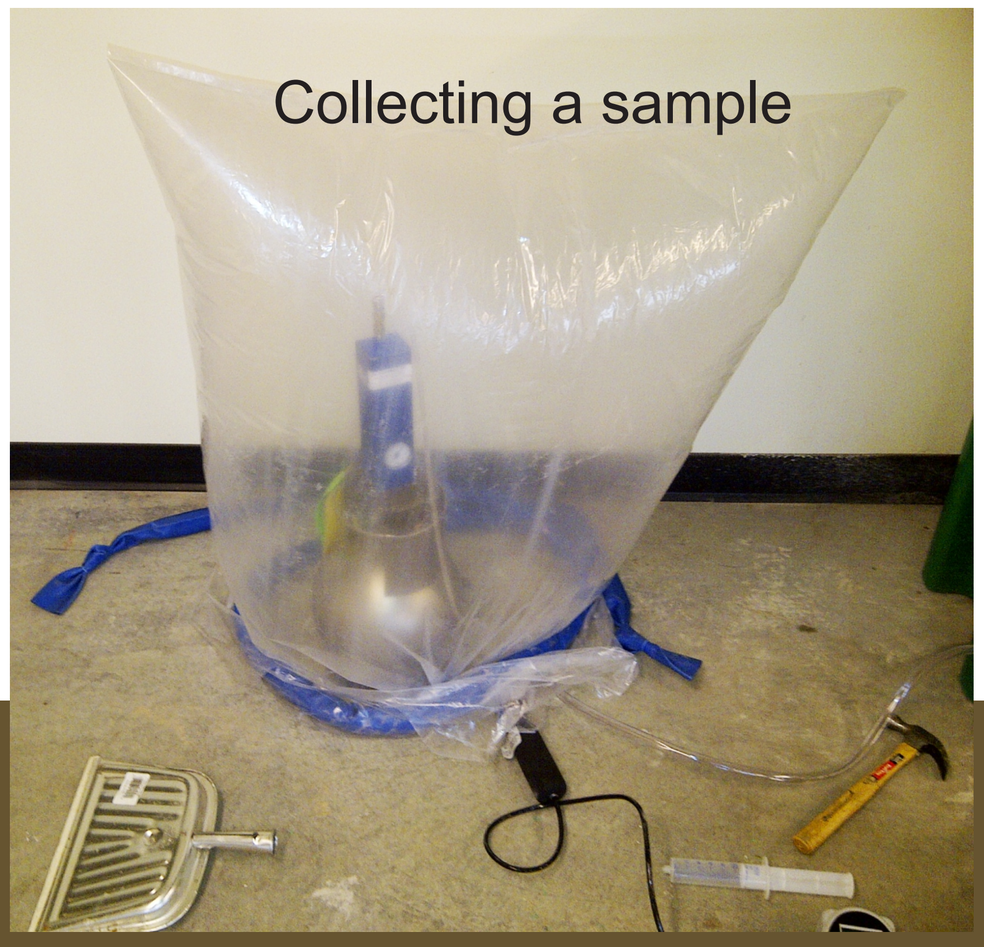
- Methane Monitoring Point
- Groundwater Monitoring Well
- Soil Gas Probe
- New Residential Construction

Map of Bridger Creek
Bozeman Landfill Soil Gas Project
Bozeman, Montana

Indoor Air and Subslab Sampling



Indoor air: Samples are collected over a 24 hour period using a 6 Liter Summa Canister which comes from the laboratory under vacuum pressure.



Collecting a sample

Drilling concrete slab

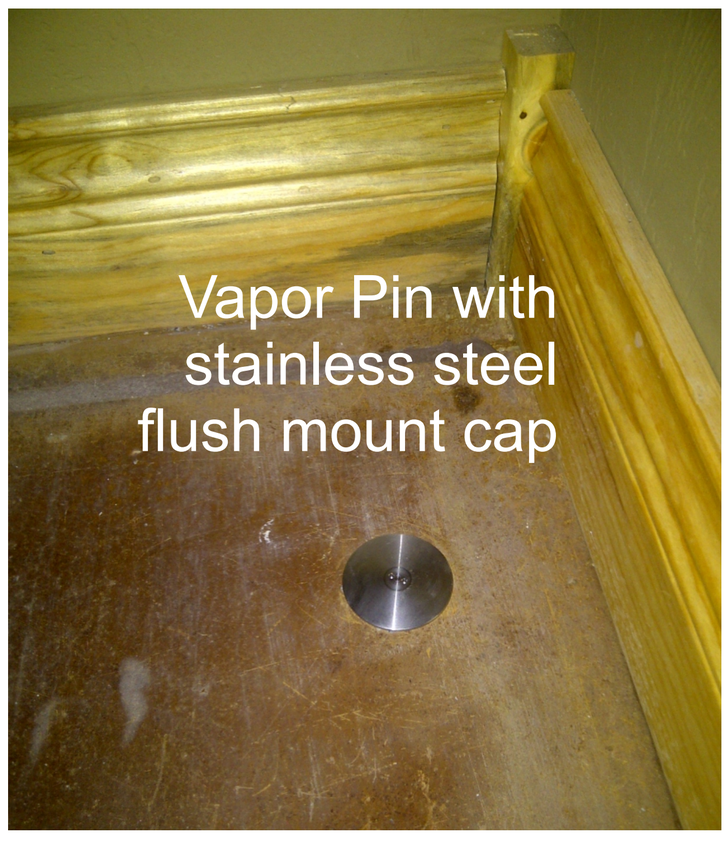
Drilled hole before Vapor Pin installation

