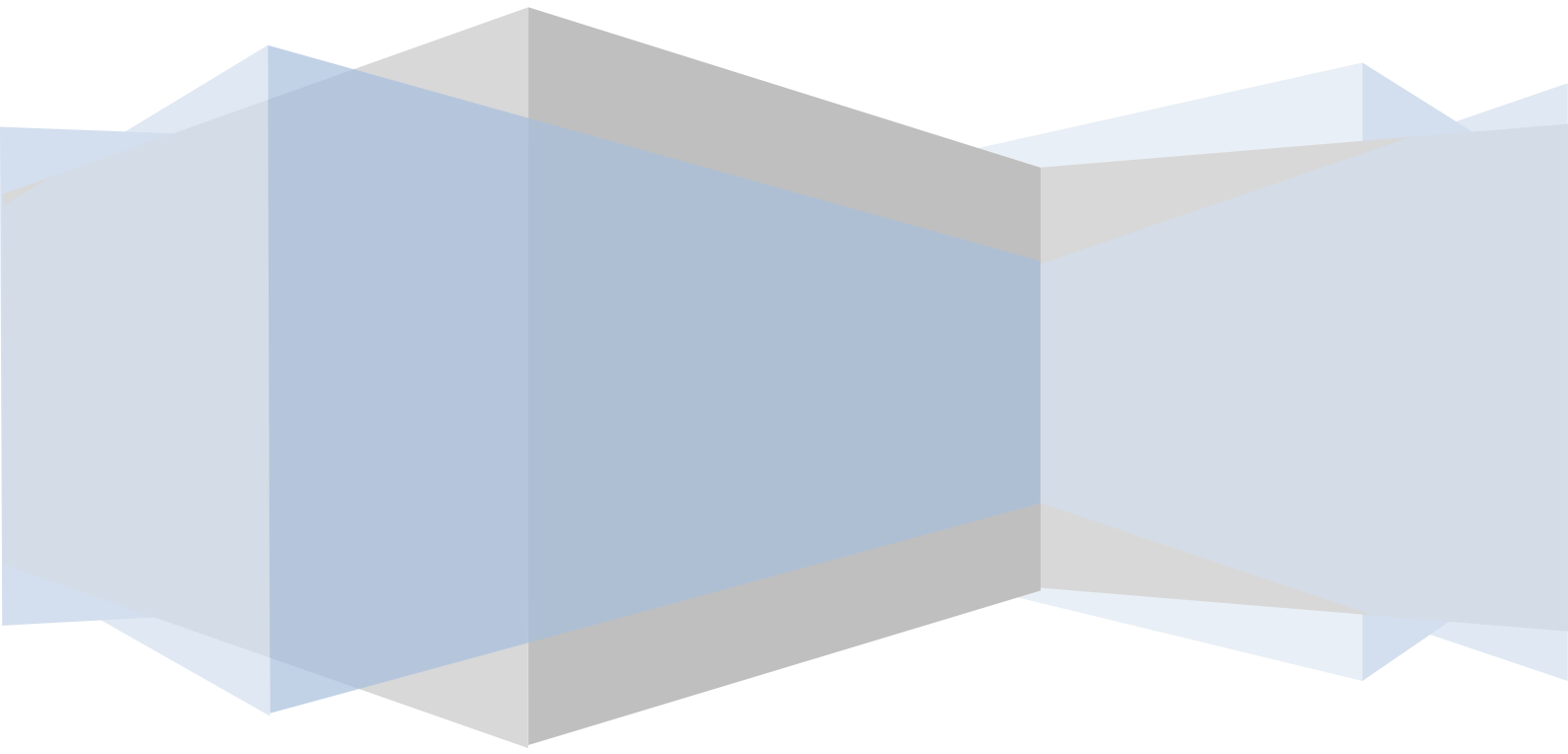
ON-SITE EMERGENCY PLAN

SPECTRUM COAL & POWER LTD.

AT-MCL BALARAM OCP, PO-N.S NAGAR, BHARATPUR, DIST-ANGUL



CONTENT

1.0 GENERAL INFORMATION ABOUT THE FACTORY

M/s Spectrum Coal & Power Limited (SCPL)(Formerly ST-CLI Coal Washeries Limited) is the first private sector company India to setup power grade coal washery in the state of Chhattisgarh.SCPL currently operates a 1200 TPH washery and supplies washed coal to its Power House customer in the state of Gujarat and Maharastra. SCPL is also in process for constructing a 50 Mw Coal Washery Rejects based Power Plant in Korba, Chhattisgarh.

The plant is located in Talcher Area, which is 155 km west of Bhubaneswar in the District of Angul. The nearest Railway Station is Talcher at 17 km in the South East of the plant. The N.H. 42 is about 16 km north passing through Angul town. N.H. 42 connects Bhubaneswar / Cuttack with Sambalpur through Angul. NH 23 which passes through Talcher Town and connects NH 42 at Banarpal is about 20 km from the plant site.

Coal from Open Cast mines of Talcher Coalfields will be fed to this plant and Beneficiated Coal having an ash percentage of 34 or less will be dispatched to the Vijaywada Thermal Power Plant of APGENCO by rail.

The location of the plant has got the following advantages:-

i. Proximity to the Coal Mines of MCL as it is located within the mining area.
ii. Proximity to the MCL Balram Railway siding linking with Talcher station. In future this will be connected to Angul Railway station also, which is about 14 km from washery site. Connecting railway line is under construction from Angul to Balram CPP siding.
iii. Accessibility by road (N.H.23, N.H.. 42,N.H. 42, N.H. 5&N. H.6) Keonjhar, Rourkela, Cuttack Sambalpur are well connected.
iv. Sufficient water storage facility in the adjacent quarry void.
v. Proximity to source of power i.e., electric substation which is about 11 km for the plant.

FACTORY ADDRESS:-

M/s. Spectrum Coal & Power Ltd.,

At-MCL Balaram OCP

P.O-N.S.Nagar, Bharatpur, Talcher, Post Box No-5

Dist-Angul Pin-759103

Telephone Number:-9437082976/9777334421

E. mail- spectrum.talcher@gmail.com

Name of Occupier- Mr. Narendra Prakash Bhati

Permanent address- 204-B, Baji Prabhu Nagar, Ram Nagar, Nagpur, Maharastra

Present address- 204-B, Baji Prabhu Nagar, Ram Nagar, Nagpur, Maharastra

Tel.No : 09823010888

E. Mail: npbhati @gmail.com

Name of Manager- Mr. Om Prakash Ghanashyam Das Katare

Permanent- Village/Post: Barauri, Tahasil: Mauranipur, Dist: Jhansi, Uttar Pradesh

Present address: Kumanda guest house, Pragati Nagar, Near Lord Shiva Mandir, Chandi Bazar Road, Post /Dist . Angul, Odisha,

