ADDENDUM TO

AGENDA PAPERS FOR 32ND MEETING OF

THE STANDING COMMITTEE ON SAFETY IN COAL MINES

On 17-3-2009

GOVERNMENT OF INDIA
MINISTRY OF COAL

INDEX

ITEM – III

Action taken on recommendations of 31st meeting of Standing Committee on Safety in Coal Mines held on 14.2.2008

Particulars	Status / Action Taken
Para 12 (Strengthening of DGMS) **Director General of Mines Safety clarified that they would have no objection to above suggestion provided some concrete procedure is worked out by CIL within the provisions of Mines Act, 1952. CMD, CIL agreed to constitute a committee within 15 to 20 days to look into this suggestion. Chairman suggested that this matter should be discussed at the level of Secretaries as well.** **(Action: MOL&E, DGMS, CIL)**	**CIL** The matter has been taken up with CIL. CIL informed that they have sought some opinion / further guidelines from DGMS which are yet to be received. As soon as required opinion is received matter will be further examined.
Para 45 (Theft of Explosives) **Chairman observed that some coal companies including State Govt. companies like J&K Mineral Development Corporation are not attending the meeting of the Standing Committee and are not furnishing the required information which is a serious matter and they must submit the information in future without fail. He desired Secretary (Coal) to write to Chief Secretary, J&K in this regard.** **(Action: MOC/All Companies)**	**MOC** In response to d. o. letter written by Secretary (Coal) to Chairman, J&K Mineral Development Corporation, they have furnished their new address to which meeting notice for 32nd meeting has been sent to them.
Para 48 (Sub-Committee to Inspect Private Mines) **Representative of BMS, Shri S. K. Pandey suggested that instead of representation of only three members of Trade Unions by rotation in the Sub Committee, all Trade Unions should be represented. Chairman agreed to consider this.** **(Action: MOC)**	**MOC** The matter was taken up with Trade Unions. Some of the Trade Unions have nominated their representatives. Details of which given as under: 1. Orissa Coal Mines Labour Federation, Orissa (Shri K. C. Patra) 2. Indian National Mine Workers Federation (INTUC), Jharkhand (Shri Rajendra Prasad Singh, Ex-MLA, President) 3. Indian National Mine Workers Federtion, (INTUC) C/o. Rastriya Koyla Mazdoor Sangh, Nagpur (Shri S.Q. Zama, General Secretary) 4. Indian Mine Managers Association, Kolkata (Shri S.K. Baksi, Hony. General Secreatry) 5. Coal Mines Officers' Association of India (CMOAI (Apex), Jharkhand (Shri Sukhdeo Narayan, President) 6. All India United Trade Union Centre (AIUTUC) (Shri A.L. Gupta, Vice-President)

ITEM – IV

Safety Statistics

1. COAL INDIA LIMITED (CIL)

a. Safety Statistics of CIL for last 4 years

SL NO.	Parameters	2005	2006	2007	2008
1	Numbers of fatal accidents	76	51	55	52
2	Numbers of fatalities	97	106	57	64
3	Numbers of serious accidents	391	317	326	337
4	Numbers of serious injuries	405	336	340	342
5	Fatality Rate per million tonne of coal production	0.29	0.30	0.15	0.16
6	Fatality Rate per 3 lakhs manshift deployed	0.28	0.32	0.18	0.20
7	Serious injury Rate per million tonne of coal production	1.20	0.96	0.92	0.86
8	Serious injury Rate per 3 lakhs manshift deployed	1.18	1.02	1.05	1.16

Note: Figures for 2007 & 2008 are provisional & subject to reconciliation with DGMS.

b. Company-wise Fatal Accidents, Fatalities, Serious Accidents & Serious Injuries for last 4 years

COMPANY	FATAL ACCIDENTS				FATALITIES				SERIOUS ACCIDENTS				SERIOUS INJURIES			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
ECL	16	8	7	8	17	13	8	8	123	102	105	106	125	105	115	107
BCCL	14	12	10	9	19	61	10	9	71	45	66	91	76	47	66	91
CCL	7	5	7	4	21	5	8	4	24	19	16	10	24	19	16	10
NCL	3	4	5	6	3	5	5	10	18	15	10	25	19	15	10	26
WCL	11	13	12	10	11	13	12	12	47	57	60	40	48	60	61	41
SECL	14	7	10	9	15	7	10	10	93	68	60	60	98	72	63	60
MCL	10	2	4	4	10	2	4	4	13	10	9	4	13	17	9	4
NEC	1	0	0	2	1	0	0	7	2	1	0	1	2	1	0	3
CIL	**76**	**51**	**55**	**52**	**97**	**106**	**57**	**64**	**391**	**317**	**326**	**337**	**405**	**336**	**340**	**342**

Note: Figures for 2007 & 2008 are provisional & subject to reconciliation with DGMS.

c. Company-wise Fatal Accidents, Fatalities, Serious Accidents & Serious Injuries since last meeting (14.2.2008) till 31.12.2008

Company	Fatal Accidents	Fatalities	Serious Accidents	Serious Injuries
ECL	8	8	106	107
BCCL	9	9	91	91
CCL	4	4	10	10
NCL	6	10	25	26
WCL	10	12	40	41
SECL	9	10	60	60
MCL	4	4	4	4
NEC	2	7	1	3
CIL	**52**	**64**	**337**	**342**

d. Company-wise Cause-wise Fatal Accidents & Fatalities in CIL for last 4 years

COMPANY	YEAR	ROOF/SIDE FALLS		HAULAGE, WINDING, CONVEYOR		TRUCKS, WAGONS & DUMPERS		NON-TRANSPT M/C		EXPLO-SIVES		ELECTRI-CITY		OTHERS		TOTAL	
		A	F	A	F	A	F	A	F	A	F	A	F	A	F	A	F
ECL	2005	5	6	4	4	4	4	2	2	0	0	0	0	1	1	16	17
	2006	3	8	3	3	1	1	0	0	0	0	1	1	0	0	8	13
	2007	3	3	1	1	2	3	0	0	1	1	0	0	0	0	7	8
	2008	1	1	0	0	3	3	2	2	0	0	1	1	1	1	8	8
BCCL	2005	7	12	1	1	0	0	1	1	0	0	2	2	3	3	14	19
	2006	2	2	0	0	2	2	1	1	0	0	1	1	6	55	12	61
	2007	3	3	1	1	2	2	0	0	0	0	3	3	1	1	10	10
	2008	6	6	0	0	0	0	1	1	0	0	0	0	2	2	9	9
CCL	2005	1	1	1	1	2	3	1	1	0	0	0	0	2	15	7	21
	2006	0	0	1	1	2	2	0	0	0	0	0	0	2	2	5	5
	2007	0	0	0	0	2	3	1	1	0	0	1	1	3	3	7	8
	2008	0	0	0	0	0	0	1	1	1	1	0	0	2	2	4	4
NCL	2005	0	0	0	0	0	0	1	1	0	0	0	0	2	2	3	3
	2006	0	0	0	0	3	4	0	0	0	0	0	0	1	1	4	5
	2007	0	0	0	0	2	2	1	1	0	0	0	0	2	2	5	5
	2008	1	5	0	0	3	3	1	1	0	0	0	0	1	1	6	10
WCL	2005	3	3	3	3	3	3	1	1	0	0	0	0	1	1	11	11
	2006	1	1	4	4	1	1	1	1	0	0	0	0	6	6	13	13
	2007	4	4	1	1	5	5	1	1	0	0	0	0	1	1	12	12
	2008	4	6	1	1	3	3	1	1	0	0	0	0	1	1	10	12
SECL	2005	4	5	2	2	4	4	2	2	2	2	0	0	0	0	14	15
	2006	2	2	1	1	0	0	3	3	0	0	0	0	1	1	7	7
	2007	4	4	0	0	2	2	2	2	0	0	0	0	2	2	10	10
	2008	4	5	0	0	3	3	2	2	0	0	0	0	0	0	9	10
MCL	2005	3	3	0	0	3	3	4	4	0	0	0	0	0	0	10	10
	2006	1	1	0	0	1	1	0	0	0	0	0	0	0	0	2	2
	2007	0	0	0	0	3	3	0	0	0	0	0	0	1	1	4	4
	2008	1	1	0	0	2	2	1	1	0	0	0	0	0	0	4	4
NEC	2005	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0	1	2	1	5	2	7
CIL	**2005**	**23**	**30**	**11**	**11**	**17**	**18**	**12**	**12**	**2**	**2**	**2**	**2**	**10**	**23**	**76**	**97**
	2006	**9**	**14**	**9**	**9**	**10**	**11**	**5**	**5**	**0**	**0**	**2**	**2**	**16**	**65**	**51**	**106**
	2007	**14**	**14**	**3**	**3**	**18**	**20**	**5**	**5**	**1**	**1**	**4**	**4**	**10**	**10**	**55**	**57**
	2008	**17**	**24**	**1**	**1**	**14**	**14**	**9**	**9**	**1**	**1**	**2**	**3**	**8**	**12**	**52**	**64**

Note: "Others"- Includes 'fall of object / person',' fall of partings', 'Gas, dust, etc', 'Miscellaneous' & 'Inundation'. A = No. of Fata Accidents F = No. of Fatalities

