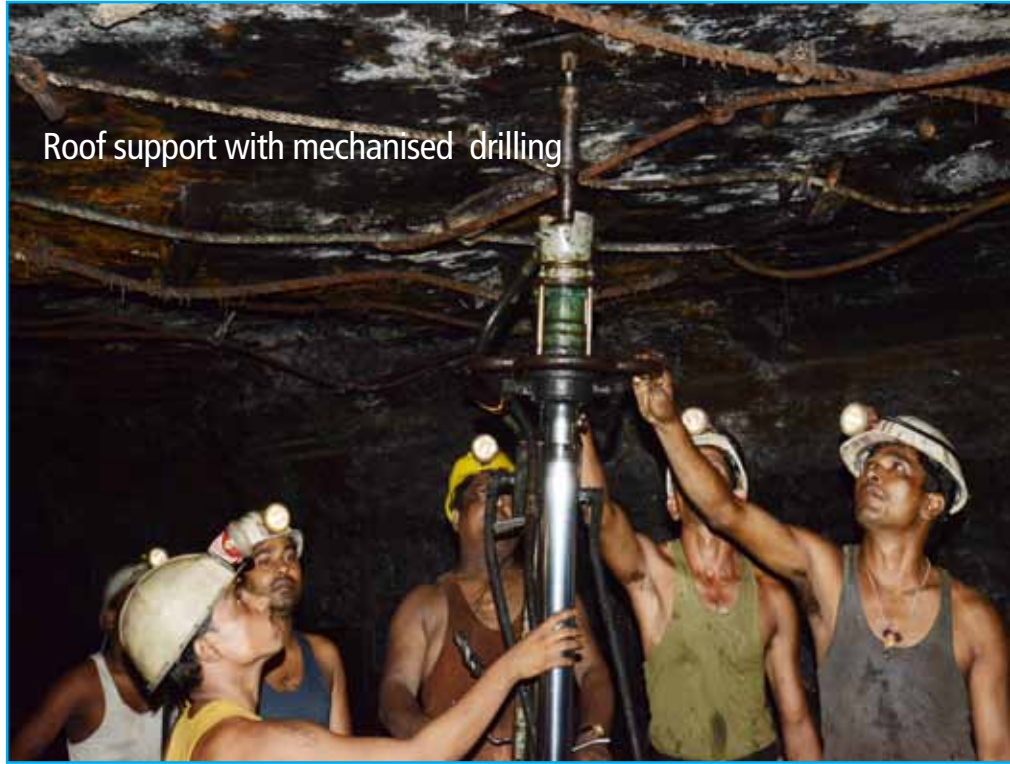


Roof support with mechanised drilling



SAFETY IN COAL MINES

SAFETY IN COAL MINES

Coal India Limited

CIL has always given the highest priority to safety, considered as part of its core business process and embedded in its Mission statement. A multidisciplinary Internal Safety Organisation (ISO) has been put in place in every subsidiary of CIL to stringently monitor the implementation of CIL's safety policy.

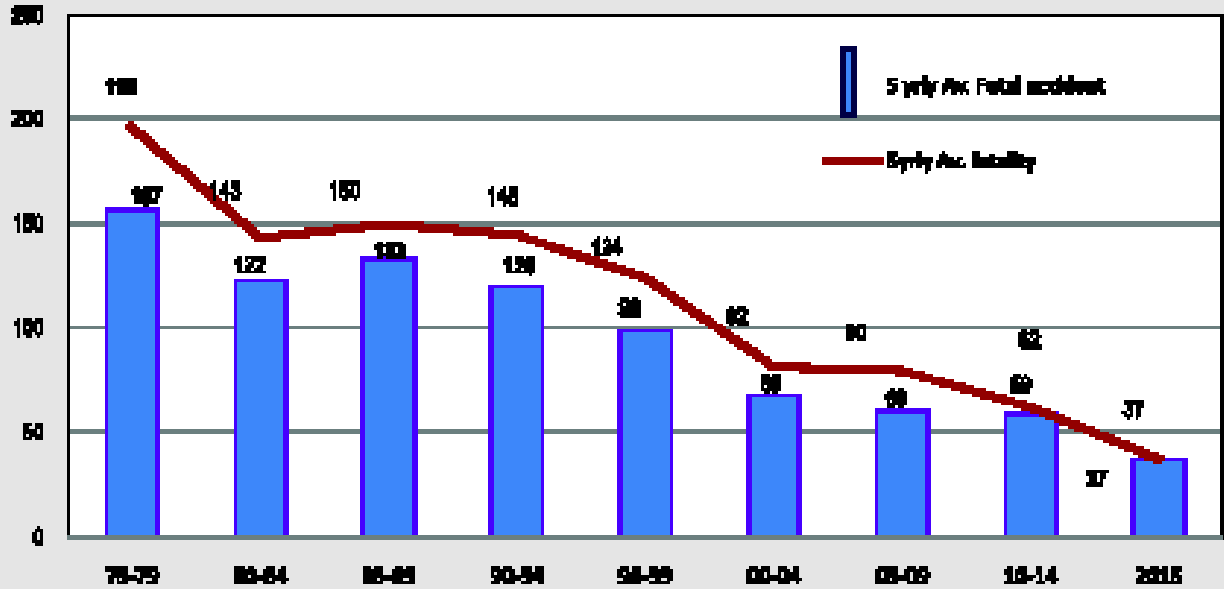
➤ Safety performance of CIL:

