Safety in Coal Mines

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Introduction

- Since last decade, sea change in the economic, political and technological environment the world over
- India is no exception
- Lot of opportunities and also daunting challenges for the mining industry
- 565 coal mines, 40 oil mines and 2000 metal mines employing more than one million
- The growth of mineral industry is proposed to be 7-8% per annum.

Introduction

- **Mining is a hazardous profession.**
- **Hence our endeavor to bring down the hazards by all available means to an acceptable level must continue.**

Introduction

- **Accidents cause both in terms of human suffering and economic waste. Safety at work is still a serious problem.**
- **Creation of a nationally acceptable and internationally comparable mine safety program is a critical success factor for all safety programs being pursued in the country as far as mining industry is concerned.**

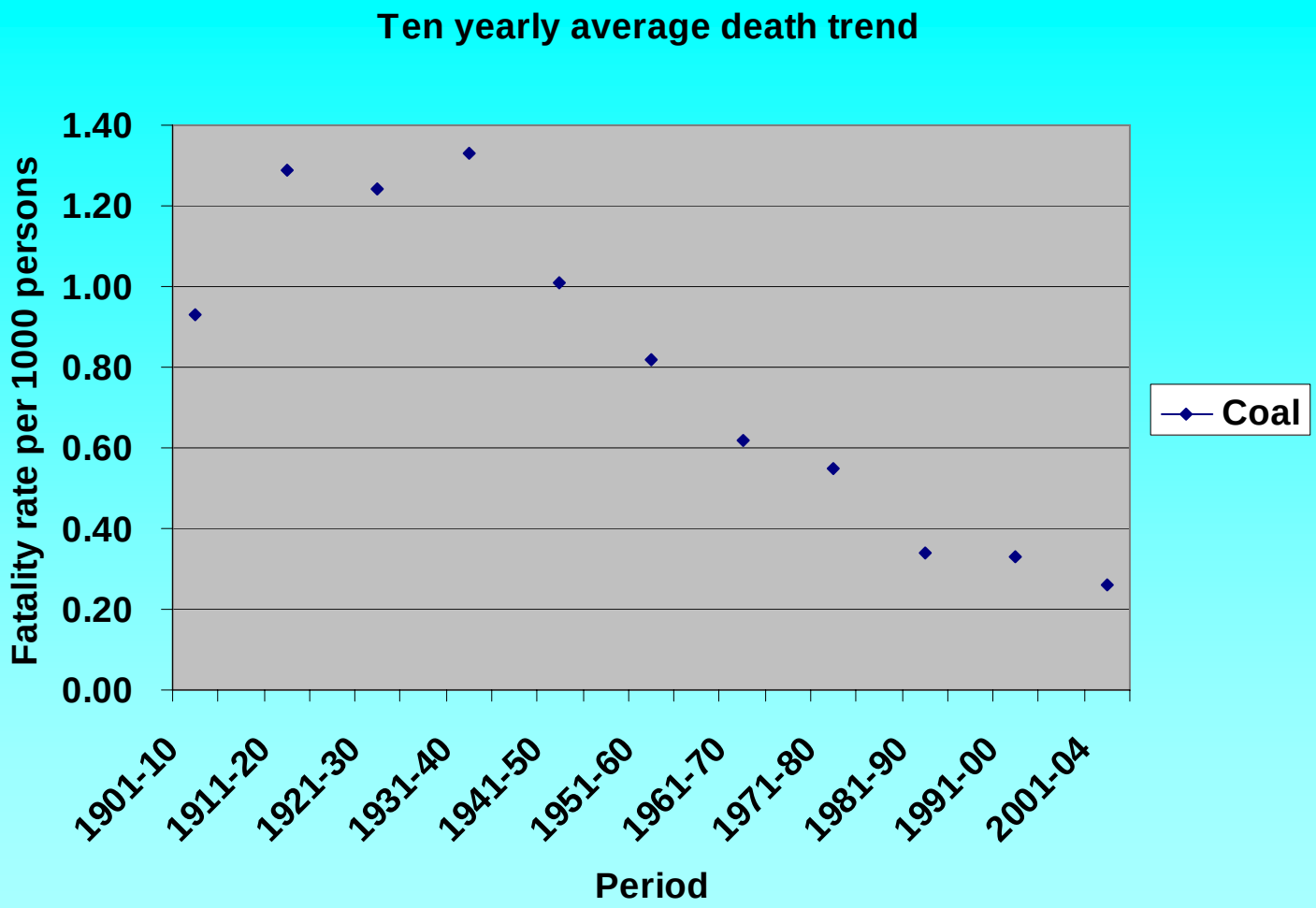
SAFETY STATUS OF INDIAN COAL MINES IN LAST FIFTY YEARS

