



# आरोग्य खनिक AAROGYA KHANIK

A NEWSLETTER OF NATIONAL INSTITUTE OF MINERS' HEALTH

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DGMS-ILO-AIR Pneumo-NIMH  
VII<sup>th</sup> National Workshop

**"Detection of Pneumoconioses and use of ILO Classification"**

30<sup>th</sup> October to 3<sup>rd</sup> November, 2012  
India Habitat Center, New Delhi

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**Registered Office of NIMH at Kolar Gold**

The birth place of National Institute of Miners' Health established in February, 1990 at Kolar Gold Fields, is located at K.R. Road, Marikuppam Post, KGF-563119 Karnataka. The Registered Office is housed in a spacious sprawling Victorian style bungalow having a built-up area of 6,000 Sq.ft in the midst of 26.21 acres of land allocated to NIMH by M/s Bharat Gold Mines Ltd. The bungalow has been recently renovated. Under the charge of Assistant Director, the office is equipped with full fledged facilities for airborne respirable dust studies as per MMR-124, noise level studies including personal dosimetry, illumination studies, etc. The KGF office is catering to the needs of both public and private sector mining companies in Southern India and adjoining states. It also has fully functional historical dust sampling instruments such as Konimeter, Soxhlet Dust Sampler, Thermal Precipitator, PRU Hand pump and Midget Impinger, etc. and dust measurement records of B&G&M&L mines since 1940s till its official closure in 2001.



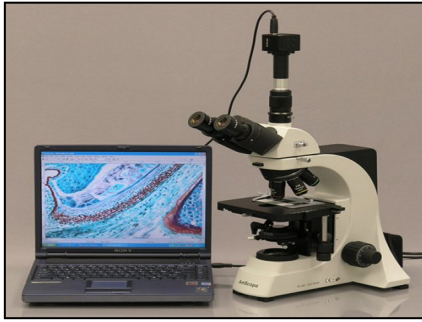
**G. S. Ravindra**

## OUR VISION

“Safe Mines  
and Healthy  
Miners”

### Research Microscope

Microscopes are a necessary instrument in research laboratories. They allow researchers to study the micro-world unseen by the naked eye. It employs method of illumination such that small differences of refractive index of the materials in the object cause differences of luminous intensity by interference.



There are several types of research grade microscopes like the electron microscope, epi-fluorescence microscope, polarizing microscope and phase contrast microscope. The most common is the compound light microscope research microscope. This type provides high power magnification of up to 1600x and is capable of viewing bacteria and cell culture. The electron type gives the best resolution and is capable of extremely high magnification. The fluorescence microscope is capable of picking up and imaging the fluorescing of a biological specimen. The polarizing microscope is also used in a research laboratory mainly for cytology. Phase contrast microscope allows better viewing contrast for unstained biological specimens. It uses a concept of having a light phase shift and translating that into a difference in viewing contrast. It is widely used in biological and medical research in cytology, histology, hematology, virology, bacteriology and parasitology. Specimens that can be observed and studied include live microorganisms such as protozoa, erythrocytes, bacteria, thin tissue slices, fibers and sub cellular particles such as nuclei and organelles. One of the major advantages of phase contrast microscopy is that living cells can be examined in their natural state without being killed, fixed and stained. As a result the dynamics of ongoing biological processes in live cells can be observed and recorded in high contrast with sharp clarity of minute specimen detail.

**U. Dhumne**

### Protein Folding: A Biological Mystery

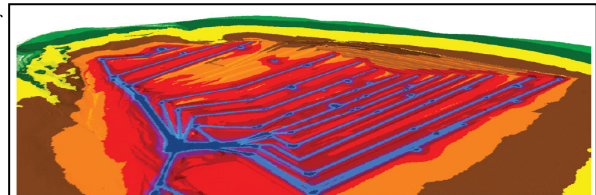
Proteins are biological workhorses that carry out vital functions inside the cell. To carry out their tasks, proteins must fold into complex three dimensional structure. What determine the shape a protein takes, and how it is achieve and what forces stabilize the native conformation is still a puzzle for scientists. One of the most important outcome in understanding the process of protein folding was a thought provoking experiment carried out by Christian Anfinsen and colleagues with RNase in 1960. On the basis of this experiment, Anfinsen concluded that the amino acid sequence determines the shape of protein, a finding for which Anfinsen was awarded Nobel Prize in chemistry in 1972. Although, now it is possible to deduce the primary structure of a protein from genes sequence, its native structure cannot be determined. It is only possible by complex experimental analyses. At present, this information is only known for few proteins. Apparently, the folding of a protein is not a chemical reaction, with a bond breaking here and a new one forming there; it is more like the weaving of an intertwined molecular pattern, the stability of which is defined by large number of interactions. Mutual shuffling of these interactions is involved in the regulation of functions and structural dynamics of the proteins. There are many diseases like (Alzheimer's, Type II Diabetes, Cataract etc.) in which unfolding or misfolding of protein, is known to play an important role. Therefore the protein folding studies may provide some clues to solve the molecular mystery of metabolic diseases.

