A PRESENTATION ON SAFETY IN COAL MINES

for
3rd US-India Working Group Meeting on Coal

by
COAL INDIA LIMITED

4th April, 2006
New Delhi
BREF FACTS REGARDING ROLE OF COAL INDIA LTD. IN THE INDIAN COAL MINING SCENARIO

• Coal India Limited is the single largest coal producing company in the world.
• Coal India Limited is the second largest corporate body in the world.
• CIL produces 85% of India’s total coal production.
• Operations are spread over 8 States (Chhattisgarh, Jharkhand, MP, Orissa, West Bengal, Maharashtra, UP & Assam)
• Operates through 8 subsidiary companies.
• Operates 467 mines (296 underground mines, 142 Opencast mines, 29 mixed mines)
• Employs nearly 455 thousand persons.
BACK-GROUND INFORMATION REGARDING COAL MINING IN CIL

• Traditional underground coal mining in India is by Bord & Pillar method with blasting-off-the-solid & coal evacuation by manual loading into mine cars hauled by rope haulages.

• Since its formation CIL has moved towards Opencast (OC) Mining. Presently 85 % of CIL’s production comes from OC, mostly by Shovel Dumper combination. Coal transport is by tippers. Draglines are also used in some mines. One mine deploys in-pit crusher & conveyor. Surface Miners are presently being used in a number of mines.

• In Underground (UG) Mining CIL has largely mechanised loading through SDLs / LHDs. CIL has 5 PSLW faces & 2 Continuous Miners with Shuttle Cars & Universal Drilling Machines.
### Technology-Wise UG Production in CIL in Last 3 Yrs

<table>
<thead>
<tr>
<th>Method</th>
<th>2002-03</th>
<th>2003-04</th>
<th>2004-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Methods</td>
<td>0.65</td>
<td>0.93</td>
<td>0.91</td>
</tr>
<tr>
<td>Mech.LW</td>
<td>1.95</td>
<td>2.05</td>
<td>1.36</td>
</tr>
<tr>
<td>Conv.LW</td>
<td>0.2</td>
<td>0.14</td>
<td>0.15</td>
</tr>
<tr>
<td>Conventional B&amp;P</td>
<td>19.53</td>
<td>17.18</td>
<td>15.65</td>
</tr>
</tbody>
</table>

**UG Production in m.t.e.**
Two of the major objectives of Nationalisation of coal mines in India in the early 70s were
• Enhancement of safety in coal mine & conservation of coal property.
• Kick start India’s drive towards energy sufficiency.
To this end CIL accords the first priority to safety in operations as embodied in its mission.
• Safety in coal mines in India are regulated by
  – The Indian Electricity Act, 1910 & Rules thereunder.

• Environmental aspects are governed by
  – The Environmental (Protection) Act 1986 & Rules framed thereunder

• The Directorate General of Mines Safety, under the Ministry of Labour, administers the provisions of the Mines Act.
SAFETY POLICY OF COAL INDIA LTD

• Plan operations & systems to eliminate / reduce mining hazards
• Implement statutes
• To improve working conditions by technology upgradation
• Dedicated provision of material & money for safety
• Deploy safety personnel wholly for safety
• Implement worker participation in safety management
• Draw & implement Safety Plans
• Establish Internal Safety Organisation
• Multi-level monitoring of safety
• Senior Management to inculcate safety awareness & practice it in their functioning
• Training & retraining to promote safety oriented skills
• Strive to improve the living conditions & health of employees
WORKMEN’S PARTICIPATORY BODIES MONITORING SAFETY IN CIL

• WORKMEN’S INSPECTORS
• MINE LEVEL SAFETY COMMITTEES meeting monthly
• AREA (Group of Mines) LEVEL BIPARTITE/TRIPARTITE COMMITTEES – meeting bi-annually.
• SUBSIDIARY COMPANY LEVEL TRIPARTITE COMMITTEES – meeting bi-annually.
• THE COAL INDIA SAFETY BOARD meeting bi-annually.
• THE STANDING COMMITTEE ON SAFETY IN COAL MINES CHAIRMED BY HON’BLE MINISTER FOR COAL meeting bi-annually.
SAFETY PERFORMANCE OF CIL IN 2005 COMPARED TO THE YEAR OF ITS INCEPTION, 1975