Tel.No : 08114384291

E. Mail: omprakash.katare@acbindia.com

Total area- 91.306 acre & total in built area – 56.335 acre

Periphery of the factory:-

i) East- MCL Work Shop

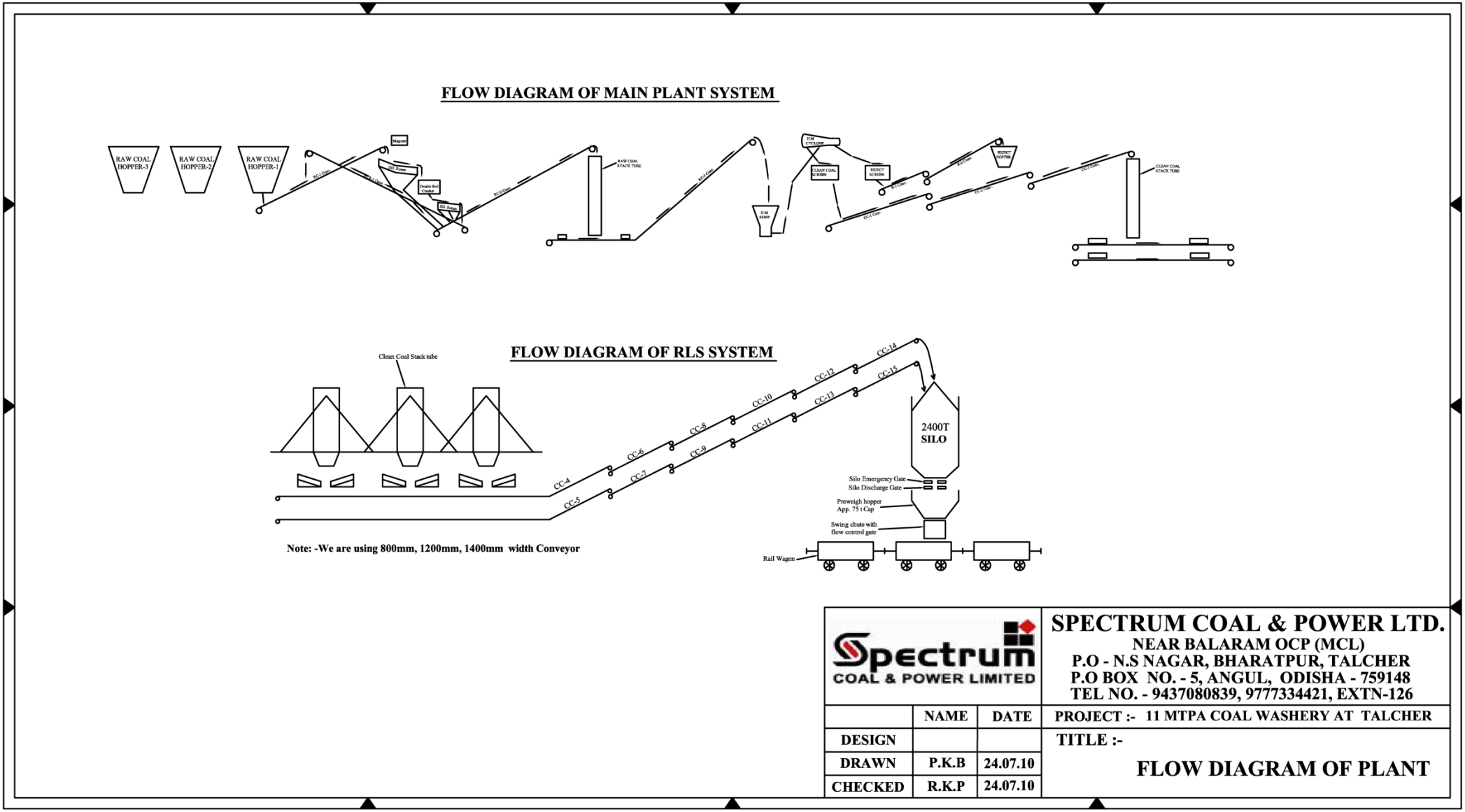
ii) West- Railway Siding (MCL)

iii) North- Balaram OCP

iv) South- Village Danara

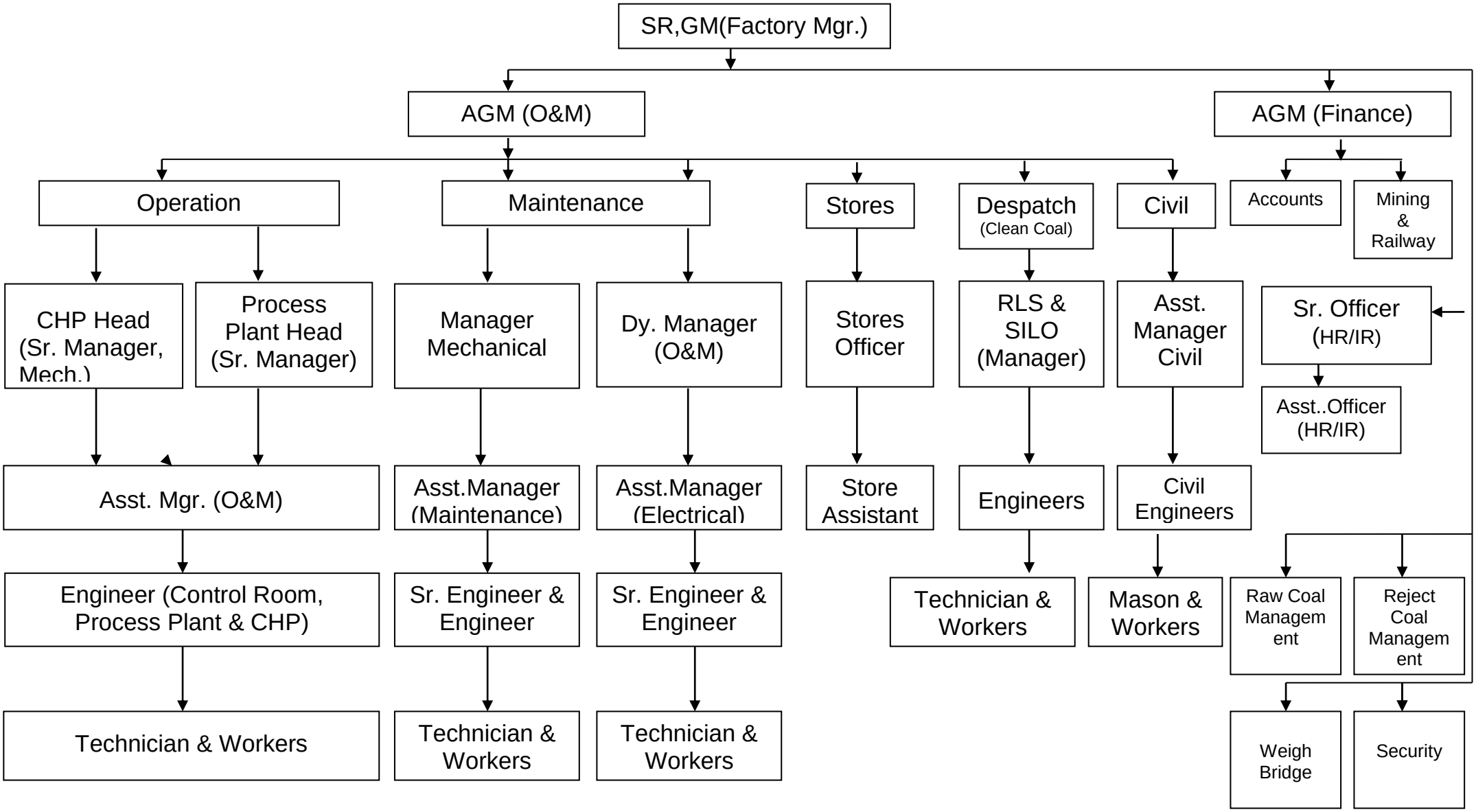
BRIEF MANUFACTURING PROCESS:

Based on the washability analysis and computer simulations, we have selected the “Heavy media cyclone (HMC)” as the main processing equipment and the fines would be treated under a combination of classifying cyclones and spirals as the fines contains lot of matter which is very difficult to wash. The HMC process is best suited for this high ash and high and NGM coal of Talcher mines as it would provide the finest separation couples with deepest beneficiation possible so as to guarantee 95% organic efficiency on a continuous basis and a fixed yield of 73.5%. Other washing processes tried out on Indian raw coal of “F” grade, such as jigs, HM baths have proved to be ineffective due to high misplacements resulting efficiencies being lower than 90%. Further, jigs and HM baths are very sensitive to feed fluctuations while HMC is not affected by fluctuations. The deepest beneficiation of HMC process would also ensure that ash remain continuously above 90% thereby ensuring minimum carbon content loss in reject. The plant which would be designed by SCPL would be a zero effluent discharge system similar to our existing washery at Dipka mines which is the only plant of its kind in India.



2.0 ORGANIATIONAL CHART

SPECTRUM COAL & POWER LIMITED, TALCHER PLANT



3.0 MANPOWER:-

LICENCE MANPOWER - 500

. Manpower has been given details in 'A', 'B', 'C' shifts and 'G' (i.e. General Shifts) in a tabular form.