- **The Growth in coal mining is has been phenomenal (Coal – 35 to 370 MTe)**
- **Complexity in mining has increased**
- **But there has been steady decrease in mining accidents**

SAFETY STATUS OF INDIAN MINES IN LAST FIFTY YEARS

Coal Mines

- **295 fatalities from 223 accidents in 1951-60 to 170 fatalities from 140 fatal accidents in 1991-2000 and**
- **Annual average figure in the first decade of the new millennium (upto 2004) is 111 fatalities from 88 fatal accidents.**
- **Ten yearly average death rate per 1000 persons employed from 0.91 to 0.32 from 1951- 60 to 1991-2000**
- **Current figure of 0.26 in 2004**


Ten yearly average death trend
Fatality rate per 1000 persons
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
1901-10
1911-20
1921-30
1931-40
1941-50
1951-60
1961-70
1971-80
1981-90
1991-00
2001-04
Period
Coal

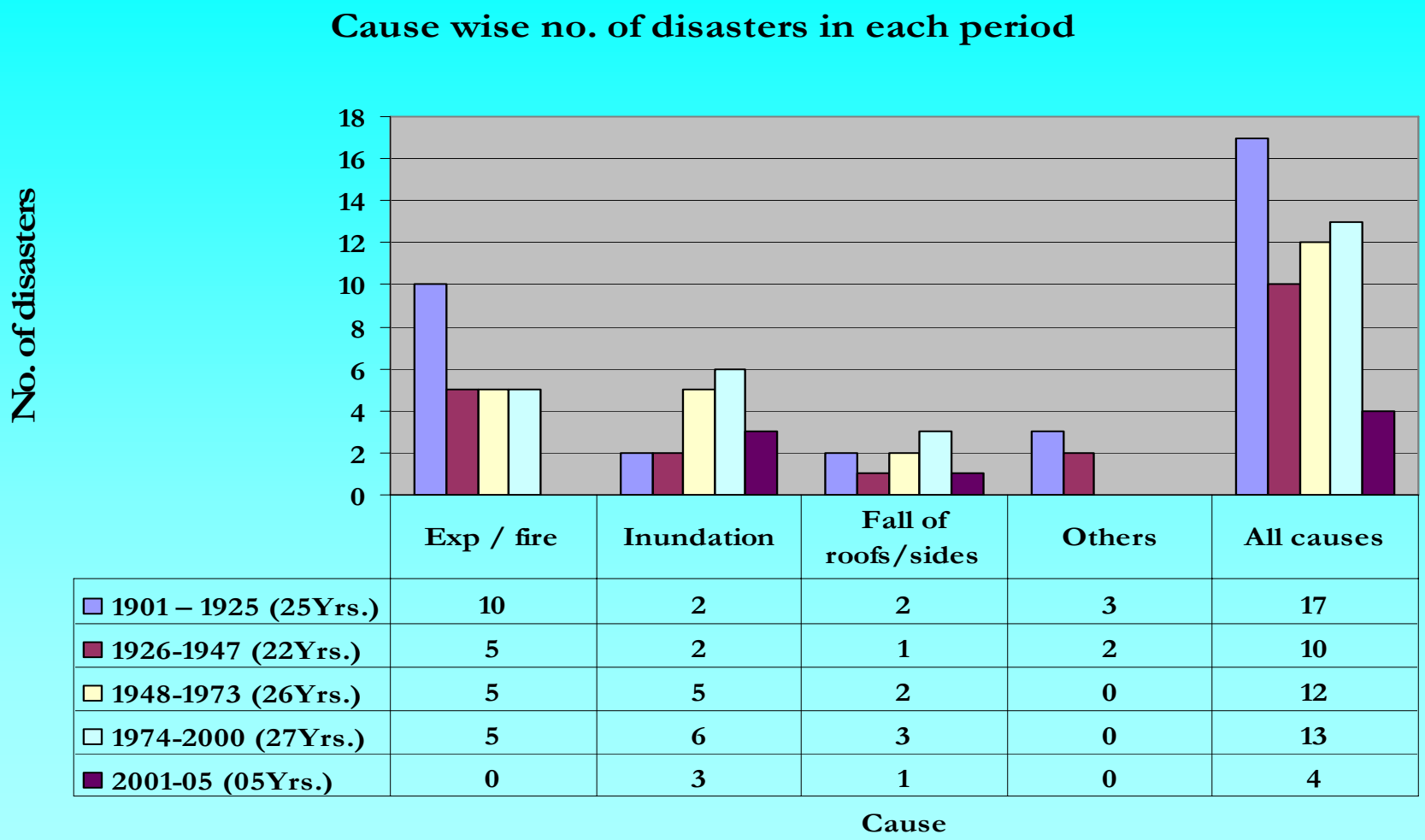
SAFETY STATUS OF INDIAN MINES IN LAST FIFTY YEARS