Subslab soil gas: Samples are collected over a ½ hour period also using a 6 Liter Summa Canister which is connected to a Vapor Pin by a series of tubing and flow controllers. Helium is used as a tracer gas to ensure a proper seal is occurring in the sampling train.

The Vapor Pin™ consists of a stainless steel or brass pin with a silicone seal that is recessed into the concrete slab and covered with a flush mounted secure cap.

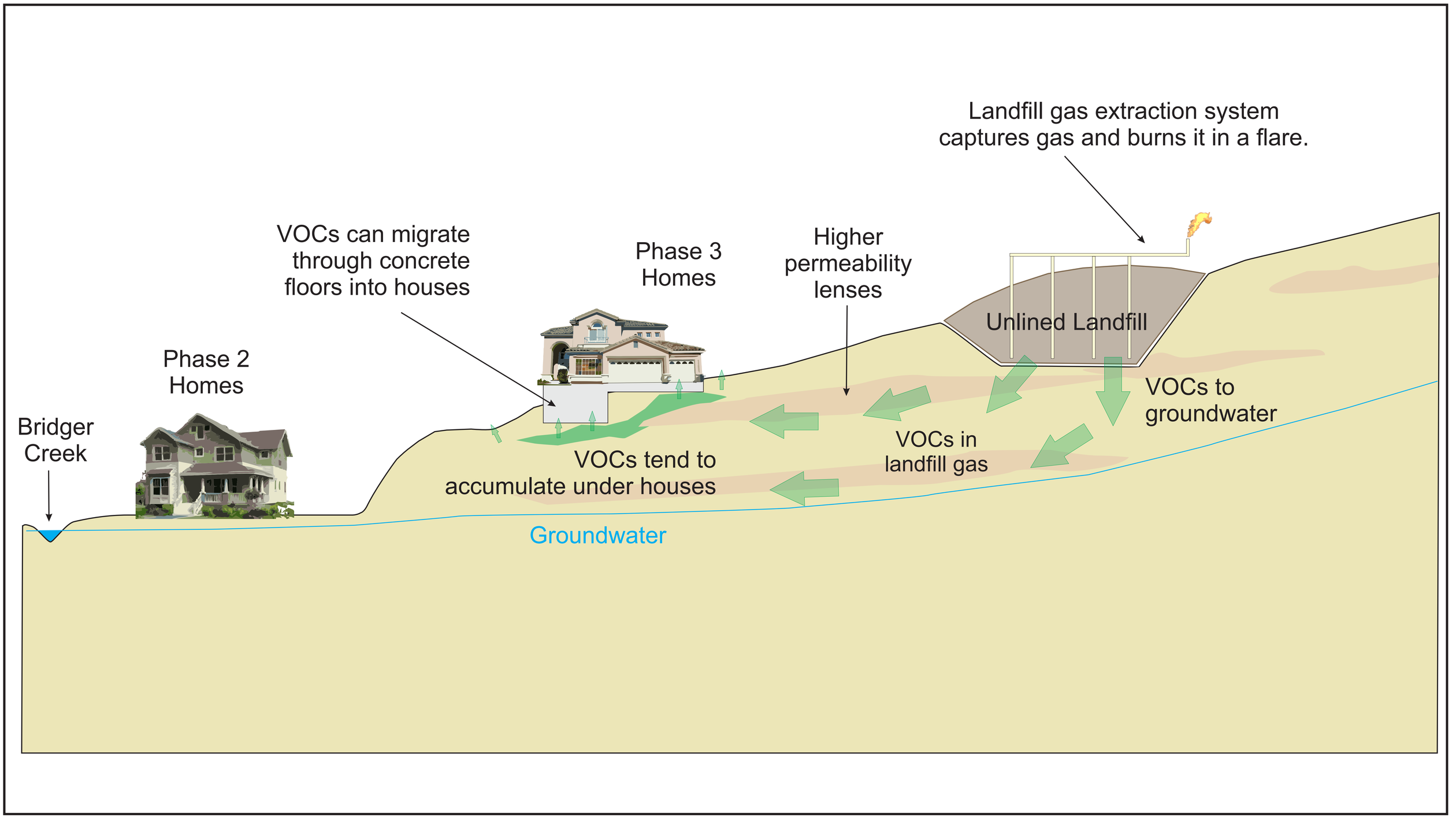
Vapor Pin installation

Soil gas being collected from an existing radon systems



Vapor Pin with stainless steel flush mount cap

New Site Model of Landfill Gas Migration



Compound Range Table - Phase II

FÖÖŐÖÞÕÑ	Sub-Slab (ug/m3)	Indoor Air (ug/m3)	EPA RSL*	MRL**	DEQ Study***	
Carbon Tetrachloride	ND - 0.65	0.26 - 0.70	0.406	188.62	<0.77 - 1.5	
1,2,4-Trimethylbenzene	0.83 - 25	ND - 8.1	7.3	21,800	<0.86 - 8.7	
Benzene	0.098 - 14	ND - 3.1	0.31	9.58	0.52 - 12	
1,2-Dichloroethane	ND - 0.20	0.055 - 2	0.094	2426.98	0.11 - 1.2	
Ethyl Benzene	ND - 22	ND - 3.5	0.97	260.38	0.41 - 6.0	
Chloroform	ND - 4.4	ND - 1.7	0.11	97.59	<0.82 - 3.6	
*RSL-EPA Regional screening level (ug/m3)						
**MRL-Minimal Risk Level; below the MRL there is no known non-cancer human health risk for chronic exposure (daily for one year or more)						
***25th percentile - 95th percentile (ug/m3)						

Compound Range Table - Phase III