CATEGORY	**"A" SHIFT** 0500-1300 hrs.	**"B" SHIFT** 1300-2100 hrs	**"C" SHIFT** 2100-0500 hrs.	**GENERAL SHIFT** 0900-1700 hrs.	**TOTAL**
Shift In-Charge (Engineer)	1	1	1	1(reliever) maintenance	4
Plant Supervisor	3	3	3	2(reliever) maintenance	11
Electrical supervisor cum control room operator	3	3	3	2(reliever) maintenance	11
Statutory supervisor	-	-	-	1	1
Chemist	-	-	-	1	1
Shift Chemist	2	2	2	1(reliever) maintenance	7
Semi Skilled samplers	5	5	5	-	15
Preparation assistant	4	4	4	-	12
Supervisor weigh bridge	1	1	1	-	3
Weigh Bridge operator	4	4	4	2	14
Sr. Engineer (Maintenance washery plant)	1	1	1	4	7
Electrical Supervisor	1	1	1	1	4

Mechanical Supervisor	1	1	1	1	4
Skilled Technician(Fitter, Electrician, Welders & riggers)	7	7	7	12	33
Helpers of the skilled technicians	3	3	3	5	14
Store Incharge	-	-	-	1	1
Store Keeper	1	1	1	1	4
Store helper	3	2	-	4	9
Finance Manager	-	-	-	1	1

Accounts Officer	-	-	-	1	1
Accountant	-	-	-	1	1
Personnel & Welfare Officer	-	-	-	1	1
Safety Officer	-	-	-	1	1
Admin. Assistant	-	-	-	4	4
Office attendants	-	-	-	3	3
Drivers	10	10	10	13	45
Cook	2	2	1	3	8
Kitchen assistant	2	2	1	4	9
Sweeper	2	-	-	3	5
Civil Engineer	-	-	-	2	2

Survey & helper	-	-	-	3	3
Security service & senior managerial persons.	25	25	25	7	82
Workers	47	47	47	36	177
	129	124	123	122	498

Depending on the requirement, the employees are called in different shifts and some employees are called on duty in National/Festivals holidays and off-days.

4.0 PRODUCT:-

SL.NO	NAME OF PRODUCT	QUANTITY (MT/DAY)	STORAGE TYPE	SIZE
1	Clean Coal Size (-50mm)	17,162 TPD	In stack tube Area (Conical Shape) In open ground	Dia-44 Mtrs H- 21.5 Mtrs

4.1 BYE- PRODUCT:-

SL.NO	NAME OF PRODUCT	QUANTITY (MT/DAY)	STORAGE TYPE	SIZE
1	Reject Coal Size (-50mm)	6,188 TPD	Open Ground	L-60 mtrs, B- 20 Mtrs H- 5 Mtrs.

5.0 INVENTORY OF RAW MATERIALS:-

Sl.No	Types of Material	One time storage capacity	Types of Storage	Stack Tube Height	Dia
01	Raw Coal	60,000 MT (Approx.)	Open Ground in Conical shape stack tube	23.5 Mtrs.	46 Mtrs.
02	Clean Coal	20,000MT (Approx.)	Open Ground in Conical shape stack tube	21.5 Mtrs.	44 Mtrs.
03	Reject Coal	50,000 MT (Approx.)	Open Ground	L- 380 Mtrs	B-123 Mtrs.
04	Anionic Powder	10MT	Polymer Preparation Building	200 m^2 (Stack upto height of 2Mtr)	-
05	Cationic Coagulant	4 MT	Polymer Preparation Building Length- Breadth-	100 m^2(Stack upto height of 2Mtr)	-

6.0 INVENTORY OF HAZARDOUS SUBSTANCES:-

Sl.No	Name of Hazardous Substances	One time storage quantity	Capacity of Storage	Type of storage	Size of storage area /tank
A	Raw Coal	60,000 MT (Approx.)	80,000 MT	Open ground in conical shape stack tube	Stack tube Dia-46 Mtrs. H-23.5 Mtrs
B	Clean Coal	20,000MT (Approx.)	30,000MT	Open ground in conical shape stack tube	Stack tube Dia-44 Mtrs. H-21.5 Mtrs
C	Reject Coal	50,000 MT (Approx.)	70,000 MT	Open ground	L- 380 Mtrs B-123 Mtrs.
D	Transformer	Details given below			
E	DG Set	Details given below			

TRANSFORMER DETAILS

SL. No	No of Transformer	TRANSFORMER CAPACITY IN KVA	LOCATION	QUANTITY OF TRANSFORMER OIL INSIDE TRANSFORMER
1	Transformer No - 1	4000 KVA TRANSFORMER(Plant)	MCC – 3 SWITCH YARD	**3435 Ltr**
2	Transformer No - 2	4000 KVA TRANSFORMER(Plant)	MCC – 3 SWITCH YARD	**3435 Ltr**
3	Transformer No - 3	160 KVA TRANSFORMER(Plant)	MCC – 3 SWITCH YARD	360 Ltr.
4	Transformer No - 4	2000 KVA TRANSFORMER(RLS)	MCC – 4 SWITCH YARD	1460 Ltr
5	Transformer No - 5	2000 KVA TRANSFORMER(RLS)	MCC – 4 SWITCH YARD	1460 Ltr
6	Transformer No - 6	160 KVA TRANSFORMER (RLS)	MCC – 4 SWITCH YARD	360 Ltr

DG SET DETAILS

SL. No	No of DG SET	CAPACITY IN KVA	LOCATION	QUANTITY OF DIESEL INSIDE THE DG SET
1	DG SET No - 1	1010 KVA DG SET (Plant)	MCC – 3 (MAIN PLANT)	1000 Ltr
2	DG SET No - 2	1010 KVA DG SET (Plant)	MCC – 3 (MAIN PLANT)	1000 Ltr
3	DG SET No - 3	1010 KVA DG SET (Plant)	MCC – 4 (RLS)	1000 Ltr

7.0 INVENTORY OF HAZARDOUS GASES /SUBSTANCES PRODUCED / GENERATED

SL.NO	**NAME**	**QUANTITY of one time storage**	**Type of storage**
No hazardous substances/gases are produced/generated during the process			

8.0 IDENTIFICATION OF HAZARDS:-

Hazards are mostly manifested in the form of pool file or fire. Each anticipated hazard scenario associated in the unit is described along with its assessment of impact on plant and locality are follows:-

i. Fire hazard in coal stock.

ii. Fire hazard in transformer oil inside transformer

Anticipated hazard scenarios

Sl.	**Area/ Activity**	**Hazard**	**Impact**
1.	Storage of raw coal in coal storage yard.	Fire may occur due to spontaneous ignition of coal	Fire will propagate within the coal storage yard.
2	Storage of Clean coal in coal storage yard.	Fire may occur due to spontaneous ignition of coal	Fire will propagate within the coal storage yard.
3	Storage of reject coal in coal storage yard.	Fire may occur due to spontaneous ignition of coal	Fire will propagate within the coal storage yard.
4	Transformer oil in Transformer	Fire may occurred due to over heating / supply of high voltage	Fire will propagate in the switch yard

METEOROLOGICAL DATA (Source- Google Net)

Parameters monitored	Season						Remarks
	Summer		Monsoon		Winter		
	Max.	Min.	Max.	Min.	Max.	Min.	
Temp (^{0}C)	46^{0}C	25^{0}C	31^{0}C	24^{0}C	28^{0}C	17^{0}C	
Relative Humidity	57^{0}C	50^{0}C	81^{0}C	68^{0}C	63^{0}C	39^{0}C	Highest in August and lowest in February
Wind Speed (kmph)	22.4	11.8	13.7	8.4	8.8	5.4	Highest wind velocity is 20 kmph and may be more some times
Wind Direction	West & Northwest		North-N/E & West- N/W		West		
Rain Fall	760mm						Heaviest rainfall in a day (24 hours) recorded is 257.33 mm

Precautions taken to avert fire in coal Storage Yard

In the present situation, the following precautions are taken for prevention of spontaneous ignition of coal.

- The exposed surface area of the coal heap is restricted to the minimum possible so as to avoid the contact of oxygen with coal.
- The exposed surface area is reduced by avoiding segregation and by packing the coal tightly and uniformly.
- The ventilation at the coal heap is suppressed so that weathering is avoided due to cut-off of oxygen.
- Coals of different sizes stored in a pile so that air voids are reduced to a great extent.
- The coal is consumed before the critical temperature is reached.
- Water Sprinkling is done to reduce the temperature.

9.0 IDENTIFICATION OF MOST CREDIBLE HAZARD SCENARIO:

9.1 FIRE IN CLEAN COAL/ RAW COAL/ REJECT COAL

Fire Hazard in coal storage yard is considered as a credible Scenario because of the following reasons.

