

about one-sixth of the faceworkers not classified as the DO.<sup>26</sup>

The second row of Table VI-1 contains the risk reductions for NDO miners expected as a result of eliminating all individual shift overexposures. Over an occupational lifetime, the average reduction in risk for simple CWP and PMF combined, and for PMF alone, increases with age. However, the risk reduction at each age is smaller for the affected NDOs than for the affected DOs. This is expected because the estimated probability that a NDO (other than a RB-DA) will, under current conditions, be overexposed on a given shift is only 16.7 percent of the corresponding probability for the DO. For the MMUs under consideration, the predicted reduction in risk for faceworkers other than the DO who live an expected lifetime of 73 years is: 2.3 fewer cases of "CWP 1+" per thousand affected NDO miners; 1.5 fewer cases of "CWP 2+" per thousand affected NDO miners; and 0.7 fewer cases of PMF per thousand affected NDO miners.

(3) *Roofbolter DA (RB-DA) Miners.* Because roofbolters are often exposed to higher quartz concentrations than other miners, the applicable dust standard for them is frequently different from the standard applicable to other miners working in the same MMU. Therefore, many roofbolters are classified as working in a "roofbolter designated area" (RB-DA). For purposes of this QRA, such roofbolters were excluded from the analysis of NDO miners presented above. Based on 2001 MSHA and operator data, 194 out of a total 659 RB-DAs met MSHA's criterion for exhibiting a pattern of recurrent overexposures—*i.e.*, dust concentrations exceeded the applicable dust standard on at least two of the sampled shifts (MSHA, datafile: RBDA2001.ZIP). Valid RB-DA samples were collected on a total of 3477 shifts at these 194 RB-DA MMUs, and the applicable dust standard was exceeded on 837 of these shifts, or 24.1 percent (95% confidence interval: 22.7 to 25.5). For this 24.1 percent, the mean excess above the

standard, as measured for the RB-DA only, was 0.72 mg/m<sup>3</sup> (95-percent confidence interval: 0.64 to 0.80).

At these RB-DAs (*i.e.*, those exhibiting a pattern of recurrent overexposures), the mean concentration reported in 2001 was 0.94 mg/m<sup>3</sup>; so, after 45 years, an RB-DA miner can be expected, if there is no change in current conditions, to have accumulated a total exposure of more than 42 mg-yr/m<sup>3</sup>. By retirement at age 65, such a miner would be expected to accumulate, on average, 7.8 mg-yr/m<sup>3</sup> less exposure if overexposures on all individual shifts were eliminated. (45 years × 24.1% of 0.72 mg/m<sup>3</sup>). The third row of Table VI-1 shows the estimated impact of the proposed rules on the risk predicted for RB-DA roofbolters. At age 73, reducing an accumulated total dust exposure of 42 mg-yr/m<sup>3</sup> by 7.8 mg-yr/m<sup>3</sup> reduces the predicted prevalence of "CWP 1+" by 19.6 per thousand, of "CWP 2+" by 12.1 per thousand, and of PMF by 6.0 per thousand.

TABLE VI-1.—BY AGE, AVERAGE REDUCTION IN CASES OF OCCUPATIONAL RESPIRATORY DISEASE EXPECTED TO RESULT FROM IMPLEMENTATION OF SINGLE SAMPLE AND PLAN VERIFICATION RULES

Type of miner	Reduction in cases of occupational respiratory disease per 1,000 affected miners								
	Simple CWP <sup>a</sup> (categories 1, 2 or 3) or PMF <sup>b</sup> ("CWP 1+")			Simple CWP(categories 2 or 3) or PMF ("CWP 2+")			PMF		
	Age			Age			Age		
	65	73	80	65	73	80	65	73	80
Affected Designated Occupation Miners <sup>c</sup> (DO) .....	16.6	24.4	30.6	6.3	15.5	28.0	2.8	7.6	16.1
Affected Non-Designated Occupation Miners <sup>d</sup> (NDO) .....	1.6	2.3	2.9	0.6	1.5	2.7	0.3	0.7	1.5
Affected Roof Bolter Designated Areas Miners <sup>e</sup> (RB-DA) ...	13.0	19.6	25.3	4.8	12.1	22.5	2.2	6.0	12.8

<sup>a</sup> Simple CWP: simple coal workers' pneumoconiosis.

<sup>b</sup> PMF: progressive massive fibrosis.

<sup>c</sup> Affected Designated Occupation (DO) Miners: includes all miners who work at the 57 percent of the Mechanized Mining Units under consideration and who are exposed to dust concentrations similar to the DO, over a 45-year occupational lifetime. Risk reduction estimates are based on reducing the mean dust concentration of 1.15 mg/m<sup>3</sup> (Std. Error = 0.018) observed in 2001 for DOs at the MMUs under consideration.

<sup>d</sup> Affected Non-Designated Occupation (NDO) Miners: includes all underground faceworkers under consideration who are not classified as the DO or a "designated area roofbolter." Risk reduction estimates are based on reducing the mean dust concentration of 1.08 mg/m<sup>3</sup> (Std. Error = 0.011) observed in 2001 for the NDO sample showing the highest dust concentration on a given MSHA sampling day within a MMU.

<sup>e</sup> Affected Roofbolter Designated Area (RB-DA) Miners: includes all miners working as roofbolters in the 29.4 percent of RB-DAs exhibiting a pattern of recurrent overexposures. Risk reduction estimates are based on reducing the mean dust concentration of 0.94 mg/m<sup>3</sup> (Std. Error = 0.025) observed in 2001 for the RB-DAs under consideration.

MSHA acknowledges that the assumptions and data used in this QRA are subject to various caveats, but the Secretary believes that, on balance, MSHA's analysis probably underestimates the increased risk of material impairment attributable to individual shift overexposures

accumulated over an occupational lifetime. Some previous commenters, however, have disagreed with this assessment or argued that some aspects of it "need further consideration." The only commenter offering specific criticisms was the NMA, which submitted a critique by M.J. Nicolich and

J.F. Gamble (September, 2000) along with general comments from Richard Lawson. Nicolich and Gamble brought up four points that, in the NMA's view, cast doubt on our conclusions. These four points will be discussed in turn.

(1) According to Nicolich and Gamble, "[t]he QRA has made some

<sup>26</sup> There are an estimated 6 NDO miners for each DO miner, and an average of 1.0 of these 6 miners

is overexposed. This does not include roofbolters

working in designated areas, who are treated as a separate group in the present analysis.