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e. Company-wise Cause-wise Serious Accidents & Serious Injuries in CIL

COMPANY	YEAR	Roof/side Falls		Haulage, Conveyor & Winding		Trucks, Dumpers & Wagons		Non-transport m/cs		Explosives		Electricity		Others		Total	
		A	I	A	I	A	I	A	I	A	I	A	I	A	I	A	I
ECL	2005	11	11	4	4	2	2	3	3	0	0	1	1	102	104	123	125
	2006	13	14	11	12	0	0	2	2	0	0	0	0	76	77	102	105
	2007	7	8	18	21	1	1	3	3	1	1	0	0	75	81	105	115
	2008	7	8	15	15	3	3	2	2	0	0	0	0	79	79	106	107
BCCL	2005	12	17	15	15	2	2	5	5	0	0	0	0	37	37	71	76
	2006	6	7	12	12	2	2	1	1	2	2	0	0	22	23	45	47
	2007	4	4	13	13	3	3	4	4	0	0	1	1	41	41	66	66
	2008	11	11	21	21	5	5	2	2	0	0	0	0	52	52	91	91
CCL	2005	2	2	1	1	5	5	5	5	0	0	0	0	11	11	24	24
	2006	0	0	0	0	1	1	3	3	0	0	0	0	14	15	18	19
	2007	1	1	0	0	4	4	5	5	0	0	0	0	6	6	16	16
	2008	1	1	2	2	3	3	1	1	0	0	0	0	3	3	10	10
NCL	2005	0	0	2	2	5	6	2	2	0	0	0	0	9	9	18	19
	2006	0	0	0	0	2	2	1	1	1	1	0	0	11	11	15	15
	2007	0	0	0	0	4	4	0	0	0	0	0	0	6	6	10	10
	2008	0	0	0	0	8	8	4	4	0	0	3	3	10	11	25	26
WCL	2005	10	10	9	9	1	2	1	1	0	0	0	0	26	26	47	48
	2006	8	10	3	3	3	3	4	4	0	0	0	0	39	40	57	60
	2007	10	10	4	4	4	4	2	2	0	0	0	0	40	41	60	61
	2008	5	6	5	5	2	2	1	1	0	0	0	0	27	27	40	41
SECL	2005	16	19	9	10	8	9	9	9	0	0	2	2	49	49	93	98
	2006	11	13	13	13	3	4	5	5	0	0	0	0	37	37	69	72
	2007	5	5	7	7	4	5	6	7	1	1	0	0	37	38	60	63
	2008	13	13	5	5	0	0	3	3	0	0	0	0	39	39	60	60
MCL	2005	2	2	0	0	3	3	4	4	0	0	0	0	4	4	13	13
	2006	0	0	3	3	1	8	0	0	0	0	0	0	6	6	10	17
	2007	0	0	1	1	1	1	4	4	2	2	0	0	1	1	9	9
	2008	0	0	0	0	2	2	1	1	0	0	0	0	1	1	4	4
NEC	2005	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2
	2006	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2008	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3
CIL	**2005**	**53**	**61**	**40**	**41**	**26**	**29**	**29**	**29**	**0**	**0**	**3**	**3**	**240**	**242**	**391**	**405**
	2006	**38**	**44**	**42**	**43**	**12**	**20**	**16**	**16**	**3**	**3**	**0**	**0**	**206**	**210**	**317**	**336**
	2007	**27**	**28**	**43**	**46**	**21**	**22**	**24**	**25**	**4**	**4**	**1**	**1**	**206**	**214**	**326**	**340**
	2008	**37**	**39**	**48**	**48**	**23**	**23**	**14**	**14**	**0**	**0**	**3**	**3**	**214**	**215**	**339**	**342**

A = No. of Serious accidents I = No. of Persons suffered Serious Injuries

f. Company-wise Place-wise Number of Fatal Accidents during the last 4 years

Company	Underground				Opencast				Surface				Total			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
ECL	8	7	5	3	2	1	2	2	6	0	0	3	16	8	7	8
BCCL	10	7	4	7	1	4	2	2	3	1	4	0	14	12	10	9
CCL	2	2	0	0	4	2	5	3	1	1	2	1	7	5	7	4
NCL	0	0	0	0	1	4	3	6	2	0	2	0	3	4	5	6
WCL	6	7	5	6	4	0	7	4	1	6	0	0	11	13	12	10
SECL	7	3	5	6	5	3	3	1	2	1	2	2	14	7	10	9
MCL	3	1	0	1	4	1	2	2	3	0	2	1	10	2	4	4
NEC	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	2
CIL	**37**	**27**	**19**	**24**	**21**	**15**	**24**	**20**	**18**	**9**	**12**	**8**	**76**	**51**	**55**	**52**

g. Company-wise Place-wise Number of Fatalities in CIL during the last 4 years

Company	Underground				Opencast				Surface				Total			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
ECL	9	12	5	3	2	1	3	2	6	0	0	3	17	13	8	8
BCCL	15	56	4	7	1	4	2	2	3	1	4	0	19	61	10	9
CCL	15	2	0	0	5	2	6	3	1	1	2	1	21	5	8	4
NCL	0	0	0	0	1	5	3	10	2	0	2	0	3	5	5	10
WCL	6	7	5	8	4	0	7	3	1	0	0	1	11	7	12	12
SECL	8	3	5	7	5	3	3	1	2	6	2	2	15	12	10	10
MCL	3	1	0	1	4	1	3	2	3	1	1	1	10	3	4	4
NEC	1	0	0	5	0	0	0	0	0	0	0	2	1	0	0	7
CIL	**57**	**81**	**19**	**31**	**22**	**16**	**27**	**23**	**18**	**9**	**11**	**10**	**97**	**106**	**57**	**64**

2. NEYVELI LIGNITE CORPORATION (NLC)

a. Accidents Statistics for Last 4 Years

Sl. No	Parameters	2005	2006	2007	2008
1	Fatal accidents	1	5	2	2
2	Fatalities	1	5	2	2
3	Serious accidents	5	6	4	3
4	Serious injuries	5	6	7	3
5	Fatality rate per Million tonnes of production	0.05	0.26	0.09	0.10
6	Fatality rate per 3 Lakh man shifts deployed	0.08	0.37	0.14	0.14
7	Serious injury rate per Million tonnes of Production	0.23	0.31	0.31	0.15
8	Serious injury rate 3 lakhs man shifts deployed	0.40	0.45	0.49	0.21

b. Cause wise Break-up

YEAR	Haulage, Winding, Conveyor		Non-Transport M/C		Others		Total	
	A	F	A	F	A	F	A	F
2005	-	-	-	-	1	1	1	1
2006	1	1	-	-	5	5	6	6
2007	-	-	1	1	1	1	2	2
2008	-	-	-	-	2	2	2	2

A - Accident *F - Fatality*

3 SINGARENI COLLIERIES COMPANY LTD (SCCL)

a. Safety statistics Statistics for Last 4 Years

Sl No	Parameters	2005	2006	2007	2008	2009 upto 31.1.09
1	Fatal Accidents	12	16	10	12	**1**
2	Fatalities	12	19	10	13	**1**
3	Serious Accidents	787	620	556	427	**28**
4	Serious Injuries	789	624	561	429	**28**
5	Fatality rate per Mt Of Coal Production	0.35	0.50	0.24	0.30	**0.25**
6	Fatality rate per 3 lakh manshifts deployed	0.18	0.32	0.18	0.26	**0.24**
7	Serious Injury rate per Mt. of Coal production	22.17	16.55	13.52	9.92	**6.95**
8	Serious Injury rate 3 lakh manshifts deployed	11.95	10.58	10.25	8.47	**6.64**

b. Place wise break-up

Year	Underground		Opencast		Surface		Total	
	Accident	Fatality	Accident	Fatality	Accident	Fatality	Accident	Fatality
2005	8	8	3	3	1	1	12	12
2006	12	15	3	3	1	1	16	19
2007	4	4	5	5	1	1	10	10
2008	4	4	5	6	3	3	12	13
2009	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**

Note: Figures for the year 2009 are up to 31st January 2009

c. Cause wise Fatalities

Year	Roof Fall/ side fall		Haulage, Winding, Conveyor		Trucks, Dumpers		Non-Transport M/c.		Explosives		Electricity		Others		Total	
	A	F	A	F	A	F	A	F	A	F	A	F	A	F	A	F
2005	2	2	3	3	-	-	4	4	-	-	1	1	2	2	12	12
2006	7	10	5	5	-	-	1	1	-	-	1	1	2	2	16	19
2007	2	2	1	1	3	3	3	3	-	-	-	-	1	1	10	10
2008	2	2	1	1	3	4	1	1	-	-	1	1	4	4	12	13
2009	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**

Note: Figures for the year 2009 are up to 31st January 2009
A = Accident F = Fatality

4 DVC

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal accidents	1	NIL		
2.	Fatalities	1			
3.	Serious accidents	1			
4.	Serious injuries	1			

5 TATA STEEL

Figures have been provided for Jharia Division only. It seems statistics of opencast mine have not been furnished.

