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DGMS (General) Circular No.1 of 1997 Dhanbad, dated the 17th July 1997.

Subject: Safety Committee Meeting

In order to improve the effectiveness of the meetings of "Safety Committee" and to make the proceedings more meaningful;, it is suggested that the meeting of the Safety Committee at any mine should be held regularly and invariably attended by persons of the superior management. Due and necessary consideration should be given to all the suggestions emanating from the "Workmen's Inspectors" and workers' representatives. Every meeting of the safety committee should also record the action, if any, taken on the suggestions/ observations of the above named persons as well as other defects pointed out in earlier meeting(s).

DGMS(General) Circular No.2 of 1997 Dhanbad, dated the 31st Oct.1997.

All Coal, Metalliferous & Oil Mines.

Internal Safety Organisation (ISO) is one of the most powerful tool in the hands of the mine operators and workers for enhancement and improvement of the status of safety in Indian mines. Fifth Conference on Safety in Mines held at New Delhi on the 26th & 27th December 1980 in its' recommendations framed guidelines for the formation of "Safety Policy" and" Internal Safety Organisation" . Arising out of the recommendations of the Fifth Conference on Safety in Mines, many mining companies have since formulated their "|Safety Policy" and created "Int3rnal Safety Organisation" to translate the principle of self-regulation into practice. So far as the functioning of the ISOs are concerned, it has been observed that their functioning could not reach the desired heights of achievement as projected by the National Tri-partite forum.

Under the present circumstances in the mining industry looking at introduction of new and sophisticated technology, mining in increasingly difficult geo-mining locale and evolution of a more conscious techno-social environment, it is now time to revitalize the institution of ISO and all efforts must be directed towards making this institution highly effective.

The Internal Safety Organisation in a company/ organisation should be made independent and directly responsible to the authority/person made responsible for ensuring safety in mines, i.e. . The Chairman/Chairman-cum-Managing Director or a Director on the Board of Directors of a mining company. A system of reporting contraventions of the provisions of law by officers in this cadre should be evolved. A complimentary system for the rectification of the violations by the operative persons in the mines should also be developed and enforced.

The head of ISO should regularly interact with the persons responsible for production in the mine to review the standard of safety therein. A written record for all such meetings should be maintained for information as well as necessary actions at all levels.

I am sure, that, steps taken in the above lines will go a long way in improving the status of safety in our mines.

DGMS(Legislation) Circular No.1 of 1997 Dhanbad Dated the 31st July 1997.

All underground Coal Mines.

Sub: Amendment of Regulation 181(3) of Coal Mines Regulations 1957.

Dear Sir,

Enclosed please find a copy of the Gazette Notification for the above amendment. The following items will not be used in underground Coal Mines unless the same are of such type, standard and made as approved by me by a general or special order in writing :

1. High pressure hydraulic hoses with end fittings.
2. Dust Respirator.
3. Hydraulic fluid used in underground machineries.
4. Cables used for high, medium and low voltage electrical system and also flexible cables/Control cables used for electrical system of all voltages.

You are requested to ascertain that the above requirements of the law are implemented with immediate effect in the interest of safety.

Regd.No.DL-33001/97

The Gazette of India
Published by Authority

No.10 New Delhi, Saturday, March 22,1977

Separate paging is given to this part in order that it may be filed as a separate compilation.

PART II – SECTION 3 - Sub Section (i)

General Statutory Rules (including Orders, Bye-laws etc. of a general character) issued by the Ministries of the Government of India (other than the Ministry of Defence) and by the Central Authorities (other than the Administration of Union Territories) .

MINISTRY OF LABOUR
(Director-General of Mines Safety)

Dhanbad, the 27th February 1997.

NOTIFICATION/ CORRIGENDUM

G.S.R. 169- In exercise of the powers conferred on me under sub-regulation (3) of regulation 181 of the Coal Mines Regulations, 1957, I, V. Mahajan , Chief Inspector of Mines Re-designated as the Director-General of Mines Safety declare Ist July, 1997 as the date from which the following items will not be used

in underground coal mines unless the same are of such type, standard and make as approved by me by a general or special order in writing :-

1. High Pressure hydraulic hoses with its end fittings.
2. Dust Respirator

CORRIGENDUM

2. Reference to G.S.R. 31, published in the Gazette of India, Part-II,, Section 31(i) dated 18th January, 1992. In the said notification:-

(i) Item No.7 shall be read as follows :

"Hydraulic fluid used in underground machineries".

