

Contamination ingress using real-time monitors with mine airflow



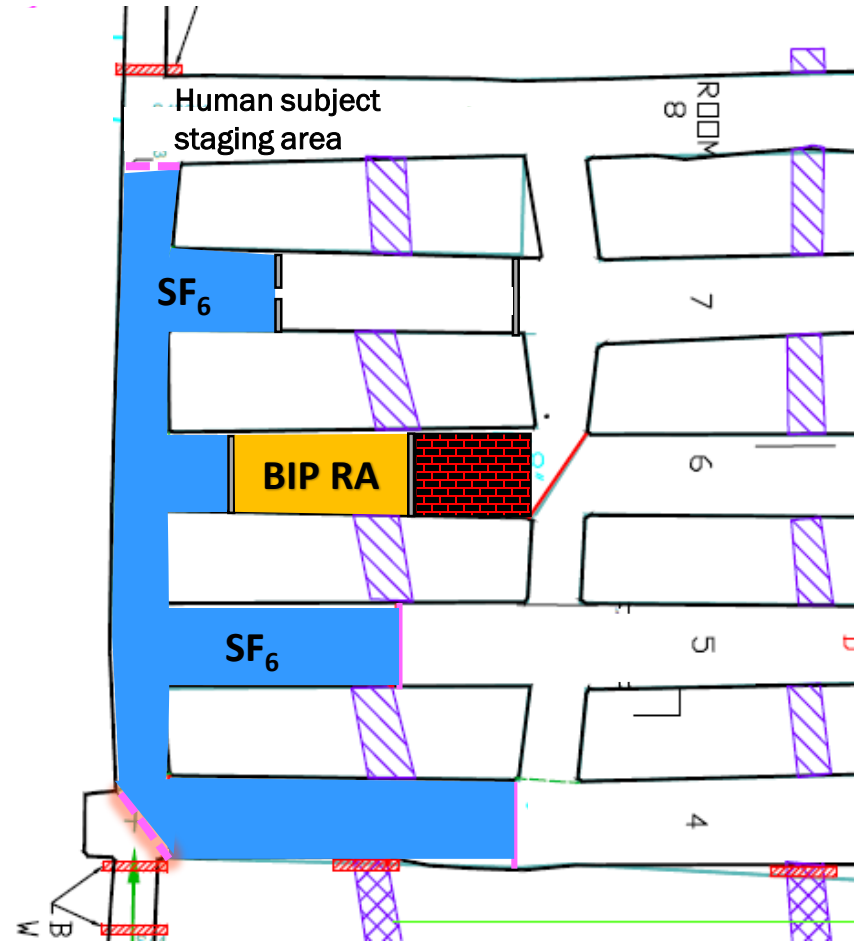
After a mine explosion or mine fire, elevated and potentially lethal carbon monoxide levels will exist in the mine

Effects of Exposure to Various Levels of Carbon Monoxide

Concentration (ppm)	Symptoms
25 ppm	
35	Headache and dizziness within six to eight hours of constant exposure.
100	Slight headache in two to three hours.
200	Slight headache within two to three hours; loss of judgment.
400	Frontal headache within one to two hours.
800	Dizziness, nausea, and convulsions within 45 min; insensible within 2 hours.
1,600	Headache, tachycardia, dizziness, and nausea within 20 min; death in less than 2 hours.
3,200	Headache, dizziness, and nausea in five to ten minutes. Death within 30 minutes.
6,400	Headache and dizziness in 1 to 2 minutes. Convulsions, respiratory arrest, and death in less than 20 minutes.
10,000 ppm	
12,800	Unconsciousness after 2–3 breaths. Death in less than three minutes.