a. Accidents Statistics for Last 4 Years

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal Accidents	2	3	1	Nil
2.	Fatalities	2	4	1	Nil
3.	Serious Accidents	2	1	2	2
4.	Serious Injuries	2	1	2	2
5.	Fatality rate per Mt of coal production	1.20	2.60	0.65	Nil
6.	Fatality rate per 3 lakh man shifts deployed	0.22	0.47	0.12	Nil
7.	Serious injury rate per Mt. of coal production	1.20	0.65	1.30	1.27
8.	Serious injury rate 3 lakh man shifts deployed.	0.22	0.12	0.24	0.24

b. Cause wise fatalities

Year	Roof fall/side fall		Haulage, Winding, Conveyor		Others		Total	
	A	F	A	F	A	F	A	F
2005	-	-	1	1	1	1	2	2
2006	1	2	-	-	2	2	3	4
2007	1	1	-	-	-	-	1	1
2008	NIL							

c. Cause wise serious injuries

Year	Roof fall/ Side fall		Haulage, Winding, Conveyor		Total	
	Accidents	**Injury**	**Accidents**	**Injury**	**Accidents**	**Injury**
2005	2	2	-	-	2	2
2006	1	1	-	-	1	1
2007	2	2	-	-	2	2
2008	1	1	1	1	2	2

6 BENGAL EMTA COAL MINES LTD (BECML)

Accidents Statistics for Last 4 Years

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal Accidents	0	0	0	0
2.	Fatalities	0	0	0	0
3.	Serious Accidents	2	3	2	0
4.	Serious Injuries	2	3	2	0
5.	Fatality rate per Mt. of coal production	0	0	0	0
6.	Fatality rate per 3 lakh man shifts deployed	0	0	0	0
7.	Serious injury rate per Mt. of coal production	0.04	0.06	0.04	0.00
8.	Serious injury rate 3 lakh man shifts deployed.	0.40	0.50	0.40	0.00

7 GUJARAT INDUSTRIES POWER COMPANY LTD. (GIPCL)

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal Accidents	**NIL**		1	Nil
2.	Fatalities			1	
3.	Serious Accidents			Nil	1
4.	Serious Injuries				1
5.	Fatality rate per Mt. of coal production			0.57	Nil
6.	Fatality rate per 3 lakh man shifts deployed			2.9	
7.	Serious injury rate per Mt. of coal production			Nil	0.76
8.	Serious injury rate 3 lakh man shifts deployed.				17.71

8 INTEGRATED COAL MINING LIMITED (ICML)

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal Accidents	1		Nil	
2.	Fatalities	1			
3.	Serious Accidents	Nil			

9 RAJASTHAN STATE MINES & MINERALS LTD. (RSMM)

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal Accidents		Nil		
2.	Fatalities				
3.	Serious Accidents				

10 JHARKHAND STATE MINERAL DEVELOPMENT CORPORATION LIMITED (JSMDCL)

Sl. No.	Parameters	2005	2006	2007	2008
1.	Fatal Accidents	Nil	1	Nil	Nil
2.	Fatalities		1		
3.	Serious Accidents		Nil		

11. Accident Statistics of Coal & Lignite Mines in India

Company	Year	Fatal Accidents	Fatalities	Serious Accidents	Serious Injuries
CIL	2005	76	97	391	405
	2006	51	106	317	336
	2007	55	57	326	340
	2008	52	64	337	342
JSMDC	2005	0	0	0	0
	2006	1	1	0	0
	2007	0	0	0	0
	2008	0	0	0	0
DVC	2005	1	1	1	1

Company	Year	Fatal Accidents	Fatalities	Serious Accidents	Serious Injuries
	2006	0	0	0	0
	2007	0	0	0	0
	2008	0	0	0	0
GMDC	2005	1	1	1	1
	2006	0	0	1	1
	2007	0	0	0	0
	2008	2	2	0	0
IISCO	2005	1	1	0	0
	2006	2	2	1	2
	2007	0	0	2	2
	2008	0	0	1	1
J&K	2005	0	0	1	3
	2006	0	0	0	0
	2007	0	0	0	0
	2008	0	0	0	0
NLC	2005	1	1	2	3
	2006	5	5	1	1
	2007	2	2	0	0
	2008	2	2	3	3
SCCL	2005	11	11	795	800
	2006	16	19	557	564
	2007	12	12	566	574
	2008	12	13	427	429
Tata Steel	2005	2	2	2	2
	2006	3	4	1	1
	2007	1	1	2	2
	2008	0	0	4	5
GIPCL	2005	0	0	0	0
	2006	0	0	0	0
	2007	1	1	0	0
	2008	0	0	1	1
ICML	2005	1	1	0	0
	2006	0	0	0	0
	2007	0	0	0	0
	2008	0	0	0	0
MIL	2005	2	2	0	0
	2006	0	0	1	1
	2007	1	1	0	0
	2008	1	1	0	0
Total India	2005	95	116	1192	1214
	2006	78	137	878	905
	2007	73	75	896	918
	2008	67	80	774	782

Note : Source DGMS / Coal Companies

Figures for 2008 for JSMDC, GMDC, IISCO, Tata Steel, J&K, ICML & MIL are upto 31-8-2008 only.

ITEM - V

COAL INDIA LIMITED (CIL)

Analysis of Major Accidents That Occurred During Recent Past

1. An accident involving **5 fatalities occurred in Northern Coalfields Limited (NCL)** at about 5.40 AM in the first shift of **17.12.2008** due to collapse of the Dragline Overburden Dump measuring 200 m length x 70 m width x 20 m height into coal face burying persons who had gone into the western side coal face for starting coal production of first shift. The following workmen lost their lives:-

(i) Shri Sree Ram Kori, Mining Sirdar (Age about 57 years)
(ii) Shri Kolahal Yadav, Sr. Dumper Operator, (Age about 50 years)
(iii) Shri Lal Jee Sahu, Shovel Operator (Age about 53 years)
(iv) Shri Mani Ram Baish, Shovel Operator (Age about 44 years)
(v) Shri Mani Kant, General Mazdoor, Cat. II (Age about 48 years)

Brief cause of accident:

The coal rib of about 15 m thick left against the dragline dump collapsed. Thereby approximately three lakh cum of loose debris of OB Dump along with coal buried the truck in which the above persons reached the coal face.

Action Taken

a) On receipt of information, NCL management requisitioned three numbers of Hydraulic Backhoe Excavators from nearby NCL mines and ten numbers of Dump Trucks with four numbers of Dozers so as to remove the OB Debris to locate the buried workmen. Limited space restricted deployment of more machines.

b) Special geo-seismic equipment including ground penetrating radar was brought from Central Institute of Mining & Fuel Research (CIMFR), Dhanbad and Central Mine Planning and Design Institute (CMPDI). Sniffer dogs were also deployed to speed up the rescue and recovery operation.

An internal ISO Enquiry Committee from NCL headed by a CGM has been constituted by the Competent Authority. Enquiry is in progress. Also Technical Experts from Central Institute of Mining & Fuel Research (CIMFR), Dhanbad are working to find out the causes of failure of OB dump. Director General of Mines Safety (DGMS) is also conducting statutory inquiry of this accident as per provisions made under Mines Act –1952.

A High Power Committee has also been constituted to carry out indepth examination of the accident comprising of the following:

a. Shri A.K. Singh, CMD, CMPDIL, Ranchi -- Chairman
b. Shri Om Prakash, Director (Technical), WCL -- Member

c.	Dr. V.K. Singh, Head of Slope Stability Division, CMRI, Dhanbad	-- Member
d.	Prof. I. Roy, BIT, Mesra	-- Member
e.	Shri P.K. Chatterjee, ED (S&R), CIL	-- Member Secretary

The following aspects to be examined by the Committee :

i. Cause of the accident;

ii. Human failure, if any;

iii. Whether the accident could have been avoided by taking identified corrective measure; and

iv. Measures to avoid recurrence of such accident in future in Jayant Project and other mines with similar working in NCL.

34Report of the Committee is yet to be submitted.

2. A dangerous occurrence leading to major accident in the 3rd shift of 3.11.2008 in Panel No. E-10/20/P-1 at **Ledo Colliery of North Eastern Coalfields occurred on 4.11.2008 at about 5.30 AM involving injuries to 19 persons and subsequent fatalities of 5 workmen** amongst them inflicted with burn injuries.

At about 5.30 AM on 04-11-2008 (in the 3rd shift of 03.11.2008) a dangerous Air Blast has occurred in the goaf of panel No. P 1 (sub panel 3) between -7 level and -8 level of 20 ft seam in LEDO underground mine in which 19 (nineteen) persons have been affected and injured by hot air expelled from the goaf. All affected workers have rescued from accident place by 9.30 a.m. and sent to Central Hospital, Margherita and other nearby hospitals for further treatment.

The accident was enquired into by Mine Safety Director, Sitarampur Area – 2 on 5, 6, 8, 26, 27, 28 & 29.11.2008 and 22.12.2008. The inquiry revealed that while 27 persons were engaged in a depillaring panel (being worked by "scrapper-assisted chamber method")of a Degree III gassy seam, also highly susceptible to heating, overhanging roof from adjoining improperly sealed off chambers, measuring about 1000-1200 m2, fell from a height of 7.3 m, expelling accumulated hot methane / inflammable gas and heated / burning coal particles to cause an explosion, in turn causing burn-injuries to 12 persons and minor injuries to 7 other persons. 5 persons succumbed to their injuries whilst undergoing treatment at various hospitals. Eight other persons escaped un-hurt.