During storage of coal in the yard, weathering of coal takes place due to mild oxidation, which is an exothermic process. If the heat liberated is not completely dissipated, the temperature of coal rises as coal is a bad conductor of heat. The rate of oxidation is double within 10^0C rising temperature. The bulk of coal may reach critical temperature i.e. its ignition point 50-80^0C and may burst into flame. This phenomenon is known as spontaneous ignition of coal.

Significant heat flux experienced at distance due fire on Clean coal area in different season.

Storage details	Significant heat level Kw/m²	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Clean coal 20,000 MT	4.5	6.2	5.3	7.4	***Causes pain if unable cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.***
	12.5	4.5	3.5	5	***Minimum energy required for melting of plastic***
	37.5	2.3	2.2	3.4	***Sufficient to cause damage to the equipment.***

Significant heat flux experienced at distance due fire on Raw coal area in different season.

Storage details	Significant heat level Kw/m²	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Raw coal 60,000 MT	4.5	7.1	6.4	8.4	*Causes pain if unable cove rthe body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.*
	12.5	4.1	5.6	5	*Minimum energy required for melting of plastic*
	37.5	3.5	3.2	3.8	*Sufficient to cause damage to the equipment.*

Significant heat flux experienced at distance due fire on Reject coal area in different season.

Storage details	Significant heat level Kw/m²	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Reject coal 50,000 MT	4.5	5.8	5.2	7.1	*Causes pain if unable cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.*
	12.5	4.3	3.4	4.8	*Minimum energy required for melting of plastic*
	37.5	2.1	2.0	3.3	*Sufficient to cause damage to the equipment.*

9.2 FIRE HAZARD IN TRANSFORMER OIL IN TRANSFORMER

Transformer oil is a flammable liquid as per schedule-1, Part-II (b) (v) having flash point of 144^{0}C, auto ignition temperature of >270^{0}C and explosive limit of 0.7% volume in air. So, it is susceptible to fire hazard. Whenever Transformer oil catches fire it shall manifest in the form of pool fire. The significant heat flux that spread from the source in case of pool fire in transformer is mentioned below.

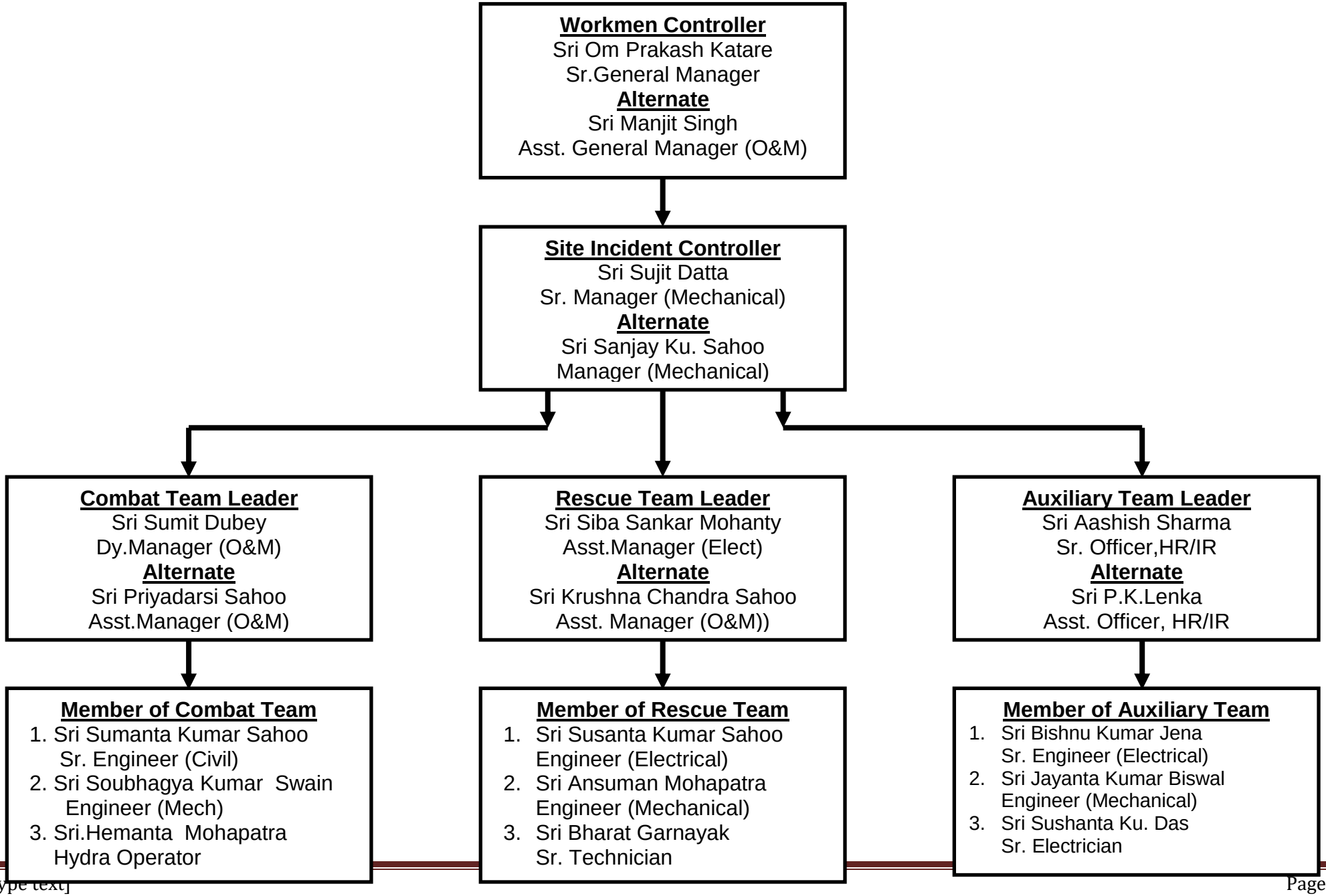
Significant heat flux experienced at distance due to fire on transformer containing transformer oil in different season.

Storage details	Significant heat level Kw/m^2	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
TRANSFORMER OIL 3435 L	4.5	17.9	17.2	15.5	Causes pain if unable cove the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
	12.5	9.8	9.5	8.3	Minimum energy required for melting of plastic
	37.5	3.0	3.8	2.9	Sufficient to cause damage to the equipment.

10. PLOT PLAN

The Plot showing Emergency Control Room, Assembly Points, Hazard Zones. Iso- risk Contour, Fire hydrant line, Emergency Exit etc. is given in Annexure.

11.0 EMERGENCY COMMAND STRUCTURE



12.0 ROLE OF KEY PERSONS OF EMERGENCYCOMMAND STRUCTURE

WORKS MAIN CONTROLLER (WMC):-

- ⇒ On being informed, rush to the scene and take overall charges of the situation
- ⇒ Make quick assessment of the situation and decide declaration of emergency by blowing the siren in appropriate code**[intermittent three times with half minutes interval]**
- ⇒ Direct respective leaders through Site incident Controller to take control of the situation in the affected area
- ⇒ Make continuous review and assess the possible developments to determine the extent of damage to plant and human being
- ⇒ Direct shut-down the plant, if necessary
- ⇒ Orders evacuation process by consulting with key persons
- ⇒ Ensure that casualties are receiving adequate attention
- ⇒ Liaise with the fire services, police services and other statutory authorities
- ⇒ Declare closure of the emergency by blowing the siren [only once long siren for 25 seconds]
- ⇒ Issue the authorized statements to the media services
- ⇒ Report all statutory authorities in the prescribed manner
- ⇒ Communicate to employees about the mishap, measures taken and giving confidence to employees for avoiding recurrence of the incident by investigation and ordering preventive measures to be implemented

SITE INCIDENT CONTROLLER:-

- ⇒ On hearing Emergency siren, rush to the scene and report to the Works Main Controller
- ⇒ Carry out the instruction of Works Main Controller
- ⇒ Make quick assess about the gravity of the situation and appraises Works controller
- ⇒ Orders Combat Team Leader, Rescue Team Leader and Auxiliary Team to perform their responsibilities immediately
- ⇒ Extend all sorts of the help through different agencies to minimize the damage to human beings, plant, property and environment
- ⇒ Report the development of the situation time to time to Works Main Controller
- ⇒ Provide the required information to the fire brigade team for fire fighting
- ⇒ Preserve the evidences for the subsequent inquiries