(ii) Item No.22 shall be read as follows :-

"Cables used for high, medium and low voltage electrical system and also flexible cables/control cables used for electrical system of all voltages".

Chief Inspector of Mines
Re-designated as Director-General of Mines Safety.

DGMS(Approval) Circular No.1 Dhanbad, dated the 27th Nov'1997.

All Coal and |Non Coal Mines.

Sub: Withdrawal of permission to manufacture and supply of winding ropes to mines.

This is to inform you that the permission for manufacturing and supply of ropes to mines fording purpose granted to M/s.Nicco Corporation Limited (Steel Division), Nicco House, 2, Hare Street, Calcutta-1 through this directorate circular No. DGMS (Approval) Circular No.19 of 1976 has been withdrawn with immediate effect vide this Directorate No.Mech(HQ)/App/ WR/ NICCO/476 dated 20.11.97

DGMS(Tech)(Sapicom) Circular No.1 of 1997. Dhanbad, dated 31st March, 1997

All mines.

Recently an accident took place in a mine while four boys were taking shelter underneath an abandoned haulage foundation. The foundation collapsed injuring all the four days and one of them succumbed to his injuries in the hospital.

The enquiry revealed that the haulage foundation was a part of the mine. Further there is also need for prohibiting persons below eighteen years of age in any part of the mine under Section 45 of the Mines Act, 1952.

You are requested to comply with the following recommendations :

(i) Any part of the equipment or installation not being used for the mining purpose currently shall be totally dismantled or properly, adequately and duly fenced off effectively. If any covering is to be done. That should be done in a permanent safe way.

(ii) Mine management should ensure that children do not enter the mine premises/ workings (current or abandoned) so as to endanger their lives.

DGMS(Tech)(Sapicom) Circular No.2. of 1997 Dhanbad, dated the 8th April, 1997.

All Coal Mines.

Sub: Support of freshly exposed Roof and Sides in belowground coal mines.

Roof and sides fall accidents still continue to be the major cause of fatality in underground coal mines inspite of our best efforts. An exercise was therefore undertaken to analyse the accidents caused by fall of roof and sides in detail. Frequency distribution of all fatal accidents were carried out to identify the major cause of fatality. The analysis has revealed that :

- 38.76% of total fatal accidents and 39.46% if total fatalities are caused by fall of roof and sides only.

- 60.30% of belowground fatal accidents and 57.43% of belowground fatalities occur due to fall of roof and sides only.

It has also been noticed that most of these fatal accidents had occurred invariably in Roof and Pillar method of extraction both during development as well as during depillring operations. The place wise distribution of such accidents has indicated crowding of accidents within Freshly Exposed Roof and sides.

- 58.50% of roof and side fall accidents and 58.40% of fatality due to fall of roof and sides occurred within 10m of development and depillaring faces i.e. in Freshly Exposed Roof area.

Although Coal Mines Regulations provide for support of such Freshly Exposed Roof and sides as per the Systematic Support Rules framed for the purpose, but it has been observed during the course of enquiries into such accidents that :

- Either the supports were not provided or were in-adequate.

- The supports were not designed in accordance with the geo-technical requirements specific to such workings, and

- The type of support was not commensurate with the type of ground to be supported.

Recommendations:

In view of the situation described above and it is recommended that :-

1. Full column grouted roof bolts may preferably be used as support in Freshly Exposed Roof area in development workings.

2. The design and pattern of roof bolting shall be based on RMR and in consultation with the Technical experts from a recognized Scientific and Technical institutions in Association with this Directorate.

3. Quality and Efficiency of roof bolts shall be monitored regularly in accordance with the recommendations of the circular (Tech) (Tech) No.1 of 1996 issued from this Directorate.

