



OPERATIONAL MANUAL

(Version 06)

MAHANADI COALFIELDS LIMITED

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**MCL**

Mahanadi Coalfields Limited
(A Subsidiary of Coal India Ltd.)
Operational Manual

Version 06
Section 01
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APPROVAL

This manual contains the instructions and necessary controls to support most of the operations of Mahanadi Coalfields Limited (MCL) complying with the international standards - ISO 9001, ISO 14001 and ISO 45001.

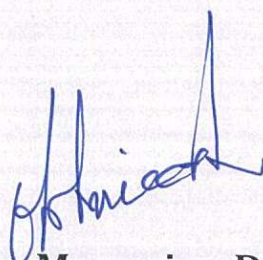
The contents of this manual are hereby approved, authorized, and released for the use of all concerned in MCL. Any future change(s) in this manual shall be issued only after my specific approval.

This manual now supersedes the Version 05 of Operational Manual of MCL issued on 22/04/2021.

All users shall also exercise necessary care to prevent unauthorized use, loss, damage, and/or illegibility of this manual.

Place: Sambalpur

Date: 14/07/2023


Chairman-cum-Managing Director

Mahanadi Coalfields Limited

1.0 DISTRIBUTION LIST

COPY	COPY HOLDER	FOR USE OF.....	DISTRIBUTED SECTIONS
OM – 0	Nodal Officer (IMS), HQ, MCL	As corporate master copy, and for the use of CMD, Directors, and external auditors.	All sections
OM – 1	Central Library, HQ, MCL	All concerned in HQ.	All sections
OM – 2	Area GM, Basundharal Area	All concerned in the Area & its units.	All sections
OM – 3	Area GM, Ib Valley Area	All concerned in the Area & its units.	
OM – 4	Area GM, Lakhanpur Area	All concerned in the Area & its units.	
OM – 5	Area GM, Orient Area	All concerned in the Area & its units.	
OM – 6	Area GM, Bharatpur Area	All concerned in the Area & its units.	
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OM – 10	Area GM, Lingraj Area	All concerned in the Area & its units.	
OM – 11	Area GM, Talcher Area	All concerned in the Area & its units.	
OM-12	Area GM, Mahalaxmi Area	All concerned in the Area & its units	
OM – 13	GM, Central Repair Workshop, Talcher	All concerned in the CR Workshop, Talcher	Section 1, WS.1 to WS.7, ST.1 and TR.1
OM – 14	GM, CWS Ib Valley	All concerned in the CR Workshop, Ib- Valley	
OM – 15	CMS incharge Central Hospital, Talcher	All concerned in CHT and CHI	Section1, Section 6- MS.1 and ST.1
OM – 16	CMS incharge Central Hospital, Ib-Valley		
OM – 17	GM/ Incharge Mines Rescue Station, Orient area Ib-Valley	All concerned in the MRS.	Section 1, Section 6 – MR.1 and ST.1

[The above copy holders may distribute copies for awareness/training within their functional domains – refer procedure under section 7.5.D of IMSM of MCL.]

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00.1 OPEN-PIT MINE SURVEYING

1. OUTPUTS OF THE PROCESS:

- Report indicating assessed volume of coal and overburden mined/ to be mined.
- Statutory and other operational drawings and mine-plans.

2. RELATED ENVIRONMENTAL IMPACTS / OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- CIL's mine surveying norms contained in "Yellow Book" and/or "Ferguson Report".
- Manual on Colliery Survey (CMPDIL Publication).
- Applicable recommendations of Mines Safety Conferences.
- Coal Mines Regulation; and Regulation numbers 64, 65, 67 – 69.
- DGMS Circular numbers 6/1955, 3/1958, 13/1958, 44/1959, 65/1964, 20/1966, 28/1966, 42/1967, 30/1969, 44/1971, Tech 1/1976, Legis 2/1981.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Surveying instruments, e.g., total station, dumpy level, theodolites	Survey Section
II. MANPOWER:		
A	SH (Survey)	Mine Manager
B	Head Surveyor/Surveyor	SH (Survey)
C	Draftsman	
D	Chainman	
E	Survey Mazdoors	
III. NATURAL RESOURCES: None		

5. PROCESS STRUCTURE:

Mine surveying' is a sub-process of the main process 'mining (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). This sub-process is periodically undertaken after 'operational planning' has been completed based on the performance measurement of previous period; and provides inputs to subsequent sub-processes of 'mining arrangements' and 'working face preparations'. Surveying also contributes to preparation of statutory and other necessary operational drawings and mine-plans.

The activities involved in this sub-process are given below. All these are carried out internally without any outsourcing.

- Assessment of volume of coal and overburden mined/to be mined.
- Providing survey inputs for planning and monitoring of mining operations.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above).

SL NO	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Assessment of volume of coal and overburden mined/to be mined – Critical parameters of this activity are measurement of face advance, bench height/width, and dump height/width; and calculation of volume of coal and overburden removed; to ensure, - Estimation of difference between reported and measured production of coal and overburden, and - Calculation of correction factor to be applied during reporting the production in next month.						
1	Ensure that the plans/drawings and cross-sections are made, and calculation of volumes done only as per the provisions of the “Yellow Book”.	SH (Survey)	Mine Survey Register	√	----	----
2	Ensure that correction factors estimated for production reporting are calculated and reported to Mine Manager at the beginning of every month as per the provisions of the “Yellow Book”.			√	----	----
b. Providing survey inputs for planning and monitoring of mining and allied operations – Critical parameters of this activity are the timeliness and accuracy of prepared mine-plans/projections, shot holes demarcation, measured volume of blasted material, and quantity of coal in stockyards; to ensure, - Availability of reliable information for planning and execution of mining and allied processes, and - Effective monitoring of the execution of mining and allied processes.						
1	Ensure that all statutory plans and drawings are prepared as per DGMS guidelines, and submitted in time to Mine Manager for dispatch to DGMS.	SH (Survey)	Mine Survey Register, Surveyors' Diary	√	----	----
2	Ensure that following are prepared as per standard practices of mine surveying, and submitted in time to Mine Manager for production planning. - Monthly quarry plan and drawings, - Drawings of coal/overburden bench advances, - Estimated volume of blasted material, - Any other measurement/drawing as sought.			√	----	----

00.2 QUARRY PREPARATIONS & ADVANCE STRIPPING

1. OUTPUTS OF THE PROCESS:

- Sufficient land available for active mining;
- Rehabilitated villages for land oustees;
- Afforested areas/locations.

2. RELATED ENVIRONMENTAL IMPACTS / OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Approved PR/RPR/RCE of the mine.
- DGMS permission for mining in mine leasehold.
- Applicable recommendations of Mines Safety Conferences.
- Environmental clearance conditionality for the mine.
- Consent/conditionality against Air and Water Acts.
- Coal Mines Regulation; and Regulation numbers (104-110), 128,135,139-140,143.
- DGMS Circulars numbers 6/1964, 56/1964, 36/1972, 11/1973, Legis 1/1976, 17/1977, Tech 7/1977, Tech 2/1986, Tech 5/1988, Tech 1/1989, Tech 5/90, Tech Sapicom 4/1993.
- Coal Bearing Areas (Acquisition and Development) Act,1957.
- Coal Mines (Conservation and Development) Act 1974; and Coal Mines (Conservation and Development) Rules, 1975/amended 2011.
- Colliery Control Order.
- Mines Act, and Mines Rules.
- Environmental (Protection) Act 1986; and Rules, 1986.
- Air and Water Acts; and Rules.
- Forest Conservation Act 1980; and Rules.
- Indian Forest Act,1980
- National Ambient Air Quality Standards,1994/2009.
- Water CESS Act 2003; and Water Cess Rules,1978, amended 2017.
- Noise Pollution (Regulation and Control) Rules 2000/ amended 2017
- IS 10500; IS 2216; and MoEF&CC Schedule VI.
- Land Acquisition Act,1894/2013.
- Land Acquisition (Mines) Act,1885/1895.
- Central Motor Vehicles Rules,1989/2019.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Dragline, Shovel, Backhoe, Dumper, Pay loaders, Dozer, Tippers	Excavation Section
B	Electrical sub-station, field switch-gear, cables, illumination equipment, etc.	E&M Section
II. MANPOWER:		
A	Project Officer	Area GM
B	AEO	
C	Mine Manager	Project Officer
D	SH (Civil)	
E	SH (Excavation)	
F	SH (E&M)	
G	PEO	Mine Manager
H	SH (Safety)	
I	SH (Mining) / Under managers	SH (Excavation)
J	Excavation Engineers	

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
K	Excavation Foremen	SH (Civil)
L	Civil Engineering Assistants	
M	Overseers	
N	Overman & Mining Sirdars	SH (Mining)
O	HEMM Operators/helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust during the HEMM operations)	SH (Excavation)
B	Energy (electricity for operation of HEMM)	
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

‘Mine preparations and advance stripping’ is a sub-process of the main process ‘mining arrangements’ (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). This sub-process is done after detailed operational planning based on the performance measurement of previous period which provides necessary input for the next process ‘working face preparation’.

The activities involved in this sub-process are given below. Some of these (marked by an asterisk) may be outsourced, for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below. The remaining activities are carried out internally.

- Diversion of roads, rivers/streams/nullahs, and overhead electrical transmission lines. *
- Deforestation and resettlement of villages (tree plantation for compensatory afforestation outsourced). *
- Removal of topsoil and overburden, and their storage/dumping. *

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under ‘3’ above).

SL NO	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a.	Diversion of roads, rivers, streams, nullahs, and overhead electrical transmission lines - Critical parameters of this activity are diverted length of road/nullahs/rivers/OHT; route of diversion; and timely acquisition of land for diversion; to minimize the environmental impacts/OH&S risks and ensure the following - Timely availability of clear land for mining, - Preservation of topsoil for later use in overburden dump reclamation, - Continuity of the road/nullahs/river/OHT-line after diversion, and - Adequate compensation to land-losers and compensatory afforestation.					
1	Plan all required diversion activities in February every year for next financial year, and obtain competent approvals, etc.	Project Officer	Annual Operation Plan	√	----	----
3	Ensure dumping of top soil separately for later use in reclaiming overburden dumps	Mine Manager	----	√	----	----
4	Ensure disposal of all other wastes only at the designated locations		----	√	√	----
5	Ensure adequate water sprinkling in all three shifts to suppress the dust	Overman and Mining Sirdar	Mobile Water Tanker Trips Register	----	√	√
6	Arrange for measurement of required parameters of air, water and noise at designated monitoring stations	PEO	Air, Water and Noise Quality Report	----	√	√

SL NO	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
b. Deforestation and rehabilitation/resettlement of villages – Critical parameters of this activity are area of deforestation, and number of land oustees to be rehabilitated; to minimize the environmental impacts and ensure the following: - Timely availability of land for mining operations, - Adequate compensatory afforestation, and - Adequate rehabilitation/resettlement of land oustees.						
1	Plan the deforestation and acquisition of tenancy/village land in February every year for the next financial year and obtain competent approvals, etc. – considering the environmental clearance conditionalities.	AEO	Annual Operation Plan	√	√	----
2	Ensure that forest and tenancy land is acquired within the above-planned timeframe as per provisions under LA Act and/or CBA Act, and environment clearance conditionalities.	Project Officer	Land Acquisition Register	√	√	----
3	Arrange for plantation of suitable varieties of trees for compensatory afforestation as per environment clearance conditionalities, and educate all concerned about importance of conserving forestry resources.	PEO	Plantation Record	√	√	----
4	If above plantation work is to be outsourced, arrange for engaging suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.	PEO	Plantation Record	√	√	----
5	Make temporary arrangement for drainage of rainwater to prevent soil erosion during monsoons and contamination of water bodies due to effluents.	SH (Civil)	Civil Contract Works Register	----	√	----
6	Provide employment or land/cash compensation to identified land losers as per applicable R&R policy and environment clearance conditionalities.	Estate Officer	Land Losers Compensation Register	√	√	----
7	Ensure that rehabilitation/ resettlement sites contain adequate civic amenities.	Estate Officer	----	√	----	----
8	Ensure that generated wastes (e.g. materials from demolished buildings) are re-used to the maximum extent, and unusable materials are disposed of only at the designated dumps	SH (Civil)	----	----	√	----
c. Removal of top soil and overburden, and their storage/dumping – Critical parameters of this activity are depth of alluvium/top-soil layer; advance stripping of overburden; number of dumpers deployed per shovel; length of transport routes; and safety of men and machinery; to minimize the environmental impacts and ensure the following - - Removal of top soil and its separate overburden to allow exposure of sufficient area for making coal benches, - Minimum possible lead distance for dumpers transporting coal/ overburden, - Minimum possible idle time for digging and loading machines (i.e., shovels), - Prevention of accidents during shovel, dumper and dozer operations, and - Prevention of breakdowns/damages to HEMM during their operations.						
1	Ensure that codes of practice for operation of HEMM are suitably displayed in operators’ cabins of all HEMM.	SH (Safety)	-	√	√	√
2	Ensure operations of HEMM are carried out strictly as per the code of practices made available as above	All Operators	-	√	√	√
3	Verify the compliance of above codes of practice during daily inspections	Manager/ Under-Manager	Manager/ Under-manager’s diaries	√	√	√
4	Prevent overloading of tippers/dumpers to avoid spillage on haul roads	Overman and Mining Sirdar	----	√	√	√

SL NO	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
5	Ensure adequate water sprinkling in all three shifts to suppress the dust		Water Tanker Trips Register	----	√	√
6	Arrange for measurement of required parameters of air, water and noise at designated monitoring stations	PEO	Air, Water and Noise Quality Report	---	√	----
7	Record the production and operational details of topsoil and overburden excavated and transported from the mine, under the following record formats. • Production, Dispatch & Manpower Report; • HEMM Performance Report; • POL Consumption Report; and • Statement of Tyres, Engines.	SHs (Mining, Excavation)	As under column 2 of this row.	√	√	----

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are compiled during the work.	√	√	√
2	That any wastes generated during construction work are removed from mine premises and suitably disposed.	----	√	----
3	That barbed wire fencing is maintained around the plantation areas.	----	√	----
4	That at the end of the 3 years period the planted saplings should be at least 1.2 m high and 80 % of the planted saplings must have survived.	----	√	----
5	That the planted trees include fruit bearing trees, medicinal plants, timber yielding plants, ornamental plants, and other plants; the tree density being 2500 per hectare or more.	----	√	----
6	That exhaust smoke of tippers/dumpers used for diversion work is within the prescribed limits.	----	√	√
7	That air, water, and noise measurements are carried out only at the statutorily designated monitoring stations.	----	√	√

00.3 PIT & DUMP SLOPE STABILIZATION

1. OUTPUTS OF THE PROCESS:

- Stabilized overburden dumps with acceptable slope angles
- Pits with stable slopes and acceptable slope angles

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining in mine leasehold.
- Approved PR/RPR/RCE of the mine.
- Environment clearance conditions for the Projects.
- Environmental Protection Act, 1986.
- Environmental (Protection) Rules, 1986.
- Noise Pollution (Regulation and Control) Rules, 2000 / amended 2017.
- Consent against Air and Water Acts.
- Air and Water Acts 2003 / amended 2017.
- Water Cess Act (Amended), 2003,/ amended 2017 , Water Cess Rules, 1978.
- National Ambient Air Quality Standards, 1994./2009.
- Central Motor Vehicle Rules, 1989/2019
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Recommendations of Mines Safety Conferences.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Dragline, Shovels, Dumpers, Dozers, Pay loaders, Tippers, and Graders	Excavation Section
B	Related electrical field switch-gear, cables, illumination arrangements, etc.	E&M Section
II. MANPOWER:		
A	Mine Manager	Project Officer
B	PEO	
C	SH (Civil)	
D	SH (Mining)/Under Managers	Mine Manager
E	Civil Engineers/Assistants	SH (Civil)
F	Overseers	
G	Overman/Mining Sirdars	SH (Mining)
H	HEMM Operators and Helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling during pit & dump stabilization)	SH (Civil)
B	Energy (electricity for operation of HEMM)	SH (Excavation)
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

'Pit and dump slope stabilization' is a sub-process of the main process 'mining arrangements' arrangements' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). It is used throughout mining operations to prevent failure and collapse of pit-slopes and/or dump-slopes.

The activities involved in this sub-process are given below. Of these, some elements of the asterisked ones are sometimes outsourced, for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below. The remaining activities are carried out internally.

- a. Dump slope stabilization (tree-plantation on dump-slopes, and retaining wall construction done externally). *
- b. Pit slope stabilization (retaining wall construction done externally). *

6. OPERATIONAL INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above).

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Overburden Dump Slope stabilization – Critical parameters of this activity are dump-slope angle, and consolidation of dump; to minimize the environmental impacts and ensure the following - - Prevention of slope-failures resulting into mud-slides, accidents, and/or loss of coal/ overburden production, and - Efficient operation of dumpers on the haul roads around dump-slopes.						
1	If any part of work is to be outsourced, (e.g., plantation, civil work) arrange for engaging suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.	Concerned SHs	Contract Works Register	√	√	√
For External Dumps						
2	Ensure that heights (maximum 90m) and widths (minimum 20m) of various benches of overburden dumps are planned to keep the overall dump-slope angle between 34 to 38 degrees (or as per DGMS permission).	Mine Manager	Monthly Plan	√	----	√
3	Ensure that the designated dump areas are within the limits approved under DGMS permission and environment conditionalities.	----	----	√	√	√
4	Ensure that - Overburden dump benches conform to the planned dimensions - Berms of at least 1 m height are maintained along edges of benches and dump-tops.	SH (Mining)	Manager Diary, Under-Manager's Diary	√	√	√
5	Prevent unauthorized entry/access to active dumps, dust generation from wind action, and accidents due to rollouts and slope failures.		----	√	√	√
6	Arrange consolidation/stabilization of passive-dumps as per DGMS guidelines and environmental conditionalities.		Plantation Record	√	√	√
For Internal Dumps						
7	Identify whether coal rib is necessary against internal-dump toes to prevent dump slides into the pit, and maintain the ribs where necessary.	Overman	----	√	√	----
8	To excavate the coal rib when required, first ensure water drainage by puncturing of ribs, and only then extract coal from the ribs.		----	√	√	----
9	Maintain appropriate pit-floor gradient to allow the drainage of water into the mine sump, so as to prevent internal-dump failure due to water accumulation along dumps.		Overman Report	√	√	√
10	Ensure reverse-slope along dump top, garland drains along dump edges, and contour drains along dump slopes - to drain water away from the pit.		Overman Report	√	√	----
11	Prevent dumping of alluvium along pit floor.		-----	√	√	----
12	Arrange plantation along dump slopes as per environmental clearance conditionalities.	SH (Civil)	Plantation Record	√	√	----

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
13	Arrange, as necessary, the construction of retaining walls along internal-dump toes near main entries, and the toe pitching along slopes to stabilize dumps and prevent erosion.		Civil Contract Works Register	√	√	----
b. Pit slope stabilization – Critical parameters of this activity are overall pit-slope angle, and stable pit-slopes; to minimize the environmental impacts/OH&S risks and ensure the following, - Prevention of pit-slope failures and bench-collapses resulting into accidents and loss of coal/ overburden production, - Smooth operation of dumpers and dozers.						
1	Ensure that planned heights and widths of various benches are adequate to keep the overall pit-slope between 32 to 38 degrees (or as per DGMS permission).	Mine Manager	Monthly Plan	√	√	√
2	Ensure that planned quarry area and coal/overburden mining quantities are within limits specified under DGMS permission and environmental clearance conditionalities.		----	√	√	√
3	Ensure that overall pit-slope angle is maintained by mining the coal and overburden benches in correct sequence and dimensions.	SH (Mining)	Manager/ Under-Manager Diary	√	√	√
4	Maintain adequate advances of upper overburden benches to avoid narrowing of lower benches even during pressures of production targets.		----	√	----	----
5	Make wider benches near faults and slips to prevent bench failures along slip planes, and arrange for clay/laterite filling in cracks to avoid water inflow into them.		----	√	√	√

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work	√	√	√
2	That exhaust fumes of trucks used for transportation of construction material are well within prescribed limits	√	√	√
3	That any wastes generated during construction of retaining walls are removed from mine premises and suitably disposed	----	√	----
4	That barbed wire fencing is maintained around the plantation area on the slope	√	√	----
5	That at the end of the 3 year period the planted saplings should be at least 1.2 m high, 80 % of the planted saplings must have survived, and tree density is at least 2500 per hectare.	----	√	----
6	That the planted trees include fruit bearing trees, medicinal plants, timber yielding plants, ornamental plants, and other plants	----	√	----

00.4 QUARRY DEWATERING ARRANGEMENT

1. OUTPUTS OF THE PROCESS:

- Dry and firm mine/ bench floor for operation of HEMM.
- Constructed garland drains
- Constructed pump foundations

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Coal Mines Regulations, 2017, regulation numbers 149, 151, 152, 237.
- DGMS Circular No Tech 2/1978.
- Environment clearance conditions for the Projects.
- Environmental Protection Act, 1986.
- Environmental (Protection) Rules, 1986..
- Noise Pollution (Regulation and Control) Rules, 2000,/ amended 2017.
- Consent against Air and Water Acts.
- Air and Water Acts, and Rules.
- Water Cess Act (Amended), 2003/2017, Water Cess Rules, 1978.
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Recommendations of Mines Safety Conferences.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Main and auxiliary mine-pumps and water-pipelines.	E&M Section
B	Related electrical switch-gear, cables, etc.	
II. MANPOWER:		
A	SH (E&M)	Project Officer
B	SH (Civil)	
C	PEO	
D	SH (Mining)/Undermanager	Mine Manager
E	SH (Survey)	
F	Civil Engineers/Assistants	SH (Civil)
G	Overseers	
H	Surveyors	SH (Survey)
I	Overmen & Mining Sirdars	SH (Mining)
J	Engineers (E&M)	SH (E&M)
K	E&M Foremen	
L	Electrical and Mechanical Fitters and Helpers	
M	Pump Operators	
III. NATURAL RESOURCES:		
A	Energy (electricity for operation of pumps)	SH (E&M)

5. PROCESS STRUCTURE:

'Mine dewatering' is a sub-process of the main process 'mining arrangements' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). This sub-process is executed perennially in the mine to provide dry and firm mine/bench floor for efficient operation of HEMM.

