

sampling; \$2.2 million resulting from the elimination of bi-monthly sampling; \$0.3 million resulting from a reduction in MSHA-ordered mine closures; and \$0.3 million resulting from reduced Black Lung payouts by underground coal operators. These costs include net first year compliance costs of approximately \$2.1 million.

2. Benefits

This benefits analysis is in support of the proposed single sample and plan verification rules, and updates information used in the single-shift sample (65 FR 42068) and plan verification proposed rules (65 FR 42122). It has been updated to include the revised QRA;³² the reduction in the number of active mines (and miners); and more recent information on the DOL's Black Lung Compensation Program. As a result, MSHA believes it has more comprehensively quantified the expected reduction in risk of CWP and the associated benefits (*i.e.*, the number of prevented cases of CWP) for those miners currently subject to a pattern of recurrent overexposures to respirable coal mine dust.³³

MSHA notes that the methodology will almost certainly lead to an underestimate of the number of MMUs with recurrent overexposures. This is due to the fact that the agency must rely on samples taken for 30 or fewer shifts each year for each MMU. MSHA estimates that each MMU averages 384 production shifts per year, so samples are taken for only about 8 percent of all shifts. An MMU exhibits a pattern of recurrent overexposure when valid samples at the MMU exceed the applicable dust standard on at least two shifts during a year. MSHA uses data for those MMUs exhibiting such a pattern to estimate miners' overexposures and the reduction in dust that would be inhaled by miners if dust levels were reduced to the exposure limit on every shift.

Due to the fact that only a small fraction of shifts are sampled, this approach will very likely underestimate the total number of shifts with excessive exposures. There is no straightforward way to determine the extent of the underestimate, but the following illustrates the likelihood of not

identifying MMUs that experience excessive exposures. The table below shows the probability that an MMU will *not* exhibit a pattern of recurrent overexposures (*i.e.*, 2 or more overexposures on 30 randomly sampled shifts out of 384 working shifts in a year) when there are actually "n" noncompliant shifts during the year. For example, if an MMU exceeds the applicable standard on 25 shifts during a year, there is a 40 percent probability that fewer than two of the 30 samples for that MMU would be taken on those 25 shifts. Therefore, there is a good chance that such an MMU would not be identified as having a pattern of recurrent exposures. It should also be noted, however, that only 6.5 percent (*i.e.*, 25/384) of production shifts would, on average, be out of compliance at such an MMU. This is substantially below the average of 20 percent of shifts found out of compliance at MMUs MSHA has identified as exhibiting a recurrent pattern.

TABLE IX-2-1.—RELATIONSHIP BETWEEN THE NUMBER OF NONCOMPLIANT SHIFTS AND THE PROBABILITY OF NOT DETECTING A PATTERN OF RECURRENT OVEREXPOSURES FOR A SINGLE MMU

Number of noncompliant shifts ³⁴	Probability (%) of not being identified ³⁵
5	94.9
10	82.0
15	67.0
20	52.5
25	40.0
30	29.7
35	21.6
40	15.4
45	10.9
50	7.5
55	5.1
60	3.5
65	2.3
70	1.5
75	1.0
80	0.6
85	0.4
90	0.3
95	0.2
100	0.1

³⁴ Number of individual shift overexposures out of 384 shifts in a year.

³⁵ Probability (%) that an MMU will fail to display a pattern of recurrent overexposures, based on 30 sampled shifts, given "n" individual shift overexposures out of 384 shifts in a year.

Occupational exposure to excessive levels of respirable coal mine dust, which includes quartz in varying proportions, imposes significant health risks. These include the following adverse health outcomes: simple coal

worker's pneumoconiosis (simple CWP), progressive massive fibrosis (PMF), silicosis, and chronic obstructive pulmonary disease (COPD) (*e.g.*, asthma, chronic bronchitis, emphysema) (See the *Health Effects*, section V., of the plan verification proposed rule and section VII of the single-shift sample proposed rule (65 FR 42068) for a more complete discussion). Cumulative exposure to respirable coal mine dust is the main determinant in the development of both simple CWP and PMF although other factors, such as the percentage of quartz in the respirable dust and the type of coal, also affect the risk of miners developing simple CWP and PMF (Jacobsen, *et al.*, 1977; Hurley, *et al.*, 1987; Kuempel, *et al.*, 1995; Attfield and Moring, 1992; Attfield and Seixas, 1995). The true magnitude of occupationally induced simple CWP and PMF among today's coal miners is unknown, although prevalence estimates are available from various surveillance systems. The overall prevalence rate of simple CWP, Categories 1, 2, 3, and PMF combined was 2.8 percent among all miners examined in the Miners' Choice program during FY 2000–2002 (see *Health Effects* discussion). The combined prevalence rate of simple CWP and PMF for underground coal miners was 3.8 percent during the same time period. Studies from the Coal Workers X-ray Surveillance Program (CWXSP) indicate a decline in the prevalence of CWP from 11 percent in the 1970s to 2.8 percent in the sixth round of CWXSP (1992–1996)(NIOSH, Table 2–11, 1999).

The proposed single sample and plan verification rules present MSHA's strengthened plan to meet the Mine Act's requirement that a miner's exposure to respirable coal mine dust be at or below the applicable dust standard on each and every shift.

The QRA estimates the reduction in risk for CWP as a result of reducing respirable coal mine dust concentrations over a miners' 45-year occupational lifetime to be no more than the applicable dust standard on just that percentage of shifts currently exhibiting a pattern of recurrent overexposures.³⁶ The term "affected" is used to identify those miners who work on a MMU or RB-DA where there is a recurrent

³⁶MMUs with a recurrent pattern of overexposure are defined as those MMUs with two or more of the DO samples exceeding the applicable dust standard. RB-DAs with a recurrent pattern of overexposure are defined as those with two or more RB-DA samples exceeding the applicable dust standard. (See the QRA section IV.b of the 2003 single sample reopening notice and section VI of the 2003 plan verification NPRM for details).

³² The revised QRA is published in full in section IV.b of the 2003 single sample reopening notice and section VI of the 2003 plan verification NPRM. The revised QRA has been expanded to include quantitative estimates of the reduction in CWP for affected roofbolters working in designated areas (RB-DA).

³³ The pattern of recurrent overexposure is defined by a MMU having any combination of two or more samples in excess of the applicable dust standard within a one-year period.