4. All other circulars issued earlier in this respect shall be strictly implemented so as to ensure safe and secured ground conditions for improved safety standard in the mine.

DGMS(Tech)(Sapicom) Circular No.3 of 1997 Dhanbad, dated the 8th April,1997.

All Underground Metalliferous Mines.

Sub: Fatal /Serious accidents due to defective design of ore chutes.

The accidents in belowground non-coal mines due to defect in the ore chute design and connected operations therewith have been noticed during the course of accident enquiries and subsequent analysis of accidents. The analysis has revealed that proper safety measures and effective design feature had not been incorporated to prevent the dangers from the following :

a. Sudden run down/rolling of much from the stope or ore pocket any empty ore chutes.

b. Improper d3sign of the covering lips of the ore chutes to prevent any openings being left therein.

c. Operators safety in case of sudden run down/ rolling of muck.

In view of the above, it is recommended that :-

(i) a buffer stock (much) shall always be left over the chute to work as cushion and to guard against sudden rub/roll down of debris.

(ii) manual operation of ore chutes / pocket with the help of wooden planks as covering of the opening shall be eliminated and should be replaced with mechanically (pneumatic or hydraulic) operated chutes.

(iii) safety of the chute operator or the persons passing underneath shall be ensured by providing operator's cabin or refuse chamber with a view to guard against any dangers associated therewith.

DGMS(Tech) Cir.No.4 of 1997 Dhanbad, dated the 17th April,1997.

All shaft Mines.

Sub: Routine Test of Cage Suspension Gear Components.

Attention is being drawn towards DGMS (Tech) in 7 of 1994 when it was stipulated that at least 25% of the routine tests of Cage Suspension Gears shall be carried out at National Test House.

The matter has been further discussed with user industry and now it has bee3n decided that at least 50% of the routine tests of the Cage Suspension Gears shall be done at any National Test House and rest 50% of the routine tests may be done at DGMS approval test houses.

It is to clarify that it is the responsibility of the user to ascertain quality of the C.S.Gears being purchased by them for their mines.

Both the user as well as the manufacturer may collaborate as to ensure that the above recommendations shall be complied with strictly hence forth.

DGMS (Tech) Circular No.5 of 1997 Dhanbad, dated the 30th April 1997.

All Shaft Mine.

Sub: Dangerous Occurrence due to mis-match of Detaching hook and its catch plate.

Recently serious dangerous occurrence has taken place in amine involving fall of cage after over-wind . During over-winding of cage, the detaching hook got detached after its wings hit the catch plate but the hook in detached condition could not rest properly on the catch plate as their resting area of the projected fin on the catch plate was very less and thus the fins broke and the cage had a free fall till it rested luckily on the keps.

There had been similar incident in the past also when the cage broke the kep and had a free fall in the shaft causing fatal devastation.

Fortunately persons were not in the cage on either occasion so major accidents were avoided.

In the earlier case, lower capacity of detaching hook was used where as the catch plate of the earlier detaching hook of higher size was allowed to remain but in the later case detaching hook of 5 tonne SWL was used with a catch plate meant for STSWL detaching hook. Obviously there was some mis-match in detaching hook and catch plate at some level.

As a safe practice, after the detachment of the detaching hook, the projected fins of the hook must sit on the catch plate having adequate resting area on both side. To have this adequate resting area, the clearance between the catch plate hole and detaching hook width should not exceed 4 mm. While purchasing of the equipment, copy of the approved drawing may be collected from the respective manufacturer. However for a ready reference the table given below may be useful.

TABLE - 1

Sl.No.	SWL of the detaching hook.	Width of the detaching hook.	Bore of the catch plate	Thickness of the catch plate	Min. resting area of the projected fins on either side of the hole of the catch plate.
1.	5 & 8 tonne	178 mm	181 mm	25 mm	430 sq.mm
2.	10 tonne	203mm	207 mm	25 mm	700 sq.mm
3.	12 tonne	254 mm	257 mm	32 mm	850 sq.mm

In future, the following recommendations are to be complied strictly while installing new suspension gears and during subsequent maintenance operations.