Accident statistics is the indicator of relative status of safety. Over the years the safety standard in mines of CIL has significantly improved as is evident from the table and graphs given below:

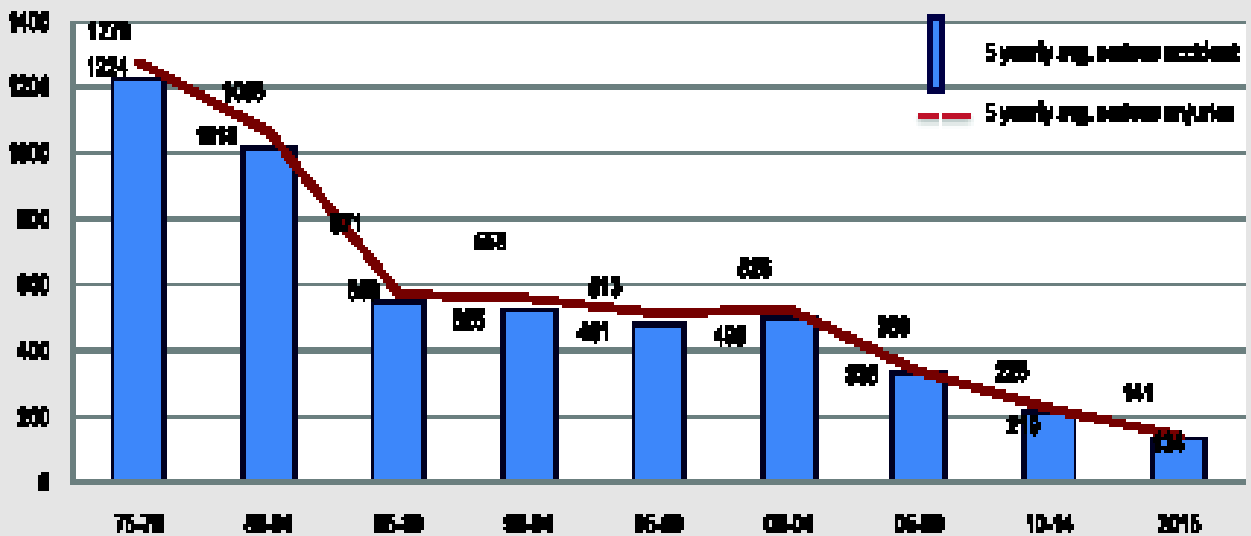
Comparative Accidents Statistics of CIL of 5 Yearly Average since 1975 vis-a-vis 2015

Time Period	Av. Fatal Accidents		Av. Serious Accidents		Av. Fatality Rate		Av. Serious Injury Rate	
	Accident	Fatalities	Accident	Injuries	Per MT	Per 3 Lac Man shifts	Per MT	Per 3 Lac Man shifts
1975-79	157	196	1224	1278	2.18	0.44	14.24	2.89
1980-84	122	143	1018	1065	1.29	0.30	9.75	2.26
1985-89	133	150	550	571	0.98	0.30	3.70	1.15
1990-94	120	145	525	558	0.694	0.30	2.70	1.19
1995-99	098	124	481	513	0.50	0.29	2.06	1.14
2000-04	068	082	499	526	0.28	0.22	1.80	1.47
2005-09	060	080	328	339	0.22	0.25	0.92	1.04
2010-14	056	062	219	228	0.138	0.23	0.49	0.80
2015	037	037	135	141	0.07	0.15	0.27	0.56