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>1975</th>
<th>2005</th>
</tr>
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<tbody>
<tr>
<td>FATAL ACCIDENTS</td>
<td>177</td>
<td>73</td>
</tr>
<tr>
<td>FATALITIES</td>
<td>233</td>
<td>94</td>
</tr>
<tr>
<td>SERIOUS ACCIDENTS</td>
<td>1456</td>
<td>354</td>
</tr>
<tr>
<td>SERIOUS INJURIES</td>
<td>1515</td>
<td>364</td>
</tr>
<tr>
<td>FATALITY RATE / M.TE. OF PRODUCTION</td>
<td>2.62</td>
<td>0.28</td>
</tr>
<tr>
<td>FATALITY RATE / 3,00,000 MANShiftS</td>
<td>0.52</td>
<td>0.27</td>
</tr>
<tr>
<td>SERIOUS INJURY RATE / M.TE.</td>
<td>17.03</td>
<td>1.08</td>
</tr>
<tr>
<td>SERIOUS INJURY RATE / 3,00,000 MANShifts</td>
<td>3.41</td>
<td>1.06</td>
</tr>
</tbody>
</table>

Figures for 2005 are subject to reconciliation with DGMS.
CAUSE-WISE BREAK-UP OF FATALITIES IN CIL IN 2005

- Roof/Side falls: 30%
- Dumpers & Trucks: 18%
- Non-transport m/c: 11%
- Electricity: 11%
- Explosives: 2%
- Inundation: 15%
- Others: 11%
- Underground Transport: 11%

Roof/Side falls constitute the largest category of fatalities, followed by Dumpers & Trucks and Non-transport m/c.
CAUSE-WISE FATALITIES IN DISASTERS* IN CIL

- Methane Explosions: 19%
- Inundation: 48%
- Roof fall: 9%
- Bench failure: 3%
- Water gas explosion: 3%
- Fires: 18%

* Fatal accidents resulting in 10 or more fatalities
CAUSE-WISE FATALITIES IN CIL 3 YEARS

Figures for 2004 & 2005 are subject to reconciliation with DGMS
PLACE-WISE BREAK-UP OF FATALITIES IN CIL IN LAST 3 YRS

Figures for 2004 & 2005 are subject to reconciliation with DGMS
PLACE-WISE RATES OF FATALITIES IN CIL IN LAST 3 YRS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FATALITY RATE/M.T.E</th>
<th>FATALITY RATE/300,000 Manshifts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UG</td>
<td>OC</td>
</tr>
<tr>
<td>2003</td>
<td>0.87</td>
<td>0.09</td>
</tr>
<tr>
<td>2004</td>
<td>0.83</td>
<td>0.10</td>
</tr>
<tr>
<td>2005</td>
<td>1.09</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Figures for 2004 & 2005 are subject to reconciliation with DGMS.
MAJOR AREAS OF CONCERN IN SAFETY IN CIL

• Instrumentation for early warning of impending failure of strata (roof/ sides).
  – Load cells, convergence recorders are used in PSLW faces.
  – One mine where poor strata condition was a bottleneck has been turned around with the help of RMT, UK with modified support design with resin bolting & strata monitoring by Remote Reading Telltales, Sonic Extensometers, Strain Gauge Bolts, Remote Reading Rib Extensometers, Vibrating Wire Stress Meters.

• Technology for detection of hidden slips / cracks in underground mines. National Institute of Rock Mechanics, Kolar is engaged in R&D in this direction.

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MAJOR AREAS OF CONCERN IN SAFETY IN COAL INDIA LIMITED

- Identification & delineation of unapproachable waterlogged old workings of doubtful location. CIL has commissioned R&D in this direction through Ground Penetrating Radar, Electrical Resistivity Survey, Seismic Methods.
- Early detection of mine fires & fire fighting systems for mines. CIL has installed computerised Environmental Tele-monitoring Systems in 13 mines & more such systems would follow.

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MAJOR AREAS OF CONCERN IN SAFETY IN CIL

• Stabilisation of ground surface disturbed by past mining at shallow depths.
• Controlling extensive fires in numerous coal seams in Jharia Coalfields.
• Exchange of information regarding overall safety systems for mines – opencast & underground.
• Exchange of information regarding Mine Rescue Organisation & Systems.

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THANK YOU

Prepared by
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Coal India Limited