(a) The cappel should pass smoothly through the catch plate bore,

(b) The catch plate shall be fitted properly so that the winding rope remains at its centre of the catch plate hole and also the champering of the catch plate around its hole is placed downward to facilitate smoother entry of the cappel into the catch plate in case of over wind.

(c) The catch plate shall be so installed on the girders that in case of over-winding, no part of the structure obstruct the detaching hook to enter the catch plate hole smoothly.

(d) The catch plate is a part of the detaching hook so it must have the same identification number to that of the detaching hook supplied together.

(e) Before installation of the detaching hook, engineer shall measure the fin distance of the detaching hook in detached condition and shall also measure the catch plate hole dia and the extent of resting area of the projected fins on both side of the catch plate hole shall be recorded.

(f) As required under Regulation 81(2)(a) of Coal Mines Regulation 1957 and Regulation 89 (2)(a) of Metalliferous Mines Regulations 1961, the detaching hook shall be taken apart for examining wear and tear once at least in every six months and during such process, the copper pin of the detaching hook shall be replaced by a new one having identical specification and dimensions. The replaced copper pin shall be checked for any partial shear. If any partial shear/ abnormal indentation is observed the matter must be referred to manufacturer of the detaching hook as well as to this directorate to ensure its suitability for further use of the detaching hook.

Such resting area and the position of catch plate shall be rechecked during each recapping of winding rope and the measurement shall be recorded. The resting area of the projected fins on either side of catch plate hole as mentioned above shall not be less than what has been indicated in the table-1.

DGMS(Tech) Circular No.6 of 1997 Dhanbad, dated the 20th August 1997.

All Mines.

Sub: Quality of Tub Couplings.

1.0 Enquiries into fatal /serious accidents and incidents connected with haulage system occurred during the last ten years since 1986 have again brought to the light the inadequacy of strength of tub couplings being in use at present. The analysis of accidents for this period revealed that about 28%of the total haulage accidents occurred due to mechanical failure (i.e. sub-standard equipment, installation and maintenance) and failure of tub coupling and opening of couplings contributed about 35% of the accident under this category.

The above analysis prompted the need for an in-depth study regarding design, strength of tub couplings, quality, manufacturing process etc. With the above objective in view 14 tub couplings from different subsidiary of Coal India Ltd, Singareni Coal Company Ltd and J & K Minerals Ltd, were collected at random, examined & got tested at Central Mining Research Institute, Dhanbad.

2.0 Tests

(i) 12 couplings were subjected to the following tests :

(i) Breaking load
(ii) Load at which the coupling start deforming
(iii) Hardness
(iv) Chemical Composition
(v) Micro Examination
(vi) Adequacy of heat treatment
(vii) NDT

(ii) Two couplings from J&K Minerals Ltd did not conform to the approved design and therefore were not subjected to above tests.

3.0 Results of the 12 tub couplings tested at CMRI

The CMRI report has revealed the following observations.

i. Only three couplings had attained the required yield load and factor of safety.
ii. The material for most of the couplings did not conform to the approved design.

iii. The hardness of couplings in most of them were either very high or low because the heat treatment given were not proper.
iv. The dimensions of some couplings also varied from standard.

So it was very clear that 9 out 12 couplings sent for testing (75%) did not conform to the standards stipulated vide DGMS (Tech) Circular No.1 of 1986. Further this approval was given for the type and no specific/particular manufacturer was approved. It was therefore the esp0onsibility of the user industry to assure itself of the proper quality of tub couplings from liable & reputed manufacturers who had the proper manufacturing facilities.

4.0 Conclusion

It could be inferred from the study that efforts made by the Directorate-General of Mines Safety to correct the various irregularities in design, strength, material to be used, head treatment, quality control both during manufacturing and during procurement through issue of different circulars viz. DGMS CircularNo.59 of 1964, DGMS (Tech) Circular No.10 of 1979, DGMS (Tech) Circular No.4 of 1985and DGMS(Tech) Circular No.1 of 1986 have met with little success. The quality control for tub couplings although is a matter of interest of the management(users) but it has been established that the quality control aspect was not given due priority and importance.