Trend of 5 yrly Av. of fatal accident & fatality vis-a-vis 2015



Trend of 5 yrly average serious Accident & Injury vis-a-vis 2015



➤ Safety performance of CIL in 2015:

All accident statistical parameters have shown improvement in 2015 vis-a-vis 2014 as evident from the table below:

SN	Parameters	2014	2015	Reduction in nos.	% of Reduction
1	Fatal accidents	044.00	037.00	07.00	15.9%
2	Fatalities	046.00	037.00	09.00	19.6%
3	Serious accidents	183.00	134.00	49.00	26.7%
4	Serious injuries	186.00	141.00	45.00	24.2%
5	Fatality rate per MT of coal production	000.09	000.07	00.02	22.2%
6	Fatality rate per 3 lakhs man shift deployed	000.18	000.15	00.03	16.7%
7	Serious injury rate per MT of coal production	000.38	000.27	00.11	28.9%
8	Serious injury rate per 3 lakhs man shift deployed	00.72	000.56	00.16	22.2%

➤ **Major activities of the Safety & Rescue division of CIL**

- o Inspection of mine to review safety status & follow up action.
- o Prima-facie fact-finding enquiries into fatal accidents and major incidences such as mine fire, subsidence, in-rush of water, slope failure, explosion etc.
- o Organizing appropriate review-forums with employees representatives for joint consultation on safety-related issues.
- o Regular meetings of the CIL Safety Board and consistent monitoring of recommendations / suggestions made during the meeting.
- o Regular meetings of the National Dust Prevention Committee (NDPC).
- o Maintenance of accidents / major incidents related statistics in CIL's database.

- o Publication of safety bulletin for disseminating and sharing knowledge in the field of safety awareness.
- o Making safety a thrust area in R&D activities.
- o Imparting specialised training by accredited trainers to unit and area level executives directly engaged in ensuring safety in mines.

➤ **Measures taken for improvement of safety in 2015:**

- o To improve safety standard, CIL has vigorously pursued several measures in the year 2015 along with on-going safety related initiatives apart from compliance of statutory requirements for safety, which are given below.
- o Continuous review of safety status of mines is being done by the multi-disciplinary Internal Safety Organisation (ISO).

- o Guidelines on corrective measures: After analysis of fatal accidents which occurred at different points of time in 2015. Several directives / guidelines on corrective measures to be taken for prevention of recurrence of similar type of accidents in future have been issued by the Safety & Rescue Division of CIL.
- o Training for preparation of Risk Assessment based SMP: Executives who have been trained by SIMTARS, Australia are engaged for imparting training and upgrading the knowledge of mine level executives as well as members of safety committee of mine to identify the hazards and evaluate the associated risks in the mines and prepare risk assessment based Safety Management Plans (SMPs).
- o Preparation of risk assessment based SMP: On the basis of training being imparted, the risk assessment based Safety Management Plans (SMPs) have been prepared for all mines of CIL.
- o Review of SMPs: SMPs are being reviewed by SIMTARS accredited executives of CIL for further improvement.
- o Implementation of SMP: Control measures proposed in the risk assessment based Safety Management Plans (SMPs) are being implemented.
- o Standard Operating Procedure (SOP): Risk assessment based site specific Standard Operating Procedures (SOP) are being implemented for various mining and allied operations.
- o Internal Safety Audit conducted in all subsidiaries of CIL.
- o Deployment of more number of surface miners to eliminate blasting operation in opencast mines.
- o Phasing out manual loading in UG mines.
- o Switching over to use of resin capsules from cement capsules in a phased manner.
- o A check list for dealing with emergency have been prepared.

➤ **Mine Safety Inspection:**

Following inspections are being made in each mine to ensure that all mining operations are carried out in the mine as per the provisions of the relevant statute and safety norms,

- o Round the clock supervision of all mining operations by adequate number of competent & statutory supervisors and officers.
- o Periodic mine inspection by Head Quarter and Area level senior officials.
- o Surprise back shift mine inspection by mine and Area level officials.
- o Regular inspection by workmen inspectors appointed in each mine.
- o Monthly mine inspection and meeting of safety committee for each mine.
- o Regular mine inspection by officials of Internal Safety Organisation
- o Periodic mine inspection by High Powered Task Force, Area and Subsidiary level Tri-partite Safety Committee members, etc.