The enquiry further revealed that had continuous environmental monitoring, paying special attention to influx of methane and carbon mono oxide from the goaf area, been done to ascertain environmental conditions in the depillaring district as well as in the improperly isolated goaves, as called for by clause 11 of Directorate's letter No. S2/As/Coal/24/Perm-07/1268 dated 23.5.2007, granting permission under Regulation 100A of the Coal Mines Regulation, 1957, and,

(ii) Stoppings to isolate the sub-panels been constructed to prevent breathing in of air into goaves and resultant spontaneous beating therein, in accordance with the provisions of Regulation 118A (1) of the Coal Mines Regulations, 1957 read with this DGMS

Technical Circular No. 3 of 1988 clauses 2, 20. 21 & 22 of Directorate's letter No. S2/As/Coal/24/Perm-07/1268 dated 23.5.2007, granting permission under Regulation 100A of the Coal Mines Regulations, 1957, and,

(iii) Adequate number of convergence recorders been installed in the vicinity of pillar under extraction to fore-warn from dangers arising from any chanceof air blast due to any dangerous arising from any chance of air blast due to any dangerous overhanging of roof in the goaf, as called for by the provisions of Regulation 100(5) of the Coal Mines Regulations, 1957, read with DGMS Technical CircularNo. 2 of 1988 & Clause 2.0 & 8.7 of Directorate's letter No. S2/As/Coal/24/Perm-07/1268 dated 23.5.2007, granting permission under Regulation 100A of the Coal Mines Regulations, 1957.

The ISO report observed certain lapses due to failure on the part of the local management. The Agent of the mine was suspended and GM & CGM were issued Show Cause Notices.

The detailed inquiry is in progress.

ITEM - VIII

Requirement of statutory personnel and Action taken to fill up the shortage

COAL INDIA LIMITED (CIL)

Executive: Assistant Manager - 1st Class & 2nd Class

Category	Company	Appointment made during 2008-09	Existing as on 31/3/08	Requirement as on 31/3/08
1st class Asst Manager	ECL	Nil	101	102
	BCCL		90	101
	CCL		318	315
	NCL		162	110
	WCL		378	255
	SECL		366	350
	MCL		110	80
	NEC		10	10
	CIL		**1535**	**1323**
2nd class Asst Manager	ECL	Nil	357	437
	BCCL		274	381
	CCL		287	438
	NCL		130	244
	WCL		362	480
	SECL		454	507
	MCL		104	183
	NEC		21	21
	CIL		**1989**	**2691**

Non-executive: Overman, Mining Sirder & Surveyor

Category	Company	Appointment made during 2008-09	Existing as on 31/3/08	Requirement as on 31/3/08
Overman	**ECL**	0	1112	1326
	BCCL	8	771	1158
	CCL	19	493	608
	NCL	39	241	341
	WCL	0	958	1152
	SECL	0	1169	1318
	MCL	9	391	444
	NEC	7	40	55
	CIL	**82**	**5175**	**6402**
Mining Sirdar	**ECL**	0	1474	2020
	BCCL	14	1342	1819
	CCL	75	795	820
	NCL	4	139	165
	WCL	8	1315	1819
	SECL	136	1931	2028
	MCL	31	337	483
	NEC	5	111	132
	CIL	**273**	**7444**	**9286**

Category	Company	Appointment made during 2008-09	Existing as on 31/3/08	Requirement as on 31/3/08
Surveyor	**ECL**	0	156	188
	BCCL	0	82	95
	CCL	5	119	119
	NCL	0	17	23
	WCL	4	167	190
	SECL	19	263	295
	MCL	2	51	57
	NEC	2	6	8
	CIL	**32**	**861**	**975**

NEYVELI LIGNITE CORPORATION (NLC)

Category	Requirement#	Existing#	Surplus / Shortfall
Asst. Manager (1st Class)	19	17	(-) 2
Asst. Manager (2nd Class)	112	85*	(-) 27
Overman	123	38	(-) 85^
Mining Sirdar	-	4	+4
Surveyor	14	11	(-) 3

Note:- Figures are as on 31st Jan'09

Based on relaxation, requirement & actual strength of statutory manpower.

*10 Asst. Managers from Mine-I and 13 Asst. Managers from Mine-II are on deputation to underground mines training to acquire First Class Manager's Certificate.

^Necessary action has already been taken to recruit 50 Nos. Overman / Foreman.

SINGARENI COLLIERIES COMPANY LIMITED (SCCL)

Recruitment and promotion is a continuous process. This is being reviewed twice a year keeping in view of retirement/ resignation etc., and in addition to this process, recruitment also made as and when requirement arises to carryout mining operations safely.

The requirement and existing strength of statutory manpower as on 31.01.2009 is as follows:

DETAILS OF STATUTORY MANPOWER

Class/Category	Requirement as on 31.01.2009	Existing strength as on 31.01.2009
Mining (First Class Mine Manager Certificate)	319	371
Mining (Second Class Mine Manager Certificate)	518	536 (Includes 114 MGT/GMEs)
Overmen	1172	1114 (Includes 47 JMETs)
Mining sirdar	1497	1546
Surveyor	191	192 (Includes 17 trainees)
Electrical Supervisors	304	298 (Includes 46 AFM(T)
Mechanical Supervisors	339	314 (Includes 42 AFM(T)

MGT= Management Graduate Trainees; GME=Graduate Mining Engineers;
JMET= Junior Mining Engineer Trainees; AFM (T)= Asst. Foreman Trainee.
(up to Jan.09)

In addition to the above, the following are selected and are undergoing training.
JMET's Recruited: 93; AFM (Mech.): 30; AFM(Elec.): 30.

TATA STEEL

Category	Appt. made in 2007	Appt. made in 2008 (as on date)	Existing As on 31.12.08	Req. As on 31.12.08
Asst. Mgr. (1-st class)	1	__	19	17
Asst. Mgr. (2-nd class)	11	21	41	30
Over man	6	6	122	88
Elec. & Mech. Supervisor	2	4	107	96
Mining Sirdir	13	9	222	155
Surveyor	---	---	12	10

ICML

Category	Existing as on 31.12.2008	Requirement as on 31.12.2008
Asst. Manager (1st Class)	2	2
Asst. Manager (2nd Class)	7	7
Overman	16	13
Mining Sirdar	18	16
Surveyor	3	1

GIPCL

Category	Existing As on 31.3.08	Appointment made during 2008-09	Additional Requirement
Asst. Mgr. (1-st class)	2	1	Nil
Asst. Mgr. (2-nd class)	8	5	Nil
Over man	19	4	Nil
Mining Sirdir	--	--	--
Surveyor	1	2	2

ITEM - IX

Safety Budget and its Utilization

NEYVELI LIGNITE CORPORATION

Amount in Rs. Lakhs

Year	Capital		Revenue	
	Budget	Actual Expr.	Budget	Actual Expr.
2005-06	244.30	184.23	429.40	360.55
2006-07	365.50	300.00	400.00	360.00
2007-08	914.75	619.34	400.00	343.00
2008-09 Upto Jan'09	296.15	About 190.00	400.00	About 270.00

DAMODAR VALLEY CORPORATION

Safety Budget provision is available for expenditure on safety and for procurement of safety items/equipment. The fund available in Safety budget is properly utilized. No safety work has so far been hampered due to non-availability of budget.

Amount in Rs. Lakhs

Year	Capital		Revenue	
	Budget	Actual Expr.	Budget	Actual Expr.
2005-06	Nil		7.00	6.20
2006-07			7.00	5.96
2007-08			7.00	5.00
2008-09 Upto Jan'09			7.00	2.85

RAJASTHAN STATE MINES & MINERALS LTD.

Sufficient funds for safety are being provided by the company

Amount in Rs. Lakhs

Year	Capital		Revenue	
	Budget	Actual Expr.	Budget	Actual Expr.
2005-06	Nil	Nil	39.80	39.29
2006-07			48.78	29.72
2007-08			35.50	64.00
2008-09	35.00	24.40	83.51	0.66

INTEGRATED COAL MINING LIMITED (ICML)

Amount in Rs. Lakhs

Year	Capital		Revenue	
	Budget	Actual Expr.	Budget	Actual Expr.
2005-06	No Restriction	83.17	No Restriction	306.96
2006-07		96.47		335.34
2007-08		127.22		276.66
2008-09		69.86		158.90

Note : Figures for 2008-09 are upto 31.08.08

ITEM – XII

Recommendations of 10th Conference on Safety in Coal Mine held on 26/27th November 2007

A guideline on Safety Management System has been received from MoLE / DGMS. The same have been reproduced below for the information of the Hon'ble Members:

SAFETY MANAGEMENT SYSTEM (A Guideline for Implementation)

The Ninth Conference on Safety in Mines recommended adopting Risk Management as a tool for development of appropriate health & safety management systems in Indian mines. It was further suggested that the risk assessment exercise should follow an appropriate process.