This sub-process involves only one activity, e.g., 'drying of mine floor and haul roads'. Some portions of this activity, i.e., 'garland drain construction' and 'pump foundation construction', are outsourced for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below. The remaining activities are carried out internally.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a.	Drying of Mine Floor & Haul Roads – Critical parameters of this activity are the water level in mine sump, and water accumulation at the benches and haul roads; to minimize the environmental impacts/OH&S risks and ensure the following - - Prevention of slushy/muddy mine floor, haul roads and bench floors, and - Accessibility of coal bench at quarry floor for mining work.					
1	Estimate the following at least once every month. - Water-make of the mine through direct sources (e.g., rain) and indirect sources (e.g., ground water seepage), - Required sump capacity, - Needed rate and capacity of pumping for the mine including stand-by pumps – (keeping in view the discharge quantity requirements under environment clearance conditionalities), - Proposed discharge point for mine-water.	SH (E&M)	Mine Discharge Pump Running Hours Record	√	√	√
2	Arrange for installation and operation of pumps and pipelines to meet the requirements estimated at ‘1’ above		----	√	√	√
3	Ensure that pump operators use ear muffs while operating the mine-pumps if noise level is beyond tolerable limits		----	----	√	√
4	Prepare/update (every month) the water danger plan as per CMR 2017.	SH (Survey)	Water Danger Plan	√	√	√
5	Arrange for relocations, modifications, and de-silting of mine sumps.	SH (Mining)	----	√	√	√
6	Maintain suitable gradient of benches and haul road to ensure collection of water into the sump through the drains.	SH (Mining)	----	√	√	√
7	Ensure treatment of effluent water to meet the requirements under environment conditionalities.	PEO	----	√	√	√
8	Ensure daily monitoring of sump water level.	SH (E&M)	----	√	√	----
9	Prevent inflow of surface-water into the mine through construction and maintenance of garland drains around the mine [If to be outsourced, engage suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given in para-7 below in the work orders.]	SH (Mining)	Contract Works Register	√	√	√
10	Ensure the collection of discharged mine water in sedimentation ponds (de-silted at suitable intervals) followed by necessary treatment before discharge into main water bodies.	SH (Civil)	----	√	√	√

- 7. DEFINED CONTROLS FOR CONTRACTUAL WORKS:** Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work	√	√	√
2	That the dug-out soil/ overburden and other construction materials are dumped only at the designated sites/ overburden dumps	√	√	√
3	That exhaust fumes of trucks used for transportation of construction material are well within prescribed limits	√	√	√

00.5 MONSOON PREPARATION

1. OUTPUTS OF THE PROCESS:

- Workable mine floor and haul roads
- Constructed/repared sumps, retaining walls, culverts, garland and other drains, pump foundations, sheds, etc.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Coal Mines Regulations, 2017, regulation numbers 149, 151, 152, 237.
- DGMS Circular number Tech 2/1978.
- Environment clearance conditions for the Projects.
- Environmental Protection Act, 1986.
- Environmental (Protection) Rules 1986 and its amendments.
- Noise Pollution (Regulation and Control) Rules, 2000, / amendment 2017
- Consent against Air and Water Acts.
- Air and Water Acts, and Rules.
- Water Cess Act (Amended), 2003/2017, Water Cess Rules, 1978.
- IS 10500, 1991; IS 2216, 1982; MoEF&CC Schedule VI, 1996.
- Recommendations of Mines Safety Conferences.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Dozers, Backhoes, Pay loaders, Tippers, and Graders	Excavation Section
B	Main and auxiliary pumps, and water pipelines	E&M Section
C	Related electrical field switch-gear, cables, illumination arrangements, etc.	
II. MANPOWER:		
A	Project Officer	Area GM
B	SH (Excavation)	Project Officer
C	SH (E&M)	
D	SH (Civil)	
E	SH (Survey)	
G	SH (Mining)/Under Managers	Mine Manager
H	Overmen and Mining Sirdars	SH (Mining)/ Under Manager
I	HEMM Operators and Helpers	
J	Excavation Foremen	SH (Excavation)
K	E&M Foremen	SH (E&M)
L	Electrical & Mechanical Fitters and Helpers	
M	Pump Operators	
N	Overseers	SH (Civil)
III. NATURAL RESOURCES:		
A	Energy (electricity for operation of pumps)	SH (E&M)

5. PROCESS STRUCTURE:

'Monsoon preparation' is a sub-process of the main process 'mining arrangements' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). It is undertaken every year during April-June quarter as an advance preparation to prevent/deal with the increased inflow of rainwater into the mine.

Efficient execution of this sub-process contributes to the uninterrupted execution of subsequent sub-processes during monsoon period, e.g., working face preparation, drilling-blasting, and excavation-transportation of coal/ overburden.

This sub-process involves only one activity, e.g., 'drying of mine floor and haul roads'. Some portions of this activity, i.e., 'construction/strengthening of sumps, retaining walls, culverts, garland drains, drains along haul roads and benches, pump foundation/ sheds, etc.' and 'laying/cleaning of hume-pipes along and/or across haul roads' are outsourced for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Drying Mine Floor and Haul Roads – Critical parameters of this activity are the water level in mine sump, and water accumulation at the benches and haul roads; to minimize environmental impacts/OH&S risks and ensure the following - Prevention of slushy/muddy mine floor, haul roads and bench floors, and accessible coal bench at quarry floor.						
1	Estimate in April every year, the following. - Water-make of the mine expected during the monsoon through direct sources (rain) and indirect sources (ground water seepage, surface water inflow, etc.), - Required sump capacity, - Needed pumping rate and capacity for the mine, including stand-by pumps, and - Proposed discharge point for the water.	SH (E&M)	----	√	√	√
2	Keeping in view the above inputs, prepare a comprehensive program for each of the following activities, with specific time-frame/responsibilities for completion, and cost involved; and obtain competent approval. - Installation of new pumps and pipelines, - Construction/strengthening of sumps, retaining walls, culverts, garland drains, drains along haul roads and benches, pump foundations/sheds, etc., - Cleaning of existing pipelines & sumps, - Laying/cleaning of drainage pipes, - Carpeting of haul roads with hard overburden, - Protection of electrical installations like poles, field switches, etc., - Strengthening of overburden dump slopes with retaining walls and plantation, - Reverse sloping of overburden dumps, - Making of berms on top-edges of dumps, and top benches in the mine.	Project Officer	Monsoon Preparation Plan	√	√	√
3	Ensure timely implementation of the above program	SHs (Mining, E&M, Civil, Excavation)	Contract Works Register	√	√	√
4	If any part of above planned work is to be outsourced, arrange for engaging suitable contractors as per section	Concerned SHs	----	√	√	√

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
	8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.					
5	Monitor every Monday from April to June, the status of implementation of the monsoon preparation program (ref 2 above).	Project Officer	Inspection Notes	√	√	√
6	During monsoon season, monitor in every shift the water level in nearby water bodies, dams, sumps, etc.	SH (E&M)	----	√	√	√
7	Inspect daily the condition of sumps, drains, retaining walls, etc.	SH (E&M)	----	√	√	√
8	Arrange for provision of wireless communication system at pumping installations and other required locations.	SH (E&M)	----	√	----	----
9	Ensure compliance against the conditionalities set under consent against Water Act.	PEO	----	----	√	----

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work.	√	√	√
2	That the dugout soil/ overburden and other construction materials are dumped only at the designated sites/ overburden dumps.	√	√	√
3	That exhaust smoke of tippers/dumpers used for transportation of construction material is within the prescribed limits.	√	√	√

00.6 ELECTRICAL POWER ARRANGEMENT

1. OUTPUTS OF THE PROCESS:

- a. Uninterrupted and efficient electrical power supply

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- a. Coal Mines Regulations, 2017, regulation numbers 175, 178, 202, 210 to 217
- b. DGMS Circular numbers 28/1967, Legislation 1/1976, Tech 13/1979.
- c. Indian Electricity Act, 1910 (Amended in 2003)
- d. Indian Electricity Rules, 1956/2019.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Electrical sub-station, switch-gear, cables, illumination equipment, etc.	E&M Section
II. MANPOWER:		
A	SH (E&M)	Project Officer
B	Engineers (E&M)	SH (E&M)
C	E&M Foremen	
D	Electrical and Mechanical Fitters and Helpers	
E	Electric sub-station and electrical equipment operators	
III. NATURAL RESOURCES:		
A	Energy (electricity for mining operations)	SH (E&M)

5. PROCESS STRUCTURE:

'Electrical power supply arrangement' is a sub-process of the main process 'mining arrangement' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). It is used throughout the mining operations to ensure uninterrupted and efficient supply of electrical power for all. Efficient execution of this sub-process contributes to the uninterrupted execution of all the operational activities. The only activity involved in this sub-process is 'electrical power arrangement', and no part of it is outsourced.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Arranging for Supply of Electrical Power – Critical parameters of this activity are the power supply adequacy, and controlled power consumption in the mine; to ensure, • Uninterrupted working of mining machinery, and • Efficient utilization of electrical power.						
1	On the basis of approved annual action plan for the mine estimate once every year the following, • Electrical power demand in the mine, • Locations where electrical power is needed, • Needed supply voltage, power cables and switch-gear, and • Additional requirement for electrical equipment and cables.	SH (E&M)	----	√	----	√
2	Ensure the installation and commissioning of electrical equipment and wires/cables to ensure power supply to all mining equipment as per the requirements determined at ‘1’ above.		Sub-station Log Book; and Sub-station Oil Change Issue, Testing and Recovery Record	√	----	√
3	Monitor daily the duration of supply, actual consumption of electrical power, and power factor in the mine.			√	----	----
4	Ensure the implementation of safety related provisions of the relevant clauses under the Coal Mines Regulations, 1957 and the Indian Electricity Rules (ref Obligatory Requirements on pre-page).			√	----	√

00.7 QUARRY BENCH PREPARATION

1. OUTPUTS OF THE PROCESS:

- Safe and suitable Overburden & Coal benches for HEMM operation

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS Circular No Tech 3/1976.
- Mines Act, 1952, and Mines Rules, 1955.
- Coal Mines Regulation, 2017, regulation numbers (104-110)
- DGMS permission for mining in mine leasehold.
- Approved PR/RPR/RCE of the mine.
- Environmental Protection Act, 1986.
- Environmental (Protection) Rules, 1986 and its amendments.
- Consent against Air and Water Acts.
- Air and Water Acts, and Rules.
- Water Cess Act (Amended), 2003/2017, Water Cess Rules, 1978.
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- National Ambient Air Quality Standards, 1994.
- Noise Pollution (Regulation and Control) Rules, 2000, amendment 2017
- Land Acquisition Act, 1894/2013
- Land Acquisition (Mines) Act, 1885.
- Coal Bearing Areas Act, 1957.
- Coal Mines (Conservation and Development) Act, 1974; and Rules, 1975.
- Colliery Control Order, 2000.
- Forest Conservation Act, 1980; and Rules, 2003.
- Indian Forest Act, 1927.
- Central Motor Vehicles Rules, 1989/2019
- Environmental clearance conditionalities for the mine.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Draglines, Shovels, Dumpers, Dozers, Pay loaders, Tippers, and Graders	Excavation Section
B	Related electrical field switch-gear, cables, illumination arrangements, etc.	E&M Section
II. MANPOWER:		
A	Mine Manager	Project Officer
B	SH (E&M)	
C	PEO	
D	SH (Mining)/Under Managers	Mine Manager
E	SH (Survey)	
F	SH (Safety)	
G	Surveyors	SH (Survey)
H	Overman & Mining Sirdars	SH (Mining)
I	E&M Foremen	SH (E&M)
J	Electrical & Mechanical Fitters and Helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust from HEMM operations)	SH (E&M)
B	Energy (electricity for operation of HEMM)	SH (Excavation)
C	Fuels and lubricants	

5. PROCESS STRUCTURE:

'Bench making' sub-process is a part of the main process 'working face preparation' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). This sub-process is undertaken before the process 'coal/ overburden loading and transportation', and provides necessary input for the subsequent sub-process 'drilling and blasting'.

The only activity involved in this sub-process is 'bench preparation', which may sometimes be simultaneous to the outsourced sub-process of 'coal / overburden removal' for which necessary controls to ensure conformance to the requirements are given under the related instructions.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Bench Preparation – Critical parameters of this activity are bench height, width, and gradient; to minimize the environmental impacts and ensure the following - • Prevention of bench-overhangs, • Efficient and safe digging and transportation activities, • Convenient working width for HEMM, • Smooth face alignment of benches, and • Self-draining of water from benches to main sump.						
1	Ensure that in the bench projections shown in the mine plans/drawings- a. Shovel-bench heights are not more than the digging height of shovels; b. Bench widths are taken as the higher of, (i) thrice the width of dumpers, and (ii) twice the width of widest HEMM on that bench; c. Bench gradient is kept sloping towards the main sump; d. Quarry area is within the limits specified under DGMS permission and environment conditionalities.	SH (Survey)	Monthly Plan	√	√	√
2	Ensure that during the dozing and leveling of benches by dozers and graders, the bench height and width are as per the specifications prescribed above.	SH (Mining)	Manager Diary, Under-manager Diary	√	√	√
3	Arrange for dressing of loose materials / boulders along the bench face, while preventing undercutting of the face.	Overman and Mining Sirdar	----	√	√	√
4	Prepare a berm of at least 1 m height along the edge of the benches.		----	√	√	----
5	Prevent the spillage of overburden material onto coal benches and vice versa during the dozing and leveling operations.		Overman Report, Mining Sirdar Report	√	√	----
6	Ensure compaction of bench floor with rollers/dozers to ensure smooth movement of HEMM.		----	√	√	----
7	Arrange for installation of compatible electrical switch-gear, cables, and illumination equipment at safe places along the bench to prevent damage from blasting, and from moving HEMM.	SH (E&M)	----	√	√	√
8	Ensure that codes of practice for operation of HEMM are suitably displayed in operators’ cabins of all HEMM.	SH (Safety)	Safety Officer Diary	√	√	√
9	Arrange for measurement of air, water and noise at designated monitoring stations.	PEO	Air, Water and Noise Quality Report	----	√	√

00.8 DRILLING AND BLASTING OR MECHANIZED COAL CUTTING IN QUARRY BENCHES.

1. OUTPUTS OF THE PROCESS:

- Loosened and properly sized overburden and coal for removal after drilling and blasting.
- Produced coal of proper size after mechanized coal cutting.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Explosive Allocation as per MCL headquarters' notification.
- Coal Mines Regulation, 2017 – regulation number 135, 144, 183 – 188, 190- 196, 199, 200, 206, and 207.
- DGMS Circular numbers 11/1961, 45/1963, 71/1963, 57/1964, 42/1965, 1/1967, 18/1971, 36/1972, Tech 1/1975, Tech 8/1976, 11/1977, Tech 15/1977, Tech 11/1979, Tech 3/1980, Tech 4/1980, 1/1981, Tech 8/1982, Tech 4/1983, 2/1985, 2/1990, Tech (S&T) 7/97.
- Indian Explosives Rules, 1983, clause number 76.
- Environmental (Protection) Rules, 1986 and its amendments; National Ambient Air Quality Standards, 1994/2009; Noise Pollution (Regulation and Control) Rules, 2000/2017
- Central Motor Vehicles Rules, 1989./2019
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Environment clearance conditions for the Projects.
- Conditionalities against Air and Water Acts.
- Explosive storage and usage license of the mine.
- Safe Usage of Explosives (CMPDIL Publication).

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Drill machines	Excavation Section
B	Dozers	
C	Explosive carrier vans (Where explosive transport is done departmentally)	Blasting Section
D	Blasting accessories (Stemming equipment, circuit testers, exploders, etc.)	
E	Blast-warning sirens/audio-alarms	
II. MANPOWER:		
A	PEO	Project Officer
B	SH (Blasting)/Blasting Officer	Mine Manager
C	Blasting Overman & Mining Sirdars	SH (Blasting)
D	Shot-firers	
E	Shot-firer Helpers & Blasting Guards	
F	Explosive Van Drivers	
G	Magazine Clerks	
H	Drill Operators and Helpers	SH (Excavation)
I	Dozer Operators	
III. NATURAL RESOURCES:		
A	Water (for sprinkling before blasting and wet-drilling)	SH (Blasting)
B	Energy (electricity for operation of HEMM)	SH (Excavation)
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

'Drilling and blasting' is a sub-process of the main process 'working face preparation' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). This sub-process is undertaken after the sub-process 'bench preparation'; and provides necessary input for the next process 'coal and overburden loading/transport and quarry rearrangements'.

Activities involved in this sub-process are given below. Of these, some elements of the asterisked ones are sometimes outsourced, for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-6 below. The remaining activities are carried out internally.

- Explosive transportation, handling, and storage (ANFO/LD internally; SMS outsourced). *
- Blasting pattern setting and drilling of shot holes. *
- Charging of holes (ANFO/LD internally; SMS outsourced). *
- Shot firing.
- Blast vibration monitoring.

* - Sometimes, rock-breaking in coal strata through Drilling and Blasting is not undertaken at all, and is totally outsourced through use of surface miners. Controls for this outsourcing are also given under para-6 below.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Explosive storage and transportation (where done internally) – Critical parameters of this activity are explosive type and quantity, detonators type and quantity, magazine-capacity and type, and recorded issue/return at magazine; to minimize the environmental impacts/OH&S risks and ensure the following, • Safe storage of explosives and detonators, • Handling of optimum amount of permitted explosives and detonators, and • Prevention of loss of explosives due to leakage/spillage/accidents.						
1	Ensure that explosives are stored only in the licensed magazine having all required safety features.	SH (Blasting)	Magazine Register/ Explosive and	√	----	√
2	Ensure recorded issue of explosive against authorized requisitions from SH (Blasting).	Magazine Clerk	Detonator Register	√	----	----
3	Arrange for transportation of explosives and detonators in separate but approved type of van, with appropriate security arrangement.	SH (Blasting)	Explosive transit slip	√	----	√
4	Ensure safe and accident-free driving of explosive van along shortest and safe route.	Van Driver	Explosive Van Log Book	√	----	√
5	If explosive transportation is to be outsourced, arrange for engaging suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-6 below in the work orders.	SH (Blasting)	Contract Works Register	√	√	√
6	Ensure that explosives are handled as per statutory rules/guidelines.	Blasting Overman	----	√	√	√

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
b. Blasting Pattern Setting and Drilling – Critical parameters of this activity are number of holes, burden, spacing, & depth; to minimize the environmental impacts and ensure the following, - Required quantity of blasted material from the blast round, - Prevention of toe formation, - Minimal vibrations and throw of blast, and - Elimination of need for secondary blasting.						
1	Prepare blasting pattern for the blast to show number of shot holes, spacing, burden, depth, explosive-charge per hole, deck-charging and stemming as needed, and the detonating sequence.	SH (Blasting)	Drilling and Blasting Record	√	√	√
2	Arrange for leveling of the drilling site and removal of loose rocks.	Overman	----	√	√	√
3	Maintain following minimum vertical distances from overhead electric feeder wires while raising drill mast. 6.6KV Distribution Line: 3m 33 KV Line (1 to 3 insulators): 4m		----	√	√	----
4	Arrange for drilling of holes as per pattern decided above only when dust extractor is functional, using earmuffs during drilling.	Overman	Drilling and Blasting Record	√	√	√
5	Ensure drill operations with optimum feed pressure & rotation while ensuring wet drilling and air/water flushing			√	√	√
6	Verify hole-depth, spacing, and burden against those specified under above pattern.	SH (Blasting)		√	√	√
7	Arrange for measurement of air, water and noise at designated monitoring stations	PEO	Air, Water, Noise Quality Reports	----	√	√
c. Charging of Holes – Critical parameters of this activity are quantity of explosive per hole, deck-charging, stemming, detonating sequence; to minimize environmental impacts/OH&S risks and ensure following, - Throw of blasted material within the bench, - Minimum ground vibrations, and - Fragmentation within 1/10 of excavator bucket size.						
1	Ensure the availability of permitted explosive and primer/cast booster cartridges from magazine/explosive-supplier's store as per guidelines/norms under the Indian Explosive Rules, 1983.	SH (Blasting)	Explosive Transit Slip.	√	----	----
2	Arrange for charging and priming of explosives in shot holes without spillages and as per blasting pattern decided at 'A.1' above, while taking safety precautions as per Coal Mines Regulations, 1957.		Explosive Consumption Record	√	√	----
d. Shot Firing – Critical parameters of this activity are stemming density, detonator-exploder circuit connection, and safety during blasting; to minimize the environmental impacts/OH&S risks and ensure the following, - Elimination of misfires, and - Prevention of accidents during blasting.						
1	Ensure the stemming of loaded shot holes and connecting of detonators in the correct sequence as specified in the blasting pattern decided at 'A.1' above.	Shot Firer	----	√	√	----
2	Ensure safety precautions as per Coal Mines Regulations, 1957 (ref Obligatory Requirements on pre-page).	Shot Firer	----	√	√	√
3	Inspect the blast-site to assess safety and to deal with misfires if any.		Shot-firer Report	√	----	√
4	Assess the quantity of blasted material resulting from the blast.	SH (Blasting)	Drilling and Blasting Record	√	----	----
5	Estimate the blast efficiency in terms of powder factor.	SH (Blasting)		√	----	----

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
e. Blast Vibration Monitoring – Critical parameters of this activity are controlled blasting, and regular monitoring; to minimize the environmental impacts/OH&S risks and ensure the following, - Minimum vibration from the blast, and - Monitoring of ground vibration as per related statutes.						
1	Ensure the use of shock-tube technology with exploder preferably using emulsion/ LD explosives and delay detonators, when blasting near machinery/structures to minimize vibration due to blasting.	Blasting Officer	----	√	√	√
2	Ensure that vibration levels of blasting are regularly monitored and kept within limits prescribed under related DGMS circular no Tech (S&T) 7/1997.	Blasting Officer	Vibration Monitoring Record	√	√	√

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
A: For Rock Breaking By Drilling And Blasting:				
1	That only the ‘permitted explosive and/or detonator’ specified above should be supplied.	√	√	√
2	That the strength and VoD of the supplied explosive should be under permissible limits to prevent excess vibration and throw and to get optimum fragmentation.	√	√	√
3	That the levels of toxic chemicals, noise, vibration, and fume generation should be within permissible limits.	----	√	√
4	That the explosive carrier van should be duly licensed to carry explosives and relevant license information should be displayed on the van.	√	√	√
5	That the related statutes/regulations are duly complied during explosive transportation, handling, and storage by the supplier.	----	√	√
B: For Coal Cutting by Surface Miners:				
1	That all related statutes/regulations are compiled during the work.	√	√	√
2	That cutting operations are carried out only when the internal water spraying arrangement of the surface miner is functioning.	√	√	----
3	That during operation/maintenance of the surface miner, oil leakages are prevented	√	√	√
4	That air, water, and noise measurements are carried out only at the statutorily designated monitoring stations.	----	√	√

00.9 COAL AND OVERBURDEN LOADING AND TRANSPORTATION

1. OUTPUTS OF THE PROCESS:

- Overburden at dumps
- Coal at stock yards/siding/CHP

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining in mine leasehold.
- Coal Mines Regulation, 2017, regulation numbers (104-110),128,135,139,140,143
- DGMS Circulars numbers 6/1964, 56/1964, 36/1972, 11/1973, Legis 1/1976, 17/1977, Tech 7/1977, Tech 2/1986, Tech 5/1988, Tech 1/1989, Tech 5/1990, Tech Sapicom 4/1993.
- Environmental (Protection) Rules and Act 1986.
- National Ambient Air Quality Standards, 1994./2009
- Noise Pollution (Regulation and Control) Rules, 2000/2017.
- Central Motor Vehicles Rules, 1989/2019
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Environment clearance conditions for the Projects.
- Consent / Conditionalities against Air and Water Acts.
- Applicable recommendations of Mines Safety Conferences.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Draglines, Shovels, Backhoes, Dumpers, Pay loaders, Dozers, and Tippers	Excavation Section
B	Electrical sub-station, field switch-gear, cables, illumination equipment, etc.	E&M Section
C	Conveyor belts, screen, coal receiving pits/bunkers/hoppers	
II. MANPOWER:		
A	Mine Manager	Project Officer
B	SH (E&M/SDG)	
C	SH (Excavation)	
D	PEO	
E	SH (Mining)/Under Managers	Mine Manager
F	Overman/ Mining Sirdars	SH (Mining)
G	HEMM Operators and Helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust from HEMM operations)	SH (Excavation)
B	Energy (electricity for operation of HEMM)	
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

'Coal and overburden loading and transportation' is a sub-process of the main process 'coal and overburden loading/transport and quarry re-arrangements' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual).

This sub-process is undertaken after the process 'working face preparation'; and provides necessary inputs for the next process 'coal crushing, handling and stocking'.

The activities involved in this sub-process are given below. Of these, some elements of the asterisked ones are sometimes outsourced, for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below. The remaining activities are carried out internally.

- a. Loading and transport of coal and overburden. *
- b. Preservation of coal during loading and transport. *

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Loading and Transport of coal and overburden – Critical parameters of this activity are number of dumpers deployed per shovel, length of coal and overburden transport routes, and operational safety of men and machinery during loading and transport; to minimize the environmental impacts/OH&S risks and ensure the following, - Achievement of targeted production level of coal and overburden, - Minimum possible lead distance for dumpers transporting coal/overburden, - Minimum possible idle time for digging and loading machines (i.e., for shovels), - Prevention of accidents during shovel, dumper and dozer operations, and - Prevention of breakdowns/damages to HEMM during their operations.						
1	Ensure that codes of practice for operation of HEMM are suitably displayed in operators’ cabins of all HEMM.	SH (Safety)	----	√	√	√
2	Ensure operations of HEMM are carried out strictly as per the code of practices made available as above.	All Operators	----	√	√	√
3	Ensure that tippers transporting coal in mine premises are covered to prevent coal spillage and dust generation.	Mine Manager	----	√	√	----
4	Prevent overloading of tippers/dumpers to avoid spillage on haul roads.	SH (Mining)	----	√	√	----
5	Ensure that coal is stacked in stockyards with proper compaction with dozers to avoid spontaneous heating.	SH (SDG)	----	√	√	√
6	Ensure adequate water sprinkling in all three shifts to suppress the dust.	Overman and Mining Sirdar	Water Tanker Trips Register	----	√	√
7	Verify the compliance of above codes of practice during daily inspections.	Manager/ Under-Manager	Manager/ Under-Manager diaries	√	√	√
8	Arrange for measurement of air, water and noise at designated stations	PEO	Air, and Noise Quality Report	----	√	√
9	Record the production and operational details of topsoil and overburden excavated and transported from the mine, under the following record formats. - Production, Dispatch & Manpower Report; - Contractual Production Report; - HEMM Performance Report; - POL Consumption Report; and - Statement of Tyres, Engines.	SHs (Mining, Excavation)	As under column 2 of this row.	√	----	----
b. Preservation of coal during loading and transport – Critical parameters of this activity are coal bench cleanliness, and clean-coal loading at faces; to minimize environmental impacts/OH&S risks and ensure, - Removal of non-coaly overburden material from coal faces, and - Loading of only clean coal at the faces by shovels/nav loaders/backhoes.						

