Respirable quartz: Geometric mean exposures and percent exceeding designated occupational exposure limits in coal mining, MSHA inspector and mine operator samples, 1982–2003

	Underground Mines			Surface Mines		
Year	GM (mg/m3 MRE)	No. of Samples	% > PEL*	GM (mg/m3 MRE)	No. of Samples	% > PEL*
1982	0.047	2,144	36.7	0.040	538	46.1
1983	0.050	3,972	38.5	0.037	990	44.2
1984	0.045	3,622	39.3	0.038	991	44.4
1985	0.045	3,500	35.3	0.035	742	41.5
1986	0.050	3,354	38.2	0.033	867	38.1
1987	0.046	3,279	36.3	0.030	728	33.4
1988	0.055	3,584	35.3	0.044	968	37.0
1989	0.052	3,210	37.1	0.032	699	35.2
1990	0.056	3,079	34.7	0.040	680	37.1
1991	0.054	4,647	33.8	0.030	410	27.8
1992	0.048	6,493	28.2	0.023	1,308	21.6
1993	0.046	5,556	25.4	0.033	1,228	29.8
1994	0.046	5,591	27.0	0.035	1,208	30.5
1995	0.057	5,802	31.1	0.038	1,369	26.5
1996	0.061	3,996	31.3	0.036	1,485	21.0
1997	0.056	5,573	29.1	0.035	1,921	20.4
1998	0.060	7,361	28.5	0.035	1,913	20.4
1999	0.057	9,291	26.6	0.033	2,121	18.6
2000	0.048	9,105	21.4	0.026	1,951	15.7
2001	0.037	12,328	15.5	0.015	4,763	6.2
2002	0.033	9,951	13.2	0.014	3,748	5.7
2003	0.039	5,909	15.4	0.023	1,156	11.2

- incalculable SIC - Standard Industrial Classification PEL - permissible exposure limit REL - recommended exposure limit
GM - geometric mean mg/m^3 - milligrams per cubic meter MRE - Mining Research Establishment
MSHA - Mine Safety and Health Administration
* Samples selected based on the respirable dust level and MSHA PEL (2 mg/m^3 MRE or adjusted PEL).
NOTE: The MSHA PEL is 2 mg/m^3 MRE for respirable dust containing less than or equal to 5 percent quartz. The PEL is adjusted using the formula [(10 mg/m^3 MRE) / (% quartz)] for respirable dust containing greater than 5 percent quartz. See appendices for source description, methods, and agents.
SOURCE: MSHA coal mine inspector and mine operator quartz data.