The Science & Technology division of Directorate-General of Mines Safety conducted several workshops on 'Risk Management' in Indian mines with the assistance of experts from Australian International Mines Safety Training Co. Pvt. Ltd., under an Indo-Australian Aid Project. Drawing inputs from inferences drawn from the workshops and synthesizing the same with international recommended practices, a document on 'Safety Management System – A guideline for implementation' has been prepared and enclosed as annexure-1 to Cir. Tech 13/2002. A Risk Management Plan, designed by the officials of a coal mine is given in the Annexure-II for understanding the actual process. This is given as guide only and need to be tailored for specific requirements.

The DGMS has advised mine managements to undertake a formal risk assessment process with the help of above guidelines. It should be followed by preparation of 'Risk Management Plans' and implementation thereof aimed at reducing the likelihood and impact of mishaps of all kinds in Indian mines.

Safety Management System – A Guideline for Implementation

Background

Indian Mining Industry makes a major contribution to the national economy and to the well being of the society as a whole. The country's mineral industry represents a unique mix of very small to medium to large mines. Currently there are 596 coal mines, 40 oil projects and a large number of non-coal mines with more than 6000 being in record under the Mines Act (however the figure is estimated to be much larger). Besides, there are innumerable small quarries restricted to shallow depth and employing a small number of persons and do not fall under the purview of the Mines Act. Total workforce of the mining industry in India consists of about one million. For the continuing viability and stability of the industry, it is important that full advantage be taken of developments in mining methods & procedures, modern machinery & equipment and advances in approaches to management of all mining activities, including health & safety.

While safety in any sphere of activities is important, it has special significance when the risk is greater. Unlike the major industries, mining has high potential risk of accidents. It has a dubious distinction of involving a very high actual hazard as the environment changes continually with the progress of work. It is, therefore, not possible for any external agency to ensure safety of any mine. The principal responsibility for the safety and good health of workers employed in mines rests with the management of that mine.

The present day environment demands to have a fresh look at *Safety Management* as a structured process composed of well defined systems that emphasize continuous improvement in work quality, health, welfare and productivity of workforce engaged in mineral industry through setting up of improved safety standards and their effective implementation and administration. Because the statutory provisions can never be fully comprehensive, appropriate and site specific and because the process of Legislation Making is often slow, these often trail behind the technological innovations. Trend, world over is, therefore, to make the statutory provisions 'Flexible' by switching over from the regime of *Prescriptive Regulation to Self Regulatory of Goal Setting Legislation.* It is now widely accepted world over that the concept of *Risk management* through *Risk assessment* contributes greatly towards achieving these objectives Considering the accident scenario in Indian Mining Industry, it has now become essential that risk assessment be undertaken of all hazardous operations, equipment and machinery, taking account of the procedures used, maintenance, supervision and management. Introduction of risk management as a tool for development of good health and safety management system is a beakthrough in the traditional strategy as it differs from the existing one by involving the entire staff in the realization of safety improvement programme with responsibility and accountability sharing proportionate to the decision making authority. The system is sure to be an effective tool for improvement of health and safety scenario in our mining industry. The Risk assessment process will identify all the existing and probable hazards in the work environment and in all operations, assess the risk levels of those hazards in order to prioritise which hazard needs immediate attention for redressal, where maintenance of ongoing management will be sufficient and which are of very milk nature. Then for managing these risks, different Mechanisms (underlying causes) responsible for these hazards are identified and their control measures, set to timetable, are recorded pinpointing the responsibilities.

Further, the monitoring and auditing at regular interval recommended as a part of the system would ensure that safe operating procedures are followed, evaluated, corrected, standardized and documented training procedures for workers and executives are in place and are carried out regularly, and commitment to health and safety is demonstrated at all levels of organization. On implementation of the system, an appropriate safety level in each stage of operation may be obtained by a systematic and documented management system with well-defined responsibility and accountability for safety among the mine employees.

Guidelines for Implementation

The guideline is structured in the following way :

1. Objective
2. Structure (Strategic, Management, Operations)
3. Process for Hazard Identification & Risk Assessment
4. Appendices.

1. Objective of the Guideline

This Guideline is to assist mines put a renewed focus on managing health and safety in their workplace.

The risk of various hazards arising in any mine ranges from almost zero to very high depending upon the deposit being worked, the complexity & size of mining operation as well as the conditions under which this is done and culture of the mines. Whilst many of these are

mitigated by following the Standards, the aim of this Guideline is to introduce new methods to assess and manage hazards in mines.

The Safety Management System established by a mine must ensure all risks are identified and critical risks are controlled to ensure long-term health and safety.

A Safety Management System should set the culture, framework and actions necessary to ensure that mining operations are carried out safely.

In order to turn these commonly agreed principles into an effective safety management system for the mine, the system may include the following elements –

- Health & Safety Policy of the company and the mine
- Roles and Responsibilities of all levels in the organization
- Specified competencies of staff
- Safety Committee, formation and role
- Method to identify and control high risk
- Forward Programme to ensure actions to control hazards are carried out
- Emergency Preparedness to cope with a hazard if it should occur.
- Monitoring processes for all identified hazards with or without residual risks.
- Identification of trigger points and resultant actions if these are reached.
- Safety clearance for new equipment, work methods and materials used.
- Accident Statistics collection, analysis & actions.
- Reporting and record keeping requirements
- Auditing and review processes

2. Structure of The Safety Management System

The basis for ensuring safe and healthy production depends primarily on –

2.0 Attitude of workforce at all levels

- Competent people
- Fit-for-purpose equipment
- Suitable work methods (or processes and procedures)
- Planned and controlled work environments

Good management will set standards to achieve these objectives and a suggested structure for the Safety Management System is summarized below and detailed in Sections 3 to 5.

2.1 Strategic Level

The following management strategies are required:

- Development of organization mission statement and policy, giving high regard to safety and production, strongly backed by management and owners.
- Have policies made by the organization that ensures health and safety a critical element in all mining activities.
- Delegate organizational responsibility to appropriate levels.
- Institute formal structures and committees to discuss and implement safety improvements.
- Establishing and maintaining the Safety Management System.

2.2 Management Level

Management is responsible to follow the strategic lead of the organization by:

- Implementing and managing site-specific Safety Management Plans.
- Identification of major hazards and assessment of risks.
- Managing hazard reduction plans.
- Defining appropriate roles and responsibilities.
- Having personnel with appropriate competencies for the work.
- Having site-specific and tested emergency processes in place.
- Providing appropriate guidelines, directives and training.
- Operation of formal structures and committees.

2.3 Operational Level

At operational level managers/safety officers, workmen inspectors and workers should –

- Assess risks associated with each step of all work.
- Develop and maintain a Manual outlining work safe standards and guidelines.
- Ensure personnel are trained to a competent level for each work task.
- Follow safe operational processes and procedures.
- Actively participate in safety committees and continuous improvement.

3.0 Strategic Level

3.1 Health & Safety Policy

The Mine Health and Safety Policy is a statement by the organization of its occupational health and safety philosophy and intentions. It provides a framework for action to achieve safety objectives and targets. The Policy should –

- Provide a mission and vision of a healthy and safe work place
- Be inclusive and understood by everybody in the mine
- Provide management commitment for –
  - A healthy and safe work place
  - Regular review of risks
  - Support for a Safety Management System (Safety Committee, Risk Assessment, Continuous Improvement etc.)
- Carry the expectation that mine management, supervisory staff and work persons willingly comply with it.

3.2 Safety Management - Rule and Responsibilities

Ensuring the safety of a mining operation is a complex task requiring the continued commitment of all personnel associated with the mine, as well as compliance with all safety legislation, guidelines and circulars. The effective management of safety within a mine includes the following –

- A sound Health & Safety Policy which is supported by all sectors of the mine.
- Clear roles and responsibilities of all personnel for safety
- A safety management programme and forward plan
- A safety work place design for jobs, equipment and materials
- Induction, training & continuous improvement of staff
- Hazard identification and control management
- Appropriate accident and emergency plants
- Effective accident/incident investigation and reporting
- Auditing of processes and outcomes against Policy
- Review of safety management plans

In the effective management of safety, all mine personnel have different roles to play but still have the same objective. They also share a duty of care to –

- Provide a safe place of work
- Provide proper equipment and facilities
- Have and follow a safe system of work
- Have competent staff and employees
- Look after fellow workers
- Take appropriate precautions (eg. Use of Personal Protective Equipment)
- Raise safety issues and continuously improve
- Have appropriate emergency procedures

The roles of the following Key Staff in the Safety system should be clearly spelt out in the safety management system as well as in all the lower levels of the plan:

Owner, Agent, Manager, Supervisor, Safety Officer, Workman Inspector, Trade Union Representative, Mechanic, Operator, Worker, Contractor and Contractor Management etc.

3.3. Safety Committee

The Safety Committee can have a significant role in effective Mine Safety Management. It contains representatives from all aspects of the mine, with a focus on ensuring and improving health and safety in the workplace. Whilst the committee's function is well defined in the Mines Rules, the Safety Plan needs to outline the operation of the Safety Committee to ensure committee members and the mines workforce are quite clear on its role, its responsibilities and objectives.

The types of areas to clarify are –

- The members of the Committee & their roles
- Key Responsibilities of the Committee to –
  - Improving health and safety in the workplace
  - Reviewing accident / incident reports & statistics
  - Identify hazards & the review of action plants
- Meeting arrangements for sub-committees, if formed
- Implementing & managing the Plan (schedule of activities)
- Reporting responsibilities and notice boards.