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Ensure that the coal bench is free from loose debris and overburden material/boulders before commencement of coal loading by shovels/pay loaders/backhoes.	Under Manager	Under-Manager Diaries, Overman Report, Mining Sirdar Report	√	√	----
2	Ensure that while loading coal from the faces, the shovel/pay loader/backhoe/ surface miner operator does not scrape the non-coaly floor while filling the excavator bucket.			√	√	----
3	Ensure that the drain on high-wall side of the face is maintained to keep the face dry and prevent extra moisture in loaded coal.			√	√	----
4	During coal loading, arrange for segregation of any overburden material that has fallen onto the coal face during blasting of overlying overburden benches.			√	√	----
5	Arrange for mining of stone/shale bands through separate benches, if the band thickness exceeds 1m.			√	----	----
6	Arrange for sufficient lighting at the faces in the evening and night shifts.	SH (E&M)	----	√	----	----

- 7. DEFINED CONTROLS FOR CONTRACTUAL WORKS:** Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work.	√	√	√
2	That all tippers/dumpers carrying coal/overburden should be covered during transportation and move along specified routes only.	√	√	√
3	That exhaust smoke of tippers/dumpers used for transportation work is within the prescribed limits.	√	√	√
4	That air, water, and noise measurements are carried out only at the statutorily designated monitoring stations.	----	√	√

00.10 HAUL ROAD & DRAIN MAKING/MODIFICATION

1. OUTPUTS OF THE PROCESS:

- Properly constructed/modified haul roads suitable for safe and efficient movement of HEMMs.
- Properly constructed/modified drains for enabling self-draining of water from haul roads to mine sump.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining in mine leasehold.
- Coal Mines Regulation, 2017 – regulation numbers 101, (104-110)
- DGMS Circular number 36/1972, Tech 3/1976, Tech 17/1977.
- Environmental (Protection) Rules, 1986 and its amendments.
- National Ambient Air Quality Standards, 1994/2009.
- Noise Pollution (Regulation and Control) Rules, 2000/2017
- Central Motor Vehicles Rules, 1989/2019
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Environment clearance conditions for the Projects.
- Conditionalities against Air and Water Acts.
- Schedule of Rates Book – CPWD & SR (CPWD Publication).
- Applicable recommendations of Mines Safety Conferences.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Dozers, Backhoes, and Graders	Excavation Section
B	Shovels, Dumpers, and Tippers/Trucks	
C	Related electrical field switch-gear, cables, etc.	E&M Section
II. MANPOWER:		
A	Project Officer	Area GM
B	Mine Manager	Project Officer
C	SH (CIVIL)	
D	PEO	
E	SH (Mining)/Under manager	Mine Manager
F	SH (Survey)	
G	SH (Safety)	
H	Surveyors	SH (Survey)
I	Overman/Mining Sirdars	SH (Mining)
J	HEMM Operators and Helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust from HEMM operations)	SH (Excavation)
B	Energy (electricity for operation of HEMM)	
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

'Haul road and drain making/modifying' sub-process is a part of the main process 'quarry re-arrangements' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual).

It is undertaken after the sub-process 'coal/overburden loading and transportation'; and provides necessary inputs for the subsequent sub-process 'HEMM relocation and other machine rearrangements'.

The only activity involved in this sub-process is 'bench preparation'. A part of this, e.g., 'haul roads construction/modification' is outsourced when required, for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Making and Modifying Haul Roads and Drains – Critical parameters of this activity are road width, gradient, compaction, and load-bearing capacity of the haul road; to minimize the environmental impacts/OH&S risks and ensure the following, • Smooth surface for HEMM operations, • Convenient working width and gradient for the dumper operations, and • Self-draining of water from the haul roads to the main sump.						
1	Ensure that in the mine plans/drawings, a. Haul road width is projected as per DGMS permission; b. Haul road gradient is not projected steeper than 1 in 14 for main haul roads and 1 in 10 for short ramps (or as per DGMS permission); c. Haul lead for coal and overburden transport is kept at the minimum possible.	SH (Survey)	Monthly Plan	√	√	√
2	Ensure that haul roads and drains are constructed as per DGMS permission for the mine and the above plan. [If above work is to be outsourced, arrange for engaging suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.]	SH (Civil)	Contract Works Register	√	√	√
3	Keep all haul roads leveled with motor grader and dozer to ensure smooth roads with minimum rolling resistance.	Overman and Mining Sirdar	Overman and Mining Sirdar Report	√	√	√
4	Keep all drains clear of debris/muck along haul roads.			√	√	----
5	Maintain a berm of at least 1m height along the free-face edge of all haul roads.			√	√	√
6	Ensure that codes of practice for operation of HEMM are suitably displayed in operators’ cabins of all HEMM.	SH (Safety)	----	√	√	√
7	Ensure operations of HEMM are carried out strictly as per the code of practices made available as above.	All Operators	----	√	√	√
8	Ensure that clear visibility up to 30 m is available to HEMM operators at all the curves on haul roads, and a super-elevation of 0.03 m per meter of road-width exists on the outer arc of the haul road curves.	Overman and Mining Sirdar	Overman and Mining Sirdar Report	√	----	√
9	Display suitable traffic signals with fluorescent paint along the haul route, especially at curves and along downward slopes.			√	----	√

10	Arrange for spreading of morram, stone chips, etc., on haul roads, compacting with road rollers, and tree plantation along permanent haul roads as per environment clearance conditionalities.	Overman and Mining Sirdar	Overman and Mining Sirdar Report	√	√	----
11	Arrange for measurement of air, water and noise at designated monitoring stations.	PEO	Air, Water and Noise Quality Report	----	√	√

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That the related statutes/regulations are duly complied during haul road making/modifying.	√	√	√
2	That drains are aligned near the high wall side of main haul roads, having at least 1.5 m width and 1.0 m depth, and that haul roads have a cross gradient to allow self-draining of water into the drains.	√	√	√
3	That exhaust smoke of trucks used for transportation of construction material is within the prescribed limits	----	√	√
4	That there is no spillage of coal tar during road construction work, and that any wastes generated during construction work are removed from mine premises and suitably disposed.	----	√	----
5	That tree plantation is done along permanent haul roads and other vacant spaces at the density of minimum 2500 trees per hectare.	----	√	----

00.11 HEMM RELOCATION AND REARRANGEMENT OF OTHER MACHINERY

1. OUTPUTS OF THE PROCESS:

- Relocated/ rearranged HEMMs and other machinery for efficient production

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Applicable recommendations of Mines Safety Conferences
- Environmental (Protection) Rules, 1986 and its amendments.
- National Ambient Air Quality Standards, 1994/2009
- Noise Pollution (Regulation and Control) Rules, 2000/2017
- Central Motor Vehicles Rules, 1989/2019
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Environment clearance conditions for the Projects.
- Conditionalities against Air and Water Acts.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Cranes, Dozers, Backhoes, Graders, and Tippers	Excavation Section
B	Electrical field switch-gear, cables, illumination arrangements, pumps, etc.	E&M Section
II. MANPOWER:		
A	Project Officer	Area GM
B	Mine Manager	Project Officer
C	SH (Excavation)	
D	SH (E&M)	
E	PEO	
F	SH (Mining)/Under managers	Mine Manager
G	SH (Safety)	
H	Excavation Engineers	SH (Excv)
I	Excavation Foremen	
J	E&M Engineers	SH (E&M)
K	Overmen/Mining Sirdars	SH (Mining)
L	HEMM Operators and Helpers	
M	E&M Foremen	SH (E&M)
N	Electrical & Mechanical Fitters and Helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust from HEMM operations)	SH (Excavation)
B	Energy (electricity for operation of HEMM)	
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

'HEMM relocation and other machinery rearrangement' is a sub-process of the main process 'coal/overburden loading/transport and quarry rearrangement' (refer operational process flow for coal mining and supply for open cast mining as under Annexure - 2A of Integrated Management System Manual). This sub-process is undertaken after the sub-process 'coal/overburden loading and transportation' and 'haul-road/drains making/modifications; and provides necessary inputs for the process 'working face preparation'. No part of this sub-process is outsourced.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. HEMM relocation and other machinery rearrangements – Critical parameters of this activity are length of coal and overburden transport routes, flitting distance for shovels, and machine safety during flitting; to ensure, • Minimum possible lead distance for dumpers transporting coal/overburden, • Minimum possible HEMM-flitting distance, and • Prevention of breakdowns/damages to HEMM/other machinery during flitting.						
1	Ensure that the above considerations are taken into account while preparing next month’s program for flitting of shovels, electrical equipment, pumps, cables, etc., covering at least, • Proposed dates of flitting of machinery, • Time period & destination for flitting, • Alternative arrangement if needed for maintaining production during flitting.	Project Officer	Monthly Operation Plan	√	√	√
2	Ensure that HEMM/other machinery is released from production operations for flitting as per programs prepared above.	SH (Mining)	----	√	----	----
3	Arrange for clearing of all haul roads and transport routes for machinery flitting.		----	√	√	√
4	Ensure timely implementation of above programs of machinery flitting.	SHs (Excavation and E&M)	----	√	----	----
5	Ensure that codes of practice for operation of HEMM are suitably displayed in operators’ cabins of all HEMM.	SH (Safety)	----	√	√	√
6	Ensure operations of HEMM are carried out strictly as per the code of practices made available as above.	All Operators	----	√	√	√
7	Arrange for measurement of air, water and noise at designated monitoring stations.	PEO	Air, Water and Noise Quality Report	----	√	√

U0.1 SURVEYING OF UNDERGROUND WORKINGS

1. OUTPUTS OF THE PROCESS:

- Report indicating assessed volume of coal mined/ to – be- mined.
- Statutory and other operational drawings and mine-plans.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Manual on Colliery Survey (CMPDIL Publication).
- Applicable recommendations of Mines Safety Conferences.
- Coal Mines Regulation; and Regulation numbers 64 – 70, 163 and 251,252.
- DGMS Circulars related to the above CMR regulations.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Surveying instruments, e.g., total station, dumpy level, theodolites, and UG surveying accessories.	Survey Section
II. MANPOWER:		
A	SH (Survey)	Mine Manager
B	Head Surveyor/Surveyor	SH (Survey)
C	Draftsman	
D	Chainman	
E	Survey Mazdoors	
III. NATURAL RESOURCES: None		

5. PROCESS STRUCTURE:

‘Surveying of UG Workings’ is a sub-process of the main process ‘mining arrangements’ (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual). This sub-process is periodically undertaken after ‘operational arrangements’ has been completed based on the performance measurement of previous period. It provides inputs to subsequent sub-processes e.g. ‘mine ventilation arrangements’, ‘mine dewatering arrangements’, ‘working face preparations’, and ‘drilling and blasting or mechanized coal cutting’. Surveying also contributes to preparation of statutory and other necessary operational drawings and mine-plans.

The activities involved in this sub-process are given below. All these are carried out internally without any outsourcing.

- Assessment of volume of coal mined/to-be-mined.
- Providing survey inputs for planning and monitoring of mining operations.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under ‘3’ above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
A. Assessment of volume of coal mined/to-be-mined – Critical parameters of this activity are measurement of face advance, UG gallery height/width, and calculation of volume of coal mined; to ensure the following. • Estimation of difference between reported and measured production of coal, and • Calculation of correction factor to be applied during reporting the production in next month.						
1	Ensure that the plans/drawings/cross-sections is made, and volume calculation done in line with provisions of related coal mines regulations as at item 3.a above.	Section Head, Survey	Mine Survey Register	√	----	----
2	Ensure that correction factors estimated for production reporting are calculated and reported to Mine Manager at the beginning of every month as per provisions of related coal mines regulations as at item 3.a above.			√	----	----
B. Providing survey inputs for planning and monitoring of mining and allied operations – Critical parameters of this activity are the timeliness and accuracy of prepared mine-plans/projections, gallery-alignment demarcation, recording of water levels in sumps, and quantity of coal in stockyards; to ensure, • Availability of reliable information for planning and execution of mining and allied processes, • Accurate alignment of underground galleries, • Accurate estimation of distance between working galleries and old workings, UG water bodies, etc., and • Effective monitoring of the execution of mining and allied processes.						
1	Ensure that all statutory plans and drawings are prepared as per DGMS guidelines, and submitted in time to Mine Manager for dispatch to DGMS.	SH (Survey)	Mine Survey Register	√	----	----
2	Ensure that Mine Manager is informed adequately in advance about distance between the working faces and any old working, UG water bodies, etc.			√	----	----
3	Arrange for marking of centerline alignment of galleries being driven.			√	----	----
4	Ensure that following are prepared as per standard practices of mine surveying, and submitted in time to Mine Manager for production planning. • Monthly UG mine plan and drawings, • Records of water level in sumps, • Drawings of coal face advances, • Estimated volume of coal stored in surface stockyards, • Any other measurement/drawing as sought.			√	----	----

UO.2: MINE DEWATERING ARRANGEMENTS

1. OUTPUTS OF THE PROCESS:

- Dry and firm working places for UG mining,
- Constructed UG dams,
- Constructed pump foundations.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Applicable recommendations of Mines Safety Conferences.
- Environment clearance conditions for the Projects.
- Consent/conditionality against Air and Water Acts.
- Coal Mines Regulation 2017; and Regulation numbers 149 - 152, and 237.
- DGMS Circulars related to the above CMR regulations.
- Environment (Protection) Act; and Rules.
- Noise Pollution (Regulation and Control) Rules.
- IS 10500, 1991; IS 2216, 1982; and MoEF&CC Schedule VI.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Main and auxiliary mine-pumps, and water-pipelines	E&M Section
B	Related electrical switch-gear, cables, etc.	
II. MANPOWER:		
A	SH (E&M)	Project Officer
B	SH (Civil)	
C	PEO	
D	SH (Mining)/Under Managers	Mine Manager
E	SH (Survey)	
F	Civil Engineers/Assistants	SH (Civil)
G	Overseers	
H	Surveyors	SH (Survey)
I	Overman & Mining Sirdars	SH (Mining)
J	E&M Engineers	SH (E&M)
K	E&M Foremen	
L	E&M Fitters and Helpers	
M	Pump Operators	
III. NATURAL RESOURCES:		
A	Energy (electricity for operation of pumps)	SH (E&M)

5. PROCESS STRUCTURE:

'Mine dewatering arrangement' is a sub-process of the main process 'mining arrangements' (refer operational process flow for coal mining and supply for underground mining as under Annexure - 2B of Integrated Management System Manual). This sub-process is executed perennially in the mine to provide dry and firm working places for efficient UG mining operation.

This sub-process involves only one activity, e.g., 'drying of mine faces and sumps'. Some portions of this activity, i.e., 'UG dam construction' and 'pump foundation construction', are sometimes outsourced for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to obligatory-provisions as under '3' above).

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
A. Drying of mine faces and sumps – Critical parameters of this activity are the water level in mine sump, water levels in old workings in the vicinity of UG working zone, and water accumulation at the working faces and galleries; to minimize the environmental impacts and ensure the following. • Prevention of slushy/muddy face/gallery floors, • Prevention of inundation of UG mine/workings with water from old workings, and • Accessibility of coalface for mining work.						
1	Estimate the following at least once every month. • Water-make of the mine through direct sources (e.g., rain) and indirect sources (e.g., ground water seepage), • Required sump capacity, • Locations/modifications of UG dams, • Needed rate and capacity of pumping for the mine including stand-by pumps – (keeping in view the discharge quantity requirements under environment clearance conditionality), and • Proposed discharge point for mine-water	SH (E&M)	Mine Discharge Pump Running Hours Record	√	√	√
2	Arrange for installation and operation of pumps, pipelines, and UG dams to meet the requirements estimated at ‘1’ above [If to be outsourced, engage suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.]	SH (E&M)	Mine Discharge Pump Running Hours Record	√	√	√
3	Ensure that pump operators use ear muffs while operating the mine-pumps		----	----	√	√
4	Prepare/update (every month) the water danger plan as per CMR 2017	SH (Survey)	Water Danger Plan	√	----	----
5	Arrange for relocations, modifications, and de-silting of mine sumps	SH (Mining)	----	√	√	----
6	Maintain suitable gradient of UG galleries to ensure collection of water into the sump	SH (Mining)	----	√	----	----
7	Ensure treatment of effluent water to meet the requirements under environment conditionality	PEO	----	√	√	√
8	Monitor water level in sumps daily	Surveyor	Survey Register	√	----	----
9	Prevent inrush of water into the mine from old workings and UG water bodies through timely dewatering, and checking by driving advance boreholes	SH (Mining)	Manager’s Diary	√	----	----
10	Ensure the collection of discharged mine water in sedimentation ponds (de-silted at suitable intervals) followed by necessary treatment before discharge into main water bodies	SH (E&M)	----	----	√	√

7. DEFINED CONTROLS FOR OUTSOURCED WORKS:

Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work	√	√	√
2	That the dug-out soil and other construction materials are dumped only at the designated sites	√	√	√
3	That exhaust fumes of trucks used for transportation of construction material are well within prescribed limits	----	√	√

UO.3 MINE VENTILATION ARRANGEMENTS

1. OUTPUTS OF THE PROCESS:

- Comfortable working environment in UG, and
- Ventilation parameters monitoring record.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Applicable recommendations of Mines Safety Conferences.
- Environment clearance conditions for the Projects.
- Consent/conditionality against Air and Water Acts.
- Coal Mines Regulation 2017; and Regulation numbers 133-138, 141-148, 153-173, 201 and 240.
- DGMS Circulars related to the above CMR regulations.
- Environmental (Protection) Act; and Rules.
- Noise Pollution (Regulation and Control) Rules.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Main Fan, Booster Fans, Auxiliary Fans	E&M Section
B	Auxiliary fan ducting, brattice cloth, methanometers	Mining Section
C	CO-testing meters, anemometers, wet & dry bulb thermometers, methanometers, stone-dust barriers	
D	Electrical switch-gear, cables etc.	E&M Section
II. MANPOWER:		
A	Mine Manager	Project Officer
B	SH (E&M)	
C	PEO	
D	SH (Mining) & Under Managers	Mine Manager
E	Overman/ Mining Sirdars	SH (Mining)
F	Timber Mistry and Mazdoors	
G	Fan Operators	
H	Ventilation Mazdoors	
III. NATURAL RESOURCES:		
A	Energy (electricity for operation of HEMM)	E&M Section
B	Lubricants for Main Fan	

5. PROCESS STRUCTURE:

'Mine ventilation arrangements' is a sub-process of the main process 'mining arrangements' (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual).. This sub-process is executed perennially to ensure necessary air circulation for all other sub-processes, especially 'working face preparations' and 'drilling and blasting or mechanized coal cutting'.

The activities involved in this sub-process are given below. All these are carried out internally.

- Circulation of air in UG workings, and
- Monitoring of quantity and quality of air circulated in the UG mine.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Circulation of air in UG workings – Critical parameters of this activity are quantity and velocity of air reaching the workings, temperature and humidity at working places, and quantity of methane gas in the mine air; to minimize the environmental impacts/OH&S risks and ensure the following. • Availability of adequate quantity of air at working faces, • Adequate velocity of air at the faces, • Keeping quantity of methane in the air within permissible limits.						
1	Ensure that ventilation stoppings are undamaged and leakage-free	Overman, Mining Sirdar	Overman Diary, Mining Sirdar Report	√	√	√
2	Arrange repairing of leakages in stoppings, brattice cloth, fan ducting, etc. to increase air quantity and velocity at working faces			√	√	√
3	Ensure that fan ducting and brattice cloth coursing is extended up to the face to provide air to workmen			√	√	√
4	Check quantity of methane in the air and immediately take precautionary measures as per CMR 2017 if the quantity exceeds prescribed limits	Under Manager, Overman, Mining Sirdar	Under Manager diary, Overman Diary, Mining Sirdar Report	√	√	√
5	Ensure that ventilation doors are kept closed and air leakages are eliminated at air crossings	SH (Mining)	SH (Mining) Report	√	----	----
6	Ensure that adequate quantity and velocity of air is available in traveling and haulage roadways, rest shelters, first aid rooms, pumping stations, UG sub-stations and switches, UG tipplers, conveyor drives, and other UG work-places	SH (Mining)	----	√	----	√
7	Ensure that humidity level at working faces remains within permissible limits by suitably coursing the air with brattice cloth and fan ducts	Overman	Overman Diary	√	----	√
8	Ensure actions in line with the provisions of CMR 2017 whenever any ventilation measurement indicates unsafe conditions	SH (Mining), Mine Manager	Manager / Under Manager Diary	√	----	√
9	Ensure that main fan and booster fans (if any) are operated round the clock at the prescribed speed and pressure, and are kept free from air and oil/lubricant leakages	Mine Manager	Fan Operations Record	√	√	√
10	Arrange for measurement of noise at designated monitoring stations	PEO	Noise Quality Report	----	√	√

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
b. Monitoring of quantity and quality of air circulated in UG mine – Critical parameters of this activity are periodicity of ventilation measurements, accurate recording of results, and timely reporting of results for required remedial actions; to minimize the environmental impacts/OH&S risks and ensure the following. - Timely measurement of ventilation parameters (quantity, velocity, humidity, CH₄/CO gas quantity, etc.), and - Recording and reporting of results to SH (Mining) and Mine Manager for timely remedies.						
1	Ensure timely measurement of the following ventilation parameters at the places designated under CMR 2017, and accurate recording of results - Air quantity, Air velocity, Humidity, Temperature, Methane gas quantity, CO and CO2 gas quantity, Air pressure, quantity at Main Fan and Booster Fans (if any), and conditions of stoppings, air-crossings and ventilation doors.	Under Manager and Overman (in charge of ventilation)	Ventilation Registers	√	----	√
2	Ensure that results of ventilation measurements are made available to Mine Manager and SH (Mining), by next morning, or Immediately, if the results indicate unsafe conditions in UG workings.		----	√	----	√

UO.4 POWER SUPPLY & LIGHTING FOR UG WORKINGS

1. OUTPUTS OF THE PROCESS:

- Uninterrupted and efficient electrical power supply

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Applicable recommendations of Mines Safety Conferences.
- Coal Mines Regulation 2017; and Regulation numbers 174-182, 201, 201 to 213.
- DGMS Circulars related to the above CMR regulations.
- Indian Electricity Rules.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Electrical sub-station, switch-gear, cables, illumination equipment, lux-meter, etc.	E&M Section
II. MANPOWER:		
A	SH (E&M)	Project Officer
B	E&M Engineers	SH (E&M)
C	E&M Foremen	
D	E&M Fitters and Helpers	
E	Electric sub-station and equipment operators	
III. NATURAL RESOURCES:		
A	Energy (electricity for mining operations)	SH (E&M)

5. PROCESS STRUCTURE:

'Power supply and lighting for UG workings' is a sub-process of the main process 'mining arrangement' (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual). It is used throughout the mining operations to ensure uninterrupted and efficient supply of electrical power and lighting for all other processes. Efficient execution of this sub-process contributes to the uninterrupted execution of all the operational activities.