5.0 Recommendation

In view of the fact that Rope haulages still remain the primary means of transportation of mineral in the belowground mines, continuance of the above irregularities is a matter of grave concern. It may also be noted that over the last decade haulages have remained the second largest contributor to underground serious accident due to all causes.

In this back drop, it is imperative to initiate suitable action by all concerned to meet the challenge for improvement in safety and thereby enhance operational performance while reducing the risk of accidents due to haulages.

You are requested to take the following steps/ measures for evolving a system of quality assurance scheme in the organisation.

i. The design of the couplings to be used in the mine shall comply requirements of DGMS (Tech) Circular No.1 of 1986.

ii. 5-10 % of the couplings selected at random shall be tested of proof load & NDT at any national Test House or approved test House.

iii. 1% of the couplings shall be subjected to Break load and the chemical, composition of the material shall be analysed.

iv. The manufacturer(s) of tub couplings must have adequate manufacturing and testing facilities.

v. Quality control cell shall be set up at company level to ensure purchase and use of quality tub couplings.

vi. Intensive inspection of all haulage installations shall be done in a phased manner and all sub. standard tub couplings shall be withdrawn from use immediately.

DGMS (Tech) (S&T) Circular No.7 of 1997 Dhanbad, dated the 29th August, 1997.

All Mines.

Sub: Damage of structures due to blast induced ground vibrations in the mining areas.

1.Introduction :

In response to increase demand for coal and other minerals, a number of large mechanised opencast mines have come into operation. Some of these opencast workings are located near surface structure like residential buildings , schools, commercial shops. Hutments with large number of inhabitants etc. Whenever blasting is done in these opencast mines, ground vibrations are generated outward from the blast area and cause damage to surrounding surface structures. The vibrations radiating from the blast holes while passing through surface structures, induce vibrations on the structures causing resonance. The components of ground motion can affect the structures through compression and tension and also through vertical and horizontal shearing effects. Blast induced ground vibrations create socioeconomic problems for the mine managements as well as the people residing in vicinity of these mines. As only 20-30 % of energy of commercial explosives used in the mines is utilized for fragmenting the rock, the rest of energy is transmitted through the earth in the form of ground vibrations resulting in damage to the surrounding structures.

2.0 Damager Criteria

The peak particle velocity has so far been considered as the best criteria for evaluating blast vibrations in terms of its potential to cause damage. The extensive studies on the problems have established that the frequency of the waves is also equally important factor to consider the effect of damage.

The blasting damage is generally classified into following four categories :

Sl. No.	Category	Description of damage
(i)	No appreciable damage.	No formation of noticeable cracks.
(ii)	Threshold damage	Formation of fine cracks, fall of plaster, opening & lengthening of old cracks, loosening of joints, dislodging of loose objects etc.
(iii)	Minor damage	Superficial not affecting the strength of structure(s). Hair line cracks in masonry around openings near partition, broken windows. Fall of loose mortar etc.
(iv)	Major damage	Formation of several large cracks, serious weakening of structures, shifting of foundation, fall of masonry, ruptures of opening vaults etc.

3.0 Natural Frequencies

Elements of building construction such as sprung floors, stud partition walls, ceiling and windows can all react as mass-spring systems, each with its own natural frequencies of about 4-24 Hz (low frequencies) Ground vibrations at these frequencies amplified by the structures increase the risk of damage. When the low frequency ground vibration coincides with the natural frequency of the structure resonance in originated. The resonance is a state in which the structure absorbs most energy progressively becoming deformed with time, until plastic deformation occurs. Therefore even the low peak particle velocity of ground vibrations at natural frequency of structure is more harmful to the structure. Natural frequencies of brick and concrete structure generally vary from 8-16 Hz.

4.0 Structural response

All structures develop cracks from natural causes like periodic changes in humidity, temperature and wind velocity. Changes in soil moisture cause foundation cracks. The width of old cracks change seasonally and number of cracks increase with the time. This damage is independent of damage caused by blasting.

The cracking location and the wall material have an influence on the particle velocity at which cracking begins. If the entire structure is not inspected thoroughly, there may be chances of biased opinion on the type of cracks. Thus it is important to place transducer properly for the correct assessment of damage.