3.4 Overall Safety Management System and Plans

Activity	Frequency	Role - Action
Management	Annually	Set and review Mine Health & Safety (H&S) policy
	Annually	Lay basis for Safety and Hazard Management Plans
	Annually	Arrange for internal / external audits
Regular Health and	Annually	Review H & S policy set by management
Safety meeting	Annually	Implement/manage Safety/Hazard Management Plans
involving	Annually	Create and manage the Safety Manual
representation	Annually	Establish high risk areas/issues in mine for review
across the mine.	Annually	Set programme & responsibility for the forthcoming year for hazard review and other issues (eg. Training, job analysis, equipment assessment etc.)
	Quarterly	Review/Participate in new Hazard examinations
	Monthly	Review accident statistics and accident investigation, adverse incident analysis and make appropriate decisions.
	Monthly	Conduct site inspections
	Monthly	Raise matters of H & S concern
	Monthly	Report against Safety and Hazard Management Plan
	Special	Arrange special meetings as required

4.0 Management Level

4,1 Hazard Identification & Risk Management

The management of the mine should conduct a risk assessment process to identify any hazard that could influence the safety and health of workers of the mine.

For all hazards that pose a potential chance of multiple fatalities at one time and are not fully controlled, a *Hazard Management Plan* must be drawn up.

To operate mines safety all hazards must be quickly identified and controlled. Using a risk ranking process can assist mine staff to identify the highest risk hazards for attention. This process is summarized below and detailed in Section 7.

- Identity hazards
- Assess the risks posed by these hazards (risk ranking)
- Control or treat hazards to reduce unsafe or unhealthy situations

This technique should be used to assist effective management of safety in the workplace within the Safety Management Plan.

It should be noted that Hazard Identification and Risk Assessment should not be considered to be a once off occurrence but should be done at regular intervals to ensure that the plans to cope with the identified hazards are pertinent and up to date.

4.2 Safety Management Plan

The Safety Management Plan is a working document, which outlines all of the actions to be carried out to ensure safety and health at the work place. This document is fundamental to management of safety by the Health and Safety Committee and Management. The sort of issues which should be addressed in Safety Management Plan include –

- Important committee or safety related meeting dates
- Dates to review policies, manual or work procedures
- Dates required for major hazard analyses to be completed
- Outcomes or actions following review of hazards, accidents or statistics
- Actions, dates and responsibilities to complete agreed actions
- Achievement of actions

4.3 Safety Manual

Accompanying the Safety Management Plan should be a Safety Manual. This manual would outline the operational procedures to comply with the overall and specific hazard management plans.

It is the document that would be available to all workers on site and should enable them to be aware of not only this framework within which they have to do their work but also what is expected from them to ensure a safe and healthy work environment. It could contain –

- Relevant Acts, Regulations and Circulars
- Emergency Procedures
- Standing Orders
- Individual job procedures
- Process for introducing new methods, equipment or materials etc.
- Training requirements
- Hazard Identification and Risk Management Process
- Safety Management Forms (accident investigation, hazard analysis, reporting etc.)

- Medical examinations
- Entitlements for employees injured or suffering health impacts at the mine.

5.0 Operational Level

Occupational processes and safe operating procedures need to be made to suit the site-specific conditions of the mine. These needs to be simple and clear whilst meeting the requirements of legislation, regulations, Mine Standing Orders and recognize Hazards associated with that work. These operating procedures must form the basis for training and competency assessment of mine operators.

Typically, safe-operating procedures would be required for the following areas –

- Work associated with each step of the mine production and maintenance
- Roof Support methods and rules
- Explosives transport, storage, handling and usage
- Ore handling, storage and transport
- Traffic rules and safety on haul roads
- Rules for operating equipment
- Usage of Personal Protective Equipment and critical spots in the mine for dust, noise, heat, vibration, Illumination etc.
- Inspections supervisions and daily reporting requirements
- Emergencies
- Housekeeping rules

The safety management system should at all time be such that it promotes a process of **continuous improvement**.

Because of their status and immediacy to the job. Managers and Supervisors have a key safety role in the mine to ensure –

- The work environment is safe for workers
- Planned work methods are safe & followed
- All accidents & near misses are investigated
- Workers are competent & know their duties
- Adequate reporting on shift change-over occurs

6.0 Hazard Identification & Risk Assessment

6.1. Definition

Hazard	Source of potential harm, injury or loss.
Risk	Combination of the likelihood of a specific unwanted event and the potential consequences if it should occur.
Risk Assessment	A process that involves measurement of risk to determine priorities and to enable identification of appropriate level of risk Treatment (used also to describe the overall process of risk management).
Risk Control	Implementation of strategies to prevent or control hazards.
Risk Management	Overall description of the steps taken to manage risk, by identifying hazards and implementing controls in the workplace

6.2 Risk Assessment Process

Risk assessment is to be performed on a regular basis. The goal for each risk assessment session is to identify hazards, determine risk ratings and controls, and to review the implementation of risk controls from previous risk assessment sessions.

6.2.1 Assemble the Team

A team approach is recommended to establish hazards in the workplace. It is best to use a vertical wedge of employees (eg. Manager, engineer, safety officer, supervisor, worker) as well as workers from different aspects of the operation to provide different perspective or views, likelihood, consequence and controls that are both practical, feasible and cost effective. The members of the team should be varied from session to session to gain a broad perspective of the hazards across a site.

6.2.2 Identifying the Hazards

The process of identifying hazards is possibly the most important part of the whole risk assessment process. This can be done in many ways but the objective is to ensure that all of the possible hazards are identified.

Hazards are only discounted when they have been assessed not to pose a risk. Until that is done all possible hazards should be identified and noted down.

Normally the best process is to proceed step by step through a ask. A number of other processes can also be utilized –

- Previous experience of accidents or occurrences in the mine.
- Work process evaluation
- Consultation with employees who may have experience in the job
- Off-site specialists with experience at other mine site (consultants).
- Fault tree analysis to determine underlying issues and hazards that might not be evident at first glance.
- Safety statistics for this or other mines.
- Significant incident, near-miss or accident reports
- Inspections in the mine

Another method is to consider the hazards that could occur from an unwanted release of energy (eg. Mechanical, electrical, gravity, fluids or air, chemical, nuclear, heat, light, noise)

Decide how to divide up the workplace, e.g. –

- By activities (or processes) e.g. drilling & blasting, load and haul, crushing;
- By equipment, machinery be.g. mobile plant, trucks, conveyors, crushers;
- By geographical areas e.g. pit, compound, workshop;
- By specific job activity.

Look at specific issues and jobs. Break processes up into nodes. Examine each node independently and look at failure modes or things that can go wrong for each node. Examine accident-prone jobs or situations. Carry out a brainstorming exercise and visit the site, identify all hazards. Hazards will be identified that are likely or less likely, have major and minor impact and importance. At this stage collect, do not exclude ideas, be defensive or squash potential hazards that are raised. Record findings.

Notwithstanding whichever method is used for identification of the hazards, they should all be noted down so that a record of their existence is kept. This can be used to save time and

effort when further rounds of risk assessment are being done. Simple forms are provided in the Appendix for use.

There should also be a mechanism for reporting of hazards by staff as they are found which is separate from the format risk assessment process. Hazards are to be recorded before staff forgets about potential hazards, or are not selected for the risk assessment team.

6.2.3 Assessment of the Risk & Ranking

Objectives of risk ranking are to –

- Identify which risks are most in need of attention, and the options for achieving that risk reduction.
- Identify which risks need careful ongoing management, the nature of the ongoing management as well as the indicators that show that the risk is being managed.
- Identify triggers which might be used to monitor that hazard and initiate remedial action if elimination is not feasible.

The process of Risk Ranking is carried out by considering both the Likelihood of the occurrence of each Hazard and the potential Consequence should be Hazard occur. Each can be estimated or calculated by engineering principles. This will enable the risk ranking to be carried out. Risks are ranked according to the level of risk i.e. the highest risk to the lowest risk. It is important that the risks are ranked to identify those requiring immediate attention and maximize benefits from the efforts.

The risk of any hazard is dependent upon the chance that it will occur(likelihood) and the impact of an occurrence (consequence) :

Risk Score = Likelihood x Consequence

Consequence is the size of the **loss** or damage. In terms of health and safety, it is the degree of harm that could be caused to people exposed to the hazard, the potential severity of injuries or ill health and / or the number of people who could be potentially affected. It should be remembered that consequence of a hazard need not only be in terms of safety criteria but could also be in terms of a money loss, incurred costs, loss of production, environmental impacts as well as public outrange.

Likelihood - is the chance that the hazard might occur.

In some cases personnel are only exposed to the hazard for part of the time. A more detailed analysis can be carried out of the Risk Ranking by taking this into consideration. Replacing Likelihood by Exposure (% time personnel are present) and Probability (chance that they will be harmed).

Risk Score = Probability x Exposure x Consequence

The values used for Likelihood, Consequence. Exposure or Probability need to be agreed to by the risk assessment team.