- **Main factor behind this reduction in fatality rate in coal mines is shift of production technology from conventional underground to mechanised opencast, and**
- **Reduction in u/g manpower through introduction of mechanisation**

Disasters are regularly occurring

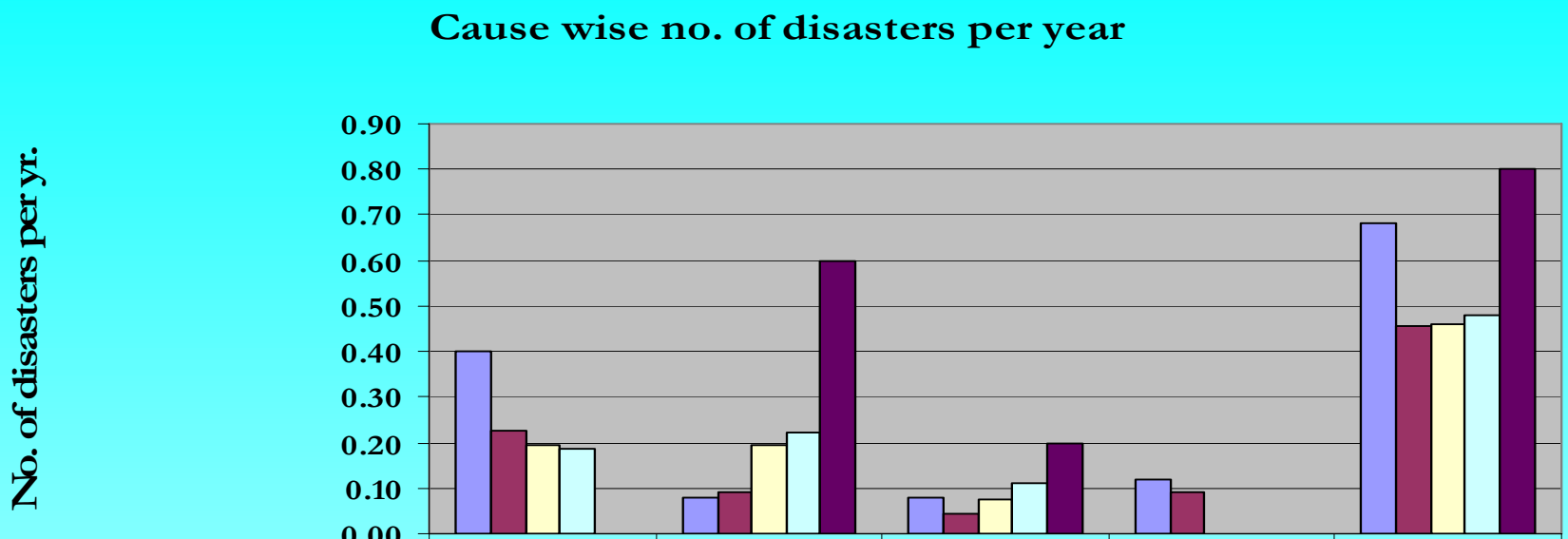
- **In coal mines, major concern is the occurrence of disasters at regular intervals, mostly in the underground mines.**
- **Disasters due to explosion have been controlled in the last two decades.**
- **The frequency of disasters due to inundation has been alarmingly increased in the recent past.**
- **There has been four disasters in the last five years, out of which three disasters are due to inundation.**