**Dr. NK. Prasanna Kumari**

### Noise Mapping in Opencast Mines

Noise is recognized as a major pollutant of the mining environment. ‘Noise’ means unwanted sound. The most important noise sources in mines are excavators, loaders, compressors, drilling machines, dumper, dozers, ventilation fans and blasting. Increased noise levels are potentially hazardous and can produce adverse effects including elevated blood pressure, reduced performance, sleeping difficulties, annoyance and stress, tinnitus; noise induced hearing loss (NIHL) and temporary hearing threshold shift for mine workers as well as inhabitants of surrounding areas known as buffer zone.

Following the development of technology it is now possible to monitor the continually changing pattern of noise situation in a mining area. Noise levels at various stations in a mining complex can be measured and these can be used to predict the noise levels in other simulated points using propagation models so as to generate a noise map. A noise map is a graphic representation of the present sound levels in real time, as well as the simulated future noise environment in case a change is predicted due to expansion of mining operations or introduction/removal of noise producing machines. It is shown by contour lines indicating boundaries between different noise levels in a study area. The main noise indicators for noise mapping are  $L_{day}$ ,  $L_{evening}$ ,  $L_{night}$  and  $L_{den}$  (day-evening-night). All of these indicators are defined in terms of A-weighted decibels.



**Noise map of a mine (Stapelfeldt and Manvell, 2011)**

Noise mapping is useful environment management tool not only for compliance of statutory requirements but they keep a constant check on the noise impact on surrounding community helping us towards a sustainable development.

**V. Manwar**

## Noise Level Study at Chavara, Kollam Dist, Kerala



A detailed "Noise level study" involving personal noise dosimetry and area noise profile analysis was carried out by NIMH at Chavara during March, 2012. A total of 75 noise level samples (33 Area & 42 Personal noise dosimetry samples) were drawn from different locations of the mines & plant. After carrying out detailed analysis of the results, it is observed that, 64% of the samples have recorded noise levels well below the warning limit of 85dB (A), 24% of the samples have recorded higher than the warning limit of 85dB (A) and only 12% samples have recorded noise levels above the danger limit of 90dB (A).

**G. S. Ravindra**

## Vibration in Dozers and Loaders

It is generally perceived that Z (vertical) axis dominates the vibration spectra for equipment engaged in loading, hauling or dumping operations. Therefore vibration attenuation measures are aimed mainly to dampen intensity along vertical axis. This is true for machineries like Dumpers or Tipplers. In a study comprising 18 dumpers, it was evident that all dumpers had Z-axis as dominant axis of vibration. Dumpers, in mines, are used to transport the ore or waste. The dumpers, after being loaded by excavators or Loaders, travel on the mine haulage road to the unloading point. It does not frequently change direction and orientation except negotiating curves and change in inclination. Hence vibrations in X and Y directions are less likely compared to Z direction. Contrary to this, operation of Loader or Dozer is associated with sudden jerks and shocks when the equipment trips over boulders etc. Also the front-back (X axis) vibration occurs more when these machines push against the stockpile (in case of loaders, while loading) or the dump (in case of dozers while dozing). The operation of both the machine is marked by a characteristic continuous and vigorous alternation between forward and reverse motions which may cause shearing stress on the vertebral column. This may be potentially harmful particularly for neck. It was observed in a study conducted by NIMH that Dozers and Loaders have more vibrations along X axis.

The current trend of replacement of ordinary seats with pneumatic suspension seats in dumpers or shovels should also be adopted as engineering control in Dozers & Loaders with a shift of focus towards X-axis instead of techniques which are traditionally aimed at dampening vibration in vertical axis. Translational vibration in X axis has two components: front & rear. Vibration in rear direction can be attenuated by lumber supported back rest. Hence, there is much need of research to develop seats which can absorb vibration in X-axis, especially in front direction. Considering the vibration hazard potential of these machines mainly emanating from X axis, it is suggested to explore the utility of Seatbelts for Loader and Dozer operators as a vibration safeguard. Speedy or harsh driving of these machines must be avoided.

**B. B. Mandal**

## PME of Mine workers from Gujarat state by NIMH

National Institute of Miners' health conducted medical examination of 1270 employees from Lignite, Bauxite, Manganese, Fluorspar and Multi metal mines in the state of Gujarat. The medical examinations of workers was carried out as per standards prescribed under Rule 29B of Mines Rules, 1955 and recommendations of 10<sup>th</sup> Conference on Safety in Mines. The medical examination included General Physical examination, Chest X-ray, Spirometry, Audiometry, ECG, Vision Screening, Urine Analysis, Blood Sugar, complete Lipid Profile, Hematological tests and Renal Function tests.