Risk ranking can be determined by qualitative and quantitative means. It should however be remembered that none of these methods are best. The best choice of method will depend on the circumstances and preferences at the mine at the time the exercise is done. However regardless of the method, establishing Risk Ranking will set priorities for Hazard control. The most of important purpose in Hazard Identification, Risk Assessment and Ranking is to draw up and implement plans to control these hazards. However, keeping the acceptance of the participants during workshops conducted at different mines, a criteria table for Quantitative Risk ranking is given in Section 7.

These plans are then included in the Safety Management Plan.

6.2.4 Treatment, Controls and Action Plans

Examine the high priority risks. Consider the potential to reduce or eliminate the risk by using the hierarchy of controls. This assists establishing methods to reduce the risk. From experience, the effectiveness of each method is given as a percentage after each of the control descriptions.

Elimination : Remove step to eliminate the hazard completely (100%)

Substitution : Replace with less hazardous material, substance or process (75%)

Separation : Isolate hazard from person by guarding, space or time separation(50%)

Administration : Adjusting the time or conditions of risk exposures (30%)

Training : Improving skills making tasks less hazardous to persons involved (20%)

Personal protective equipment: Used as the last resort, appropriately designed and properly fitted equipment where other controls are not practicable (5%)

Control measures can reduce either the Likelihood or Consequence of the event or both. Depending on the level or reduction of the hazard there could still be residual risk that needs to be monitored so that a secondary prevention process can be initiated when trigger points are reached.

The team should develop an action plan recommending actions, responsibilities and when it should be completed. Put forward to decision-making authority and review if necessary. Make a decision to proceed.

Allocate tasks, monitor progress. Review implementation effectiveness and determine if other hazards have been created. Pursue continuous improvement. A number of forms are included for carrying out this activity. Alternatively, the use of software tools will enable the recording of controls and allocation of responsibility for controls. Whichever method is used, it should be formalized and controlled periodically.

6.3. Induction, Training & Continuous Improvement

Each mine will have training programmes for employees, which need to be reviewed against safety criteria. The updating of training requirements should include retraining of existing personnel to the new skill level. This can be performed on-the-job. When the new skill, procedure, etc. has been taught to an individual and he has been assessed to have achieved that Competency, this should be recorded. This allows the mine to track staff that are qualified to perform particular tasks. In some instances, staff should be prevented performing tasks until they have been correctly trained in new procedures and are considered competent to perform a task safely.

6.4 Accident/Incident Reporting & Investigation

This would be a Standing Order to ensure compliance with Regulations and to inform mine personnel on responsibilities and reporting requirements. It should cover –

- Responsibility of those on the site
- Immediate response and Emergency backup
- Notifying key staff of accident
- Securing the site
- Treatment of any injuries

- Investigation and Reporting
- Review of any recommendations and determining actions.

6.5. Auditing & Review / Revision

Reviewing the effectiveness of programmes within the Safety Management Plan. This should be an on-going process. This should show whether policies, regulations and expectations are being met or where systems can be made more effective. Both internal and external audits should be considered. Auditors need training to be objective and independent. Management Team or the Health and Safety Committee would have to decide how often would audits be done, what systems or areas would be audited and reporting arrangements.

7. Process

Using the equations in Section 6.2.3 the following values can be used to calculate Risk Score for a Hazard.

Risk score = Consequence x Likelihood

Risk score = Consequence x Probability x Exposure

Scale for consequence

Several dead	5
One dead	1
Significant chance of fatality	0.3
One permanent disability/less chance of fatality	0.1
Many lost time injuries	0.01
One lost time injury	0.001
Small injury	0.0001

Scale for exposure

Continuous	10
Frequent (daily)	5
Seldom (Weekly)	3
Unusual (Monthly)	2.5
Occasional (Yearly)	2
Once in 5 years	1.5
Once in 10 years	0.5
Once in 100 years	0.02

Scale for probability

May well be expected	10
Quite possible	7
Unusual but possible	3
Only remotely possible	2
Conceivable but unlikely	1
Practically impossible	0.5
Virtually impossible	0.1

8. Conclusion

Management of safety issues based on assessment of risks not only integrates safety with productivity but also can be used as a very good tool for reduction of costs. The systems

stand on the premise that all risks need not be eliminated and different control measures can be adopted for different levels or risks. The key here is to aim for ALARA (as low as reasonably achievable), which eventually depends on cost considerations. The system allows prioritization of allocation of scarce resources thereby cutting costs and reducing wastages. This assumes great importance in the current Indian scenario.

The other merits of the system are that it is created by the mine operators themselves through considerable brainstorming. The approach lets the mine operators/users feel ownership of the system, something that is not cast upon them by experts, Government agencies or outsiders, and hence chances of successful implementation is much more. In this system, grey areas are minimized, responsibilities for action are pinpointed and scopes for auditing and improvements are always present.

For convenience of mine operators, the following Annexures are given:

Annexure I	:	Forms for risk assessment, its control and audit
Annexure II	:	Risk Management Plan, designed by the officials of a coal mine.

These guidelines are given for guidance only and they need to be tailored for specific requirements.

Annexure – I

Typical Risk Management Forms

1. Hazard Identification and Risk Ranking

Leader …….. Team …….. Date ……...

Ref. No.	Identified Hazard	Existing Controls	Estimate the Risk				Risk Rank
			Likelihood		Conseq-uence	Risk Score	
			Exposure	Probability			

2. Control / Treatment of Risks

Leader ……. Team …….. Date …….

Ref. No.	Treatment options	Cost or difficulty to implement	Effectiveness of treatment			Selected method
			Likelihood	Consequence	Risk	

3. Action Plan

Leader …… Team ……. Date ……...

Ref. No.	What is to be done	Target date	Responsibility	Signed off on completion

Annexure – 2

Some Case Studies
Mine A

Sep 1. Initial Hazard Identification, Risk Assessment and Prioritization

Sl.No.	Description of Hazard	Consequence	Probability	Exposure	Total Risk
1.	Inundation	5	10	10	500
2.	Poor Quality of Supplied Material	5	10	10	500
3.	Geological Disturbance	5	10	10	500
4.	Improper Strata Control	5	7	10	350
5.	Training Facilities Inadequate	5	7	10	350
6.	Shortage of Skilled Persons/development of unskilled persons	5	7	10	350
7.	Inadequate Communication system	5	7	10	350
8.	Poor Supervision	5	7	5	175
9.	Spontaneous Combustion	5	3	10	150
10.	Improper Surveying	5	3	10	350
11.	Explosion / Blasting	5	3	5	75
12.	Haulage	1	7	10	70
13.	Machinery	1	7	10	70
14.	Lack of Awareness	1	7	10	70
15.	Sealed Off Panels	5	3	2.5	37.5
16.	Inadequate Supply of Spare Parts	0.3	7	10	21
17.	Use of Uncalibrated Instrument	1	7	3	21
18.	Ventilation not to Plan	0.1	10	10	10
19.	Other : Fires	0.1	7	10	7

Step 2. Identifying Mechanism contributing principal Hazards and Ranking

No.	Major Hazard	Mechanism	Cons.	Prob.	Expo.	Risk
1.	**Inundation**	- River overflow above HFL	5	7	10	350
		- Waterlogged Working U/g	5	2	10	100
		- Inrush through subsidence cracks / Bore Hole	5	7	2	70
2	**Poor Quality of Supplied Material**	- Improper procurement procedure	5	7	10	350
		- Inspection procedure not followed	5	7	10	350
		- Improper storage	5	3	10	350
3.	**Geological Disturbance**	- Presence of fault & slip planes	5	10	10	500
		- Fractured roof	5	10	10	500
4.	**Improper Strata Control**	- Failure to identify bad roof	5	10	10	500
		- Improper dressing	5	7	10	350
		- Improper supervision	5	7	10	350
		- Poor workmanship	5	7	10	350
		- Non-superimposition of some pillars in continuous working	5	7	10	350
		- Inadequate support design	5	3	10	150
		- Poor quality of support material	5	3	10	150
5.	**Training Facilities**	- Non-existence of training schedule				