FŎÖ ŐŎÞŌŇ	Soil Gas Probes (ug/m3)	Sub-Slab (ug/m3)	Indoor Air (ug/m3)	EPA RSL*	MRL**	DEQ Study***
Bromomethane	ND	ND- 16	ND	5.2	19.40	<0.77 - <1.3
2-Butanone (Methyl Ethyl Ketone)	6.6 - 160	ND - 6200	1.3 - 28	5200	no data	<7.7 - 18
Tetrahydrofuran	ND - 46	ND - 5700	ND - 32	2090	27.00	<0.80 - 4.2
Carbon Tetrachloride	ND	ND - 0.78	ND - 0.84	0.406	188.62	<0.77 - 1.5
1,4-Dioxane	ND	ND - 6.3	ND - 7.3	0.316	108.04	<0.77 - <1.3
1,2,4-Trimethylbenzene	ND - 9.1	ND - 24	ND - 52	7.3	21,800+	<0.86 - 8.7
Vinyl Chloride	ND - 850	ND - 0.58	ND - 0.25	0.16	76.64	<0.038 - <0.064
Benzene	0.92 - 16	ND - 14	0.14 - 34	0.31	9.58	0.52 - 12
1,2-Dichloroethane	ND - 0.050	ND - 14	ND - 350	0.094	2426.98	0.11 - 1.2
Trichloroethene	ND - 24	ND - 5.6	ND - 3.1	0.43	2.15	<0.042 - 1.3
Tetrachloroethene	3.9 - 790	ND - 340	ND - 15	9.4	271.13	0.061 - 2.8
Ethyl Benzene	0.28 - 7.9	ND - 36	0.025 - 30	0.97	260.38	0.41 - 6.0
m,p-Xylene	0.33 - 32	ND - 39	0.080 - 140	104	216.98	<1.7 - 24
Chloroform	ND - 14	ND - 1.6	ND - 18	0.11	97.59	<0.82 - 3.6

*RSL-EPA Regional screening level (ug/m3)

**MRL-Minimal Risk Level; below the MRL there is no known non-cancerhuman health risk for chronic exposure (daily for one year or more)

***25th percentile - 95th percentile (ug/m3)

Soil Vapor Mitigation

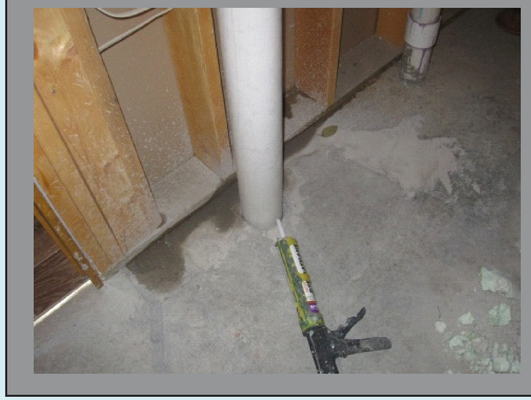
Soil gas vented from piping through roof