In the mud houses, number of cracks develop before blasting and these cracks widened and et extended with the passage of time. These cracks are further widened and get extended due to blast induced ground vibrations. Concrete structures vibrate for longer duration that brick and mud structures. Concrete walls have free top and show no cracks at vibration levels for which mud and brick walls can damage Cracks develop in concrete walls with large vibration level. Cracks in brick- structures can be observed in junction of walls, roof and at window corners. Brick walls with clay mortar and cement- sand mortar behave in same fashion. Steel structures can sustain more vibration level.

The magnitude of vibration on structures in much more than on the ground. Duration of vibration in structure is also longer than, that of ground vibration. Multi-storied buildings are more sensitive to blast vibration that the single-storied buildings.

To predict the extent of damage and to take preventive measures, it is necessary to measure ground vibrations due to blasting. Studies on structural response of ground vibration in the structures of different constructions within the mining areas under Indian condition are limited and therefore such study should be carried out to ascertain the degree of damages for improvement and standardization of damage criteria under Indian conditions.

5.0 Measurement of blast induced vibrations

5.1 Instrumentation

The instrument selected for monitoring blast induced ground vibration shall be simple, light, compact, easily portable, battery operated, digital form output, triggering by geophone etc. Triaxial transducers for recording blast vibration shall have a liner frequency upto 500 Hz and capable of recording particle velocity upto 100 mm/s.

5.2 Methodology

The transducers shall be placed near the structure on the solid undisturbed ground and should be placed well in contact with the ground. For structural response, the transducers shall be placed horizontally over the wall, floors and ceiling. A minimum of 15 points of observations corresponding to a minimum of 10 blasts shall be made for better prediction with a high index of determination.

5.3 Predictor Equation

The least means square method of regression analysis shall be used to interpret the date. The square roof scale distance shall be used for analysis and interpretation of data when blasting is done on surface and measurements are taken on the surface, or the blasting is done underground and measurements are taken underground. On the other hand, if blasting is done on the surface and the measurements taken underground the cube root scaled distance shall be used.

6.0 Guidelines on experimental blasting

6.1 Factors

Major factors affecting particle velocity of ground vibration are type and amount of explosive charge used, distance from the charge to the point of observation (surface structures), geological, structural and physical properties of the rock that transmits the vibrations, height of structures and blast geometry. Use of safe charge/delay, in hole delay with non- electric initiation systems. Proper burden, inclined holes in conformity with slope of bench, deck charge, air deck, sequential blasting, clearing off loose pieces of rocks from the blast site and proper stemming of holes bring reduction in blast induced ground vibrations. Controlled blasting methods in conjunction with effective muffling of holes will control ground vibrations and also arrest fly rock.

6.2 Plan

A plan showing structures belonging to the to the owner and not belonging to the owner in different prominent shades should be prepared. The plan shall incorporate details of construction of the structures in a tabular form. Plan should also show 50 m., 100m, 200 m and 300 m zones from the structures, the place of experimental study and the limit upto the which blasting is proposed to continue.

6.3 Study/ observations

In a particular mining area with built-up structures where deep hole blasting is to be introduced for the first time, experimental blasting shall be carried out by any research/ academic institute much before the structures fall within the blasting danger zone. The type of instruments, the methodology and predictor norm as recommended in para 5.0 shall be followed in measurement of blast induced vibrations. Based on the study, the safe charges for different zones shall be determined and recommendations made in the report. In a cluster of buildings of different types existing close to each other, the charge for the buildings/ structures requiring greater protection against damage shall be assessed and recommended.

6.4 Structural response

During the study the response of the structures assuming different natural frequencies should be calculated and plotted on a figure. Softwares with the different programmes are available now for the said plot and should be used for convenience.

6.5 Monitoring

In order to ensure effective control over the vibration and related damages there is a need for regular in-house monitoring and the managements should train the blasting personnel during the experimental study and start observations on their own during the regular blasting operations.