COMBAT TEAM LEADER:-

- ⇒ On hearing the emergency siren, rush to the scene with fire fighting team with sufficient equipment in the minimum possible time and report to Site Incident Controller
- ⇒ Carry out the instruction of Site Incident Controller
- ⇒ Ensure the team members resume their position with appropriate equipment
- ⇒ Monitor the fire fighting operation to control the situation
- ⇒ Ensure that situation is controlled by arresting, spillage, fighting fire, shutting, of the valve and equipment by the team in consultation with Site Incident Controller
- ⇒ Assist the Incident Controller till the situation is under control

COMBAT TEAM MEMBERS:-

- ⇒ On hearing the emergency siren, rush to the scene with fire fighting equipments in the minimum possible of time and report to their team leader
- ⇒ Carry out orders of the team leader
- ⇒ Operate the fire fighting equipments for controlling the situation

RESCUE TEAM LEADER:-

- ⇒ On hearing the emergency siren, rush to the scene and report to the Site Incident Controller
- ⇒ Carry out the instruction of the Site Incident Controller

- ⇒ Ensure the arrival of this team members
- ⇒ Keep necessary equipments of first-aid for preliminary treatment
- ⇒ Keep the ambulance ready to carry the injure persons to the hospital
- ⇒ Ensure the proper personal protective equipments lead the team for rescue operation
- ⇒ Inform the Works Main Controller for the developments time to time
- ⇒ Guide the non-essential persons to reach assembly point
- ⇒ Search the missing person on the roll call basis

RESCUE TEAM MEMBERS:-

- ⇒ On hearing the emergency siren, rush to the scene with appropriate personal protective equipments and report to their team leader
- ⇒ Carry out orders of the team leader

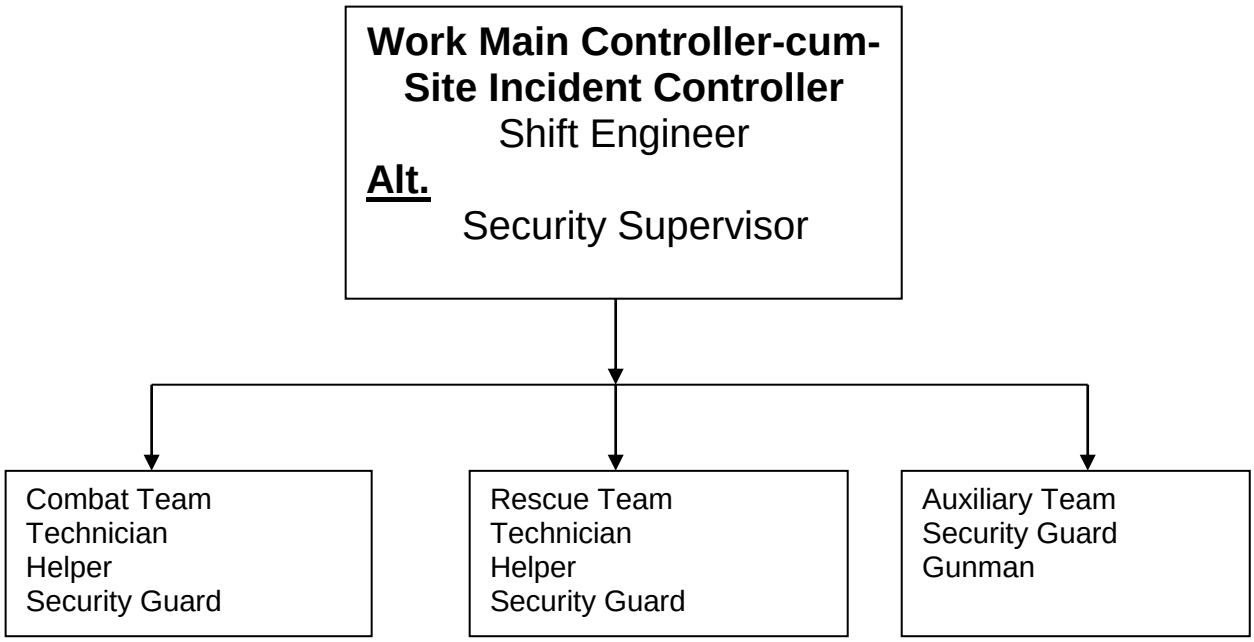
AUXILIARY TEAM LEADER:-

- ⇒ On hearing the emergency siren rush to the scene and report to the Site Incident Controller
- ⇒ Carry out the instruction of Site Incident Controller
- ⇒ Ensure the arrival of this team members
- ⇒ Intimate statutory authorities over phone
- ⇒ Intimate nearest Fire Station over phone
- ⇒ Intimate mutual-aider over phone
- ⇒ Keeps the first-aid and primary health center staff, equipment ready to take care of immediate medical needs
- ⇒ Takes care of victims' family
- ⇒ Make all arrangement like transport, other needs, arrange finance
- ⇒ Ensure all casualties are shifted to hospital for medical treatment
- ⇒ Keep records of casualties and provide information of the matter to works Main Controller

AUXILIARY TEAM MEMBERS:-

- ⇒ On hearing emergency siren, brush to the scene and report to the team leader
- ⇒ Carry out the orders of the team leader
- ⇒ Provide immediate first-aid treatment to the victims
- ⇒ Ensure ambulance vehicle ready
- ⇒ Coordinate with team, rescue team, statutory authorities and mutual-aid partners

13.0 SILENT HOUR COMMAND STRUCTURE



ROLE OF KEYS PERSONS IN SILENT HOUR COMMAND STRUCTURE

- ⇒ Silent Hour is the time when General Shift people are not available
- ⇒ The command structure for the silent hour shall be same as during normal hour, however, **during the silent hour the shift Engineer / security Supervisor shall act as Works Main Controller-cum Site Incidence Controller, till the arrival of the Works Main Controller**
- ⇒ **Works Main Controller-cum Site Incidence Controller(Silent Hour)**shall inform Works Main Controller, Site Incident Controller, Combat Team Leader, Rescue Team Leader and the Auxiliary Team Leader by telephone or by sending special messenger to their residences
- ⇒ On receiving the information the Works Main Controller, Site Incident Controller, Combat Team Leader, Rescue Team Leader and Auxiliary Team Leader shall reach the site at the earliest and simultaneously Combat Team Leader, Rescue Team Leader and Auxiliary Team Leader shall ensure the presence of their respective team members
- ⇒ Thereafter the action plan as well as the role of key persons shall be same as the normal hour execution of Command Structure

14.0 ACTION PLAN FOR ON-SITE EMERGENCY:-

STEP NO.	INITIATOR	ACTION TO TAKEN
1.	The person noticing the emergency	➢ Inform the security gate and the concerned Shift-In-charge who in turn will inform Site Incident Controller immediately regarding the fire hazard.
2.	Site Incident controller	➢ Inform work main controller (WMC) and will rush to site. In case of failure electronic system, the standby available provision for running with bike, will their to pass on the command as advised. ➢ Assesses the situation and call the combat Team Leader (CTL), Rescue Team Leader (RTL) & Auxiliary Team Leader (ATL). ➢ Arranging to evacuate the unwanted persons and call for additional help. ➢ Time to time to pass information to the Work Main Controller (WMC) about the situation at site.
3.	Work Main Controller (WMC)	➢ Rush to emergency Control room. ➢ Inform Key persons of emergency command structure about the scene telephonically. ➢ Take stock of the situation in consultation with the SIC. ➢ Take decision on declaration of emergency and ask for emergency waiting siren. ➢ Advise Auxiliary Team Leader to inform the statutory authorities and seek help of mutual aid required. ➢ Decide the declaration of normalcy of emergency after combation the situation.