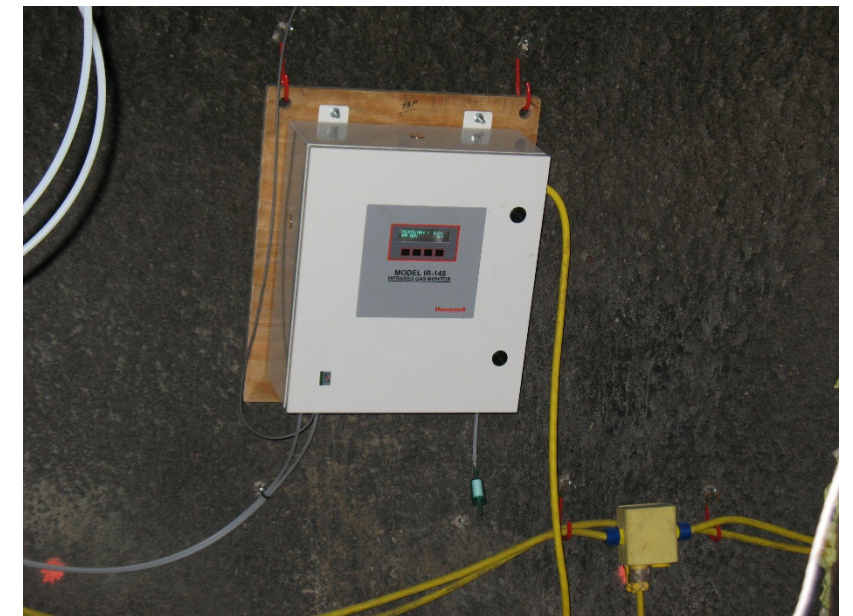
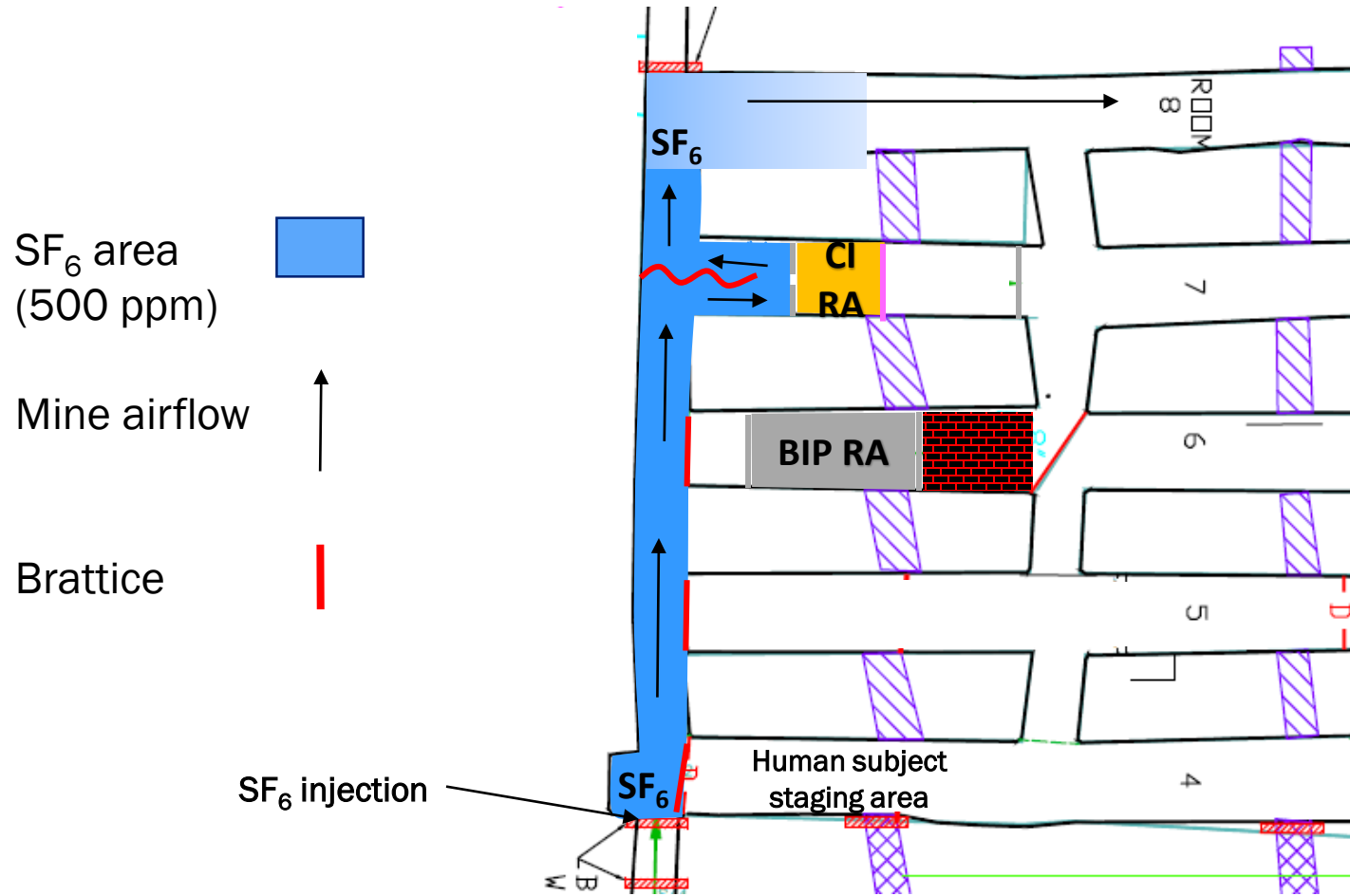
Contamination ingress area layout in Experimental Mine during previous static ingress testing (vacutainers and gas chromatograph)