Cause wise no. of disasters in each period



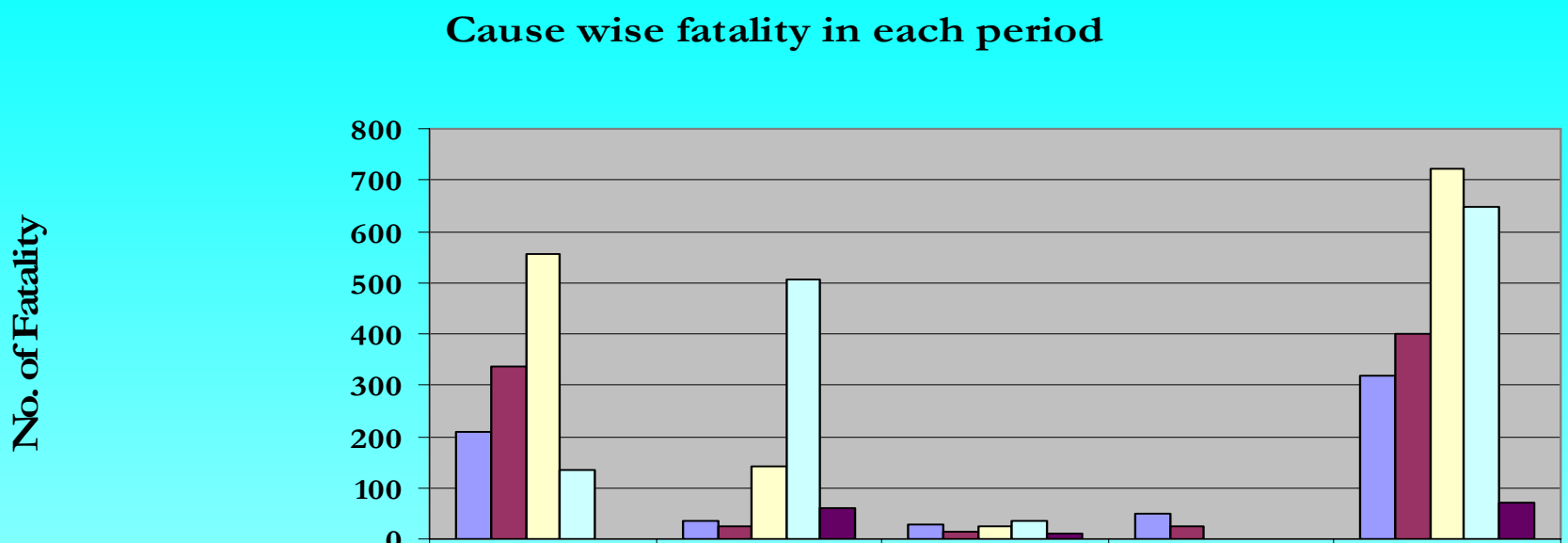
	Exp / fire	Inundation	Fall of roofs/sides	Others	All causes
1901 – 1925 (25Yrs.)	10	2	2	3	17
1926-1947 (22Yrs.)	5	2	1	2	10
1948-1973 (26Yrs.)	5	5	2	0	12
1974-2000 (27Yrs.)	5	6	3	0	13
2001-05 (05Yrs.)	0	3	1	0	4