➤ **Special drive for accident prevention in OCPs:**

- o Formulation of mine-specific traffic rule.
- o Code of Practices for HEMM operators, maintenance staff & others
- o Preparation and implementation of risk assessment based safety management plan (SMP).
- o Training of contractor workers involved in contractual jobs.
- o Introduction of Safe Operating Procedures (SOP)s for safe mining operations.
- o Procurement of advanced surveying / slope monitoring devices.

➤ **Emergency Response System:**

- o Emergency action plans of each mine is being reviewed from time to time

- o Mock rehearsals are being adopted for examining the preparedness/efficacy of emergency action plan.
 - o Demarcating escape routes: An exercise for demarcating escape routes in underground mines, on plains as well as belowground by fluorescent paint, display of the same at the entry to the mine has been done.
 - o A check list for dealing with emergency has been prepared.
- o CIL has prepared a flow chart for sending information regarding crisis / disaster in mines from site of accident to the Ministry of Coal, New Delhi. This is prepared in line with guidelines of crisis management plan of the Ministry of Coal so that quick communication can be sent to all concerned and rescue & recovery & corrective actions are initiated at the earliest.
- **Safety Monitoring in CIL:** Apart from statutory monitoring by DGMS, the status of safety is being monitored at various levels by the following agencies:

Level	Monitored By
Mine level	1. Workman inspectors: as per Mines Rule-1955. 2. Pit safety committee: constituted as per Mines Rule-1955.
Area level	1. Bipartite/tripartite committee meeting. 2. Safety officers' coordination meeting.
Subsidiary HQ level	1. Bipartite/tripartite committee. 2. Area safety officers' coordination meeting. 3. Inspection by ISO officials.
CIL HQ: Corporate Level	1. CIL Safety Board. 2. CMDs meet. 3. Co-ordination meeting with ISOs. 4. NDPC meeting.
Ministry of Coal (MOC) / Other Ministerial Level	1. Standing committee on Safety in coal mines. 2. National conference on safety in mines. 3. Various Parliamentary Standing Committees.

- **Statutory frame-work for safety in coal mines:**
- o Coal mining, world over, is highly regulated industry due to presence of many inherent, operational and occupational hazards and associated risks. Coal mine safety legislation in India is one of the most comprehensive and pervasive statutory framework for ensuring occupational health and safety (OHS). Compliance of these safety statutes is mandatory
 - o In India, the operations in coalmines are regulated by the Mines Act, 1952, Mine Rules –1955, Coal Mine Regulation-1957 and several other statutes framed thereunder. Directorate-General of Mines Safety (DGMS) under the Union Ministry of Labour & Employment (MOL&E) is entrusted to administer these statutes. The following are the statutes that are applicable in coal mines for occupational health and safety (OHS).

Sl. No.	Statute
1	The Mines Act -1952
2	The Mines Rules -1955
3	The Coal Mine Regulation -1957
4	The Mines Rescue Rules -1985
5	The Electricity Act- 2003
6	Central Electricity Authority (measures related to safety & supply) Regulations - 2010
7	The Mines Vocational Training Rules -1966
8	The Mines Crèche Rules -1966
9	Indian Explosive Act, 1884
10	The Explosive Rules - 2008
11	Indian Boiler Act, 1923
12	Mines Maternity Benefit Act & Rules -1963
13	The Workmen Compensation Act - 2009
14	The Factories Act - 1948 Chapter -III & IV

➤ Safety Policy of CIL:

Safety is always given prime importance in the operations of CIL as embodied in the Mission. CIL has formulated a safety policy for ensuring safety in mines and implementation of which is closely monitored at several levels.

- o Operations and systems will be planned and designed to eliminate or materially reduce mining hazards;
- o Implement Statutory Rules and Regulations and strenuous efforts made for achieving superior standards of safety;
- o To bring about improvement in working conditions by suitable changes in technology;
- o Provide material and monetary resources needed for the smooth and efficient execution of safety plans;
- o Deploy safety personnel for accident prevention work;
- o Organize appropriate forums with employees' representatives for Joint consultation on safety matters and secure their motivation and commitment in safety management;
- o Prepare annual safety plan and long term safety plan at beginning of every calendar year, unit-wise and for the company, to effect improved safety in operations as per respective geo-mining needs
- o Prepare the units for onset of monsoons, to fulfill implementation of decisions by the committee on Safety in mines and safety conferences and to take measures for overcoming accident proneness, keeping priority in sensitive areas of roof-falls, haulage, explosives, machinery, etc.

