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INTERVENTION MEASURES ADOPTED IN ASBESTOS MILLING UNITS AT CUDDAPAH (ANDHRA PRADESH)

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SUMMARY

Intervention measures such as total or partial enclosure of jaw crushers, edge runner and vibrator were employed by the mine owners to reduce the very high level of asbestos dust in the milling units of asbestos mines at Pullivendalla, Cuddapah (Andhra Pradesh). Similarly, suitable training and health education programmes in respect of the usage of the respiratory mask and protective clothes were organised for the workers by the mine owners. In the semi-automatic milling units, the concentration of dust came down to below the TLV of 2 f/ml in two processes. In other three milling units the dust concentrations reduced to certain extent. The workers used respiratory masks and overalls more frequently. All the protective measures undertaken have been possible because of the frequent joint follow-up action by the Directorate General of Mines Safety and the National Institute of Occupational Health.

BACKGROUND INFORMATION

The Environmental-cum-Medical Survey was conducted in the asbestos mining and milling units at Pullivendalla, Cuddapah (Andhra Pradesh)[1]. The airborne dust concentration of asbestos was found to be much below the Threshold Limit Value (TLV)[2] of 2 f/ml in mining units where wet drilling process was in use. However, the dust concentrations in various other sections were 2 to 244 times higher than the TLV[1] (Figs. 1 & 2). The overall prevalence of asbestosis was 11.5%. It was higher in milling workers

(21.3%) as compared to the mining workers (3.1%). In-depth immunological studies revealed that alteration in the immunological pattern was correlated with exposure to asbestos dust and subsequent development of asbestosis[3]. To reduce airborne dust concentration, engineering control measures including personal protection were adopted in three milling units. The present report examines whether the dust concentration of asbestos in workroom air reduced to below the TLV level.

OBJECTIVES

The objectives of the present study were as follows:

1. To evaluate the efficacy of environmental engineering measures adopted at various sites of the milling units;
2. To examine the impact of health education on the use of personal protective devices, and other health promotive measures.

PLAN OF WORK

Intervention Measures

After the first phase of the study, several meetings were arranged with mine owners and mine managers in the presence of the Director General of Mines Safety, and the Director of Mines and Safety. All of them were clearly explained the existing levels of asbestos dust concentrations in the milling units and its possible adverse effects on health. They were also informed about the need to reduce the dust concentration level by appropriate environmental engineering control techniques, as well as use of personal protective devices (Fig.3).

Environmental Engineering Measures

A. Three types of engineering control measures on vibrator were adopted in three milling units:

(a) Total enclosure of vibrator (Fig.4)

(b) Total enclosure with a lid so that if there is a mechanical defect it could be easily rectified (Fig.5) and

(c) Vibrators enclosed with jute bags.

In the first two types, one inlet was made to feed the raw material into the vibrator and one outlet for extracting the processed material.

B. On the jaw crusher or edge runner, iron enclosures were used with lids to feed the raw material (Fig.6).

Measurement of Airborne Asbestos Fiber Concentration in Asbestos Milling Units:

The membrane filter method, as per the recommendation of the Bureau of Indian Standards (BIS-11450-1986)[4] was used for measurement of asbestos fiber in the work environment in the milling units before and after the adoption of environmental engineering control measures.

RESULTS AND DISCUSSION

Airborne fiber concentrations for the various processes in four asbestos mills before and after the installation of environmental engineering control measures are presented in Tables-1 to 3 and Fig.7.

In Mill 'A' (Table-1), the reduction in fiber concentration was not considerable, despite the fact that the jaw crushers

Table-1

*Average Asbestos Fiber Concentration Before and After Initiation of Control Measures in Mill 'A'**

Department	N	Before (Phase-I) Mean	N	After (Phase-II) Mean	Control Measures
Jaw Crusher	7	24.14 (6.69-40.74)	4	18.33 (17.51-19.16)	Lid
Decorticator	5	28.82 (12.49-42.68)	3	28.95 (5.55-55.79)	Nil
Vibrator (1)	7	222.45 (96.77-488.05)	4	59.25 (6.80-102.03)	Partial enclosure & isolation
Vibrator (2)	14	227.36 (150.0-283.55)	4	71.73 (14.76-129.13)	Partial enclosure & isolation
Fiber Room	3	124.13 (91.05-161.61)	4	17.44 (5.61-34.65)	Slow movement in fiber collection

** Figures in parenthesis indicate Range.*
N = Number of Samples.

had iron enclosures and the vibrators were covered with jute bags.