The only activity involved in this sub-process is 'electrical power and lighting arrangement', and no part of it is outsourced.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
Arranging for supply of electrical power – Critical parameters of this activity are the power supply adequacy, controlled power consumption in the mine, and illumination adequacy; to ensure, • Uninterrupted working of mining machinery, • Effective illumination at working places, and • Efficient utilization of electrical power.						
1	On the basis of approved annual action plan for the mine estimate once every year the following, • Electrical power demand in the mine, • Locations where electrical power is needed, • Needed supply voltage, power cables and switch-gear, and • Additional requirement for electrical equipment and cables	SH (E&M)	----	√	----	----
2	Ensure the installation and commissioning of electrical equipment (FLP ones where required) and wires/cables to ensure power supply to all mining equipment as per the requirements determined at '1' above		Sub-station Log Book; and Sub-station Oil Change Issue, Testing and Recovery Log Book, Illumination Record	√	----	----
3	Monitor daily the duration of supply, actual consumption of electrical power, and power factor in the mine			√	----	----
4	Ensure appropriate lighting at surface machinery/installations and main UG working places like pit bottom, pumps, sub-station, haulages, conveyor drives, compressors, etc.			√	----	----
5	Ensure the implementation of provisions of the relevant clauses under the Coal Mines Regulations, 1957 and the Indian Electricity Rules			√	----	√

UO.5 INSTALLATION/SHIFTING OF PLANT AND MACHINERY

1. OUTPUTS OF THE PROCESS:

- Installed/relocated plant and machinery for efficient production

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Applicable recommendations of Mines Safety Conferences.
- Environment clearance conditions for the Projects.
- Consent/conditionality against Air and Water Acts.
- Coal Mines Regulations 2017; and Regulations 76-91, 95-98, 100, 103, 154-156, 161, and 208-237.
- DGMS Circulars related to the above CMR regulations.
- Indian Electricity Rules.
- Environmental (Protection) Act; and Rules.
- Noise Pollution (Regulation and Control) Rules.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Machinery to be installed/shifted, e.g., conveyors, feeders, compressors, haulages, auxiliary fans, booster fans, track-lines, tipplers, pumps, pipelines, incline//shaft fittings, side discharge loaders, load haul dumpers, continuous miners, roof bolting machines, tubs, etc.	E&M Section
B	Electrical field switch-gear, cables, illumination arrangements, etc.	E&M Section
II. MANPOWER:		
A	Project Officer	Area GM
B	Mine Manager	Project Officer
C	SH (E&M)	
D	SH (Civil)	
E	PEO	
F	SH (Mining)/Under Managers	Mine Manager
G	SH (Safety)	
H	E&M Engineers	SH (E&M)
I	E&M Foremen	
J	E&M Fitters and Helpers	
K	Machinery Operators and Helpers	
L	Civil Engineers	SH (Civil)
M	Civil Engineering Assistance and Overseers	
N	Overman/Mining Sirdars	SH (Mining)
III. NATURAL RESOURCES:		
A	Energy (electricity for machinery operations)	SH (E&M)
B	Lubricants	

5. PROCESS STRUCTURE:

'Installation/shifting of plant and machinery' is a sub-process of the main process 'mine arrangements' (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual).

This sub-process is undertaken after the sub-process 'coal evacuation from face to surface' and 'drilling and blasting or mechanized coal cutting'; and provides necessary inputs for the process 'working face preparation'. No part of this sub-process is outsourced.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
Installation / shifting of plant and machinery – Critical parameters of this activity are length of traveling and transport galleries, shifting distance for machinery, and machine safety during installation/shifting; to minimize environmental impacts/OH&S risks and ensure following - • Minimum possible distance for coal transportation; • Minimum possible machinery-shifting distance; and • Prevention of breakdowns/damages/accidents/dangers to men and machinery during installation / shifting.						
1	Ensure that above considerations are kept in view for preparing next month’s program for machinery installation and shifting, firming up at least, • Dates & location of installation, • Dates & location of shifting, • Alternative arrangement if needed for maintaining production during above.	Project Officer	Monthly machinery installation / shifting program	√	----	----
2	Ensure that machinery is released from production operations for installation/ shifting as per program prepared above	SH (Mining)	----	√	----	----
3	Arrange clearing of workplaces & transport routes for machinery shifting/ installation		----	√	----	----
4	Ensure timely implementation of above programs of machinery flitting	SH (E&M)	----	√	----	----
5	Ensure that necessary civil construction work for machinery shifting / installation are carried out as per above program	SH (Civil)	Contract Works Register	√	----	----
6	Ensure suitable display and explanation of approved code of practice for machinery operation	SH (Safety)	----	√	√	√
7	Ensure machinery operations are carried out strictly as per approved code of practices made available as above	All Operators	----	√	√	√
8	Ensure that machinery installations and shifting are carried out without contravening any regulation as under CMR 2017 and related DGMS circulars	Overman, Foremen, Mining Sirdar	Overmen / Foremen Report, Mining Sirdar Report	√	----	----
9	Arrange for measurement of air, water and noise at designated monitoring stations	PEO	Air, Water and Noise Quality Report	----	√	√

UO.6 STABILIZATION OF MINED-OUT AREAS

1. OUTPUTS OF THE PROCESS:

- Stabilized roofs with sand stowing.
- Safe faces and goaf-edges with roof-supports.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining operations of the mine.
- Applicable recommendations of Mines Safety Conferences.
- Environment clearance conditions for the Projects.
- Consent/conditionality against Water Act.
- Coal Mines Regulation 2017; and Regulation numbers 118 – 128.
- DGMS Circulars related to the above CMR regulations.
- Noise Pollution (Regulation and Control) Rules.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Sand stowing pumps and pipelines	Excavation Section
B	Related electrical switch-gear, cables, etc.	E&M Section
II. MANPOWER:		
A	Mine Manager	Project Officer
B	SH (Mining)/Under Managers/Stowing In charge	Mine Manager
C	Overman/Mining Sirdars	SH (Mining)
D	Sand Stowing Plant Operators, Fitters, Helpers	
E	Roof Support Mistry and Mazdoors	
III. NATURAL RESOURCES:		
A	Water (for sand stowing)	SH (Mining)

5. PROCESS STRUCTURE:

‘Stabilization of mined-out areas’ is a sub-process of the main process ‘mining arrangements’ (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual). It is undertaken after the sub-processes ‘drilling and blasting or mechanized coal cutting’ and ‘coal evacuation from face to surface’. It is used to prevent premature collapse of roof strata in UG working faces and facilitates the next sub-process ‘working face preparation’.

The activities involved in this sub-process are given below, both of which are carried out internally without any outsourcing.

- Roof stabilization with sand stowing.
- Stabilization of face and goaf-edges with roof-supports.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under ‘3’ above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Roof stabilization with sand stowing – Critical parameters of this activity are hydraulic gradient, rate of depillaring face advance, and rate of sand stowing; to minimize environmental impacts/OH&S risks and ensure the following - - Complete filling up of goaved out areas with sand, and - Prevention of roof fall, cracks and sagging in goaf areas.						
1	Ensure that the stowing plant is operated at scheduled hours for sand stowing, and idle running of water through stowing pipes is avoided	Stowing In- charge	Sand Stowing Register	√	----	----
2	Arrange for adequate availability of sand in the surface sand-bunker for stowing			√	----	----
3	Ensure that no voids are left in goaves from where coal has been extracted, and all voids are fully stowed with sand			√	----	----
4	Ensure that stowing pipes are flushed with water to clear out any residual sand in the pipes before stopping stowing operations in each stowing cycle			√	----	----
5	Ensure that stowing plant operators use ear plugs while running the stowing plant/pump		----	----	√	√
6	Ensure that rate of sand stowing is appropriately matched with the rate of depillaring face advance	SH (Mining)	----	√	----	----
7	Ensure that hydraulic gradient is suitable for sand stowing in the depillared goaves	Mine Manager	----	√	----	----
b. Stabilization of face and goaf-edges with roof-supports – Critical parameters of this activity are time-gap between goaving and support-setting, and type of depillaring-panel supports and goaf-edge supports; to minimize the environmental impacts/OH&S risks and ensure the following. - Prevention of roof-strata failures resulting into accidents and loss of coal production, - Adequate space in the galleries for smooth operation of men and machinery after roof supporting.						
1	Ensure that galleries, splits, slices and goaf-edges in depillaring panels are supported with props, cogs, chocks, roof bolts, etc. strictly as per the ‘systematic support rules’ specifically approved for the mine	Under Manager, Overman, Mining Sirdar	Under Manager Diary, Overman Report, Mining Sirdar Report	√	----	----
2	Ensure that the time gap between coal extraction and roof-supporting in splits, slices and goaf edges are kept within safe limit and as per DGMS permission			√	----	----
3	Ensure that provisions of applicable regulations as under CMR 2017 nos 104-112 and related DGMS circulars are followed during depillaring operations	SH (Mining)	Manager/ Under Manager Diary	√	----	----
4	Ensure that wherever necessary, steel arch supports are set-up for longer life of the gallery	Mine Manager	Manager Diary	√	----	----

UO.7 PREPARATION OF UNDERGROUND WORKING FACES

1. OUTPUTS OF THE PROCESS:

Safe and suitable working faces for further removal of coal.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining operations of concerned mine.
- Applicable recommendations of Mines Safety Conferences.
- Coal Mines Regulation 2017; and Regulation numbers 111-132, 149-151, and 237.
- DGMS Circulars related to the above CMR regulations.
- Noise Pollution (Regulation and Control) Rules.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Roof bolting machines, auxiliary fans, and roof dressing tools	Mining Section
B	Related electrical switch-gear, cables, illumination equipment, etc.	E&M Section
II. MANPOWER:		
A	Mine Manager	Project Officer
B	SH (E&M)	
C	PEO	
D	SH (Mining)/Under Managers	Mine Manager
E	SH (Survey)	
F	SH (Safety)	
G	Surveyors	SH (Survey)
H	Overman & Mining Sirdars	SH (Mining)
I	E&M Foremen, Fitters and Helpers	SH (E&M)
III. NATURAL RESOURCES:		
A	Energy (electricity for operation of machinery)	SH (E&M)

5. PROCESS STRUCTURE:

'Working face preparation' sub-process is a part of the main process 'working face arrangements' (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual). This sub-process is undertaken after the sub-processes 'stabilization of mined-out areas', and 'coal evacuation from face to surface'. It provides necessary input for the subsequent sub-process 'drilling and blasting or mechanized coal cutting'.

The only activity involved in this sub-process is 'face preparation', and no part of it is outsourced.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above).

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
Face preparation – Critical parameters of this activity are rate of face advance, timely support of freshly-exposed roof, and suitable UG gallery height/width/gradient; to minimize environmental impacts/OH&S risks and ensure the following. • Prevention of unsupported roof at working faces and all UG galleries in use, • Efficient and safe mining activities at face, • Convenient working width and height of UG galleries and faces for men and machinery, • Correct alignment of UG galleries, and • Draining of water from face to sump.						
1	Ensure that in the face/panel projections shown in the mine plans/drawings, a. Widths and heights of galleries, splits, & slices are as per DGMS permission; b. Gallery alignment and size are appropriate for the mining method and machinery in use; c. Panel projections are in line with the mining method in use; d. Working faces are at safe distances from old workings, UG water bodies, fire areas, etc.	Mine Manager, SH (Survey)	Monthly Plan attached to record 9.8.B of Management Manual	√	----	----
2	Arrange for dressing of loose materials / rocks along the face, sides and roof of the gallery, while preventing widening of the gallery and undercutting of the face	SH (Mining), Undermanager, Overman and Mining Sirdar	Manager Diary, Under Manager Diary, Overman Report, Mining Sirdar Report	√	----	----
3	Ensure that during the face and roof dressing, the gallery height and width are as per the specifications prescribed in the above plan/drawing		√	----	----	
4	Ensure that coal-ribs are left against goaves as prescribed in DGMS permission		√	----	----	
5	Ensure that roof supports are extended up to the face to prevent unsafe working conditions for men and machinery at face		----	√	----	----
6	Ensure that idle running of machinery is prevented		----	√	----	----
7	Ensure that coal load-out arrangement from SDL, LHD, continuous miner is suitably extended up to face		----	√	----	----
8	Ensure that ear plugs are used near UG machinery where noise level exceeds specified limits, e.g., near auxiliary fans, chain/belt conveyor drives, etc.	SH (Safety)	----	√	----	----
9	Ensure that approved code of practices for the mine are available to face-personnel		----	√	----	----
10	Ensure that personnel at face strictly implement the above code of practices	Overman, Foreman	----	√	----	----
11	Arrange for installation of compatible electrical switch-gear, cables, and illumination equipment at safe places along the UG galleries where required	SH (E&M)	----	√	----	----
12	Arrange for measurement of noise at designated monitoring stations	PEO	Noise Quality Report	√	----	----

UO.8 DRILLING AND BLASTING IN WORKING FACES

1. OUTPUTS OF THE PROCESS:

- Loosened material for digging operation after blasting.
- Removed coal by continuous miner and loaded on belt conveyors/tubs.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining operations of concerned mine.
- Applicable recommendations of Mines Safety Conferences.
- Explosive Allocation vide WCL headquarters' notification.
- Environment clearance conditions for the Projects.
- Coal Mines Regulation 2017; and Regulation numbers 111-119, 127-132 and 183-207.
- DGMS Circulars related to the above CMR regulations.
- Indian Explosives Rules, 1983, clause number 76.
- Noise Pollution (Regulation and Control) Rules, 2000/2017.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Hand-held Coal Drills	Mining Section
B	Explosives and Detonators	
C	Stemming material and rod, circuit testers, exploders	
D	Continuous Miner Equipment Set (for mechanized coal cutting)	
E	Related electrical switchgear, wires/cables	SH (E&M)
II. MANPOWER:		
A	Mine Manager	Project Officer
B	PEO	
C	SH (Mining)/Undermanager/Blasting In-charge	Mine Manager
D	SH (Safety)	
E	Overman & Mining Sirdars	SH (Mining)
F	Shot-firer Sirdar and Explosive Carriers/Helpers	
G	Magazine Clerks	
H	Drill Operators	
I	Operators of Continuous Miner Equipment Set	
III. NATURAL RESOURCES:		
A	Energy (electricity for Drill and Continuous Miner operation)	SH (Mining)

5. PROCESS STRUCTURE:

'Drilling and blasting' is a sub-process of the main process 'working face preparation' (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual). This sub-process is undertaken after the sub-process 'working face preparation' and provides necessary input for the next sub-process 'coal evacuation from face to surface'.

Activities involved in this sub-process are given below. Of these, the asterisked one is sometimes partly outsourced, for which necessary controls to ensure conformance to the requirements of this sub-process are given at para-7 below. The remaining activities are carried out internally.

- Blasting pattern setting and drilling of shot holes.
- Charging and blasting of shot holes.
- Mechanized coal cutting by continuous miner (Undertaken where drilling and blasting is not done; sometimes continuous miner operation and its roof bolting work is outsourced). *

Rev	Effective from	Reason of Change
00	As on Page 1	Not applicable, since initial issue.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Blasting pattern setting and drilling of shot holes – Critical parameters of this activity are number of shot holes per face, and distance between rows and columns of shot holes at the face; to minimize the environmental impacts/OH&S risks and ensure the following - - Required quantity of blasted coal from the blast round, - Type of explosives and detonators permitted by DGMS for use in the mine, - Prevention of coal being left un-blasted along floor/roof, - Minimal vibrations and throw of blast.						
1	Prepare blasting pattern for the face keeping the above considerations in view, to show at least the following. a. Number of shot holes, b. Hole depth, c. Hole inclination/direction, d. Distance between rows & columns of holes along the face, e. Explosive-charge per hole, f. Stemming requirement, and g. Sequence of detonation.	Blasting In-charge	Drilling and Blasting Record	√	----	----
2	Arrange for leveling of floor at the face and removal of loose rocks from roof and sides before allowing drilling operations at face.	Overman, Mining Sirdar	----	√	----	----
3	Arrange for drilling of holes at the face as per pattern decided above.			√	----	----
4	Ensure that the drill operators use ear plugs and dust masks while drilling shot holes at the face.			√	√	√
5	Verify hole-depth, direction, and distance between rows and columns of holes at the face against those specified under above pattern.	Blasting In-charge	Drilling and Blasting Record	√	----	----
b. Charging and blasting of shot holes – Critical parameters of this activity are recorded issue/return of explosives at magazine, type and quantity of explosive per hole, type and delay sequence of detonators, stemming quantity and density, detonator-exploder circuit continuity, and safety during blasting; to minimize environmental impacts/OH&S risks and ensure following - - Safe storage and issue/return of explosives and detonators at the magazine, - Safe handling of amount of permitted explosives and detonators by explosive carriers, - Safe charging of holes, - Accurate connection of detonation circuit at the face, - Elimination of misfires and blown-out shots, - Adequate throw and fragmentation of blasted coal, and - Minimum vibration from the blast.						
1	Ensure that explosives are stored only in the licensed magazine having required safety features.	Magazine Clerk	Magazine Register	√	----	√
2	Ensure recorded issue of explosives and detonators against authorized requisitions from Blasting In charge / Mine Manager.			√	----	----
3	Ensure that explosives are handled and transported from magazine to the UG face by authorized explosive carriers as per statutory rules/guidelines.	Blasting In charge, Shot Firer Sirdar	Shot Firer Sirdar Report, Blasting Record	√	----	----
4	Arrange for preparation/priming of explosive cartridges, and charging of shot holes as per the blasting pattern decided at 'A.1' above, while taking safety precautions as per Coal Mines Regulations, 1957.	Blasting In charge, Shot Firer Sirdar	Shot Firer Sirdar Report,	√	----	√

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
5	Ensure adequate stemming of charged shot holes and connecting of detonators in the correct sequence as specified in the blasting pattern decided at 'A.1' above.		Blasting Record	√	----	----
6	Ensure that all personnel are withdrawn from the blasting zone and into the area in and around the face being blasted to avoid accidents and dust/fumes from the blast.			----	----	√
7	Ensure safety precautions as per Coal Mines Regulations, 1957 and test the detonation circuit before firing the round of shot-holes.			√	----	√
8	Inspect the blast-site to assess safety and to deal with misfires/blown-out shots if any.			√	----	√
9	Allow personnel into the face only after ensuring that the face is safe for working and the explosive fumes have cleared.		----	√	----	√
10	Ensure that vibration levels of blasting are regularly monitored and kept within limits prescribed under related DGMS circulars/guidelines	Blasting In-charge	Vibration Monitoring Record	√	----	----
11	Estimate the blasting efficiency in terms of the powder factor		Blasting Record	√	----	----
12	Arrange for measurement of air and noise at designated monitoring stations	PEO	Air, Noise Quality Reports	----	√	√
c. Mechanized coal cutting by continuous miner – Critical parameters of this activity are required rate of face advance and coal production, rate of coal cutting of continuous miner, rate of supporting of freshly-exposed roof, and maximum availability of continuous miners' equipment; to minimize the environmental impacts/OH&S risks and ensure the following. - Desired rate of coal production, - Supporting of freshly exposed roof before commencement of bed-separation in the roof strata, and - Immediate load-out of coal from face by shuttle cars/LHDs for continual face cutting operations.						
1	Plan the operations of continuous miner on the first working day of every month to specify at least the following. - Face advance & coal production rates, - Dates and materials for roof supporting and extending of conveyors, cables, - Faces to be worked, and - Ventilation and stowing required for supporting production operations.	Mine Manager, SH (Mining), Under Manager	Monthly Plan	√	----	----
2	Ensure that continuous miner operations are carried out as per the above monthly plan [If to be outsourced, engage suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.]	SH (Mining), Under Manager, Overman, Mining Sirdar	Undermanag er Diary, Overman Report, Mining Sirdar Report, Contractual Works Register (if outsourced)	√	----	----
3	Ensure that safety precautions as per regulations and guidelines under CMR 2017 and DGMS circulars are strictly implemented during continuous miner operations			√	----	√
4	Ensure that roof supports are extended up to the face to prevent unsafe working conditions for men and machinery at face	SH (Mining), Under Manager, Overman, Mining Sirdar	Undermanag er Diary, Overman Report, Mining Sirdar Report, Contractual	√	----	√
5	Ensure adequate face ventilation and dewatering for smooth running of continuous miner			√	√	√

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
			Works Register (if outsourced)			
6	Ensure that code of practices approved for the mine are made available to face-personnel	SH (Safety)	----	√	√	√
7	Ensure that face personnel strictly implement the code of practices provided as above	Overman	----	√	√	√
8	Ensure that machinery operators use ear muffs and dust masks while operating the continuous miner and related machinery	SH (Safety)	----	----	√	√
9	Arrange for measurement of air and noise parameters at designated monitoring stations	PEO	Air, Noise Quality Reports	----	√	√

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS:

Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That the specified rate of coal production from continuous miners is consistently achieved and roof-supporting activities are completed in time in each coal-cutting cycle	√	---	----
2	That only trained and qualified/competent personnel are deployed in the UG workings	√	----	----
3	That idle running of the machinery is prevented	√	----	----
4	That leakages and spillages of oil and lubricants from continuous miner and other hydraulic equipment are avoided/eliminated	√	√	√
5	That the levels of dust, noise, and vibration are within permissible limits; ear plugs and dust masks are used by exposed personnel	√	√	√
6	That the related statutes/regulations are duly complied during continuous miner operations and allied activities	√	√	√

UO.9 COAL EVACUATION FROM UNDERGROUND TO SURFACE

1. OUTPUTS OF THE PROCESS:

Coal at stock yards/siding/CHP.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- DGMS permission for mining operations of concerned mine.
- Applicable recommendations of Mines Safety Conferences.
- Consent/conditionality against Air Act.
- Coal Mines Regulation 2017; and Regulation numbers 76-92, 94, and 99.
- DGMS Circulars related to the above CMR regulations.
- Noise Pollution (Regulation and Control) Rules.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	SDL, LHD, conveyors, feeders, hoppers, bunkers, mine tubs, haulages, tracks, tipplers	E&M Section
B	Electrical sub-station, field switch-gear, cables, illumination equipment, etc.	
II. MANPOWER:		
A	Mine Manager	Project Officer
B	SH (E&M)	
C	PEO	
D	SH (Mining)/Under Managers	Mine Manager
E	SH (Safety)	
F	Overman/ Mining Sirdars	SH (Mining)
G	Machinery Operators and Helpers	
III. NATURAL RESOURCES:		
A	Energy (electricity for operation of machinery)	SH (Mining)

5. PROCESS STRUCTURE:

'Coal evacuation from face to surface' is a sub-process of the main process 'working face arrangements' (refer operational process flow for coal mining and supply for underground mining as under Annexure – 2B of Integrated Management System Manual). This sub-process is undertaken after the sub-process 'drilling and blasting or mechanized coal cutting'; and provides necessary inputs for the next process 'coal handling and stocking'.

The only activity involved in this sub-process is 'loading and transport of coal from face to surface', and no part of it is outsourced.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
Loading and transport of coal from face to surface – Critical parameters of this activity are rate and method of coal load-out from face, length of coal transport route, mode of coal transport, and operational safety of men & machinery during loading and transport; to minimize the environmental impacts/OH&S risks and ensure the following. • Achievement of targeted production level of coal, • Minimum possible transport distance for transporting coal, • Minimum possible idle time for transport machines, • Removal of non-coaly material/debris/stowing sand from coal faces, • Loading of only clean coal at the faces, • Prevention of accidents during loading and transport, and • Prevention of breakdowns/damages to loading transport machinery during operations.						
1	Ensure that code of practice for operation of machinery are suitably displayed/distributed and periodically explained to operators of all machinery.	SH (Safety)	----	√	√	√
2	Ensure operations of machinery are carried out strictly as per the code of practices made available as above.	All Operators	----	√	√	√
3	Ensure that the coal face is free from loose debris, stowing sand and stone/shale before starting coal loading by SDL/LHD/ continuous miner	SH (Mining), Under Manager, Overman, Mining Sirdar	Under Manager Diary, Overman Report, Mining Sirdar Report	√	----	----
4	Ensure that operator of SDL/LHD/ continuous-miner does not scrape floor or roof while loading coal from the faces			√	----	----
5	Ensure that the face is kept dry and prevent extra moisture in loaded coal			√	----	----
6	During coal loading and transport, arrange for segregation of any non-coaly material that has may have gotten mixed with coal.			√	----	----
7	Ensure use of dust masks and ear plugs by machinery operators.		----	----	√	√
8	Ensure adequate water sprinkling at the face and transfer-points in all three shifts to suppress the dust.	Overman, Mining Sirdar	----	----	√	----
9	Arrange for installation of compatible electrical switch-gear, cables, and illumination equipment at safe places along the coal transport where required.	SH (E&M)	----	----	----	√
10	Arrange for measurement of air, water and noise at designated monitoring stations.	PEO	Air & Noise Quality Report	----	√	√
11	Record the production and transport details, under Production, Dispatch & Manpower Report, and Machinery Performance Report	SHs (Mining)	As under column 2 of this row.	√	----	----

CO.1 COAL CRUSHING, HANDLING, SIZING, LOADING, SAMPLING, DISPATCH

1. OUTPUTS OF THE PROCESS:

- Coal of required grade ready for use.
- Report of coal grade analysis.