➤ **Accident Statistics of NLC - (for last five years):**

Year	Fatalities	Serious Injuries
2011-12	1	6
2012-13	4	4
2013-14	1	4
2014-15	1	1
2015-16 (up to Dec, 2015)	1	2

➤ **Safety measures**

The following safety measures are taken to prevent accident in Mines.

- o Highly sophisticated mining machineries are deployed for its continuous lignite mining and allied activities and all machineries are fitted with limit switches, emergency switches, slip monitoring devices, various type of safety clutches, safety coupling like fluid couplings, brakes, like 'Eldro' and other failsafe systems, to ensure machine safety/avoidance of wasteful breakdown/stoppage.
- o Site Mixed Emulsion is extensively used during blasting operation which greatly reduces hazards and fly rocks due to more stemming column.
- o Safety measures are implemented as per the guidelines given by DGMS and based on the recommendation of CMRI, Dhanbad and NIT, Trichy based on their study.
- o Apart from unit level monitoring of safety system, safety monitoring is also being carried out by ISO at corporate level to strengthen the hands of safety.
- o All the required Personal Protective Equipments are compulsorily issued specific to the job requirement to the employees / contract workers before taking up the work.

- o Area wise responsibility with priority to safety is being enforced at all mine operational / maintenance activities for ensuring specific site supervision.
- o Code of practices for different operations like specialized mining equipment operations, ancillary equipment operations. Traffic rules, general precautions are formulated and exhibited at appropriate locations, for the benefit of the employees.
- o On the job trainings are being imparted to inculcate safety awareness especially among the contract workers to adopt Safe Work Practices, etc.

➤ **Safety & R&D initiatives:**

- o The following measures are taken as safety & R&D initiatives at NLC Mines. The standard of illumination, noise, vibration etc., are studied and monitored with respect to the safe limit of the said parameters on regular basis.

➤ **Emergency response system:**

- o Once in every two years NLC is carrying out Risk Assessment, Occupational Health and Safety Audit by a panel of statutorily recognized accredited experts to recommend emergency response system in the form of a compendium of reports which are implemented to ensure proper safety upkeep.

➤ **Occupational Health services**

- o All the NLC mines are having First Aid Centres along with well-equipped required number of Ambulance Vans.
- o Apart from the above, a well-established "Department of Industrial Hygiene and Occupational Diseases" (DIHOD) is also functioning effectively in NLC.

➤ **Initial medical examination:**

In accordance with Rule 29 B of the Mines Rule 1955, all persons are subjected to initial medical examination before employment in mines. The initial medical

examination is done at DIHOD, General Hospital, and NLC.

o **Periodical medical examination:**

In accordance with Rule 29 B of the Mines Rule 1955, all persons are subjected to periodical medical examination once in every 5 years and once in 3 years for those who are crossing 45 years of age. The periodical medical examination is done at DIHOD, General Hospital/NLC regularly.

➤ **Accident Statistics of SCCL – (for the last five years):**

Year	Fatalities	Serious Injuries
2010-11	11	294
2011-12	13	323
2012-13	9	375
2013-14	12	321
2014-15	7	271
2015-16 (upto Dec, 2015)	5	179

➤ **Safety Measures in SCCL:**

- o Implementation of Risk Assessment based safety management plans.
- o Identification of hazards in all mining operations and associated risks thereof.
- o Adoption of control measures for elimination/mitigation of recorded hazards.
- o Adoption of the roof support system based on geo-technical studies.
- o Phasing out conventional mining methods.
- o Use of "Continuous Miner" and "Long wall" Technologies to eliminate blasting hazards.
- o Introduction of roof-bolters for resin-capsules bolting.
- o Use of rear-view cameras and proximity-warning devices in dumpers in open cast mines.
- o Introduction of automatic fire detection and fire-suppression systems in all HEMM.
- o Use of man riding systems in underground mines.
- o Tele monitoring system for real time monitoring of CH₄ and CO gases in UG mines.
- o Analysis of mine air samples by Gas-Chromatographs etc.

Safety Statistics of SCCL during the year 2015 is given below.

Company	Fatal Accidents	Fatalities	Serious Accidents	Serious Injuries	Fatality Rate		Serious Injury Rate	
					Per MT	Per 3 lakh man-shifts	Per MT	Per 3 lakh man-shifts
SCCL: 2015	7	7	243	243	0.12	0.14	4.01	4.99

Note: Figures are subject to reconciliation with DGMS.