4.	Rescue Team (RTL)	➢ Consult with Site incident Controller (SIC) and rush to emergency Site through safe route along with the team members and start the rescuing work. ➢ Shift the injured persons to hospital by ambulance after providing necessary first aid. ➢ To inform the Auxiliary Team Leader for necessary help from Mutual Aid partners.
5.	Auxiliary Team (ATL)	➢ On being directed by works Main Controller (WMC) inform about emergency to statutory Authorities depending upon the situation. ➢ Seek help of mutual Aid partners and coordinates with mutual Aid partners to render their service if required. ➢ To take role call to find out the missing persons if any. ➢ Arrange to inform the relatives of casualties. ➢ Take care of visit of the authorities to the emergency site.
6.	Team Member	➢ Each of the team members should follow the instruction of concerned team leader to migrate the emergency.

15.0 ACTIVATION AND CLOSING PROCEDURE FOR ON SITE EMERGENCY

- ⇒ Anybody notices FIRE, shout “FIRE, FIRE”, “FIRE” and inform to Shift –in-Incharge {or smoke detector indicates fire alaram installed in the emergency control room].
- ⇒ Being inform about fire, the Shift-in-Incharge informs Works Main Controller and Site Incident Controller.
- ⇒ On hearing about the fire, Work Main controller and site incident controller rush to the scene and make quick assessment of the situation.
- ⇒ On quick assessment of the situation, the Work Main Controller rush to the emergency control room and declare emergency by blowing appropriate siren code [**intermittent three times with half minutes interval]**
- ⇒ On hearing of emergency siren the key personnel of emergency combat structure perform their duties and responsibilities as per the worksheets.
- ⇒ During emergency operation, The Works Main controller keeps record of activities carried on, supervises overall, maintain liaison with mutual aiders, statutory authorities.
- ⇒ After being control the situation, the Work Main controller declares normalcy by blowing appropriate siren **[three minutes continuously].**

Annexure- I

DETAILS OF FACILITIES AVAILABLE

Emergency control room is the place from which all emergency management operation are directed and coordinated. Also it is the place from where all communication will be established, with outside agencies and district authorities.

Facilities available:-

- ⇒ P&T phone – 2nos.(09861007906,09556874242)
- ⇒ Windsock.
- ⇒ Wallboard for fixing up drawing and drawing pins. Flip charts, drawing sheets and sketch pens.
- ⇒ Switch for actuating the siren, drinking water arrangement, tables, chairs, etc.
- ⇒ Details of address and telephone numbers of key personnel of emergency command structure, statutory authorities and mutual aiders.
- ⇒ Worksheet of key personnel of emergency command structure.
- ⇒ Applicable siren code

Additional Information :-

- ❖ Safety manual
- ❖ Material safety data sheets of Diesel, Transformer Oil,
- ❖ List of emergency telephone numbers (External and internal)
- ❖ Local P&T telephone directories
- ❖ List of people working in the installation, location wise.
- ❖ List of residing address of employees / contract workers and casual workers.

Equipment:-

- ⇒ Emergency lights - 25 Nos.
- ⇒ Sufficient number of torch lights-20 Nos.
- ⇒ Self contained breathing apparatus – 1no.
- ⇒ Personal protective equipment – Helmet – 800, Safety boot-800; Safety gloves-55; Safety goggles-50; Nose mask-500; welding glass-50; Welding helmet-20.
- ⇒ Red/ Green flag -10 nos each

Assemble point:-

In an emergency, it will necessary to evacuate people from the affected zones or the zones likely to be safe areas. The safe areas are identified and Assemble Points (AP). The location of the Assemble Point is the vacant space shown in the Plot Plan. Arrangements for taking head count of persons, reconciling the head count with the attendance rolls, temporary shelter and further evacuation if necessary to safer place outside factory campus can be made.

ESCAPE ROUTE AND WIND SOCKS

Escape Routes:-

Escape route are those that allow reasonably safe passage of persons from the work area to the Assembly Point. These routes would be different for different wind direction. For fire scenarios, evacuation decisions and escape routes are to be based on the distances at which heat radiation flux reaches a level harmful to human beings ($4.5W/m^2$ for heat radiation). Escape routes are marked on the drawing that would facilitate Site Incident Controller to precisely announce the routes in case of evacuation.

Wind Socks:-

During emergencies, the knowledge of exact wind direction will helps the factory personnel to decide on the escape route to be taken for safe evacuation of personnel and also the safe assembly point and Emergency Control Centre. Therefore, the windsock is provided at the top-most point of the factory building for easy identification of the wind direction.

COMMUNICATION THE EMERGENCY AND MEDICAL AID

For communicating the declaration of emergency and evacuation decision to the plant personnel, it is envisaged that the siren would be utilized.

Declaration of emergency: - Intermittent **three times with Half-minute interval**

Normal factory siren: - **Continuous for 30 secs**.

All-clear signal: - **Continuous for 3 mins.**

Emergency medical arrangement:-

- ⇒ The first-aid boxes are available in each departments; viz Main store, Crusher site office, Main control room, RLS control room, Silo control room, Vehicle Workshop & Admn. Building.
- ⇒ First-aid boxes are maintained in each department.
- ⇒ Adequate stock of essential medicines, bandages and other appliances are being maintained.

❖ **Fire Hydrant system**

Fire Hydrant points are provided inside the plant as shown in plot plan. Fire hydrant hoses are 63 mm dia in size. Two motors along with two suitable pumps which can discharge 273 m^3 of water per hour & one jockey pump of capacity 80 m^3 are provided to main header to maintain a pressure of 7Kg/cm2. In case of temporary power failure, the fire pumps are run through DG. One water reservoir of 540 KL capacity is supplying water to the fire main line. There are 64 Fire hydrant points & 2 fire monitors are installed at different locations.

Ambulances Room

An ambulance room has been provided near the main gate. One Ambulance with 3 drivers is reserved round the clock for 3 shifts.

❖ **First Aid Centre**

One First Aid Room with facilities of Oxygen fittings, Stretchers, Thermometer, First Aid Kits, Blankets, Kidney Tray, emergency medicines and a company doctor with a lady attendant has been appointed in fulltime basis.

❖ **Fire Extinguishers**

Required type of fire extinguishers have been provided at different locations of the plant as given below

Location	Type of Extinguishers			
	CO_2 Gas type 5 kg each	ABC type Dry powder 5kg-14,10 kg-2	Foam type 5 kg each	Hydrant water jet
Below the raw coal hoppers & drive end of raw coal elevating conveyors		1		Available
At the crusher house drive in 2nd floor		1		Available
Stacking tubes for crushed raw coal		1		Available
Crushed raw coal reclamation conveyor tunnel entrance	1	1		Available
Main beneficiation process plant	1	2		Available
Clean coal conveyor drives		1		Available
Clean Coal reclamation tunnel entrances		1		Available
Sub Station MCC Panel	1	2	1	-
Control Room	1	2	1	-
Switchyard		2	1	Available
Store Building and its open shed	1	1		-
Administrative building		1	2	-

Facilities for Emergency Combat & Rescue

SI.NO	Equipment	Quantity	Location
1	Portable Hydrant Pump with all accessories	1 set	Security room
2	Breathing apparatus	1 set	First Aid room
3	Manila Rope	50 mtrs.	Security room
4	Emergency light	4 set	Admn. Office, Time office, Control room, store
5	Portable P.A.System-Battery operated	1 set	Control room
6	AC/Generator operated siren	1 set	Security room
7	Rescue ladder	1set	Security room
8	Fire beaters	10 Nos.	Store
9	Fire Hooks	10 Nos.	Store
10	Safety gloves	5 Nos.	Store
11	Safety Belts	5 Nos.	Store
12	Siren	1	Control room
13	First aid box	7	Main store, Crusher site office, Main control room, RLS control room, Silo control room, Vehicle Workshop & Admn. Building
14	Ambulance van	1	Main gate
15	First aid room	1	Main gate/Security

(i) DENSITY GAUGE:-

We have already installed total 4 (four) no. of Nucleonic Density Gauges, two nos. each in module for heavy media circuit for measurement the density of heavy media. These Nucleonic Density Gauges were supplied by its manufacturer M/s. Berthold Technologies, Germany and the same has been approved by Bhava Atomic Research Center (BARC), Mumbai. These gauges are sealed by the manufacturer and it is handled by RSO, who has been trained and certified by AFRB, Mumbai.