No.	Major Hazard	Mechanism	Cons.	Prob.	Expo.	Risk
	Inadequate	for skill development	5	7	10	350
		- Untrained trainers	5	3	10	150
		- Infrastructure not to the requirement	5	10	10	500
		- Non-existence of Feedback / Test	1	10	10	100
6.	**Shortage of Skilled or Authorized Person/Deploy-ment of Unskilled person**	- Absenteeism	1	7	5	35
		- Training not done as per requirement	1	7	10	70
		- Manpower sanction not as per requirement	5	7	10	350
		- Examination for workmanship not done regularly.	1	10	10	100
7.	**Inadequate communication**	- Non-availability of spare parts	5	7	5	175
		- Inadequate capacity of exchange	5	10	10	500
8.	**Poor Supervision**	- Negligence/Lack of commitment	5	7	3	105
		- Not having proper knowledge / experience	5	3	3	45
		- Inadequate training	0.3	3	3	27
		- Shortage of supervisors	5	7	5	175
9.	**Spontaneous Combustion**	- Panel extraction beyond incubation period	01.	3	10	03
		- More coal left in goaf	0.1	10	10	10
		- Improper management of subsidence area	5	2	2.5	25
		- Poor construction/maintenance of seals	5	3	10	150
10.	**Improper Surveying**	- Calibration of instrument not being done regularly	5	2	10	100
		- Non-superimposition of some pillars formed earlier	5	10	10	500
		- Surveying not done in time	5	3	3	45
11.	**Explosives / Blasting**	- Not taking proper shelter specially with respect to contiguous working	5	3	5	75
		- Possibility of blown through shots	5	3	5	75
12.	**Haulage**	- Poor quality of existing ropes & rollers	1	3	10	30
		- Safety devices not adequate	1	3	10	30
13.	**Machinery**	- Maintenance schedule not followed	1	7	10	70
		- Temporary trailing cable joints	1	7	10	70
		- By-passing protective devices	5	3	5	75
		- Unskilled operators	1	3	5	15
		- Moving parts of machines	1	10	10	100
14.	**Lack of Awareness**	- Non-existence of documented procedures	1	10	10	100
		- Improper / inadequate training	1	3	5	15
		- Improper communication	5	3	3	45
		- Inadequate Publicity / Objective not explained	1	3	3	09
15.	**Sealed Off Panels**	- Improper management of subsidence area	5	2	2.5	25
		- Poor construction/maintenance of seals	5	3	10	150
		- Improper supervision	5	3	5	75
		- Improper sampling & analysis procedure	5	2	10	100
16.	**Inadequate supply of spare parts**	- Improper procurement planning	1	7	5	35
		- Delay in procurement action	1	7	3	21
		- Importance not given to the indent	1	10	10	100
17.	**Use of uncalibrated Instrument**	- Non-existence of calibration procedures	5	7	5	175
			5	10	5	250
		- Non-existence of calibration	5	7	3	105

No.	Major Hazard	Mechanism	Cons.	Prob.	Expo.	Risk
		infrastructure - Non availability of spare Instruments				
18.	**Ventilation not in Plan**	- Delay in construction of stoppings	0.1	7	10	7
		- Tampering of ventilation devices	0.1	7	10	7
		- Poor construction of stoppings	0.1	3	10	3
19.	**Others : Fires**	- Conveyor Fire	0.3	2	3	1.8
		- Electrical Fires	5	7	5	175
		- Fire during gas cutting	1	3	2.5	7.5
		- Spilled off Lubricants	0.3	1	2	0.6

Step 3. Control Measures & Procedures for Respective Mechanism contributing Hazards

Mechanism	Control	Relevant Statute	Procedure	Existing Procedure Y/N	Responsible person
Inundation					
- River overflow above	- Embankment		-Water danger		
- HFL	- Float Alarm, Guard & Wireless		Procedure		
- Waterlogged Working U/G	- Pumping, Dams & Inspection		- Pumping procedure		
- Inrush through subsidence crucks/Boreholes	- Garland drain, Crack Filling & Inspection		- Subsidence management procedure		
Poor Quality of Supplied Material					
- Improper procurement procedure	- Agent to apprise Competent authority for necessary steps		- To be prepared centrally		
- Inspection procedure not followed	- Agent to ensure		-do-		
- Improper Storage	- Agent to ensure apprise GM		Storage procedure		
Geological Disturbance					
- Presence of Fault & Slip-Plane	- Effective Supervision & Additional Support		- Inspection Supervision &		
- Fractured roof	-do-		Monitoring procedure		
Improper Strata Control	- Effective Supervision		- Support procedure		
- Failure to identify bad roof			- Inspection, Supervision &		
- Improper Dressing	- Proper dressing & Proper Supervision		Monitoring P\procedure		
-Improper Supervision	- Effective Supervision		- Dressing procedure		
- Poor Workmanship	- Training, Test & Monitoring		- Inspection Supervision & Monitoring procedure		

Mechanism	Control	Relevant Statute	Procedure	Existing Procedure Y/N	Responsible person
-Non-superimposition of some pillars in contiguous working - Inadequate Support Design - Poor quality of support material Poor quality of support material	- Marking such pillars U / G & alert concerned People during extraction - Review Support Design - Corrective Steps		- Training Procedure & Inspection, Supervision & monitoring procedure - Survey procedure - Procurement procedure		
Training Facilities Inadequate - Non-existence of skill training Schedule - Untrained trainers - Infrastructure not to the Requirement - Non-existence of Feedback / Test	- Preparation of skilled - Training for trainers - Group VTC to be Equipped - To be started		- Training Procedure -do- -do- -do- -do-		
Shortage of skilled person / Deployment of unskilled persons - Absenteeism - Target not done as per Requirement - Manpower sanction not as per Requirement - Examination for workmanship not done regularly	- Disciplinary action, Work programme - Comply Agent to apprise Competent authority -do-		-Colliery Standing Order		
Inadequate Communication System - Non-availability of spare parts - Inadequate capacity of Exchange	- Agent to arrange - Agent to apprise competent authority		- Procurement Procedure		
Poor Supervision - Negligence / Lack of Commitment - Not having proper knowledge / Experience - Inadequate training - Shortage of Supervisors	- Monitoring, Motivation & Enforcement of discipline - Training & Feedback -do- - Transfer & Train to become competent		- Inspection, Supervision & Monitoring Procedure - Training procedure -do- -do- - Extraction		

Mechanism	Control	Relevant Statute	Procedure	Existing Procedure Y/N	Responsible person
	- Plan to extract panel within incubation period		Procedure		
Spontaneous Combustion					
- Panel extraction beyond incubation period			- Extraction procedure		
	- Extraction judiciously		- Subsidence Management procedure		
- More coal left in goaf					
	- Crack filling / Forestation & Proper Monitoring		- Sealing procedure		
- Improper management of subsidence area					
- Poor construction / maintenance of seals	- Construction & Maintain seals as detailed in sealing procedure		-		
Improper Surveying					
- Calibration of Instrument not being done regularly	- Regular calibration		- Extraction Procedure		
- Non-superimposition of some pillars formed earlier	- Mark such pillars at site & work accordingly				
- Surveying not done in time	- Regular Survey		- Survey procedure		
Explosion / Blasting					
- Not taking proper shelter specially with respect to contiguous working	- Monitor the efficacy of taking shelter		- Drilling & blasting procedure		
- Possibility of Blown through Shots	- Stop one of the approaching faces when within 9m.		- Survey procedure		
Haulage					
- Poor quality of existing ropes & rollers	- Procedure ropes & rollers in advance & change old ones timely		- Machinery Installation & Maintenance procedure		
- Safety devices not adequate	- Install monkey catches in Endless track & maintain all safety devices		- Conveying & hauling procedure		
Machinery					
- Maintenance schedule not followed	- Implement, Monitor & / or take connective action for non - compliance		- Maintenance Schedule		
- Temporary trailing cable joints	- Step doing temporary Joints		- Inspection, Supervision & Monitoring Procedure		
- By - passing protective devices	- Stop machines if Protective device is not functioning				
- Unskilled operators	- Stop machine if trained operator is not present – train more operators				
- Moving parts of machine	- Fence moving parts of machines & Don't allow people wearing loose dresses.		-Unsafe Practices /		
Lack of Awareness					

Mechanism	Control	Relevant Statute	Procedure	Existing Procedure Y/N	Responsible person
- Non-existence of documented Procedure - Improper / inadequate training - Improper communication - Inadequate Publicity / Objective not explained	- Document all Procedures & issue to concern persons - Training & Feedback - Detailed written Communication either by letter or on Notice Board - Explain the objective		Unsafe Act & Colliery Standing Order - Training Procedure		
Sealed Off Panels - Improper management of subsidence area - Poor construction / maintenance of seals - Improper supervision - Improper sampling & analysis procedure	- Blanketing / Crack filling & proper monitoring - Construction & maintain seals as detailed in sealing procedure - Regular supervision - Sampling & analysis as per Sampling Protocol		- Subsidence management process -Sealing procedure - Inspection, Supervision & Monitoring Procedure - Sampling Protocol		
Inadequate Supply of Spare Parts - Improper procurement Planning - Delay in procurement action - Importance not given to indents	- Advance planning considering past requirement & growth - Avoid delay - Agent to send reminders		- Material Procurement & storage procedure		
Use of Uncalibrated Instruments - Non-existence of calibration Procedures - Non-existence of calibration infrastructure - Non availability of spare Instruments	- Develop a system for periodic calibration, document, implement & monitor				
Ventilation not to plan - Delay in construction of Stoppings	- Competent authority may be apprised & reminded for need & status				
- Tampering of ventilation devices	- Competent authority may be apprised about the rettratic of contractor for doing jobs at lower rates and may be requested to solve the problem at the				

Mechanism	Control	Relevant Statute	Procedure	Existing Procedure Y/N	Responsible person
- Poor construction of stoppings **Other : Fires** - Conveyor Fire - Electrical Fires	earliest. - Effective Inspection & Supervision - Clean spilled coal/dust regularly & maintain drums & rollers properly - Maintain as per Schedule a Fire extinguisher of Dry Chemical powder / CO_2 / ABC type near electrical appliances. Machines shall not be operated bye-passing protective devices or with temporary cable joints. Joint boxes shall be compounded. Use only approved type electrical appliances.		- Sealing procedure -Conveying and Hauling Procedure - Maintenance Schedule -Fire prevention procedure		
- Fire during gas cutting	- Site of gas cutting must be stone dusted well if combustible material is there & arrangement for water & fire extinguisher must be kept ready. - Clean all spilled off oil / Lubricants well to make the site inherently safe.				