Cover for fan mounted to outside of building using downspout as vent

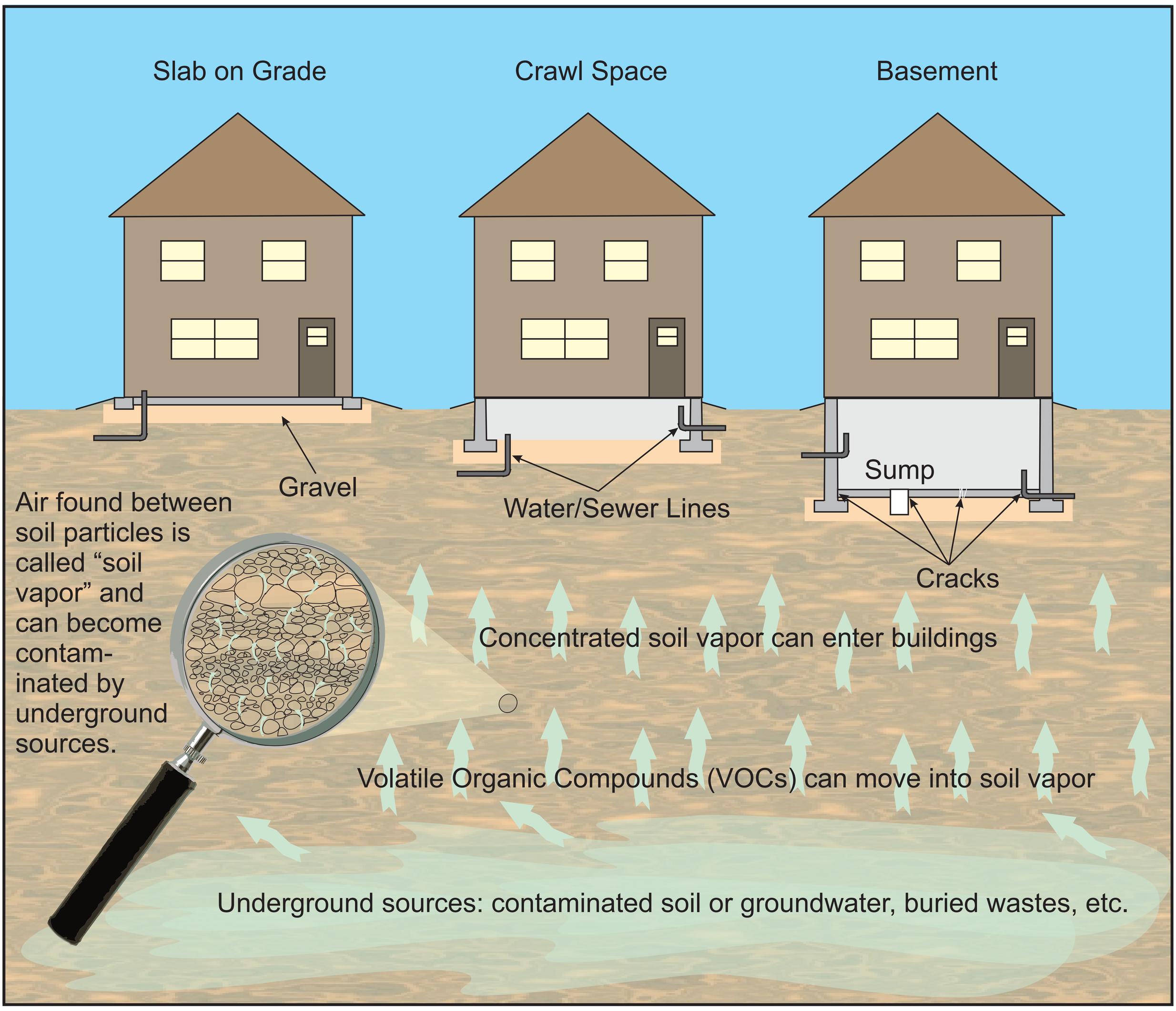
Installation of fan to create a vacuum

Installation in crawlspace

Installation through concrete slab



Vapor Intrusion Pathway



The Montana Department of Environmental Quality published the Montana Vapor Intrusion Guide dated April 22, 2013 which states:

The phrase "vapor intrusion" refers to the process by which volatile chemicals migrate from subsurface contaminant sources such as contaminated soils or groundwater, to the soil vapor phase, and into the indoor air of current or future nearby or overlying structures.