SF₆ area
(200 ppb)



Test results: 2-3% of SF₆ entered RA after 5-30 test subjects entered RA from SF₆ atmosphere with/without blower active (10,000 ppm CO atmosphere would equate to 200-300 ppm entering RA)

Contamination ingress area layout in Experimental Mine using real-time SF6 monitors with mine airflow



Contamination ingress mitigation strategy



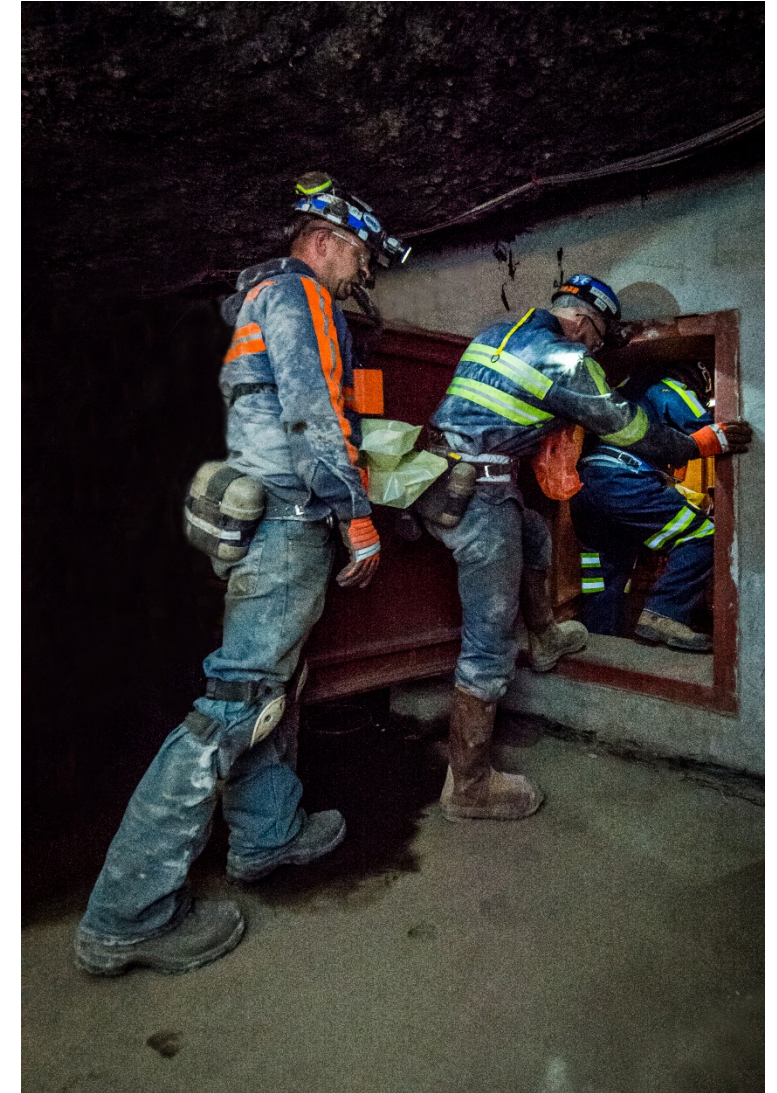
Thank you.

Questions?

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