In Mill 'B', (Table-2) the fiber concentration reduced considerably, as total enclosures were employed.

In Mill 'E', (Table-3), the vibrator was fully enclosed and thereby it reduced the fiber concentration. An iron lid with suction facilities was employed on dicorticator but it did not reduce the concentration significantly, because the lid on the

Table-2

Asbestos Fiber Concentration Before and After Initiation of Control Measures in Mill 'B'*

Department	N	Before (Phase-I) Mean	N	After (Phase-II) Mean	Control Measures
Edge Runner	7	5.43 (0.97-11.61)	4	0.785 (0.47-1.59)	Enclosure
Decorticator	6	5.55 (3.70-9.77)	3	0.90 (0.73-1.05)	Isolation
Vibrator	4	14.15 (10.77-23.26)	3	3.53 (2.39-5.79)	Enclosure
Fiber Room	4	35.25 (4.49-65.35)	3	15.00 (4.05-16.10)	Slow movement in fiber collection

** Figures in parenthesis indicate Range.*
N = Number of Samples.

vibrator which was meant for correcting the mechanical defect was frequently opened to pour the raw material. In addition, less powerful suction units were not able to reduce the level.

In Mill 'F' (Fig.7), the processes were semi-automatic, except the fiber feeding system which was fully automatic. At the fiber collection level also, the bags were enclosed and had outlet for the processed material. So, it reduced the fiber concentration to below the TLV level.

Use of Personal Protective Devices:

(A) Two types of respiratory protective devices were provided to the workers: one ordinary cloth type costing nearly Rs.3/- per

Table-3

Asbestos Fiber Concentration Before and After Initiation of Control Measures in Mill 'E'*

Department	N	Before (Phase-I) Mean	N	After (Phase-II) Mean	Control Measures
Edge Runner	3	23.27 (9.15-42.88)	4	19.16 (8.43-33.47)	Nil
Decorticator	3	32.47 (18.45-58.34)	4	26.20 (13.55-47.18)	Lid & Suction
Vibrator	4	202.76 (123.69-291.66)	6	12.74 (0.86-44.63)	Enclosure
Hand Screening	3	57.85 (22.87-85.37)	4	20.93 (5.00-33.16)	Isolation & Slow movement

** Figures in parenthesis indicate Range.*
N = Number of Samples.

piece, and another with fiber glass material (costing Rs.40/- per piece, with the cost of filter paper being Rs.4/- to Rs.5/- per piece). The second one has been certified by the Central Labour Institute, Bombay. Although the second one was much better than the first, both of them could not help reduce the exposure level of workers to the desired extent.

(B) Two types of overalls were given: one without any button, while the other front open with 6-7 buttons. The arrangement for washing of these clothes was the responsibility of the mine owner. Though both the overalls were designed for females, as the

females were mostly employed in milling units, the males were also using these overalls while working.

Other Measures:

Canvassing against smoking habit was extensively followed. The hazards of exposure to asbestos and smoking were put up in local language on the walls of the milling units.

Similarly, the dangers of alcoholism were also explained and advocated for de-addiction.

The need for establishment of 'Environmental-cum-Medical Monitoring Cell' was stressed with the suggestion that such services can either be hired from NIOH, CLI or the DGMS, or can be created by joint action of all the mine owners. The Medical Cell can carry out pre-employment and periodical medical examinations of the workers.

The need for imparting training to the workers in the usage of respiratory masks and personal protective devices was emphasized.

The results of the study in details, with names of the workers having asbestosis, have been communicated to the DGMS, Dhanbad.

FUTURE PROGRAMME

Followup actions will be taken to reduce asbestos dust and fibre emission. It is planned to extend the study to open-cast mines.

REFERENCES

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ECTION

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