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Applicable recommendations of Mines Safety Conferences
- Coal Mines Regulation, 2017, regulation numbers 209 to 212.
- DGMS Circulars issued against the above regulations.
- Environmental (Protection) Rules, 1986.
- National Ambient Air Quality Standards, 1994/2009.
- Noise Pollution (Regulation and Control) Rules, 2000/2017.
- Central Motor Vehicles Rules, 1989/2019.
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Environment clearance conditions for the Projects.
- Conditionalities against Air and Water Acts.
- Water Cess (Amendment) Act, 2003/2017, and Water Cess Rules, 1978.
- IS 436, Pt-I, Sec-I; IS 436, Pt-I, Sec-2; IS 1350, Pt-I.
- Coal Sampling Policy, CIL./ Third party sampling as per company's policy.
- Annual Coal Grade declaration of MCL./ coal-controller.
- Coal Price Notification.
- Coal Controllers Guidelines.
- Do's and Don'ts for belt conveyors (CMPDIL Publication).
- Do's and Don'ts for crushers (CMPDIL Publication).

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Coal handling equipment, e.g., receiving pits, crushers, screens, coal feeders, bunkers, conveyors, weighbridge, etc.	E&M Section
B	Electrical switch-gear, cables, illumination equipment, etc.	
C	Payloaders and Tippers	Excavation Section
II. MANPOWER:		
A	Project Officer	Area GM
B	SH (E&M/EXC.)	Project Officer
C	SH (SDG)	
D	PEO	
E	SH (Safety)	Mine Manager
F	E&M Engineers	SH (E&M)
G	E&M Foremen	
H	Coal handling plant (CHP) operators	
I	Electrical & Mechanical Fitters and Helpers	
J	Weighbridge Technicians/ Supervisors	SH (SDG)
K	Weighbridge Operators	
L	Technical Inspectors/Sampling Assistants	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust from HEMM and CHP operations)	SHs (Excavation and E&M)
B	Energy (electricity for operation of HEMM and CHP)	
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

This relates to two sub-processes, e.g., 'coal crushing, handling and sizing' and 'coal loading and dispatch'. The former is a part of the main process 'coal crushing, handling and stocking' while the latter (executed after the former) is a part of the main process 'coal delivery' (refer operational process flow for coal mining and supply for both open cast and underground mining as under Annexure – 2A & 2B of Integrated Management System Manual). These sub-processes are used in mining operations after the process 'coal loading and transport'.

Of these, 'coal loading and transportation' is outsourced when required, for which necessary controls to ensure conformance to the requirements of these sub-processes are given at para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under '3' above.).

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Coal preparation and storage – Critical parameters of this activity are correct size of coal, CHP operation hours, and safety of men and machines during operations; to minimize the environmental impacts/OH&S risks and ensure the following, - Crushing of coal to desired size, - Screening of coal into steam and slack fractions, - Storage of coal in stock yards to prevent fires and flow of coal fines into drainage system, - Prevention of breakdowns/damages to CHP equipment during operations.						
1	Ensure that codes of practice for operation of CHP-equipment are suitably displayed in operators’ workplaces of all CHP-equipment.	SH (Safety)	----	√	√	√
2	Ensure operations of CHP-equipment are carried out strictly as per the code of practices made available as above.	All Operators	----	√	√	√
3	Verify the compliance of above codes of practice during daily inspections.	E&M Engineers	----	√	√	√
4	Ensure that water spraying is done at coal crushers, screens, and conveyor transfer points to suppress dust.	E&M Foreman	----	----	√	----
5	Ensure that loading height at all conveyor loading and transfer points is optimal to prevent dust generation.		----	----	√	----
6	Ensure that all persons working near the crusher/screen complex wear earplugs and dust masks.		----	----	√	----
7	Prevent loading of conveyors over their designed capacity to avoid spillage and dust.		----	√	√	----
8	Arrange for measurement of required parameters of air, water and noise at designated monitoring stations.	PEO	Air, Water and Noise Quality Report	----	√	√
b. Coal loading and dispatch – Critical parameters of this activity are loading of correct grade and size of coal, and dispatch without any delay; to minimize the environmental impacts/OH&S risks and ensure the following - - Achievement of targeted level of coal dispatch, - Accurate delivery in terms of coal size, grade and quantity, and - Prevention of accidents during loading operations.						
1	Ensure safety precautions during CHP operations.	SH (CDS)	----	√	----	√

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
2	Record the operational details of loading and dispatch under the following - • CHP Report, • Feeder Breaker Performance Report, • Rake Report, • Dispatch Report, • Coal Samples Analysis Result, • Wagon Loading Statement Register, • Contractual Wagon Loading Register, • Contractual Coal Movement Register, • CHP Oil Recovery Record, • Local Sales Register, and • Coal Sampling Register.	SHs (E&M and CDS)	As in column 2 of this row	√	----	----
3	Arrange for measurement of required parameters of air, water and noise at designated monitoring stations.	PEO	Air, Water and Noise Quality Report		√	√

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work.	√	√	√
2	That all tippers/dumpers carrying coal are covered during transportation.	√	√	----
3	That exhaust smoke of payloaders and tippers/dumpers used for coal transportation is within the prescribed limits.	√	√	√
4	That air, water, and noise measurements are carried out only at the statutorily designated monitoring stations.	----	√	√

CO.2 COAL STOCK PRESERVATION & SHALE PICKING

1. OUTPUTS OF THE PROCESS:

- Safely preserved coal in stock yard/siding
- Arrangement for water sprinkling

2. RELATED ENVIRONMENTAL IMPACTS/ OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- Related stipulations under the Fuel Supply Agreements with Customers.
- Applicable recommendations of Mines Safety Conferences
- Coal Mines Regulations, 2017, regulation number 135.
- DGMS Circular No Tech 1/1989.
- Environmental (Protection) Rules, 1986.
- National Ambient Air Quality Standards, 1994/2009
- Noise Pollution (Regulation and Control) Rules, 2000/2017.
- Central Motor Vehicles Rules, 1989/2019.
- IS 10500; IS 2216; MoEF&CC Schedule VI.
- Environment clearance conditions for the Projects.
- Conditionalities against Air and Water Acts.

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: [Specific details under relevant section(s) of Maintenance Manual]		
A	Dozers, Pay loaders, Graders, and Tippers	Excavation Section
B	Screens, Water Sprinklers, etc.	E&M Section
II. MANPOWER:		
A	Project Officer	Area GM
B	Mine Manager	Project Officer
C	SH (CDS)	
D	SH (Civil)	
E	SH (E&M)	
F	Civil Engineers/Assistants	SH (Civil)
G	Overseers	
H	E&M Engineers	SH (E&M)
I	E&M Foreman	
J	Electrical Fitters and Helpers	
K	Mechanical Fitters and Helpers	
III. NATURAL RESOURCES:		
A	Water (for sprinkling to suppress dust)	SH (CDS)
B	Energy (electricity for operation of dozers/pay loaders)	SH (Excavation)
C	Petroleum fuels and lubricants	

5. PROCESS STRUCTURE:

‘Coal stock preservation’ is a sub-process of the main process ‘coal handling and stocking’ (refer operational process flow for coal mining and supply for both open cast and underground mining as under Annexure – 2A & 2B of Integrated Management System Manual). It is undertaken after the process ‘coal loading and transportation’.

This sub-process involves only one activity, e.g., ‘preservation of coal stock at CHP and loading points’. Some portions of this activity, e.g., shale picking, construction of garland drains, retaining walls, and pump foundations, are outsourced for which necessary controls to ensure conformance to the requirements of this sub-process is given at para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS: (Only to control critical elements; other elements controlled by concerned personnel through their technical-competence and compliance to legal/obligatory provisions as under ‘3’ above.)

SL NO	CRITICAL PARAMETERS AND IMPORTANT INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	RELATED RECORDS	TO CONTROL		
				PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
Preservation of coal stock at CHP and loading points – Critical parameters of this activity are continuous use of magnetic separator (where applicable), manual shale picking (where done), and water sprinkling on coal stocks as needed, to minimize the environmental impacts/OH&S risks and ensure the following, - Removal and segregated disposal of ferrous scrap mixed with coal, - Prevention of fires in the coal kept in stockyards, and - Segregation and disposal of shale and other extraneous material from coal at CHP/stockyards.						
1	Ensure that shale picking is done regularly from coal stockyards by sufficient number of shale-pickers, and segregated shale is stored separately to avoid mixing with coal.	SH (CDS)	Shale Picking Register	√	√	----
2	Arrange for removal and segregated storage of large shale lumps/rocks with pay loaders.		----	√	√	----
3	Arrange for leveling and compacting of the coal stock into 10m high layers, overall height not exceeding 30m (or as per DGMS permission/ environment conditionalities).			√	√	---
4	Ensure that dispatch from coal stockyards is in the order in which coal was dumped into stockyard, i.e., ‘first-in-first-out’, to prevent spontaneous heating of coal in stock.			√	√	----
5	Arrange for sprinkling of water at coal stocks with water pipelines to prevent stockpile fires.	SH (E&M)/ SH (Civil)		√	√	----
7	Arrange construction of retaining walls and garland drains to prevent pilferage/drain-out of coal from coal stocks. [If above work is to be outsourced, arrange for engaging suitable contractors as per section 8.4 of Management Manual, incorporating the relevant controls given under para-7 below in the work orders.]	SH (Civil)	Civil Contract Works Register	√	√	----
8	Ensure manual picking-out of shale and other non-coaly material from coal being transported through slow-moving conveyors (speed not exceeding 1 m/sec), and their segregated storage/disposal.	SH (CDS)	Shale Picking Register	√	√	----
9	Arrange for continuous operation of the magnetic separators (where available) over belt conveyors to segregate and dispose ferrous scrap from ROM coal.	SH (E&M)	----	√	----	----

7. DEFINED CONTROLS FOR CONTRACTUAL WORKS: Referring to requirement under section 8.4 of Management Manual, specially include relevant conditions under the work order(s) issued for contractual work(s) [a] from the list below, and [b] from para-6 above, and [c] from applicable statutes/regulations/obligations.

SL NO	DEFINED CONDITIONS	TO CONTROL		
		PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	That all related statutes/regulations are complied during the work.	√	√	√
2	That any wastes generated during construction work are removed from mine premises and suitably disposed.	----	√	----
3	That exhaust smoke of trucks used for construction work is within the prescribed limits.	----	√	√
4	That picked out shale is disposed at designated locations/dumps.	----	√	----
5	That air, water, and noise measurements are carried out only at the statutorily designated monitoring stations.	----	√	√

WS.1 ENGINE REPAIRING AND OVERHAULING

1. FINAL PRODUCT:

The final product of this shop includes engines of all types, horse power, etc. of all HEMM (dumpers, shovels, dozers, blast-hole drills, compressors, mobile/static cranes, etc.). The specifications of the final repaired engines and the performance/test characteristics of these are available in the shop manuals/maintenance manuals of the respective engine/HEMM manufacturers and OEMs.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

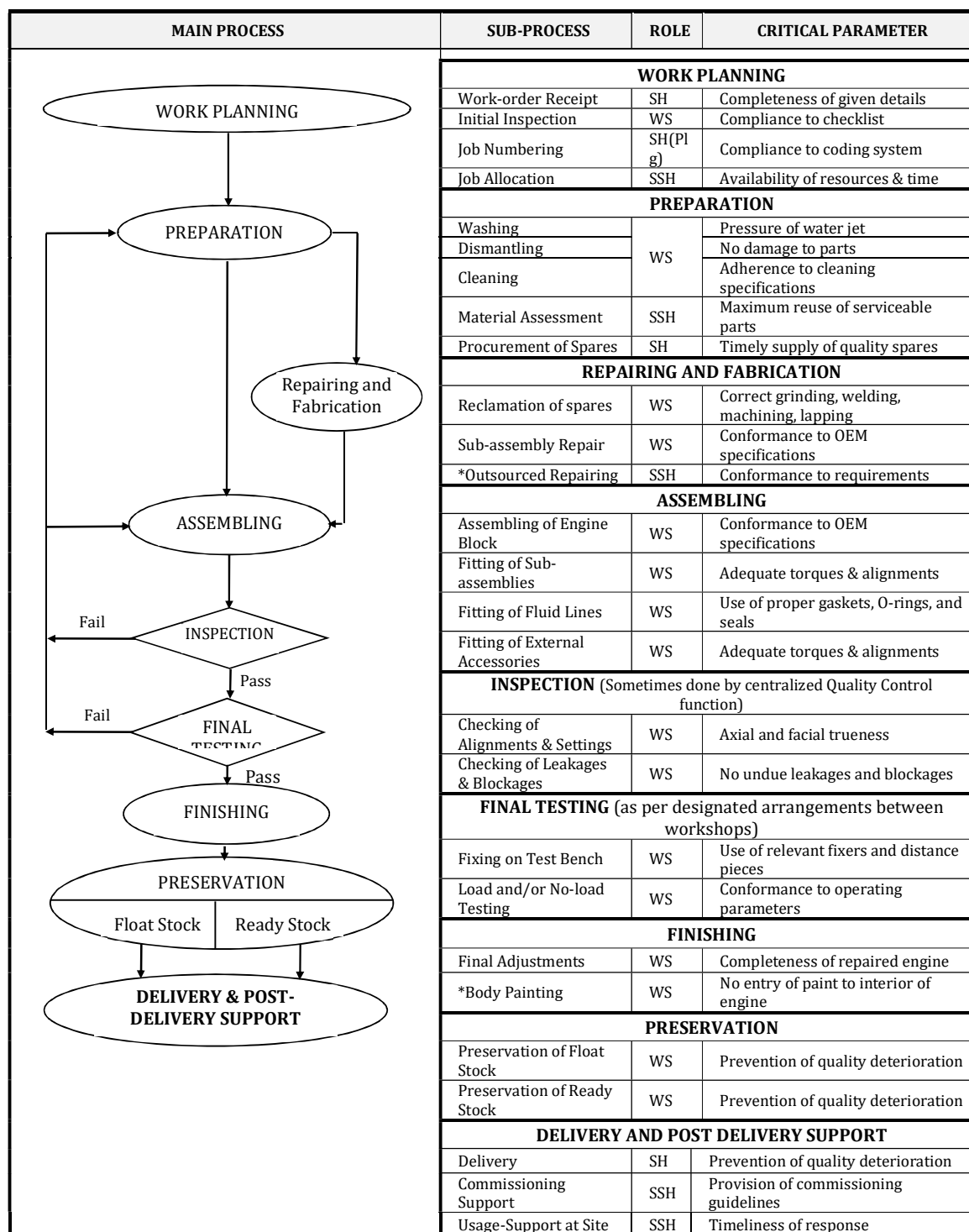
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent versions are to be referred]

- Factory Act
- Environmental (Protection) Act; and Rules

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below)		
A	Routine hand tools, Engine lifting hook, Cam shaft pilot, Liner puller, Filter wrench, Ring spanner set, Pulley puller, Liner pusher, Gear puller assembly, DE spanner set, Torque Wrenches, Crankshaft grinder, Surface grinder, oven, Injector calibration stand, PT pump calibration stand, Cleaning M/c, Press, Line boring M/c, Dynamometer, Con rod boring, welding M/c, EOT crane, Radial drill M/c, Surface grinder for main bearing cap, Con rod bend test & correction m/c, Bore endoscopy m/c, Magnetic crack detector, Dynamic balancing m/c, Engine test bench with attachments for different engines, Air compressors, Centrifugal pumps, Air bore gauge, Used oil drainage system, Fork lifter, Pneumatic grinders, Sanders, Impact wrenches, Embossing pens and Personal Protective Equipment (PPE).	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH (Sub Section Head)	SH
C	WS (Workshop Supervisor)	SSH
D	Fitter, Helper, Turner/Machinist, Welder, Crane Operator, General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:



Notes:

- A. Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- B. Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- C. The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper hand tools & tackles, fixtures etc. as required during job execution	All concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, welding screens, aprons, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
3	Undertake all the repair activities as per OEM guide lines.	SSH	√	----	----
4	Use proper trays as required during job execution to collect the oils/lubricants to avoid contamination of shop floor and chances of accidents and to reduce wastages	All concerned	----	√	----
5	Make arrangements to treat the contaminated water due to mud, oil, grease, carbon soot, leaked lubricants, cutting compounds etc. before releasing them to nearby water bodies/land	SH	----	√	----
6	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
7	Make arrangements to reduce the noise during final testing of engines	SH	----	√	√
8	Undertake careful visual inspection of all the components/sub-assemblies before assembly/fitting and ensure their proper fitment/alignment.	All concerned	√	----	----
9	Undertake the assembling activities on clean working place and ensure that no foreign materials are left inside the assembled parts.	All concerned	√	----	----
10	Ensure proper storage of ready/float sub-assemblies to avoid the damage during storage.	WS	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

WS.2 TRANSMISSION REPAIRING & OVERHAULING

1. FINAL PRODUCT:

The final product of this shop includes repaired/overhauled hydraulic transmissions of all ratings/sizes of dumpers, dozers, mobile/static cranes, etc. The specifications of the final repaired transmissions and the performance/test characteristics of these are available in the shop manuals/maintenance manuals of the respective transmissions/HEMM manufacturers and OEMs.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under 'Initial Environmental and OH&S Review Results' The significant ones, if any, are also listed under concerned record 11.2 of the Integrated Management System Manual.

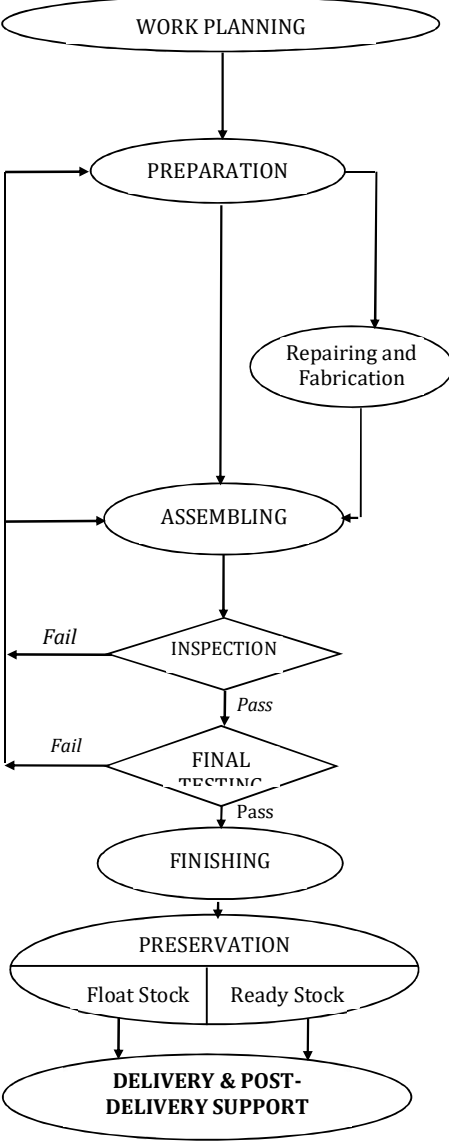
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent versions are to be referred]

- Factory Act
- Environmental (Protection) Act; and Rules

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below.)		
A	Routine hand tools, lifting hook, DE spanner set, Torque Wrenches, Transmission test bench, Pneumatic grinder, Embossing pen, High pressure water cleaner/ jet cleaner, and PPE	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH	SH
C	WS	SSH
D	Fitter, Helper, Turner/Machinist, Welder, Crane Operator, General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

MAIN PROCESS	SUB-PROCESS	ROLE	CRITICAL PARAMETER
 <pre> graph TD WP([WORK PLANNING]) --> P([PREPARATION]) P --> A([ASSEMBLING]) A --> I{INSPECTION} I -- Fail --> P I -- Pass --> FT{FINAL TESTING} FT -- Fail --> A FT -- Pass --> F([FINISHING]) F --> PR([PRESERVATION]) PR --> FS([DELIVERY & POST-DELIVERY SUPPORT]) PR -- Float Stock --> FS PR -- Ready Stock --> FS </pre>	WORK PLANNING		
	Work-order Receipt	SH	Completeness of given details
	Initial Inspection	WS	Compliance to checklist
	Job Numbering	SH (Plg)	Compliance to coding system
	Job Allocation	SSH	Availability of resources & time
	PREPARATION		
	Washing	WS	Pressure of water jet
	Dismantling		No damage to parts
	Cleaning		Adherence to cleaning specifications
	Material Assessment	SSH	Maximum reuse of serviceable parts
	Procurement of Spares	SH	Timely supply of quality spares
	REPAIRING AND FABRICATION		
	Reclamation of spares	WS	Correct grinding, welding, machining, lapping
	Sub-assembly Repair	WS	Conformance to OEM specifications
	* Repairs from other Sources	SSH	Conformance to requirements
	ASSEMBLING		
	Rear end & center housing	WS	Conformance to OEM specifications
	Input end, seals & clutch packs	WS	Conformance to OEM specifications
	Retarder & torque convertor	WS	Conformance to OEM specifications
	Control Valve	WS	Conformance to OEM specifications
	INSPECTION (Sometimes done by centralized Quality Control function)		
	Checking of Alignments & Settings	WS	Axial and facial trueness
	Checking of Leakages & Blockages	WS	No undue leakages and blockages
	FINAL TESTING		
	Fixing on Test Bench	WS	Use of relevant fixers and distance pieces
	Load and/or No-load Testing	WS	Conformance to operating parameters
	FINISHING		
	Final Adjustments	WS	Completeness of repaired transmission
	*Body Painting	WS	No entry of paint to interior of transmission
	PRESERVATION		
	Preservation of Float Stock	WS	Prevention of quality deterioration
	Preservation of Ready Stock	WS	Prevention of quality deterioration
	DELIVERY AND POST DELIVERY SUPPORT		
	Delivery	SH	Prevention of quality deterioration
	Commissioning Support	SSH	Provision of commissioning guidelines
	Usage-Support at Site	SSH	Timeliness of response

Notes:

- Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

Rev	Effective from	Reason of Change
00	As on Page 1	Not applicable, since initial issue.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
01	Use proper hand tools & tackles, fixtures etc. as required during job execution	All Concerned	√	----	----
02	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, welding screens, aprons, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
03	Undertake all the repair activities as per OEM guide lines.	SSH	√	----	----
04	Use proper trays as required during job execution to collect the oils/lubricants to avoid contamination of shop floor and chances of accidents and to reduce wastages	All concerned	----	√	----
05	Make arrangements to treat the contaminated water due to mud, oil, grease, carbon soot, leaked lubricants, cutting compounds etc. before releasing them to nearby water bodies/land	SH	----	√	----
06	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
07	Make arrangements to reduce the noise during final testing of transmissions	SH	----	√	√
08	Undertake careful visual inspection of all the components/sub-assemblies before assembly/fitting and ensure their proper fitment/alignment.	All Concerned	√	----	----
09	Undertake the assembling activities on clean working place and ensure that no foreign materials are left inside the assembled parts.	All Concerned	√	----	----
10	Ensure proper storage of ready/float sub-assemblies to avoid the damage during storage.	WS	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

WS.3 HEAVY REPAIR

1. FINAL PRODUCT:

The final product of this shop includes repaired idlers, take-up wheels, rollers, track chain asslys., wheel motor, magnetorque, compressors, mechanical gear boxes, swing/propel/crowd transmissions, rotary head of drill, etc. of all HEMM (dumpers, shovels, dozers, blast-hole drills, compressors, mobile/static cranes, etc.). The specifications of the final repaired products and the performance/test characteristics of these are available in the shop manuals/maintenance manuals of the respective engine/HEMM manufacturers and OEMs.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