Cause wise no. of disasters per year



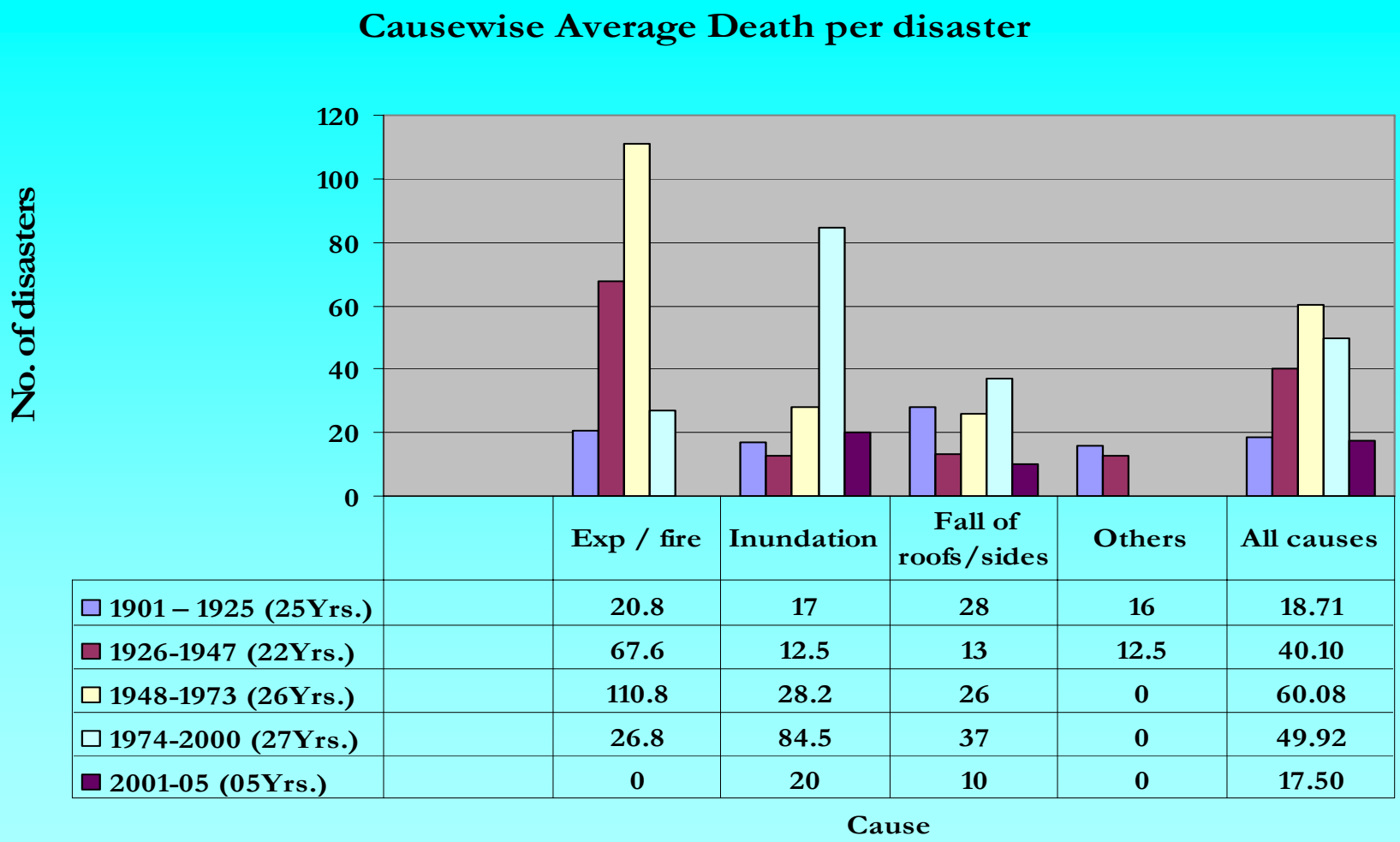
	Exp / fire	Inundation	Fall of roofs/sides	Others	All causes
1901 – 1925 (25Yrs.)	0.40	0.08	0.08	0.12	0.68
1926-1947 (22Yrs.)	0.23	0.09	0.05	0.09	0.45
1948-1973 (26Yrs.)	0.19	0.19	0.08	0.00	0.46
1974-2000 (27Yrs.)	0.19	0.22	0.11	0.00	0.48
2001-05 (05Yrs.)	0.00	0.60	0.20	0.00	0.80