7.0 Recommended permissible standards of blast induced ground vibrations:

7.1 Technical considerations

Permissible standards for different type of structures have been arrived at considering the importance of building and structures. The buildings of historical importance and multi- storied structures are likely to get damaged with low level of vibration and therefore permissible standards are to be lowest. Similarly buildings not belonging to the owner but with mud/brick in cement construction and others with good construction (RCC and framed structures) should also be protected but higher permissible standards than that of the level fixed for first category has been allowed.

The buildings belonging to the owner of the mine are constructed for a limited period generally equal to the life of the project. The management accept that these buildings constructed within the mining area are likely to suffer some damages during the extraction of minerals, but the damages should be repairable. Therefore, slightly higher permissible levels of vibrations have been allowed in such cases.

7.2 Permissible standards

Depending on the type of structures and the dominant excitation, the peak particle velocity (ppv) on the ground adjacent to the structure shall not exceed the values given below in the table.

Table: Permissible Peak Particle Velocity (ppv) at the foundation level of structures in Mining Areas in mm/s

Type of structure	Dominant excitation Frequency, Hz		
	<8 Hz	8-25 Hz	>25 Hz
(A) Buildings/structures not belong to the owner			
(i) Domestic houses/structures (kuchha brick & cement)	5	10	15
(ii) Industrial Buildings (RCC & Framed structures)	10	20	25
(iii)Objects of historical importance & sensitive structures	2	5	10
(B) Buildings belonging to owner with limited span of life			
(i) Domestic houses/structures (kuchha, brick & cement)	10	15	25
(ii) Industrial buildings (RCC & framed structures)	15	25	50

In view of the complexities of the problems I hope you all would take adequate measures as recommended above to ensure that the blasts near surface structures are carried out with utmost care and precautions. The blast induced ground vibration should be within the permissible limits as specified above.

DGMS (Tech) (S&T) Circular No.8 of 1997 Dhanbad, dated the 12th Nov,1997.

All Mines.

Sub: Suppression of Mine Dust by using 'Pulver Bond' and 'Dust Bond "

1.0 Introduction :

Most Mining operations produce dust which, when air borne, becomes a serious hazard to the health of workers and the equipment/ machines. Besides coal dust which is inflammable may also lead to disastrous explosion. In recent times with introduction of mechanisation both in opencast and underground mines, it has become a bigger danger then ever before since operations of machines usually throw up much more dust as compared to hand operations. Dust of any kind of sufficiently fine quality when inhaled in large quantities may lead to development of respiratory diseases such as Pneumoconiosis and Silicosis etc. Sizeable amounts of dusts are also produced and are rendered air borne in and around haul roads in open cast mines during material transportation by dumpers etc.

Fine dust rendered air borne remain in the atmosphere for a considerable length of time thereby positively polluting the environment . The best method of preventing roadways dust getting air borne is to consolidate it by wetting the dust with water sprays, but water sprays alone do not produce good wetting of all deposited dust and a large quantities of water may be needed frequently for producing effective results due to propensity of water to evaporate in hot and dry conditions. Wetting Agent, if added would increase the ability of water to consolidate & hold together the smaller dust particles and this Directorate vide Cir. No. 31 of 1966, Cir No.62 of 1966 and Cir No.40 of 1967 had advised the industry to use Wetting Agents for effective suppression of dust. These wetting agents were either syrupy liquid or non-ionic detergents and did not form ionized emulsion and thus not very effective for consolidation of loose dust in order to ultimately prevent it from air borne.

Due to limited availability of Wetting Agents along with the absence of methodology of correct treatment, dosages. etc. and non-availability of sufficient water, the industry had not responded to the advice and standard of dust suppression remains unsatisfactory.

To overcome the above difficulties, the research Institutes have carried out experiments with lonized Emulsion for development of cost effective suitable Dust-Settling-lonizer for effective dust suppression/dust consolidation including air borne dust for both opencast and underground mines.

2.0 Principle of Operation :

A dilution of an lonized Emulsion with positive and negative charged ions when sprayed in/ on dusty atmosphere, binds the small charged particles together to a large particles suspended in air and bring them down to settle on surface and remain there for long time. The dust suppression material thus is able to encrust surface dust and reduce the concentration of air dust.