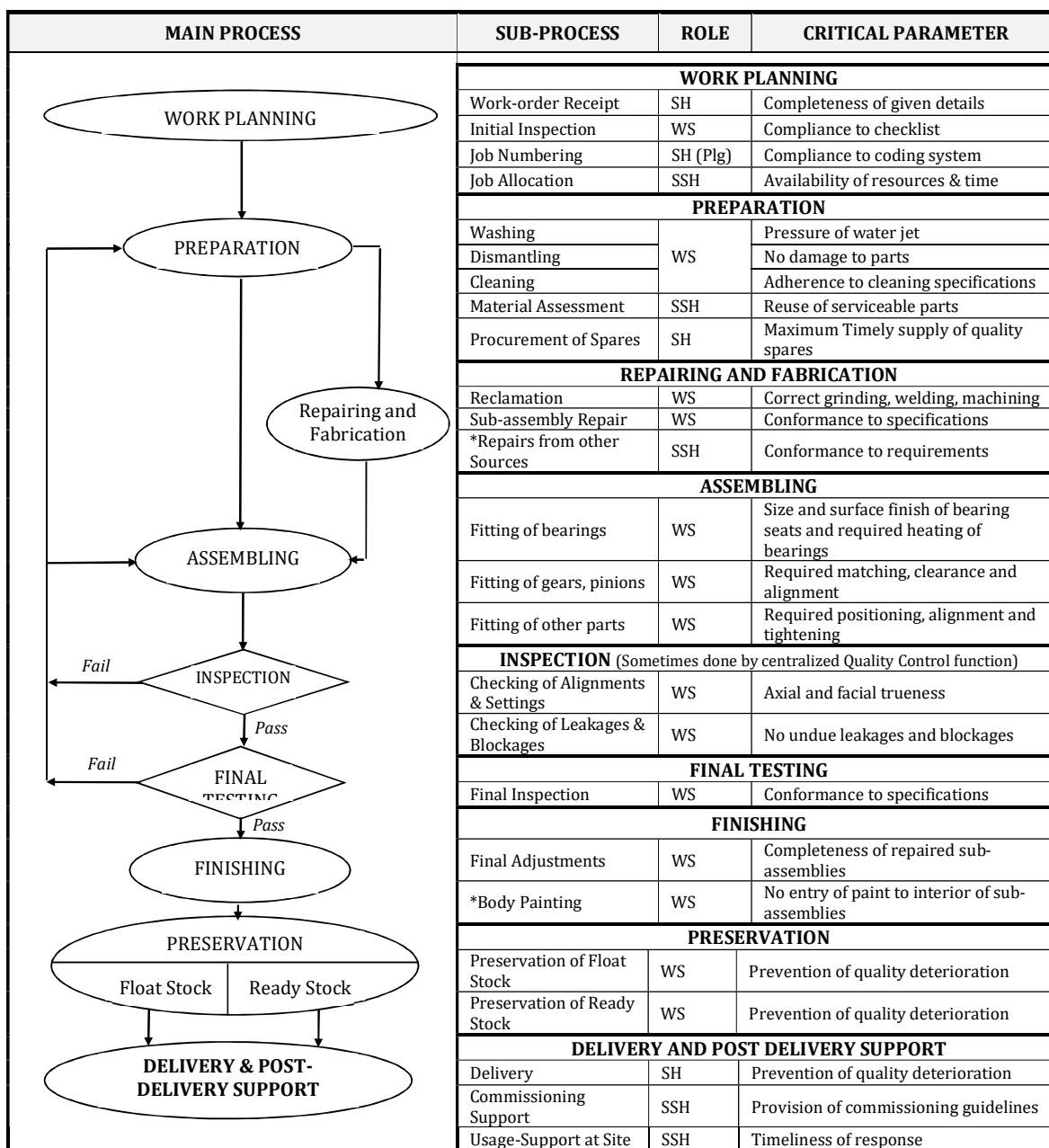
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent versions are to be referred]

- Factory Act
- Environmental (Protection) Act; and Rules

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below.)		
A	Routine hand tools, Puller, bearing heater, Measuring instruments, Hydraulic Jack, Gas Set, Personal Protective Equipment (PPE)	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH	SH
C	WS	SSH
D	Fitter, Helper, Turner/Machinist, Welder, Crane Operator General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:



Notes:

- Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPAIRMENTS	OH&S RISKS
1	Use proper hand tools & tackles, fixtures etc. as required during job execution	All concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, welding screens, aprons, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
3	Undertake all the repair activities as per OEM guide lines.	SSH	√	----	----
4	Use proper trays as required during job execution to collect the oils/lubricants to avoid contamination of shop floor and chances of accidents and to reduce wastages	All concerned	----	√	----
5	Make arrangements to treat the contaminated water due to mud, oil, grease, carbon soot, leaked lubricants, cutting compounds etc. before releasing them to nearby water bodies/land	SH	----	√	----
6	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
7	Undertake careful visual inspection of all the components/sub-assemblies before assembly/fitting and ensure their proper fitment/alignment.	All concerned	√	----	----
8	Undertake the assembling activities on clean working place and ensure that no foreign materials are left inside the assembled parts.	All concerned	√	----	----
9	Ensure proper storage of ready/float sub-assemblies to avoid the damage during storage.	WS	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

WS.4 ELECTRICAL MOTOR AND GENERATOR REPAIR/REWINDING

1. FINAL PRODUCT:

The final product of this shop includes repaired/overhauled AC and DC electrical motors and generators of electric excavator, blast-hole drills, cranes, etc. The specifications of the final repaired motors and generators and the performance/test characteristics of these are available in the shop manuals/maintenance manuals of the respective motors and generators/HEMM manufacturers and OEMs.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

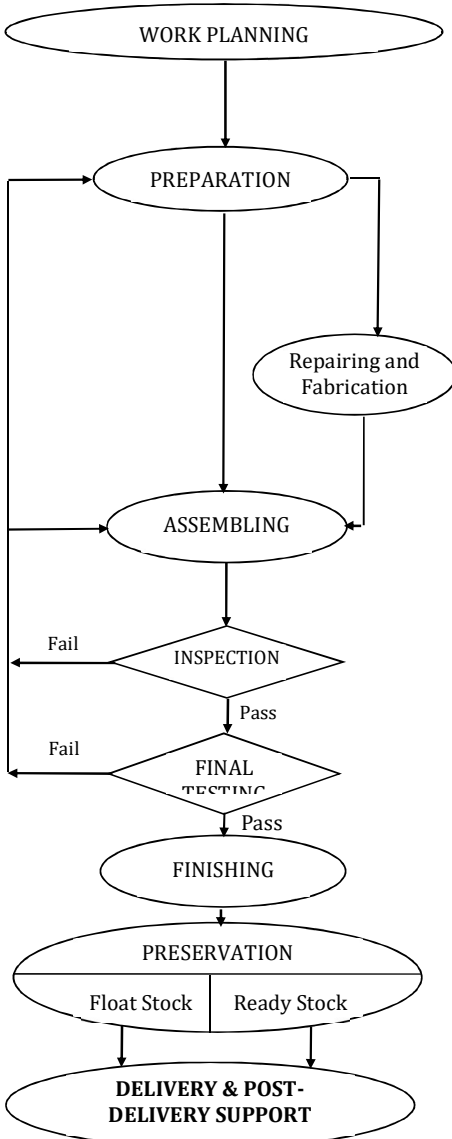
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent versions are to be referred]

- a. Factory Act
- b. Environmental (Protection) Act; and Rules

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below.)		
A	Routine hand tools, Puller, Megger, Multi-meter, Micro-ohm Meter and Surge tester, Drop testing machine, Growler, Temperature measuring instrument and Personal Protective Equipment (PPE), Induction Heater	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH	SH
C	WS	SSH
D	Winder, Electrician, Fitter, Helper, Turner/Machinist, Welder, General Mazdoor	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

MAIN PROCESS	SUB-PROCESS	ROLE	CRITICAL PARAMETER
 <pre>graph TD WP([WORK PLANNING]) --> P([PREPARATION]) P --> A([ASSEMBLING]) A --> I{INSPECTION} I -- Fail --> P I -- Pass --> FT{FINAL TESTING} FT -- Fail --> A FT -- Pass --> F([FINISHING]) F --> PR[PRESERVATION] PR --> DS([DELIVERY & POST-DELIVERY SUPPORT]) </pre>	WORK PLANNING		
	Work-order Receipt	SH	Completeness of given details
	Initial Inspection	WS	Compliance to checklist
	Job Numbering	SH (Plg)	Compliance to coding system
	Job Allocation	SSH	Availability of resources & time
	PREPARATION		
	Dismantling	WS	No damage to parts
	Cleaning & Blowering		Compressed air pressure
	Material Assessment	SSH	Reuse of serviceable parts
	Procurement of Spares	SH	Maximum Timely supply of quality spares
	REPAIRING AND FABRICATION		
	Reclamation	WS	Correct grinding, welding, machining
	Stripping & Repair of old coils	WS	No damage to core, required joining & insulation
	* Repairs from other Sources	SSH	Conformance to requirements
	ASSEMBLING		
	Rewinding		Winding pitch and insulation scheme
	Varnishing and drying, heating	WS	Preheating, furnace temperature & time, thickness and band strength, temperature & time
	Assembling	WS	Compliance to requirements
	INSPECTION (Sometimes done by centralized Quality Control function)		
	Drop & Surge & High Voltage tests for DC motors & generators	WS	Compliance to specifications
	Phase balance & High Voltage tests for AC motors & generators		
	Checking of Alignments & Settings		Free rotation and axial and facial trueness
	FINAL TESTING		
	No load/Load test	WS	Conformance to specifications
	Final Inspection		
	FINISHING		
	Final Adjustments	WS	Completeness of repaired sub-assemblies
	*Body Painting	WS	No entry of paint to interior of sub-assemblies
PRESERVATION			
Preservation of Float Stock	WS	Prevention of quality deterioration	
Preservation of Ready Stock	WS	Prevention of quality deterioration	
DELIVERY AND POST DELIVERY SUPPORT			
Delivery	SH	Prevention of quality deterioration	
Commissioning Support	SSH	Provision of commissioning guidelines	
Usage-Support at Site	SSH	Timeliness of response	

Notes:

- Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper hand tools & tackles, fixtures etc. as required during job execution	All concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, welding screens, aprons, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
3	Mark the matching parts for identification	SSH	√	----	----
4	While removal of the armature from frame take care to protect the coils from scratches and damages.		√	----	----
5	Use Compressed air/blower to remove the dust before washing	All concerned	√	----	----
6	Use proper trays as required during job execution to collect the oils/lubricants to avoid contamination of shop floor and chances of accidents and to reduce wastages	All concerned	----	√	----
7	Make arrangements to treat the contaminated water due to mud, oil, grease, carbon soot, leaked lubricants, cutting compounds etc. before releasing them to nearby water bodies/land	SH	----	√	----
8	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
9	Undertake careful visual inspection of all the components/sub-assemblies before assembly/fitting and ensure their proper fitment/alignment.	All concerned	√	----	----
10	Undertake the assembling activities on clean working place and ensure that no foreign materials are left inside the assembled parts.	All concerned	√	----	----
11	Ensure proper storage of ready/float sub-assemblies to avoid the damage during storage.	WS	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

WS.5 MACHINING

1. FINAL PRODUCT:

The final products of this shop include steel shafts, cast iron spares, non-ferrous items for the various machines used in all the mines. The specifications of the final repaired/manufactures items and spares and the performance/test characteristics of these are as per the design specifications of the respective items.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

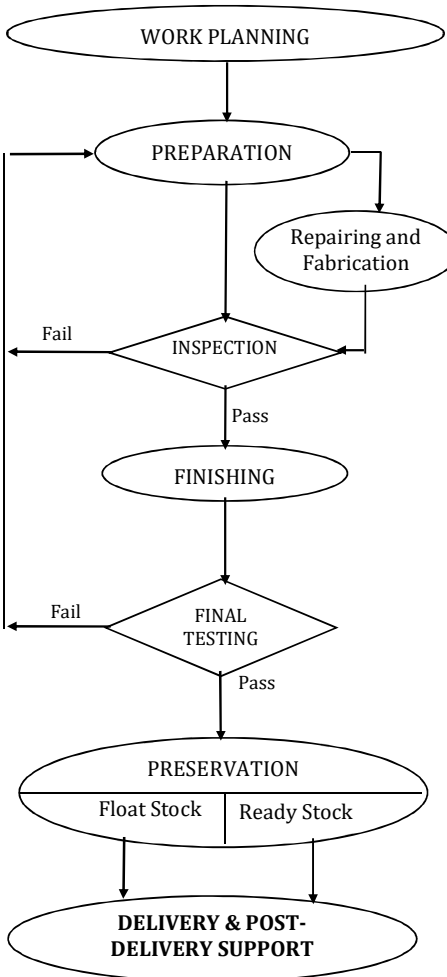
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent versions are to be referred]

- Factory Act
- Environmental (Protection) Act and Rules.

4. RESOURCES REQUIRED:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below.)		
A	Routine hand tools, Puller, Cutting Tools, measuring instruments, Marking tools, Personal Protective Equipment (PPE), Hardness tester, Dial Indicator	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH	SH
C	WS	SSH
D	Fitter, Helper, Turner/Machinist, Welder, Crane Operator General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

MAIN PROCESS	SUB-PROCESS	ROLE	CRITICAL PARAMETER
 <pre>graph TD WP([WORK PLANNING]) --> P([PREPARATION]) P --> I{INSPECTION} I -- Fail --> P I -- Pass --> F([FINISHING]) F --> FT{FINAL TESTING} FT -- Fail --> I FT -- Pass --> PR([PRESERVATION]) PR --> DS([DELIVERY & POST-DELIVERY SUPPORT]) PR --> RS([READY STOCK]) PR --> FS([FLOAT STOCK])</pre>	WORK PLANNING		
	Work-order Receipt	SH	Completeness of given details
	Initial Inspection	WS	Compliance to checklist
	Job Numbering	SH (Plg)	Compliance to coding system
	Job Allocation	SSH	Availability of resources & time
	PREPARATION		
	Assessment of inputs	SSH	Last year's consumption pattern
	Procurement of inputs	SH	Maximum Timely supply of quality inputs
	Blank Cutting	WS	Condition of cutting teeth
	Centering	SSH	Location of center punch mark
	Marking	SH	Conformity to sample/drawing
	REPAIRING AND FABRICATION		
	Turning	WS	Axial and facial trueness of job, required fixing of job, sharpness of cutting tool, vibrations in machine, cutting speed, feed, depth of cut, availability of cutting compound
	Drilling		
	Milling/Boring		
	Shaping/Slotting		
	INSPECTION (Sometimes done by centralized Quality Control function)		
	Inspection of components	WS	Compliance to specifications
	FINISHING		
	Grinding	WS	Required profile and sharpness of grinding wheel, cutting speed, feed and depth of cut, availability of cutting compound, vibrations in machine, axial and facial trueness of job
	Tapping	WS	Selection of correct tap size, required fixing of job and tapping speed
	FINAL TESTING		
	Final inspection	WS	Conformance to specifications
	PRESERVATION		
	Preservation of Float Stock	WS	Prevention of quality deterioration
	Preservation of Ready Stock	WS	Prevention of quality deterioration
	DELIVERY AND POST DELIVERY SUPPORT		
	Delivery	SH	Prevention of quality deterioration
	Usage-Support at Site	SSH	Timeliness of response

Notes:

- Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper hand tools & tackles, fixtures etc. as required during job execution	All Concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
3	Mark the matching parts for identification	SSH	√	----	----
4	Clean the machine before start of operation and check for proper functioning of all systems	All Concerned	√	----	----
5	Check the coolant tank and arrange to fill up if found coolant level is below the required level.	All Concerned	√	----	----
6	Select the required cutting speeds, feeds, depth of cuts as per the material to be machined.	All Concerned	√	----	----
7	Monitor the condition of the cutting tool at regular intervals and grind if required.	All Concerned	√	----	----
8	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
9	Ensure proper storage of ready/float items to avoid the damage during storage.	WS	√	----	----
10	Avoid idle running of machines	All Concerned	√	√	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Integrated Management System Manual.

WS.6 STRUCTURAL FABRICATION

1. FINAL PRODUCT:

The final product of this shop includes coal tubs, belt conveyor structures, pipe flanges and other structural items for the various machines used in all the underground mines. The specifications of the final repaired/manufactures items and the performance/test characteristics of these are as per the design specifications of the respective items.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

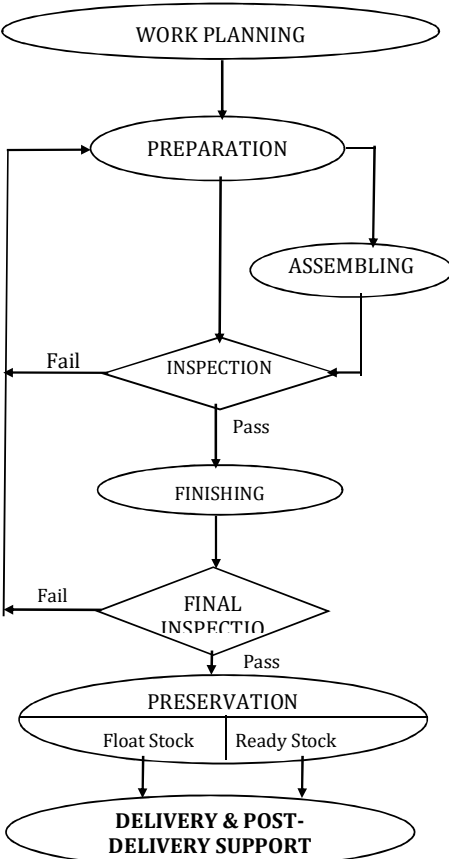
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent and current versions are to be referred]

- Factory Act
- Environmental (Protection) Act and Rules.

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below.)		
A	Routine hand tools, Puller, Cutting Tools, measuring instruments, marking tools, Personal Protective Equipment (PPE),	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH	SH
C	WS	SSH
D	Fitter, Helper, Turner/Machinist, Welder, Crane Operator General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

MAIN PROCESS	SUB-PROCESS	ROLE	CRITICAL PARAMETER
 <pre>graph TD WP([WORK PLANNING]) --> P([PREPARATION]) P --> A([ASSEMBLING]) A --> I{INSPECTION} I -- Fail --> P I -- Pass --> F([FINISHING]) F --> FI{FINAL INSPECTION} FI -- Fail --> I FI -- Pass --> PR([PRESERVATION]) PR --> FS([Float Stock]) PR --> RS([Ready Stock]) FS --> D([DELIVERY & POST-DELIVERY SUPPORT]) RS --> D</pre>	WORK PLANNING		
	Work-order Receipt	SH	Completeness of given details
	Initial Inspection	WS	Compliance to checklist
	Job Numbering	SH (Plg)	Compliance to coding system
	Job Allocation	SSH	Availability of resources & time
	PREPARATION		
	Assessment of inputs	SSH	Last year’s consumption pattern
	Procurement of inputs	SH	Maximum Timely supply of quality inputs
	Marking	WS	Finished size of item & required cutting allowances
	Cutting with gas cutter	WS	Required gas pressure & nozzle size
	Cutting with machines	WS	Shearing/punching pressure & cutting blade condition
	ASSEMBLING		
	Fitting of individual components	WS	Alignment and conformity to drawing/sketch
	Tag welding		Correct welding current and voltage
	INSPECTION (Sometimes done by centralized Quality Control function)		
	Inspection of components	WS	Compliance to specifications
	FINISHING		
	Final welding	WS	Selection of welding rods, required edge preparation before welding and required welding current and voltage
	FINAL INSPECTION		
	Final inspection	WS	Conformance to specifications
	PRESERVATION		
	Preservation of Float Stock	WS	Prevention of quality deterioration
	Preservation of Ready Stock	WS	Prevention of quality deterioration
	DELIVERY AND POST DELIVERY SUPPORT		
	Delivery	SH	Prevention of quality deterioration
	Usage-Support at Site	SSH	Timeliness of response

Notes:

- Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper hand tools & tackles, fixtures etc. as required during job execution	All Concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
3	Mark the matching parts for identification	SSH	√	----	----
4	Clean the machine before start of operation and check for proper functioning of all systems	All Concerned	√	----	----
5	Check the coolant tank and arrange to fill up if found coolant level is below the required level.	All Concerned	√	----	----
6	Select the required cutting speeds, feeds, depth of cuts as per the material to be machined.	All Concerned	√	----	----
7	Monitor the condition of the cutting tool at regular intervals and grind if required.	All Concerned	√	----	----
8	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
9	Ensure proper storage of ready/float items to avoid the damage during storage.	WS	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

WS.7 COMPONENT RECLAMATION AND REPAIR

1. FINAL PRODUCT:

The final product of this shop includes bucket assemblies, dipper handles/sticks, dump body, blade assemblies, arm & frame assemblies, hydraulic cylinders, sprockets, etc. of the excavators, dumpers, blast-hole drills, dozers, etc. machines used in opencast mines. The specifications of the final repaired/manufactures items and spares and the performance/test characteristics of these are as per the design specifications of the respective items.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

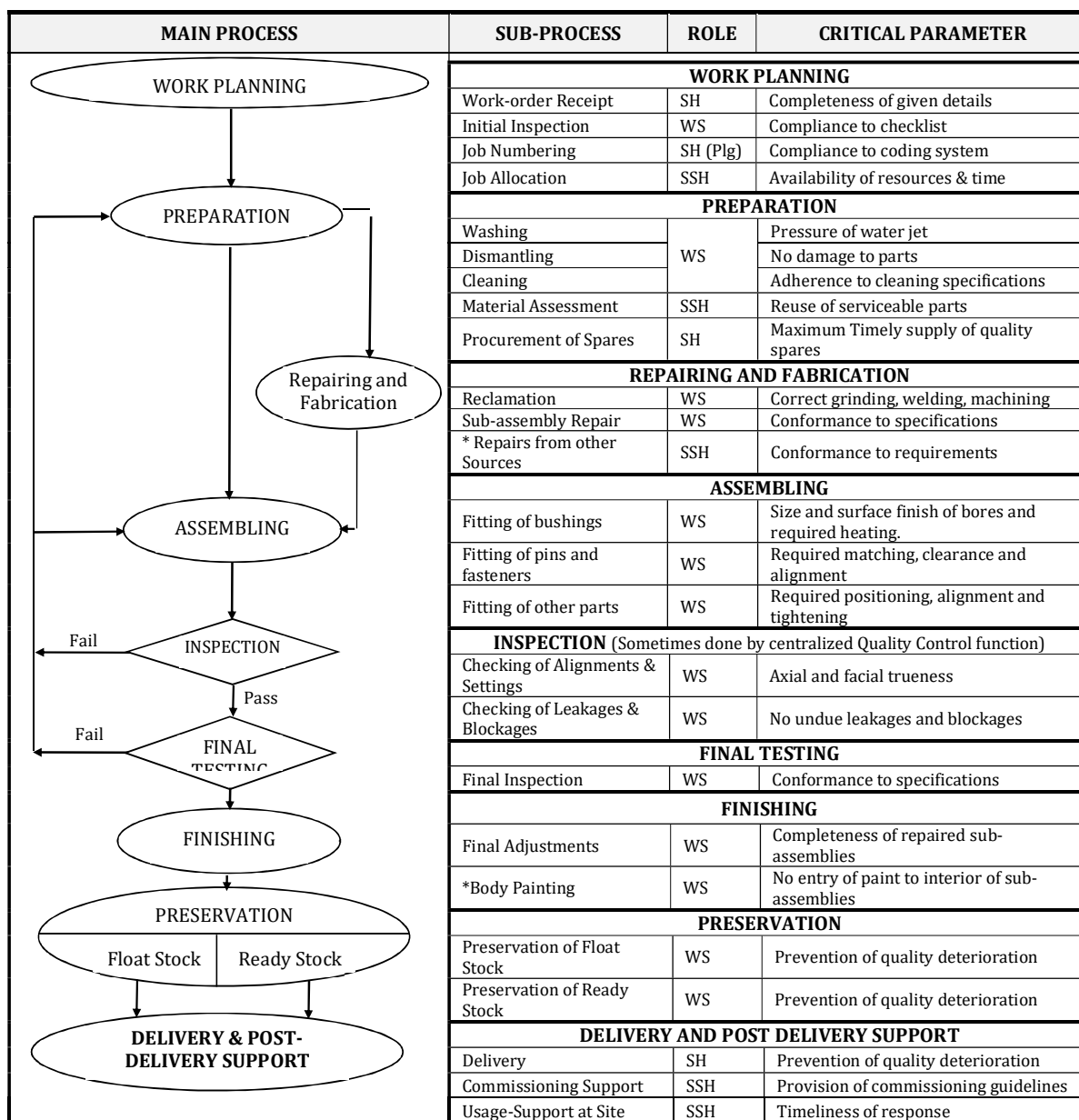
3. LEGAL/OBLIGATORY REQUIREMENTS: [Pertinent and current versions are to be referred]

- Factory Act
- Environmental (Protection) Act; and Rules

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, working tools listed below.)		
A	Routine hand tools, Puller, bearing heater, Measuring instruments, Hydraulic Jack, Gas Set, Personal Protective Equipment (PPE)	Concerned Technician
II. MANPOWER:		
A	SH	WM
B	SSH	SH
C	WS	SSH
D	Fitter, Helper, Turner/Machinist, Welder, Crane Operator General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on Shop-floor; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:



Notes:

- Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under related OEM Service Manual(s).
- Recording of all above processes is done under designated checklists/formats/registers, listing maintained by respective SHs.
- The asterisked sub-processes under column-2 above are sometimes outsourced either in full or in part. In such cases controls for ensuring overall conformity to the requirement are ensured through arrangement as under para-7 below.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper hand tools & tackles, fixtures etc. as required during job execution	All concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, goggles, ear plugs, welding screens, aprons, helmets, safety shoes etc. required during job execution by working personnel.	SH	----	----	√
3	Mark the matching parts for identification	SSH	√	----	----
4	While dismantling take proper precaution to ensure the parts are not damaged.	Technician	√	----	----
5	Use proper trays as required during job execution to collect the oils/lubricants to avoid contamination of shop floor and chances of accidents and reduce wastages	Technician	----	√	----
6	Make arrangements to treat the contaminated water due to mud, oil, grease, carbon soot, leaked lubricants, cutting compounds etc. before releasing them to nearby water bodies/land	SH	----	√	----
7	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SSH	----	√	----
8	Undertake careful visual inspection of all the components/sub-assemblies before assembly/fitting and ensure their proper fitment/alignment.	Technician	√	----	----
9	Undertake the assembling activities on clean working place and ensure that no foreign materials are left inside the assembled parts.	Technician	√	----	----
10	Ensure proper storage of ready/float sub-assemblies to avoid the damage during storage.	WS	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from OEM Service Manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Integrated Management System Manual.