Cause wise fatality in each period



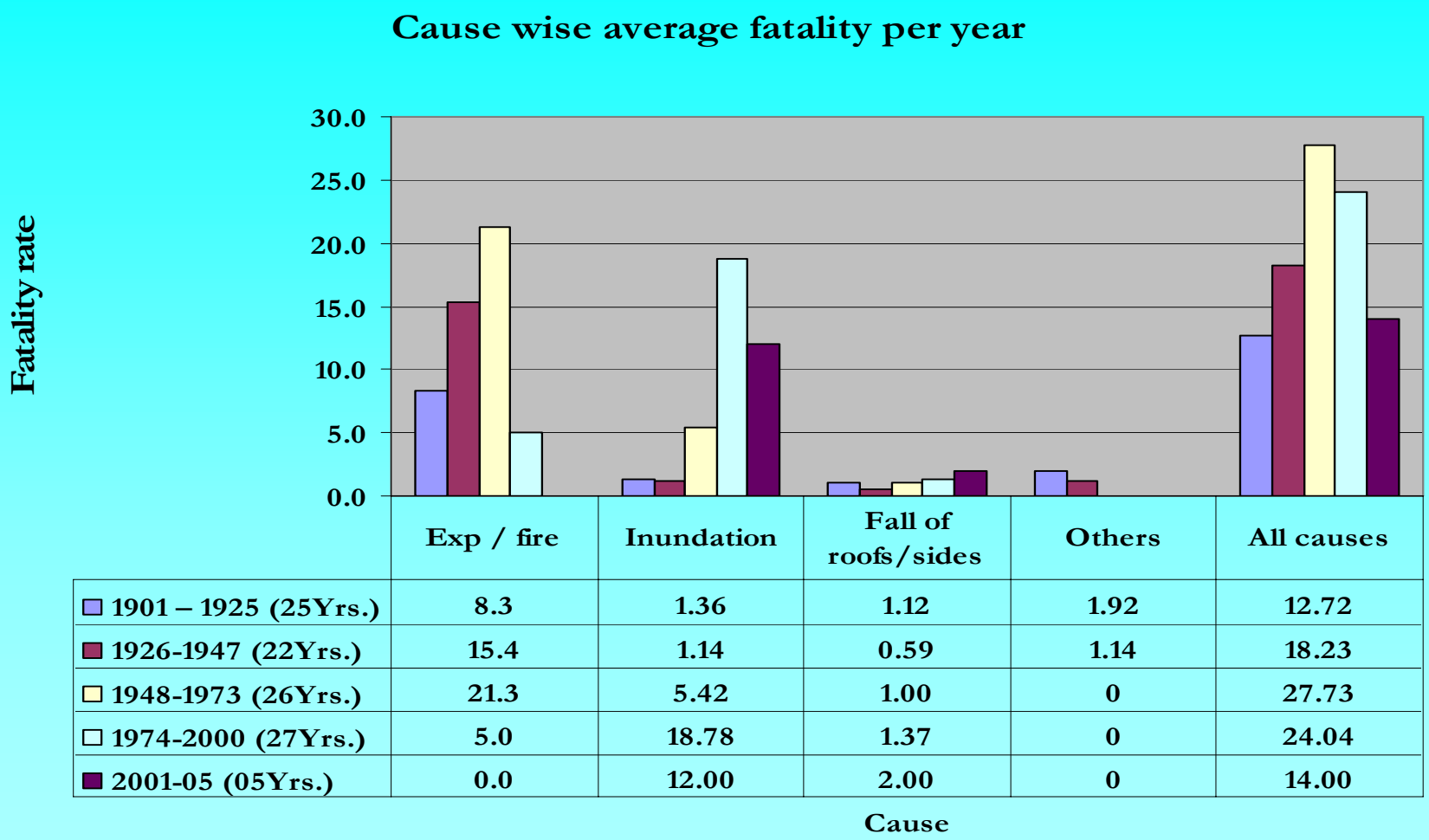
	Exp / fire	Inundation	Fall of roofs/sides	Others	All causes
1901 – 1925 (25Yrs.)	208	34	28	48	318
1926-1947 (22Yrs.)	338	25	13	25	401
1948-1973 (26Yrs.)	554	141	26	0	721
1974-2000 (27Yrs.)	134	507	37	0	649
2001-05 (05Yrs.)	0	60	10	0	70

Cause wise average fatality per disaster



	Exp / fire	Inundation	Fall of roofs/sides	Others	All causes
1901 – 1925 (25Yrs.)	20.8	17	28	16	18.71
1926-1947 (22Yrs.)	67.6	12.5	13	12.5	40.10
1948-1973 (26Yrs.)	110.8	28.2	26	0	60.08
1974-2000 (27Yrs.)	26.8	84.5	37	0	49.92
2001-05 (05Yrs.)	0	20	10	0	17.50