(ii) ON LINE ASH ANALYSERS:-

Total 4 (Four) no. of On Line Ash Analyses were also installed, two nos. in each modules for monitoring of ash content in raw and Clean coal. The Ash Analysers were Supplied by M/s. ARDEE HI-TECH PVT. LTD. These Ash Analysers were used only after obtained approval of AERB.

So, there is no such hazard for operation of such gauge in our washery. The manufacturer has stipulated that no one should open the seals at both ends. All radio-active sources in industrial applications are encapsulated in stainless steel, keeping radio-active substance separate and isolated from the material being measured. The shielding container consists of a stainless stell causing filled with lead and has a lockable shutter for the exits channel of the useful beam. There are no other hazardous substances to be used in the entire process of coal washing in this plant.

- **Siren**

  Company has siren/hotter arrangement, which can be activated manually during fire related emergency.

- **Communication**

  Public address system and EPABX telephone is available for effective communication inside the plant. Telephone directory is available in the entire department.

⇒ General Safety Precaution to Hazards.

1. Wear only cotton/approved work clothes while on duty in the plant.
2. Don't resort to short cuts.
3. Don't attempt to operate any equipment to which you are not specifically assigned.
4. Don't use the defective equipments of any kind.
5. Use the PPE to work safely.
6. Insist your fellow workers to observe the safety rules.
7. Take instruction from your superior before starting any new works.
8. Report all injuries/dangerous occurrence to your superior.
9. Curing emergency be strictly guided by the emergency action plan.

Annexure-II

DITAILS OF MUTUAL AID				
Sl.No	Name & Address of the mutual address	Distance from the factory	Contact Person with Tel. No.	Facilities Provided
1	Aryan Energy (P) Ltd. 25-Industrial Estate South Balanda, Talcher, Dist:- Angul, Odisha	3-4 KM	Mr. A.Mitra 06760-268822 06760-268833	Fire Extinguishers, Vehicle Manpower, First Aid medicines
2	Global Coal & Mining (P) Ltd. 23-14 Industrial Estate South Balanda, Talcher Dist: Angul, Odisha	2-3 KM.	Mr. J.D. Upadhyaya 06760-269453 06760-268901	Fire Extinguishers, Vehicle Manpower, First Aid medicines

Annexure -III

(A) DETAILS OF TELEPHONE NUMBERS OF KEY PERSONNEL

TELEPHONE NUMBERS OF KEY PERSONS TO DEAL WITH EMERGENCY /DANGEROUS OCCURRENCE			
Sl.No	Name & Designation	Designation as per emergency command structure	Telephone Numbers
1	Sri Om Prakash Katare Sr. General Manager	Works Main Controller	6268554685
2.	Sri Manjit Singh Asst. General Manager (O & M)	Alternate Works Main Controller	7077736702
3.	Sri Sujit Datta Sr. Manager (Mechanical)	Site Incident Controller	7077736709
4.	Sri Sanjaya Kumar Sahoo Manager (MechanicalI)	Alternate Site Incident Controller	7077736707
5.	Sri Sumit Dubey Dy. Manager (Mechanical)	Combat Team Leader	7077736712
6.	Sri Priyadarsi Sahoo Asst. Manager (O&M)	Alternate Combat Team leader	7077736712
7.	Sri Siba Sankar Mohanty Asst. Manager (Electrical)	Rescue Team Leader	7077736736
8.	Sri Krushna Chandra Sahoo Asst. Manager (Mechanical)	Alternate Rescue Team Leader	7077736732
9.	Sri Aashish Sharma Sr. Officer, HR/IR	Auxiliary Team Leader	7077736721
10.	Sri P.K. Lenka Asst. Officer ,HR/IR	Alternate Auxiliary Team Leader	7077736735

DETAILS OF TELEPHONE NUMBERS OF STATUTORY AUTHORITY

SL.NO	AUTHORITY	TELEPHONE NUMBER (OFFICE)	TELEPHONE NUMBER (RESIDENCE)
1.	Collector / District Magistrate, Angul	06764 - 230567	06764-230234
1.	Addl. District Magistrate, Angul	06764 - 230491, 233609	06764-231252
2.	Sub-Collector, Talcher	06760 - 240720	06760-240444
3.	Fire Brigade, Talcher	06760 - 240222	
4.	Deputy Superintendent of Police, Talcher	06760 - 240657	06760-240337
5.	Inspector In Charge, Colliery Police Station, Talcher	06760 - 240364	06764-236094
6.	Officer In Charge ,Gopal Prasad P.S	06760 - 240278	9437090019
7.	Asst. Director of Factories and Boilers, Angul	06764 - 220164	
8.	Director of Factories & Boilers, Odisha, Bhubaneswar	0674 - 2396070	

MEDICAL

Sl.No	Name & Address	Distance from the plant	Contact telephone number
1	District Hospital, Angul	15 KM	06764-230333
2	N.S. Central Hospital, MCL, Talcher	08 KM	06760-269183
3	Govt. Hospital, Talcher	19 KM	06760-240440

ANNEXURE-4

MATERIAL SAFETY DATA SHEET FOR HIGH SPEED DIESEL

1.	Physical State	Liquid
2.	Colour	Straw red
3.	Specific Gravity	0.86
4.	Flash Point °C	66
5.	Boiling Point °C	149
6.	Auto ignition Temperature °C	256
7.	Vapor Pressure	< 1 mm
8.	Solubility	NO
9.	Explosive Limit (% Volume in air)	5 - 7

A. POTENTIAL HEATH EFFECTS

- **Inhalation:** - Irritation of the upper respiratory tract and eyes, with possible euphoria, dizziness, headache, disco ordination, ringing in the ears, convulsions, coma, and respiratory arrest.

- **Ingestion: -** Irritation of the mucous membranes of throat, esophagus and stomach which may result in nausea and vomiting; central nervous system depression may occur, if absorbed (see inhalation symptoms above). If aspirated, chemical pneumonitis may occur with potentially fatal results. Possible kidney and liver damage may be delayed.

- **Skin Contact:** - Defeating of the skin may occur with continued and prolonged contact. Irritation and burning sensation may occur on exposure to the liquid or mists.

- **Eye Contact:** - Severe burning sensation with temporary irritation and swelling of lids.

B. FIRSTAID MEASURES

- **Inhalation:** Get person out of contaminated area to fresh air. !f breathing has stopped resuscitate and administer oxygen if readily available. **SEEK MEDICAL ATTENTION IMMEDIATELY.**
- **Ingestion:** Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. If vomiting occurs spontaneously, keep airway clear. SEEK MEDICAL ATTENTION IMMEDIATELY.
- **Skin Contact:** - Wash contaminated areas with plenty of soap and water. A soothing ointment may be applied to irritated skin after thoroughly cleansing. Remove contaminated clothing and footwear.
- **Eye Contact:** - Immediately flush eyes with large amount of water for at least 15 minutes holding lids apart to ensure flushing of the entire eye surface. **SEEK IMMEDIATE MEDICAL ATTENTION.**
- **Note to Physician:** Do not induce vomiting, use gastric lavage only. Aspiration of liquid into the lungs could result in Chemical pneumonitis. Use of adrenaline is not advised. Treat symptomatically.

C. FIRE FIGHTING MEASURES

- Fire Fighting Instructions:- Use water fog, C02, foam, dry chemical or Halon to extinguish. Keep personnel removed from and up-wind of fire. Cool adjacent structures and storage drums with water spray. Evacuate area. Prevent runoff from fire control dilution from entering streams or drinking supply.

D. HANDLING AND STORAGE

- Store only in approved containers. Protect containers against physical damage. Outside or detached storage is preferred. Separate from oxidizing materials. Store in cool, well ventilated area of non-combustible construction away from possible sources of ignition. Keep away, from incompatible materials.
- **Product Use:** This product is intended for use as a fuel in engines and heaters designed for kerosene or diesel fuels, and for use in engineered processes. Use in other applications may result in higher exposure; and require additional controls, such as local exhaust ventilation and personal protective equipment.

E. PERSONAL PROTECTION

- **Airborne Exposure Limits:** None established.
- **Ventilation System:** Not expected to require any special ventilation.