3.0 Methodology Application :

About 10 to 20 number of applications would be required in a eye lie manner for efficient dust suppression. Each application is required to be done once in two weeks followed by daily watering. The requirement of water would gradually decrease over the period of time.

4.0 Properties :

The Dust settling tonizer should have the following characteristics.

1. Flash point of lonizer should be more than 175o C.
2. It should be non- toxic and hygroscopic in nature ; &
3. It should be effective to conglomerate fine dust including air borne dust.

Field Trials of Dust Settling lonizer have been carried out by the managements of some Coal Companies in the Open Cast Mines under the guidance of CMRI, “Pulver Bond” and “Dust Bond” two Dust settling lonozers manufactured by the M/S. PVR Inshield Bituminous private Limited, P.O. Dishergarh, Dist Burdwan, West Bengal and M/S. Calcutta Mining Sealants Pvt. Ltd., P.O. Dishergarh, Dist Burdwan, West Bengal respectively possess the above characteristics and have been used for dust suppression in open cast mines. Pulver Bond passed different tests carried out by Indian School of Mines Dhanbad and Dust Bond also passed same type of tests carried by the CMRI, Dhanbad.

It is therefore, recommended that a Dust Settling lonizer may be used under all circumstances for dust suppression including air borne dust in open cast mines to start with.

We, would be pleased to get a feed back and the action taken in the matter along with recommendations, if any, for improvement of the situation further in our mechanised open cast mines.

DGMS(Tech) (S&T) Circular No.9 of 1997 Dhanbad, dated the 26th Dec,1997.

All Mines.

Sub: Identification for newly recruited inexperienced mine workers.

A person newly recruited for mine employment in a mine do not possess any knowledge of mining activities and is therefore, exposed to dangers & hazards in the same. According to Regulation 115(9) of the Coal Mines Regulations, 1957, and Regulation 118 (10) of the Metalliferous Mines Regulations 1961, an inexperienced person shall not be allowed to work alone without presence/ guidance of an experienced worker so as to ensure the safety of new worker.

It is necessary that every new person shall be given initial training as per the Mines Vocational Training Rules,1966 to develop necessary and requisite skill and safety awareness on him. The new worker should be aware of the various dangers involved in different types of operations. No inexperienced worker should be allowed to work any particular job unless he has been trained thoroughly in safe work procedure related to that job.

In view of the above, every newly recruited mine worker shall be issued a coloured helmet of a distinct colour, one different from those worn by experienced mine workers. He shall wear this distinctively coloured helmet all time while at work in or around a mine for at least one year from the date of initial employment. The coloured helmet should bear luminous markings/strips for ready identification while at work in the dark.

By introducing the system, the newly recruited mine workers can be easily and readily identified by these distinctively coloured helmets (preferably written N.E.W. newly employed worker). Competent persons and mine officials shall help to develop/ inculcate safety consciousness and safety awareness in them from the very beginning of their employment. Mine officials shall take care of, watch and guide the new workers to discharge their duties safely.

You are requested to take appropriate action in the matter at the earliest and ensure that all newly recruited mine workers are issued with distinctively coloured helmets and to ensure that they wear them at all times.

DGMS (Tech) (S&T) Circular No.10 of 1997 Dhanbad, dated the 30th Dec.1997.

All Coal Mines.

Sub: Suppression of Coal dust by using “Dust Setting lonizer”

In DGMS (Tech) Circular No.8 of 1997 the need and results from experiments with a dust setting ionizer was elaborated. The field trials for the ionizers were carried out both in opencast as well as underground mines. The results of the trials were found to be encouraging. The method of suppressing dust could be used effectively in underground coal mines also provided the methodology of application as described in the circular mentioned above is followed and the ionizer possess the prescribed properties.

It is, therefore, recommended that the dust setting ionizers may be used for dust suppression applications in underground coal mines.

As mentioned in the circular referred above, recently two such dust setting lonizers have been introduced by M/S PVR Bituminous Pvt. Ltd and M/S. Calcutta Mining Sealant Pvt. Ltd with trade names of “ Pulver Bond” and “Dust Bond” respectively.