Cause wise average fatality per year

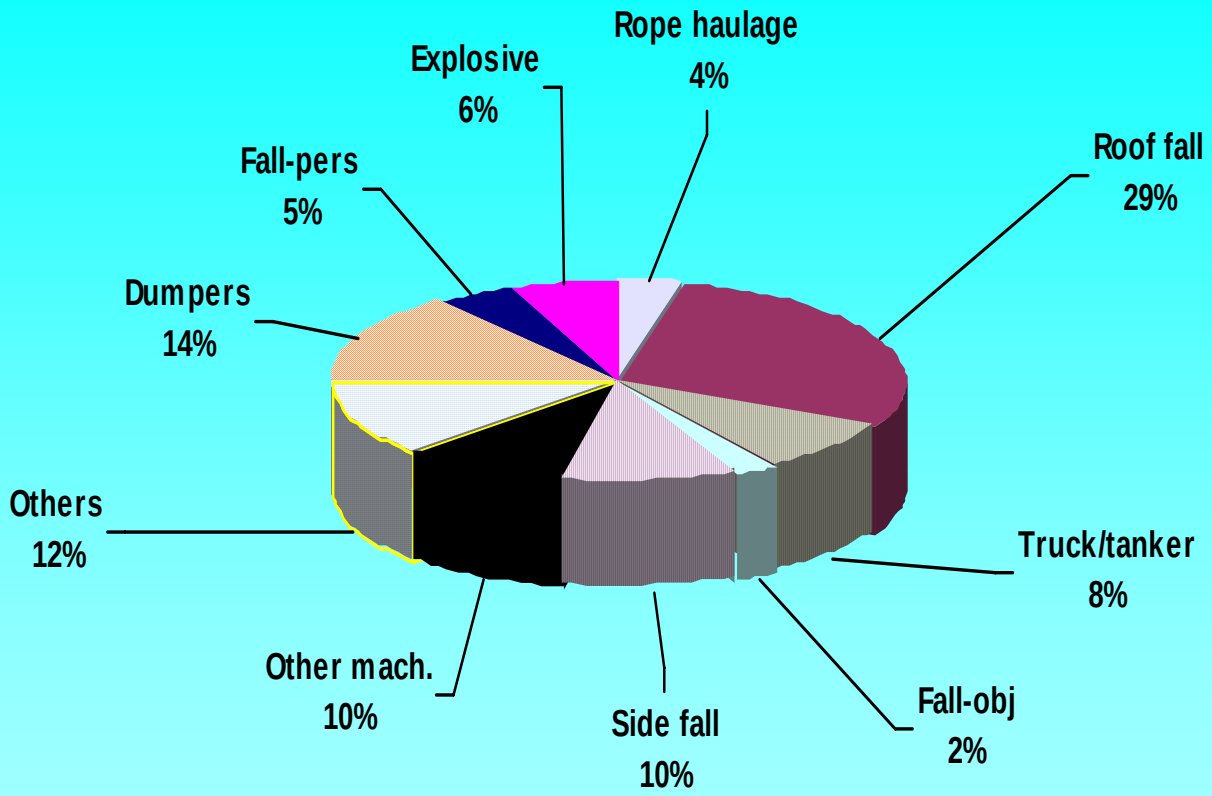


	Exp / fire	Inundation	Fall of roofs/sides	Others	All causes
1901 – 1925 (25Yrs.)	8.3	1.36	1.12	1.92	12.72
1926-1947 (22Yrs.)	15.4	1.14	0.59	1.14	18.23
1948-1973 (26Yrs.)	21.3	5.42	1.00	0	27.73
1974-2000 (27Yrs.)	5.0	18.78	1.37	0	24.04
2001-05 (05Yrs.)	0.0	12.00	2.00	0	14.00

Major causes of accidents

- **For fatal accidents involving four or less fatalities per accident, roof fall continues to be the area of major concern followed by dumpers in coal mines**

Cause-wise distribution of fatal accidents in coal mines during 2004



CHANGING SCENARIO OF INDIAN MINING INDUSTRY – SOME CRITICAL ISSUES

- **Complex geo-mining conditions**
- **Newer dimension of safety & health issues - New Technology**
- **Privatisation and outsourcing**
- **Socio-economic problems**

Newer dimension of safety & health issues - New Technology

- **Existing Legislative provisions do not match with the newer technology,**
- **Standard or safe operating procedures are yet to be developed leading to unsafe operations,**
- **Work persons are not well educated, skilled or trained to adopt such new technologies, enhancing chances of more human error,**

Newer dimension of safety & health issues - New Technology

- **The high capacity machines producing lot of heat, noise or dust – making the working atmosphere vulnerable,**
- **Longer hours of work, fly-in and fly-out concept in some isolated areas, and**
- **The physiological and mental stress levels in operating such high capacity machines are also high.**

Privatisation and outsourcing

- **Effectiveness of existing mine management structures to control the inter faces for health & safety matters for use of contractors.**
- **Big contractors award parts of the job to petty contractors not having adequate capacity or concern for safety.**
- **Employees are purely temporary or migratory in nature and not well conversant with mining activities or laws.**

Privatisation and outsourcing

- In many cases, no formal or informal training is imparted, as required.
- Contractor's workers are having more risk taking attitudes as earnings directly connected with output.
- Sometimes safety is considered as a cost component only, ignoring the cost of lives or living condition.

Privatisation and outsourcing

- **Very little commitment for ensuring safety and health conditions of the work persons.**
- **Privatisation and outsourcing can not be overruled in today's context. But these issues need special attention at the initial stage so that it does not bounce back to the objective of the mining industry.**

Social Issues:

- **Mine Safety and Health issues largely affected by the socio-economic and socio-political atmosphere prevailing in the mining field**
  - **Rehabilitation & resettlement of mining affected persons made complex by political intervention,**
  - **Shrinkage of mining activity in older coalfields or mining fields leads to shrinkage of direct or indirect job opportunity affecting the socio-economic condition of the locality**

Social Issues:

- **Ultimately reflected in to social crimes, unrest,**
- **Increasing trend of incidents / accidents due to illegal mining in such areas is of serious concern, and**
- **Environment protection is a major issue of concern.**

