

pattern of overexposure to respirable coal mine dust. There are three types of affected miners for whom reduction in risk estimates were calculated:

- *DOs*: Designated Occupation Miners.
- *NDOs*: Faceworkers neither classified as a DO nor subject to a separate applicable dust standard applicable to a Designated Area.
- *RB-DA*: Roofbolter Designated Area Miners.

Since DOs and NDOs share the same applicable dust standard, the definition of recurrent pattern of overexposure for DOs and NDOs is the same. It is determined by the pattern of recurrent overexposures observed for DOs. This pattern of recurrent overexposure is sometimes referred as the MMU's pattern of recurrent overexposures.

Applicable dust standards for RB-DAs are determined separately from the applicable dust standard shared by DOs and NDOs on the same MMU. Since RB-DAs are often exposed to higher quartz concentrations than other occupations (miners) on the same MMU, frequently, the RB-DA's applicable dust standard is more stringent (*i.e.*, a lower applicable dust standard) than that for other occupations working on the same MMU. A separate pattern of recurrent overexposure is defined for the RB-DAs.

To predict the benefits, MSHA applied its best estimate of reduction in risk of CWP for each type of affected miner (DO, NDO, and RB-DA) to estimated sub-populations of those affected miners.

The factors taken into account to estimate each of the sub-populations are:

- A recent snapshot of the number of active MMUs and RB-DAs. (MSHA, Table, May 14, 2002)
- The pattern of recurrent overexposures for affected MMUs and RB-DAs.
- The distribution of MMUs by mine size (*i.e.*, fewer than 20 employees; 20 to 500 employees; and, more than 500 employees) and the number of production shifts (*i.e.* 1, 2, or 3) (MSHA, Table, July 10, 2002 for DOs and NDOs; and MSHA, Table, September 4, 2002).
- The average number of miners on a shift for each category.
- One DO on each MMU.
- Six NDOs for each MMU.

- The number of RB-DAs on a shift, varied by mine size. (See Table IX-2-3 for specific numbers).

Since NDOs and the DO on the same MMU share the same pattern of recurrent overexposures (*i.e.*, 57.0 percent) and the same distribution of MMUs by mine size and number of production shifts, the estimates of affected populations of DOs and NDOs are both included in Table IX-2-2. The estimated sub-populations of affected miners working in DOs and NDOs are calculated as follows:

- (1) The distribution of active MMU entities was determined by mine size and number of production shifts (MSHA, Table, July 10, 2002).
- (2) The number of MMU entities that exhibited a pattern of overexposures for DOs (57.0 percent) was determined using operator and MSHA samples for respirable coal mine dust collected during the calendar year 2001 (MSHA data file: DO_2001.zip).
- (3) MSHA estimated the number of DOs to have been affected by recurrent overexposures by simultaneously applying the percentage of MMUs found to have patterns of recurrent overexposure (57.0 percent) to the number and type of active MMU entities by mine size (833 active MMUs; MSHA, Table May 14, 2002) and the distribution of production shifts by mine size mentioned in steps (1) and (2). MSHA estimates there would be 475 affected active MMUs.
- (4) The number of miners working in the DO position is proportional to the number of shifts each MMU is in production per day. The distribution of the number of affected MMU entities by production shifts (from step 3) is applied to the estimated number of DOs per MMU entity. Typically, there is one miner for each DO for each shift.

(5) Typically, six other miners operating as NDOs simultaneously work on the same MMU. Therefore, the number of affected NDOs is six times the number of affected DOs.

(6) Table IX-2-2 presents the estimated number of affected MMUs, DOs, and NDOs, by mine size and number of production shifts. The total number of affected DO and NDO miners is estimated to be 6,307.

Since RB-DAs and the combination of DOs and NDOs do not share the same pattern of recurrent overexposures, nor

the distribution of MMUs by mine size, the estimates of affected populations of RB-DAs are presented in their own table (Table IX-2-3). The estimated sub-populations of affected miners working in the RB-DAs are calculated as follows:

(1) The distribution of active RB-DA entities was recently determined by mine size and number of production shifts (MSHA, Table September 4, 2002).

(2) The number of RB-DA entities that exhibit a pattern of overexposures (29.4 percent, 194/659 RB-DAs) was determined using operator and MSHA samples for respirable coal mine dust collected during the calendar year 2001 (MSHA data file: RB-DA2001.zip)

(3) MSHA estimated the number of RB-DA entities affected by recurrent overexposures by simultaneously applying the percentage of RB-DAs found to have patterns of recurrent overexposure (29.4 percent) to the number and type of active RB-DA entities by mine size (449 active RB-DAs; MSHA, Table May 14, 2002) and the distribution of production shifts by mine size mentioned in steps (1) and (2). MSHA estimates there would be 132 affected active RB-DAs.

(4) The number of miners working in an RB-DA entity is proportional to the number of shifts each RB-DA is in production per day. The distribution of the number of affected RB-DA entities by production shifts (determined in step 3) is applied to the estimated number of roofbolters per RB-DA entity. The typical number of miners per RB-DA varies by mine size. It is MSHA's experience that, on average, one roofbolter works within the RB-DA in coal mines with fewer than 20 employees, one and one half in coal mines with 20 to 500 employees, and two in coal mines with more than 500 employees.

(5) Table IX-2-3 presents the estimated number of affected RB-DAs and miners by mine size and number of production shifts. The total number of affected miners working within an RB-DA is estimated to be 368.

The total number of affected miners working within the specified DO, NDO, and RB-DA positions among the faceworkers in underground coal mines is estimated to be 6,675.