MS.1 MEDICAL SERVICES

(Note: Apart from the below given operational instructions for hospitals, the central hospitals of MCL may also maintain a "Hospital Management System Manual" which contains the detailed processes, instructions, infrastructures etc. related to the health care services provided by the central hospitals.)

1. COVERAGE: All Central and Field Hospitals/Dispensaries of MCL.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual for hospital.

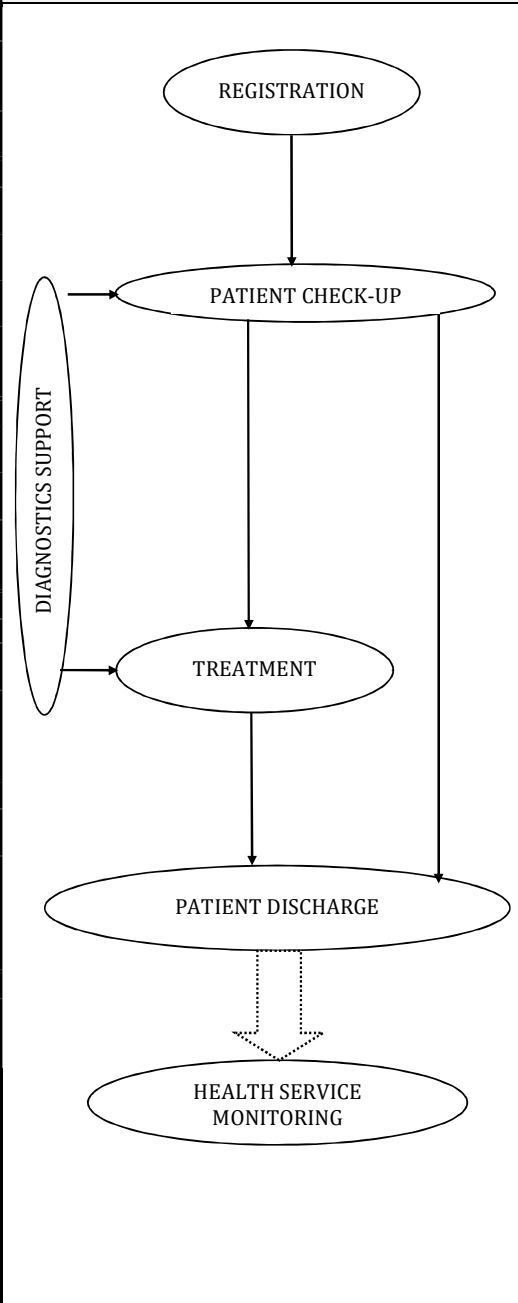
3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- a. Drugs and Cosmetics Act;
- b. Environmental (Protection) Act;
- c. Bio-medical Waste (Management and Handling Rules);
- d. Pre-natal Diagnostic Test Act;
- e. MTP Act;
- f. PNDT Act;
- g. Narcotic Drugs and Psychotropic Substances Act;
- h. Weights and Measures Act;
- i. Water (Prevention & control of pollution) Cess (Amendment) Act;
- j. Municipal Solid Waste (Management and Handling) Rules.
- k. Guidelines as provided by Medical Council of India

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual)		
II. MANPOWER:		
A	CMS/CMO In-Charge (Hospital I/C)	Area GM
B	Doctors/Officer heading medical/service section (SH)	Hospital I/C
C	Duty Doctor (DD)	SH
D	Matrons/Nurses/Pharmacist/Lab technicians and office staff	SH / DD
E	Ward boys, Electricians, Drivers, Sweepers	SH / DD
III. NATURAL RESOURCES: Water, Air, chemicals, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on hospital/dispensary premises, etc; and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

PROCESS		RESPON- SIBILITY	RECORDING UNDER
NAME	SUB-PROCESS / INSTRUCTION		
 <pre> graph TD REG(REGISTRATION) --> PCU(PATIENT CHECK-UP) PCU --> T(TREATMENT) T --> PD(PATIENT DISCHARGE) PD -.-> HSM(HEALTH SERVICE MONITORING) DS(DIAGNOSTICS SUPPORT) --> PCU DS --> T </pre>	a. REGISTRATION		
	Deciding patient's entitlement, and recoding registration details (after due payment for non-entitled patients)	Staff on Duty	Duty Roster, OPD Registration Register
	Ensuring correct identification and entry of required treatment department in OPD slips		
	b. PATIENT CHECK-UP		
	Subjective observation through recording of patient/attendant stated ailments/symptoms	Duty Doctor	OPD Treatment Register, PME/IME Report
	Objective investigation through check-up and diagnostic investigations		
	Assessment and diagnosis based on subjective observations and objective investigations		
	Planning of treatment and health care based on assessed diagnosis (including outside referrals as needed)		
	c. DIAGNOSTIC SUPPORT		
	Ensuring timely sample collection and safe storage	Staff on Duty	Pathology Lab Register, Blood Bank Register
	Arranging sample analysis and recording of results		
	Ensuring use of appropriate and sterile instruments, chemicals, etc. for testing/investigations		
	d. TREATMENT OF PATIENT (OPD, Ward and OTs)		
	Ensuring treatment as per above treatment plan	Nurses	IPD Admission Register, Anesthesia Register, Diet/Kitchen Register, CSSD Register, Laundry Register
	Regular check-up of patient's condition, and adjusting treatment plan as needed	Duty Doctor	
	Ensuring hygienic conditions in wards through regular cleaning, use of clean linen, sterile instruments, and correct diet from kitchen	Matron	
	e. PATIENT DISCHARGE		
	Arrange for completion of patient discharge report if treatment done in IPD	Duty Doctor	OPD Treatment Register, Death Information Register, Birth Register, IPD Admission Register
	Ensure that all relevant entries, advice and reports are provided to patient before discharge		
	f. HEALTH SERVICE MONITORING (Only for Central Hospitals)		
	Obtaining (daily) and analyzing (on every Saturday) the patient feedback from at least 2 patients per day each from OPD and IPD	Hospital I/C	Patient Feedback Forms
	Conducting medical audit every Saturday, selecting cases as follows, and taking remedial actions for cases with discrepancies. (a) 2 random cases from OPD such that at least half the cases involve radio-patho investigations and all depts. get covered in the week; and (b) all IPD cases of fatality, LAMA, drug complication/reaction, and cases where course of treatment was modified during patient's stay		Conformity Assessment Record (OPD), Conformity Assessment Record (IPD)

Notes: Above functionaries carry out all concerned sub-processes and their activities through their professional competence.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
a. Patient Registration – Critical parameters of this activity are availability / adequacy of all necessary items like forms, registers, rubber stamps, other stationary, etc. and timely reporting of the registration personnel at the registration counter to ensure the following, - Timely registration of reported patients, - Proper guidance to the patients for required health care services, - To complete necessary formalities with non- entitled patients.					
1	Ascertain the entitlement status of the patient for treatment in the hospital.	Registration Clerk	√	----	----
2	Ensure that non-entitled patients pay the applicable charges and obtain the consent for treatment on chargeable basis from them in case of emergency.		√	----	----
3	Collect and verify the needed papers (e.g. referrals, payment receipts (non – entitled patients), etc. and complete other required procedures as applicable, e.g. medico-legal procedures.		√	----	----
4	Allocate the registration number to the Patient by recording it in the registration register as well as on Medical Card or OPD Ticket.		√	----	----
5	If required, guide the Patient/Client for his/her next reporting.		√	----	----
b. Patient Checkup – Critical parameters of this activity are availability / adequacy of all necessary medical apparatus / equipment, patient pathological/ radiological/ultra-sonographic investigation reports and necessary stationary items like OPD treatment registers, PME/IME report forms etc. up to ensure the following, - Correct assessment and diagnosis of patient diseases/health problems - Proper treatment and health care to the patients					
1	No instruction, since to be carried out by Duty Doctor through his/her professional competence.	Duty Doctor	----	----	----
c. Diagnostic Support – Critical parameters of this activity are collection of samples /testing of patient only if the patient fulfills the necessary pre-conditions for the required test/investigations (empty stomach, first urine of the day, etc.), using of sterilized instruments and containers for sample collection and storage, using of specified and suitable (un-expired) chemicals and proper identification and traceability of test results to ensure the following - - Correct assessment and diagnosis of patient diseases/health problems - Proper treatment and health care to the patients					
1	No instruction, since to be carried out by Duty Doctor through his/her professional competence.	Staff on Duty	----	----	----
d.1. Treatment of Patients in OPDs – Critical parameters of this activity (i.e., checkups and minor procedures in OPD) are availability / adequacy of all necessary items at check-up/minor procedure room and timely reporting of the concerned duty staff in the respective OPDS					
1	Prepare the Patient through suitable pre-test procedure applicable for the needed check-up/minor procedure.	Staff on duty	√	----	----
2	Perform the check-up/minor procedure on a Patient only after his/her proper preparation as above.		√	----	----
3	For ear investigations, ensure insulation against external sounds in the check-up room		√	----	----
4	Maintain the specified level of illumination in the check-up room during eye investigations		√	----	----
d.2. Treatment of Patients in Wards – Critical parameters of this activity are - Availability/adequacy of all treatment materials like instruments, sterilized items, glassware, required medicines/drugs, linen, treatment trays, bedpans, etc. and Bed Head Tickets (BHTs) of admitted patients. - Prominent display of names and identification of admitted Patients in the ward, bed-wise and name of officer whom Patients/Clients are to contact for complaints, etc. - Availability of 'patient feedback box' with declaration of its opening arrangements, etc.					
1	Allocate ward/cabin to the patient based on patient's sex, type of disease, need for isolation, eligibility, etc. after verification of the needed papers, e.g. admission advise, referrals, etc.	Staff on Duty	√	----	----

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPAIRS	OH&S RISKS
2	Ensure that the bed/cabin is clean and set with clean disinfected linen before the Patient occupies it	Staff on Duty	√	----	----
3	If any body fluids are already being administered intravenous to Patient at the time of arrival, ensure that such medication is continued without any disturbance till further advice of Duty Doctor		√	----	----
4	Ensure timely and proper medication/ treatment, according to the treatment plan and record patient's progress under his/her BHT and offer clarifications to the patient/client about the treatment plan to the extent possible.		√	----	----
5	Assist the duty doctors and specialists during their routine check-ups in the ward/cabins, and note/record their treatment advice under the BHTs		√	----	----
6	Update the BHT with all relevant entries and hand-over the same to the staff of the next shift with all necessary information before leaving the ward at the end of duty shift.		√	----	----
7	Report immediately to Duty Doctor and record the event under Patient's BHT if the patient leaves the ward/cabin without permission.		√	----	----
8	Collect, segregate and dispatch dirty, soiled, and infected ward-linen and Patient-linen to the Laundry for washing/disinfecting and use only the cleaned/disinfected linen in the ward received from laundry		√	----	----
9	Obtain medicines and other medical supplies from Hospital Store/Pharmacy on the basis of the respective BHT specifications of Patients		√	----	----
10	Arrange for timely feeding of the correct diet to the Patients as per their BHT specification		√	----	----
11	Arrange for the appropriate type of medical gases, physiotherapy treatment, etc. for the Patients whenever needed or as specified in the respective BHTs		√	----	----
12	Upon death of a Patient, - Immediately inform the Duty Doctor and/or concerned specialist of the HOSPITAL, - Ensure the completion of applicable medico-legal procedures, - Arrange for shifting the body to the Mortuary, if so required by the Client, and - Ensure disinfecting/fumigation of the bed/cabin and adjoining area before allocation to any other incoming patient.		√	----	----
d.3 Treatment of Patient in OTs – Critical parameters of this activity are - Availability of OT materials like sterilized items (e.g., surgical instruments, rubber gloves, tubing, glassware, basins, trays, catheters, drains, dressings, sponges, packs, drapes, sheets, towels, masks, gowns, syringes, needles, etc.), medicines/ drugs, etc. and other lifesaving support systems - Sterilization in the designated sterile zones of the OT - Proper functioning of all OT equipment/instruments and the power supply back-ups.					
1	Prevent unauthorized entry into the OT complex	Staff on Duty	√	----	----

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
2	Reception of Patient: a. Verify the needed papers, e.g. surgery advice, etc. and check whether pre-operative medication, investigations, etc., have been completed satisfactorily and recorded under BHT. b. Obtain the consent for surgery from Patient/Client in the prescribed form. c. Ensure that the Patient is comfortably placed in the pre-operative chamber and educate Patient and Client about surgery to the extent necessary in order to prevent their anxieties about surgery. d. If any body fluids are already being administered intravenous to Patient at the time of arrival, ensure that such medication is continued without any disturbance till further advice of Duty Doctor.	Staff on Duty in OTs	√	----	----
3	Support during Surgery a. Ensure change of dress and depilation of Patient before shifting to operation table. b. Assist during anaesthetization of Patient. c. Assist the surgeon during the operative procedures for intubation, positioning, preparation of operating area of Patient's body, draping, instrument handling, fluid administration, blood transfusion, etc, as required. d. Operate the OT equipment as required by the surgeon.		√	----	----
4	Post-surgery OT clearing a. Arrange for shifting of Patient to sterile recovery room after the surgery. b. Ensure that all relevant surgery record forms are duly filled up and sent to the Patient's ward or ICU (as applicable) for post-operative treatment. c. Segregate and remove OT refuse dirty linen, used instruments, etc., to their designated place for dispatch to CSSD or disposal in line with Bio-medical Wastes (Management and Handling) Rules, 2016. d. Ensure that the OT is cleaned and disinfected before the preparation for the next surgery e. Arrange for day-to-day cleaning and disinfecting of the OT premises as per Hospital Maintenance Manual, to prevent infection to Patients during surgical procedures. f. Upon death of a Patient - • Ensure the completion of applicable medico-legal procedures, • Arrange for shifting the body to the Mortuary, if so required by the Client, • Ensure disinfecting/fumigation of the OT premises before any further usage of the OT.		√	√	----
e. Patient discharge: Critical parameter of this activity is advising the patient and or client about the course of treatment specified in the prescription/ BHT, the date of follow-up visit as needed and future preventive measures to be taken by the patient.					

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	For discharge from OPD - Verify the comprehensiveness of the Patient's examination and ensure that all related findings are recorded in the prescription and related reports. - Ensure that all relevant case papers like test reports, earlier treatment papers, certificates, referrals, etc., are not misplaced. - Advise the Patient and/or Client about the course of treatment specified in the prescription, the date of follow-up visit as needed, and the future preventive measures to be taken by the Patient. - Obtain Patient/Client feedback in the prescribed form, if the concerned Patient is selected for the random collection of Patient/Client feedback in OPD as per hospital management system manual. - Hand-over all relevant case papers to the Patient/Client before he/she leaves the OPD.	Staff of duty in OPDs	√	----	----
2	For discharge from IPD/EMU - Ensure that the Patient has been adequately prepared to leave the hospital. - Ensure that all relevant case papers like test reports, earlier treatment papers, certificates, referrals, etc., are attached to the Bed Head Ticket. - Fill up the discharge slip to cover all relevant details including future course of treatment and preventive measures to be taken by the Patient. - Verify that all details as under the BHT have been provided to the Patient and/or Client; and also the needed follow-up visit, and the future preventive measures to be taken by the Patient. - Obtain the Patient's/Client's feedback in the prescribed form. - Hand-over the discharge slip and all relevant case papers to the Patient/Client before he/she leaves the IPD/EMU.	Staff of duty in IPU/EMU	√	----	----
f. General Instructions					
1	Ensure orderliness and silence in the hospital premises.	All concerned	√	----	----
2	Show politeness and concern for the Patients and Clients.	All concerned	√	----	----
3	Ensure use of clean and/or sterile appliances, gadgets, facilities, etc.	All concerned	√	----	√
4	Ensure the usage of required personal protective gears.	All concerned	√	----	√
5	Ensure that only specified and suitable (e.g., un-expired) chemicals, medicines, etc., and reliable instruments are used.	All concerned	√	----	√
6	Ensure to segregate and dispatch all used appliances, gadgets, facilities for autoclaving / sterilization.	All concerned	√	----	√
7	Ensure safe storage and protection of medicines and other medical supplies under require storage conditions.	All concerned	√	----	√
8	Ensure use of colored waste-bins for segregated throwing of all solid wastes	All concerned	√	√	√
9	Ensure discharge of all liquid wastes only through designated drainages	All concerned	√	√	√
10	Ensure proper cleaning and sterilization of designated sterile zones and OT	Designated Officer(s)	√	----	√

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
11	Arrange regular cleaning, disinfecting, sterilization, etc. various premises as per defined plan(s).	Designated Officer(s)	√	----	√
12	Ensure safe & segregated collection and disposal of all hospital wastes/discharges.	Designated Officer(s)	----	√	√
13	Provide necessary information and clarifications about the intended treatment, available Duty Doctor, etc. to the reporting person.	Registration clerk	√	----	----
14	Ensure proper identification and traceability of samples and reports at all stages e.g., collection, testing/analyses, reporting, etc.	Technicians (Pathology, Radiology & Sonography)	√	----	√
15	Ensure that cleanliness and hygiene is maintained in kitchen and while distributing the diet to patients.	In-charge Kitchen	√	√	√
16	Install power saving devices like energy efficient lights, ACs, electronic regulators for fans, electronic chokes for tube lights, etc. in hospital.	Designated Officer(s)	√	√	----
g. Health Service Monitoring: Critical parameter of this activity (only in Central Hospitals) is obtaining patient feedback in the required formats, analysis of the negative feedback, selection of sample cases in OPD & IPD for health care services monitoring and verification / analysis of the same by the Quality Assurance Committee (QAC) and using these outputs for improving the health care services.					
g.1. Monitoring and Measurement of Patient/Client Satisfaction					
1	Obtain feedback on each day through Patient Feedback Record (specified under Form -1 & 2) as follows. a. Feedback from at least 2 randomly selected Patients of any OPD room; and b. Feedbacks from all the Patients discharged on that day from IPD.	Hospital I/c	√	----	----
2	Categorize the overall feedback as 'negative' or 'positive' depending on whether the average of reported count is up to 3 or more than 3. The following is additionally undertaken for 'negative' feedbacks. i. Review of every negative feedback to decide whether it represents 1. Subjective opinion influenced by unrelated issues; or 2. Objective opinion relating to possible problems in the Hospital. ii. Handle as follows after the above. 1. If unrelated opinion (refer para-i.1 above), ignoring it. 2. If indicating some problem (refer para-i.2 above), ensuring that improvement actions are initiated as per the system. 3. Use the outcome of feedback analysis for improvement.		√	----	----
g.2. Monitoring and measurement of Health Care Services					
1	Select sample cases in OPD , ensuring that a. At least 2 cases are selected on each working day – cases which provide some treatment plan on that concerned day (i.e., not merely endorsing some earlier treatment plans). b. At least 1 case is selected from each treatment departments in a week. c. At least half of the cases selected over the week involve diagnosis on the basis of radiological/pathological investigations.	Hospital I/c	√	----	----

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY / AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
2	Select of sample cases in IPD , to cover the following. a. All cases resulting into fatality, i.e. the cases for Death review. b. Random two such cases in a week where Hospital's diagnosis was changed during Patient's stay. c. All cases where reaction was noted during treatment i.e. cases of pharmaco – vigilance. d. All cases where the Patients left the Hospital against medical advice, i.e. LAMA.		√	----	----
3	Collect the documents of selected sample cases, and providing them to Quality Assurance Committee (QAC) consisting Hospital I/c as chairman and two medical doctors nominated in rotation by Hospital I/c as members for their assessment in weekly peer group review/weekly clinical meeting as follows. a. Copies of Medical Cards and/or prescriptions for OPD cases; and b. Bed Head Ticket with all its enclosures for IPD cases.		√	----	----
4	Verify the above selected sample cases through specific checklists as under Form - 3 to provide information towards at least the following aspects. a. Were all necessary investigations done before diagnosis? b. Was the diagnosis adequate/correct as per the investigation results? c. Was the planned treatment medically adequate /correct? d. Was the treatment plan executed correctly? (May not be relevant for OPD cases) e. Was the outcome of treatment medically obvious? (May not be relevant for OPD cases)	QAC	√	----	----
5	Record the result of verification along with other observations for each sample case as follows; under the Health Service Conformance Status Register. a. <u>For OPD cases</u> : If verification result for a sample case shows a discrepancy against any of the checklist criteria, declaring all Health Services provided by concerned Doctor on duty on the concerned day as 'Nonconforming', all others declared as 'conforming'. b. <u>For IPD cases</u> : Declaring that Health Service as 'Nonconforming' where verification result shows a discrepancy against any of the checklist criteria, all others declared as 'conforming'	QAC	√	----	----
6	Handle the detected Nonconforming Health Services as per section 10.2 of Management Manual	Hospital I/c	√	----	----
7	For stage outputs generated during provision of Health Services : Measure specific characteristics of such outputs through suitable means as appropriate, to verify that these meet the intended requirements. Also, maintain the evidences of conformity with acceptance criteria.	Doctor/ Staff on duty	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from related manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

FORM – 1 OUTDOOR PATIENT FEEDBACK RECORD

Hospital:		Registration number:				
Give your overall perceptions about the services provided to you by the hospital to help us in monitoring and improving our performance.						
YOUR PERCEPTION		TICK ONE IN EACH ROW				
		LOW				HIGH
		1 POOR	2 NORMAL	3 GOOD	4 VERY GOOD	5 EXCELLENT
1	How much the services of Hospital contain/cover what you had expected?					
2	How do you find the professionalism of our attending doctors?					
3	Are you satisfied with the behavior of our staff?					
4	In your opinion how well the different facilities of hospital coordinated?					
5	How do you rate the physical facilities of the hospital, e.g. Cleanliness, sanitation, waiting arrangements etc.					
Patient's Name (Optional).....						