Today's Safety Scenario

- **Safety officers, Safety Committees, Safety rules, slogans, posters, campaigns etc. - all marginally effective.**
- **These traditional strategies place safety responsibility with a staff officer isolated from the line function and burdened almost exclusively with the production process**
- **Hardly having time or will or means to hunt for hazards.**

Limitations of this approach

- **This approach fails to integrate safety into the organisation as well as operations**
- **Limits its ability to identify and resolve management oversights that contribute to accident causation.**
- **A large proportion of the managements are reluctant compliers of safety statute.**
- **They pursue traditional inspection activities, with compliance being the key focus or responsibility of the safety department - not a concern for others.**

Limitations of this approach

- **The safety functionary's job is to insulate the rest of the organisation from compliance problems.**
- **In this situation it is necessary to couple the responsibility for safety with the authority to act.**
- **It is really the line organisation that has the authority to act to make the decisions that will affect safety.**
- **The onus and responsibility to ensure safety at and in the vicinity of the worksite should rest squarely with the operator of the mine.**

Concept of Self Regulation

- **Effective safety programmes will only become a reality when the management at all levels fully integrate safety responsibility into the industry's mainstream.**
- **This will not result from safety programmes that are superimposed upon the industry, but only when safety is fully accepted as an integral part of the industry and its mission.**

Self Regulation

- **The major mineral producing countries across the globe have successfully adopted the concept of 'self regulation' & 'duty of care' with the role of Government (or Enforcement Agency) as 'facilitator' in their program for OSH management.**
- **However, in Indian scenario, a gradual shift from the existing prescriptive legislation to a goal setting legislation (meant for self regulation) appear to be a better choice at this point of time.**

STARTEGIES FOR IMPROVEMENT - AGENDA FOR ACTION

- **Development of a more flexible regulation with a simple and easy process for amendment to keep the regulation updated and keep pace with the changing need of the industry.**

- **A gradual shift from the highly prescriptive legislation of the present to a goal setting legislation with built-in mechanism for risk assessment and formulation of Safety, Health and Environment Management Plan.**

- **The concept of maintaining standard of safety and health beyond the minimum regulatory requirements.**

- **Inculcating better system and work culture by adopting ISO certification schemes for quality, environment and OSH (viz; ISO 9000, 14000 & OSHAS 18000) for the total system from extraction to utilization.**
- **Present system of External Supervision may need to be replaced by the concept of Self Supervision**

- **Necessary skill up gradation for work place supervision by all classes of work person through proper training and retraining.**
- **The present system of surveillance of work place hazards solely by naked eye & experience may need to be supplemented by instrument aided continuous surveillance of work place hazards.**

- **Detailed Mine Closure Plan before the mining process starts in order to ensure best use of the land resources once the mineral wealth is extracted and avoid potential hazard in future to environment, further mining and possible growth of habitation in that area.**

- **Advance Planning for Emergency for each mine based on quantitative risk assessment need to be done and suitable Emergency Response System has to be developed.**

- **Proper system of sharing rights & responsibilities amongst all should be in place**

- **Import of technology and equipment supported by a smart plan to adopt the technology to Indian environment including necessary training, maintenance and support services.**
- **Preference shall be given to safe, user-friendly and environment-friendly designs having in-built fail-safe mechanism incorporated in the design.**

- **A national database on experience in the field of management of Safety, Health and Environment**
- **Development of mine safety information system for assessing dangers, taking preventive measures, follow-up actions and monitoring.**

- **Application of IT through computerisation and application of electronics and communication technology in the field of OSH for mine hazard surveillance, mine safety management and disaster management.**

Assistance areas and envisaged joint projects

- Extending the scope of extension of the USDOL project on mine safety information system for sustaining the out come of the project and add on other modules like accident investigation, accident analysis, data mining etc. in coal mines.

- Joint Collaborative projects on Emergency preparedness and response system.

Assistance areas and envisaged joint projects

- Joint collaborative projects on investigation and analysis of mine accidents.
- Capacity building of DGMS Inspectors through exposure & training.
- Development of infrastructure and expertise of Mine Safety & Health Academy for training of key personnel of Indian Coal Industry.

Assistance areas and envisaged joint projects

- Development of guide lines & best practices for assessment of environmental & strata control hazards and evolving means of their mitigation through exchanges of expertise with agencies like MSHA, NIOSH etc. and strengthening of existing technical support facilities of DGMS.

Assistance areas and envisaged joint projects

- Capacity building for assessing occupational health hazards of workmen of Indian Coal Mines and its effective mitigation by occupational health inspectors of DGMS.

Thank You for patient listening