The results of the medical examinations showed, 13 (0.9 %) workers with suspected pneumoconiosis and 8 (0.6 %) workers with pneumoconiosis. Spirometry results showed 39 (3%) workers having restrictive impairments. Audiometry results showed 250 (19.6 %) workers having mild Noise Induced Hearing Loss (NIHL), 79 (6.2 %) with moderate NIHL and 8 (0.6 %) having severe NIHL. 105 (8.2 %) employees had vision less than recommended standard. About 295 (23.2 %) workers had anemia, 163 (12.8 %) workers had raised blood sugar levels indicative of Diabetes and 62 (4.8 %) workers had increased blood cholesterol levels. 68 (5.3 %) workers had high blood pressure suggestive of hypertension.

It is suggested to notify the workers with pneumoconiosis and NIHL to the enforcement agency i.e., DGMS under section 25 of Mines Act, 1952. As the audiometry was done under field conditions, the audiometry of persons with NIHL needs to be repeated under ideal conditions for revaluation to confirm before notifying to enforcement agency. The medical examination of workers with suspected pneumoconiosis should be repeated within 6 months. It is further suggested that the workers with pneumoconiosis and NIHL should be given job placements in areas with dust and noise below permissible limits. The employees with vision less than standard are unfit to work in mines until their vision is corrected.

**Dr. S. Dhatrik**

## S & T Project: Biomarkers



National Institute of Miners' Health has carried out Science and Technology project phase II titled, "Systematic study of potential biomarkers of occupational diseases in miners." sanctioned by Ministry of Mines Govt of India.

The project aims to identify early detection biomarkers which can help to understand adverse health effects of bauxite exposure. Eighty nine miners were selected on the basis of their exposure to the bauxite dust in comparison with controls. Details of each mine workers were recorded in the questionnaire specially designed for this study. Collected blood samples were analyzed for biochemical studies, parathyroid hormone and exposure biomarkers like Neopterin and Hemeoxygenase-I.

**Dr. S. Pingle**

## Workshops and Trainings attended by NIMH Scientists

### Chemical Analysis of Ores and Minerals

Shri Nikhil Kulkarni attended a Workshop-cum-Training Program on “Chemical Analysis of Ores and Minerals” at Indian Bureau of Mines, Nagpur from 1/3/2012 – 2/3/2012. In the course of this training program which was attended by a large number of industry personnel chiefly from the mining sector, the IBM scientists imparted lectures regarding ore dressing and the wet chemical methods for analysis of varied ores. Additionally lectures were also delivered on various instruments that are used for quantitative estimation of ore composition such as ICP, AAS and XRF spectroscopy. A guided tour was also conducted of the pilot plant at IBM and the various labs during this training program.

### School on Analytical Chemistry

Dr. NK. Prasanna Kumari participated in the workshop titled “(BRNS-AEACI) School on Analytical Chemistry at SK University-Anantapur, Andhra Pradesh from 24/2/2012-1/3/2012. The workshop was organized in collaboration with Bhaba Atomic Research Center.

### Workshop on Medical Writing



Indian Institute of Public Health-Delhi had organized a workshop on “Medical Writing” from 15th to 18th, May 2012. Three Senior Research Officers of the institute Dr. Sarang V. Dhatrik, Shri. Debasis Chatterjee, and Dr. Shubhangi K. Pingle participated in the said workshop. The aim of the workshop was to train scientists in the basic skill of medical writing, literature survey for writing project, standard reporting guidelines for different research design, etc. Detailed discussions and hands on training was held on writing in scientific journal, writing research proposal, compilation of data for writing project report. The faculties emphasised on transparent reporting of research finding. It was emphasized that research remains incomplete if a research project and its finding are not compiled and reported to the authorities.

### Awards

Dr. NK. Prasanna Kumari was awarded Doctor of Philosophy (Ph.D.) in Biochemistry from Institute of Medical Sciences for her work, “Protein folding Problem: Intricacies in unfolding of plant proteases (Solvent Engineering Approaches)”. at 94<sup>th</sup> Convocation, Banaras Hindu University, Varanasi.

## CONSULTANCY SERVICES OFFERED BY NIMH

### Occupational Hygiene Surveillance

- Airborne Respirable Dust studies and determination of free silica in accordance with MMR—124 of 1961.
- Area & Personal Noise Monitoring and Noise Mapping studies.
- Illumination studies in accordance with MMR 148(2) of 1961.
- Whole-body and Hand Arm vibration monitoring studies in mining machinery.
- Metal analysis using AAS

### Occupational Health Surveillance

- Periodic Medical Examination of miners in accordance with DGMS guidelines
- Evaluation of X-Rays as per ILO classification for Pneumoconiosis
- Audiometry testing for evaluation of Noise Induced Hearing Loss (NIHL)
- Testing for various biochemical parameters
- Health Impact Assessment Studies

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