FORM – 2 INDOOR PATIENT FEEDBACK RECORD

Hospital:	Indoor Regn. No:
Name of Patient:	Date of admission:
Name of Ward:	Date of Discharge:
Please give your feedback by marking a tick-mark on below given suitable bullets against each point.	
1. How much time was taken to get a bed after you were advised admission? • Less than 15 min • 15-30 min • More than 30 min	
2. Condition of bed and linen provided to you during the stay at Hospital. • Bed, Linen quilt, bed sheet was cleaned and ironed. • Any one (Bed, Linen quilt, bed sheet) was dirty. • Nothing (Bed, Linen quilt, bed sheet) was clean or proper.	
3. Food supplied by the Hospital was • Sufficient, tasty and served properly • Sufficient & tasty but was not served properly • Insufficient, not tasty and not served properly	
4. The time and care provided to you by the doctor was • Excellent • Satisfactory • Needs improvement	
5. The behavior of the doctor was • Excellent • Satisfactory • Needs improvement	
6. Availability of the drugs in Hospital as prescribed by the doctor • All the prescribed drugs were available • 50% drugs were available • No drugs were available	
7. Nursing care provided to you • Nurses were available all the time • Nurses were available sometimes only • Nurses did not attend the required calls of the Patients	
8. Behavior of nursing staffs was • Sympathetic and caring • Attended but not sympathetic and caring • Rude	
9. Services of paramedical staffs were • Sympathetic and caring • Attended but not sympathetic and caring • Rude	
10. Cleanliness of wards • Excellent • Satisfactory • Needs improvements	
11. Conditions of bathrooms/toilets • Excellent • Satisfactory • Needs improvements	
12. Cleanliness of the Hospital • Excellent • Satisfactory • Needs improvements	



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13. General opinion about the Hospital as a whole

- Excellent
- Satisfactory
- Unsatisfactory
- Needs improvements

14. Any suggestion regarding the improvement in services of the Hospital.

FORM – 3 QUALITY ASSURANCE COMMITTEE (QAC) REPORT

SL. NO	CHECKING CRITERIA	OBSERVATIONS/FINDINGS	CONCLUSION/REMARKS
1	Were all necessary investigations done before diagnosis?		
2	Was the diagnosis adequate/correct as per the investigation results?		
3	Was the planned treatment medically adequate /correct?		
4	Was the treatment plan executed correctly? (May not be relevant for OPD cases)		
5	Was the outcome of treatment medically obvious? (May not be relevant for OPD cases)		
6	Whether all activities including waste management and depletion of resources are done considering significant Environmental impacts.		
Signatures of QAC members with Designation:			

Note: To record the result of verification along with other observations for each sample case as follows, under the Health Service Conformance Status Register.

- For OPD cases:** If verification result for a sample case shows a discrepancy against any of the checklist criteria, declaring all Health Services provided by concerned DD on the concerned day as 'Nonconforming', all others declared as 'conforming'.
- For IPD cases:** Declaring that Health Service as 'Nonconforming' where verification result shows a discrepancy against any of the checklist criteria, all others declared as 'conforming'.



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Form - 4 HEALTH SERVICE CONFORMANCE STATUS REGISTER

Hospital:

Hospital I/c to arrange maintenance of this Register with above given title on the cover; and information inside the register through below given format.											
VERIFICATION DETAILS OF HEALTH SERVICES											
(QAC to fill up, referring to section MS.1. g.2.4 with signatures of all members at the end of entries of each day)											
Case Date	Registration Number	OPD or IPD	Service Providing Department	Verification Results (Refer section MS.1. g.2.4, and mark 'yes' or 'no' against all)					Conformance Status (C/NC)	Other Observations	ACTIONS TAKEN (On 'Nonconforming Health Service', and 'Other Observations') (Hospital I/c to specify, referring to section MS.1.g.2.4 with his signature at the end of entries of each day)
				a	b	c	d	e			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)



TR.1. EMPLOYEE TRAINING

1. COVERAGE: All training setups of MCL.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

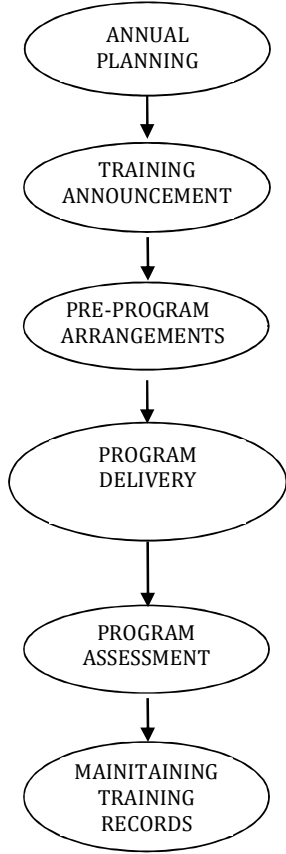
3. OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- a. DGMS guidelines.
- b. Environmental (Protection) Act; and Rules.
- c. BEE energy conservation building code

4. REQUIRED RESOURCES:

SL NO	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual, training aides listed below)		
A	Multi Media Projector, Personnel Computer, Screen, Pointer, Writing boards, duster, pens, etc.	
II. MANPOWER:		
A	Program - Coordinators	Training Institute I/c
B	In house Faculties	Training Institute I/c
D	Office Staff	Training Institute I/c
III. NATURAL RESOURCES: Water, Air, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness in office buildings and work spaces, training class rooms/spaces, hostel and associated utilities, etc. and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

PROCESS		ROLE	RECORDING UNDER
NAME	SUB-PROCESS / INSTRUCTION		
	ANNUAL PLANNING		
	Preparation of annual training plan	Training Institute I/c	Annual Training Plan and related notes
	Obtaining competent approvals		
	TRAINING ANNOUNCEMENT		
	Announcing the training with all details	Program Coordinator	Program file
	Obtaining participant names		
	Finalization of participant list and batches		
	PRE-PROGRAM ARRANGEMENTS		
	Issuance of Faculty invitation letter	Program Coordinator	Program file
	Requisition and procurement of required inputs		Program file
	Ensuring adequate class room arrangements		-
	Ensuring adequate support facilities		-
	PROGRAM DELIVERY		
	Participant Registration	Program Coordinator	Registration register
	Issuance of Training Kit		Issue record
	Daily attendance		Attendance register
	Field – visits/ Practical training as necessary		Program file
	Midcourse correction if any		Program file
	Obtaining feedbacks on training		Feedback file
	Issuance of release orders		Release order file
	PROGRAM ASSESSMENT		
	Evaluation of received feedback	Program Coordinator	Course evaluation report
	Preparation of training conformance report		
	MAINITAINING TRAINING RECORDS		
	Completing and closing program file	Program Coordinator	Program file
	Sending necessary communications, e.g. for updating training data base, faculty database, etc.		

Notes: Above functionaries carry out all concerned sub-processes and their activities through their professional competence.

6. CRITICAL OPERATING INSTRUCTIONS:

SL NO	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Ensure that the class room for training is well maintained and suitable for training with sufficient illumination and ventilation arrangements	Program Coordinator	√	----	----
2	Ensure that all required training aides like PC, multimedia projector, writing boards, pens, etc. are available and are in working condition.	Program Coordinator	√	----	----
3	Ensure food and snacks served in hostel and training institute are hygienic	Program Coordinator	√	----	√
4	Ensure that good housekeeping and cleanliness is maintained in office/class room premises and hostels	Program Coordinator	√	√	----
5	Install power saving devices like energy efficient lights, ACs, electronic regulators for fans, electronic chokes for tube lights, etc. in hospital	Designated Officer(s)	----	----	----
6	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	Designated Officer(s)	----	√	----
7	Ensure that only competent faculty are engaged for training	Program Coordinator	√	----	----
8	Obtain feedback of participants after completion of training through Form – 5 i.e. Participants Feedback	Program Coordinator	√	----	----
9	Based on the above participants feedback assess the training as 'conforming' or 'nonconforming' through Form – 6 i.e. 'Course Evaluation Report'	Program Coordinator	√	----	----
10	Handle the above reported nonconforming training services as per section 10.2 of Management Manual	Training Institute I/c	√	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from related manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Integrated Management System Manual.



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FORM – 5 PARTICIPANT’S FEEDBACK

NAME OF TRAINING INSTITUTE: _____

Date:

Program Coordinator to obtain feedback from every participant and keep in Program File.

Program Name:	Program Code (if any):
Program Dates:	

Please take a few minutes to think about the entire program, and give your comments.

A. COURSE EVALUATION: Please tick any one in each box						
A.1 Has Program contributed to enhance your knowledge and skills?		A.2 How was the coverage and content of the Program?				
Very high		Excellent				
Quite high		Very Good				
Average		Good				
Uncertain		Average				
No		Below average				
A.3 How do you find classroom/infrastructure arrangements of the Program?		A.4 How do you find the hostel arrangement of the Program?				
Excellent		Excellent				
Very Good		Very Good				
Good		Good				
Average		Average				
Below average		Below average				
B. SPEAKER EVALUATION: Please evaluate each speaker on the basis of his/her punctuality, confidence on the subject, and communication abilities. Tick one box against the name of every speaker.						
Speaker's Name	Number of Sessions Taken	Excellent	Very Good	Good	Average	Poor
C. YOUR SPECIAL COMMENTS (Continue overleaf, if required)						
About the Program:						
About the Speakers (mention speaker's name)						

Participant's name / sign (Optional)

ST.1 MATERIAL MANAGEMENT

1. COVERAGE: All central, regional and field stores of MCL.

2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:

As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.

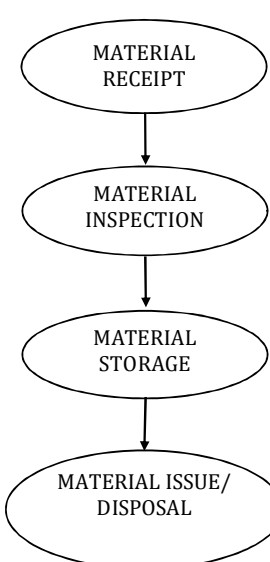
3. LEGAL/OBLIGATORY REQUIREMENTS: [Only latest/pertinent versions are to be referred]

- a. Hazardous Waste (Management and Handling) Rules;
- b. Batteries (Management and Handling) Rules;
- c. Weights and Measures Act.

4. REQUIRED RESOURCES:

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual)		
II. MANPOWER:		
A	Executives heading the Section in a store (SH)	Store In-charge
B	Store keepers supervising store activities (WS)	SH
D	Store issuer, Crane Operator General Mazdoor.	WS
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy.		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, and cleanliness on store premises, racks, etc. and physically and ergonomically safe working conditions.		

5. PROCESS STRUCTURE:

PROCESS		ROLE	RECORDING UNDER	
NAME	SUB-PROCESS / INSTRUCTION			
	MATERIAL RECEIPT			
	Verification of supply		SH	Stores Receipt Register, Supply Order
	Segregated storage and entry into records – in ‘receipt area’ for new materials; and in scrap yard for scrap material			
	MATERIAL INSPECTION			
	Arranging inspection of new material		SH	Inspection Report Stores Receipt Register, Inventory Record, Material Cards
	Shifting ‘pass’ new materials to ‘issues area’ and entry into records			
	Arranging return of rejected supplies of new material			
	MATERIAL STORAGE			
	Segregated storage of materials in designated shelves, containers, yards, etc.		SH	-
	Ensuring traceability of materials			Material Cards
	Checking condition of materials in storage, especially for new materials having ‘short-shelf-life’			-
	MATERIAL ISSUE / DISPOSAL			
	Issuing new materials only against authentic requisitions		SH	Stores Issue Register, Material Cards
	Arranging scrap disposal to authorized parties			Inventory Records
	Updating inventory records			Inventory Records Material Cards

Notes:

Above functionaries carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under CIL’s stores manual.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper material handling equipment, facilities while handling the materials in stores	All Concerned	√	----	----
2	Ensure the usage of Personal Protective equipment like hand gloves, helmets, safety shoes etc. required during work execution by working personnel.	SH	----	----	√
3	Ensure that items are kept in their respective racks/locations systematically with suitable identification marks	SH	√	----	----
4	Ensure that good housekeeping and cleanliness is maintained in store premises and material storage locations	SH	√	----	----
5	Store flammable items, industrial gas cylinders away from POL.	All Concerned	√	----	√
6	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	SH	----	√	----
7	Ensure proper storage of materials to avoid the damage during storage.	SH	√	----	----
8	Use proper trays as required during issuance of POL to collect the leaked oils/lubricants to avoid contamination of shop floor and chances of accidents and to reduce wastages	All Concerned	----	√	√

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

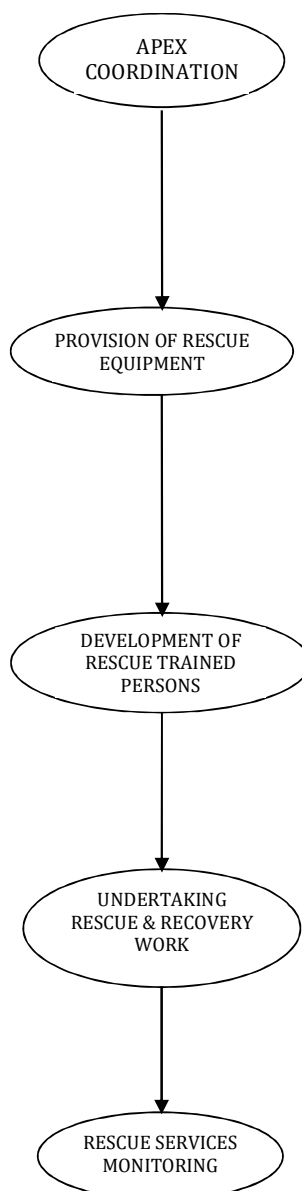
Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from related manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Management Manual.

MR.1 MINE RESCUE SERVICES

- 1. COVERAGE:** Mines Rescue Station (MRS) at Orient and Rescue Room & Refresher Training (RRRT) at Talcher of MCL
- 2. RELATED ENVIRONMENTAL IMPACTS AND OH&S RISKS:**
As listed under concerned review record; the significant ones, if any, also listed under concerned record 11.2 of the Integrated Management System Manual.
- 3. LEGAL/OBLIGATORY REQUIREMENTS:** [Only latest/pertinent versions are to be referred]
 - a. Mines Act, 1952
 - b. Mines Rescue Rules, 1985
 - c. DGMS Circulars
 - d. Hydraulic Stretch test, Gas Cylinder rules 1981
- 4. REQUIRED RESOURCES:**

SL	RESOURCE PARTICULARS	CONTROLLED BY
I. INFRASTRUCTURE: (Broad details under Maintenance Manual)		
A	Breathing equipment with absorbent chargers, Resuscitating apparatus with spare cylinders, Tube apparatus, Ancillary equipment like oxygen cylinders, oxygen pumps, bobbin meter, flow meter, universal tester, pressure gauge testing device, oxygen testing apparatus, apparatus testing tool kit, etc., Flame/Electric safety lamps, Gas detectors, Air and temperature measuring instruments, Portable telephone sets, Safety and First aid equipment like helmets, belts, first aid boxes, blankets, folding stretchers, self-rescuers, etc., Firefighting equipment, Miscellaneous equipment like charging rack for car batteries, stop watches, rain gauges, life lines, guide lines, evacuated sampling tubes with stoppered sampling bottles, sirens, barometers, VHF equipment, rescue vans, station wagons, etc.	Rescue Superintendent
II. MANPOWER:		
A	Rescue Superintendent	GM (S&R)
B	Instructors	Rescue Superintendent
C	Rescue Brigade members	
D	Other supporting Staff	
III. NATURAL RESOURCES: Water, Air, HSD, Oils/lubricants, Electrical energy		
IV. WORK ENVIRONMENT: Adequate lighting, ventilation, cleanliness, and physically and ergonomically safe working conditions in rescue setups.		

5. PROCESS STRUCTURE:

PROCESS		APPLICABLE IN	RECORDING UNDER
NAME	SUB-PROCESS / INSTRUCTION		
	APEX COORDINATION		
	Timely finalization of rescue material/manpower budget for the next financial year by 31 st March	MRS	Material/ Manpower budgets
	Posting of recue trained personnel from the prepared panel to different rescue units	MRS	Office correspondence
	Preparation the schedule for initial and refresher rescue training practices	MRS	Action Plan
	Preparation of medical examination schedule for rescue trained personnel and brigade members	MRS	Action Plan
	Liaison with DGMS and tracking of statutory compliance as required	MRS	Office correspondence
	Planning and organization of rescue competitions among various rescue units and trained persons	MRS	Action Plan
	PROVISION OF RESCUE EQUIPMENT		
	Initiating proposals and follow up of procurement actions	MRS	Office correspondence
	Distribution of rescue equipment, spares and consumables to rescue units through R/stores	MRS	Store requisitions
	Timely maintenance and calibration of rescue apparatus/ equipment	MRS, RRRT	Maintenance/ calibration registers
	Timely maintenance and calibration of rescue apparatus/ equipment	MRS, RRRT	Maintenance/ calibration registers
	Arranging hydraulic testing of gas cylinders once in 5 years	MRS, RRRT	Gas testing register
	DEVELOPMENT OF RESCUE TRAINED PERSONS		
	Selecting the eligible persons for rescue operations through written and medical test	MRS	Initial training file
	Providing 14 days initial training to selected persons	MRS	Initial training file
	Provide refresher training to field volunteers and brigade members as per training schedule	MRS, RRRT	Refresher training file
	Providing revalidation training to discontinued rescue trained persons	MRS	Revalidation training file
	UNDERTAKING RESCUE & RECOVERY WORK		
	Operating the control room round the clock to receive emergency calls	MRS, RRRT	-
	Deployment of rescue brigade as necessary during emergencies	MRS, RRRT	Rescue Report
	Assistance to mines for reopening/recovery of sealed off portions of UG mines	MRS, RRRT	Rescue Report
	Assistance to other organizations outside MCL for rescue work, if requisitioned	MRS, RRRT	Rescue Report
	RESCUE SERVICES MONITORING		
	Preparation of inspection schedule for inspection of different rescue units in the month of march every year and undertake inspection as per schedule	MRS	Action Plan
	Monthly testing of all the rescue apparatus and equipment	MRS, RRRT	Testing register
	Arranging mock rehearsals in different rescue units to evaluate the standard of emergency preparedness	MRS, RRRT	Mock rehearsal register

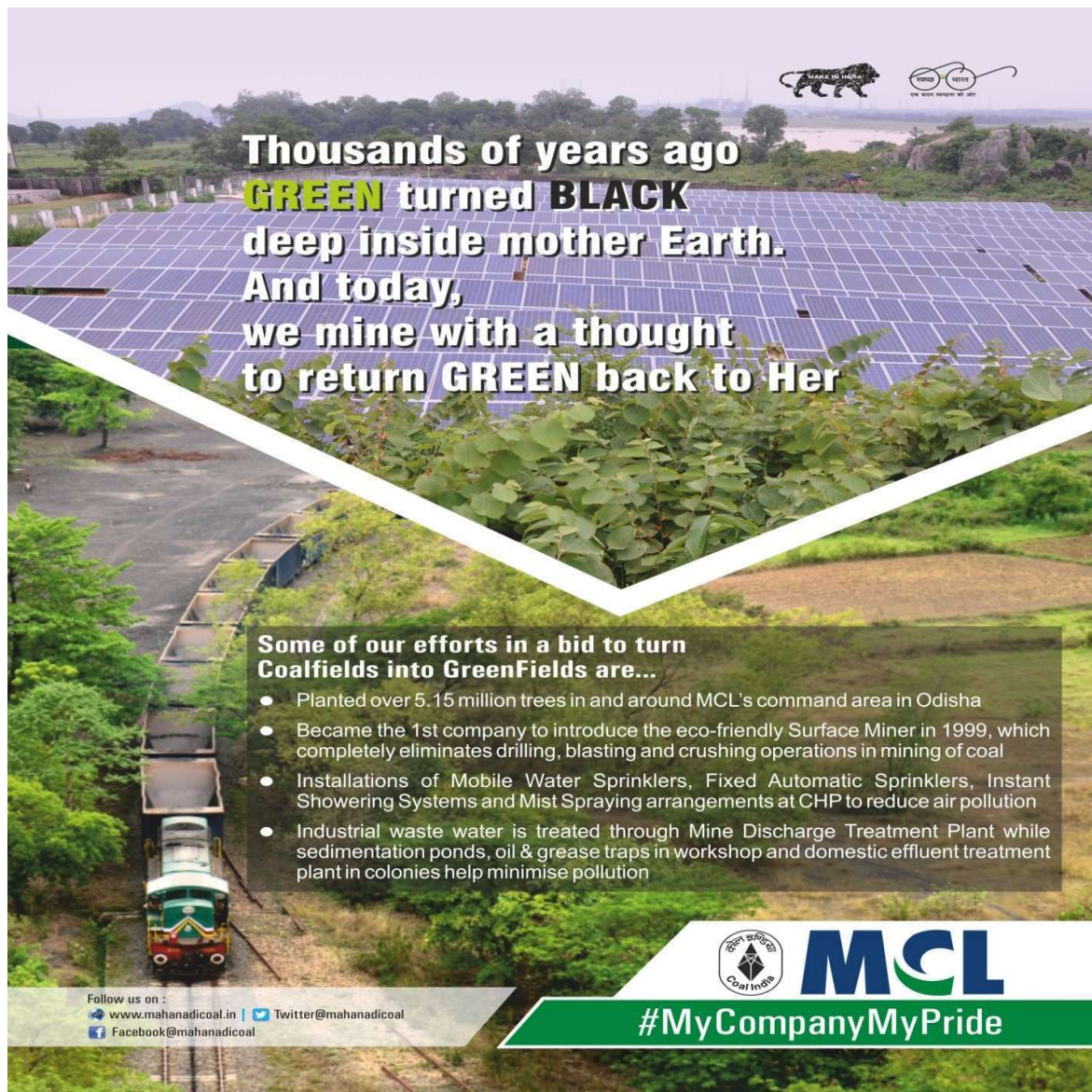
Note: Above units under column 3 above carry out all concerned sub-processes and their activities through their professional competence in reference to the provisions under legal/obligatory requirements as mentioned under Para 3 above.

6. CRITICAL OPERATING INSTRUCTIONS:

SL	OPERATING INSTRUCTIONS	RESPONSIBILITY/ AUTHORITY	TO CONTROL		
			PROCESS EFFICIENCY	ENV IMPACTS	OH&S RISKS
1	Use proper apparatus testing tool kits, hand tools & tackles, fixtures etc. as required during maintenance, adjustment, testing and repairing of rescue apparatus and equipment	All concerned	√	----	----
2	Ensure the usage of safety and personnel protective equipment like safety helmets, shoes, belts, hand gloves, goggles, etc. required during rescue operation by rescue personnel.	Rescue Superintendent	----	----	√
3	Ensure the usage of first aid equipment like first aid boxes, blankets, self-rescuers, blankets, stretchers and other rescue apparatus during rescue operations	Rescue Superintendent	√	----	----
4	Ensure that good housekeeping and cleanliness is maintained in office, rescue apparatus store room, testing site, etc.	Designated Officer(s)	√	√	----
5	Install power saving devices like energy efficient lights, ACs, electronic regulators for fans, electronic chokes for tube lights, etc. in rescue setups.	Designated Officer(s)	----	----	----
6	Ensure segregated collection of wastes, scraps and arrange for their proper disposal	Designated Officer(s)	----	√	----
7	Ensure that the required quantities of rescue equipment as mentioned under schedule - 1 & 2 of Mine Rescue Rules 1985 are available in the respective rescue setups	Rescue Superintendent	√	----	----
8	Arrange to undertake medical examination of all rescue trained persons once in every 12 months	Rescue Superintendent	√	----	----
9	Maintain the rescue equipment and apparatus kept in the rescue station/room in perfect order as per OEM guidelines and Schedule - IV of Mines Rescue Rules 1985	Rescue Superintendent	√	----	----
10	Maintain record of all rescue equipment and apparatus kept in the rescue station/ room and inspection thereof	Rescue Superintendent	----	----	----

7. DEFINED CONTROLS FOR OUTSOURCED WORK:

Under respective work order(s) issued for outsourced work(s), relevant conditions are to be included from related manuals, and/or from para-6 above, and/or from applicable statute/regulation – refer section 8.4 of Integrated Management System Manual.



**Thousands of years ago
GREEN turned BLACK
deep inside mother Earth.
And today,
we mine with a thought
to return GREEN back to Her**

**Some of our efforts in a bid to turn
Coalfields into GreenFields are...**

- Planted over 5.15 million trees in and around MCL's command area in Odisha
- Became the 1st company to introduce the eco-friendly Surface Miner in 1999, which completely eliminates drilling, blasting and crushing operations in mining of coal
- Installations of Mobile Water Sprinklers, Fixed Automatic Sprinklers, Instant Showering Systems and Mist Spraying arrangements at CHP to reduce air pollution
- Industrial waste water is treated through Mine Discharge Treatment Plant while sedimentation ponds, oil & grease traps in workshop and domestic effluent treatment plant in colonies help minimise pollution

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 **MCL**
#MyCompanyMyPride

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NO PART OF THIS MANUAL SHOULD BE COPIED OR REPRODUCED IN ANY FORM WITHOUT THE SPECIFIC PERMISSSION FROM THE TECHNICAL SECRETARY TO CHAIRMAN-CUM-MANAGING DIRECTOR, MCL, SAMBALPUR, ODISHA.

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