- **Personal Respirators:** Respiratory protection is not required unless product is sprayed or heated. Use approved respiratory protection following manufacture's recommendations where spray, mists, or vapors may be generated. Supplied air respiratory protection is required for IDLH areas.
- **Skin protection:** Wear protective glove and clean body-covering clothing.
- **Eye protection:** Face shield and goggles or chemical goggles should be worn where mist or spray may be generated, and where splashing occurs. Shower and eyewash facilities should be accessible.

ACCIDENTAL RELEASE MEASURES

- If material is spilled, steps should be taken to contain liquid and prevent discharges to streams or sewer systems and control or stop the loss of volatile materials to the atmosphere. Spills or releases should be reported, if required to the appropriate local, state and federal regulatory agencies.
- **Small Spills:** Remove ignition sources. Absorb spilled material with non-combustible materials such as cat litter, dirt, sand, or petroleum as sorbent pads/pillows. Do not use combustible materials like rags, wood chips, or saw dust. Remove contaminated materials to an appropriate disposal container.
- **Large Spills:** Remove ignition sources. Dike spill area with sand or dirt to contain material and cover sewers/drains. Remain upwind and keep unnecessary people away. Contact trained emergency response team for cleanup. Remove liquid using grounded suction pumps, isolate hazard area and deny entry.

G. TRANSPORTATION

- It is transported as combustible liquid following the transport rules of hazardous chemicals.

MATERIAL SAFETY DATA SHEET

DURALIFE® TRANSFORMER OIL- ALL GRADES

MSDS Number : 12038

1. PRODUCT AND COMPANY IDENTIFICATION Revision Date : 8/09/2010

Product Name : DURALIFE® TRANSFORMER OIL- ALL GRADES

2. HAZARDS IDENTIFICATION :

IMMEDIATE HEALTH EFFECTS :

EYE : Not expected to cause prolonged or significant eye irritation .

SKIN: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin .

INGESTION : Not expected to be harmful if swallowed .

INHALATION : This product is not expected to pose an inhalation hazard under conditions of normal use . This product has a low vapor pressure and is not expected to present an inhalation hazard at ambient conditions. Caution should be taken to prevent aerosolization or misting of this product. Acute and chronic overexposures generated under unusual conditions may be irritating to the respiratory tract .

3. FIRST AID INFORMATION:

EYE CONTACT : Immediately flush eyes with large amounts of water and continue flushing until irritation subsides. If material is hot, treat for thermal burns and seek immediate medical attention.

SKIN CONTACT : No treatment is necessary under ordinary circumstances. Remove contaminated clothing. Wash contaminated area thoroughly with soap and water. If material is hot, submerge injured area in cold water. If victim is severely burned, remove to a hospital immediately .

INHALATION: This material has a low vapor pressure and is not expected to present an inhalation exposure at ambient conditions. If vapor or mist is generated when the material is heated, and the victim experiences signs of respiratory tract irritation, remove to fresh air .

INGESTION : No treatment is necessary under ordinary circumstances. Do not induce vomiting. This material does not present any known ingestion hazard .

4. FIRE AND EXPLOSION INFORMATION :

Flammable Properties :

Flash Point : > 293 ºF (145 ºC) Test Method : ASTM D 92 (C.O.C.)

Flammable Limits in Air

Upper Percent : NA

Lower Percent : NA

Auto-ignition Temperature : > 270 ºC

Test Method : NA

NFPA Classification : Health: 0 Flammability: 1 Reactivity: 0

Extinguishing Media : Use dry chemical, foam, or carbon dioxide .

Fire Fighting Measures

Special Fire Fighting Procedures and Equipment : Water may be ineffective but can be used to cool containers exposed to heat or flame to prevent vapor pressure buildup and possible container rupture. Caution should be exercised when using water or foam as frothing may occur, especially if sprayed into containers of hot, burning liquid .

Unusual Fire and Explosion Conditions : Dense smoke may be generated while burning. Carbon monoxide, carbon dioxide, and other oxides may be generated as products of combustion .

Hazardous Combustion By-Products : None

5. ACCIDENTAL RELEASE MESURES :

Protective Measures: Eliminate all sources of ignition in vicinity of spilled material.

Accidental Release Measures : Stop the source of the leak or release. Clean up releases as soon as possible, observing precautions in Exposure Controls/Personal Protection. Contain liquid to prevent further contamination of soil, surface water or ground-water. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate , remove contaminated soil.

6. HANDLING AND STORAGE INFORMATION :

Handling : Fire extinguishers should be kept readily available.

STORAGE: Do not transfer to unmarked containers. Store in closed containers away from heat, sparks, open flame, or oxidizing materials. See also additional information section below .

Empty Container Warnings

DRUMS: Empty drums should be completely drained, properly bunged and promptly returned to a reconditioned drum, or properly disposed. Empty containers retain product residue and can be dangerous .

PLASTIC: Do not reuse this container. Empty container may retain product residues .

7. EXPOSURE CONTROLS/PERSONAL PROTECTION :

Exposure Limits and Guidelines : This product does not contain any components with OSHA or ACGIH exposure limits .

Personal Protective Equipment

EYE/FACE PROTECTION : No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as good safety practice .

SKIN PROTECTION : No skin protection is required for single, short duration exposures. For prolonged or repeated exposures, use impervious clothing (boots, gloves, aprons, etc..) over parts of the body subject to exposure. If handling hot material, use insulated protective clothing (boots, gloves, aprons, etc..). Launder soiled clothes. Properly dispose of contaminated leather articles including shoes, which cannot be decontaminated .

RESPIRATORY PROTECTION : Respiratory protection is not required under conditions of normal use. If vapor or mist is generated when the material is heated or handle, use an organic vapor respirator with a dust and mist filter. All respirators must be NIOSH certified. Do not use compressed oxygen in hydrocarbon atmospheres .

PERSONAL HYGIENE : Always wash hands and face with soap and water before eating, drinking, or smoking. Consumption of food and beverage should be avoided in work areas where this product is present .

ENGINEERING CONTROL/WORK PRACTICES : Use in a well-ventilated area. If user operations generate an oil mist, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended mineral oil mist exposure limits .

8. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance : Bright Yellow Pour Point : < -40 oF (- 40 oC)

Odor : Petroleum – mild Solubility in Water : Negligible in water

Physical State : Liquid Vapor Pressure : < 0.1 mm Hg

Boiling Point : > 482 oF (250 oC) Vapor Density (air=1) : NA

Melting Point : -59.8 oF(-51 oC) pH : NA

Specific Gravity : < 1 Viscosity @ 40 oC : 12 c St m

9. STABILITY AND REACTIVITY INFORMATION:

Chemical Stability : Stable

Condition to Avoid : High heat and open flames

Incompatible Materials to Avoid : May react with strong oxidizing agents

10. TOXICOLOGICAL INFORMATION:

Primary Eye Irritation : NA

Primary Skin Irritation : NA

Acute Dermal Toxicity : NA

Subacute Dermal Toxicity : NA

Dermal Sensitization : NA

Inhalation Toxicity : NA

Oral Toxicity : NA

Mulagenicity : NA

11. DISPOSAL INFORMATION:

Regulatory Information : All disposals must comply with federal, state, and local regulations. The material, if spilled or discarded, may be a regulated waste. Refer to state and local regulations. Department of Transportation (DOT) regulations may apply for transporting this material when spilled

Waste Disposal Methods : Waste material may be landfilled or incinerated at an approved facility. Materials should be recycled if possible .

12. TRANSPORTATION INFORMATION :

Highway / Rail (Bulk) : Not Regulated

Highway / Rail (Non-Bulk) : Not Regulated

The DOT description is provided to assist in the proper shipping classification of this product and may not be suitable for all shipping descriptions .Health and Environmental Label Language

CAUTION : Contains Petroleum Lubricant. Repeated skin contact can cause skin disorders .

ATTENTION : Used motor oil is a possible skin cancer hazard based on animal data. Repeated exposure to oil mist in excess of the OSHA limit (5mg/m3) can result in accumulation of oil droplets in pulmonary tissue .

PRECAUTIONARY MEASURES : Avoid excessive & prolonged skin contact. Wash thoroughly after handling. Avoid generation and inhalation of oil mists .

INSTRUCTIONS IN CASE OF FIRE OR SPILL : In case of fire, use water spray, foam, dry chemical or carbon dioxide. Water spray may be ineffective, but can be used to cool containers. In case of spill, do not use water, soak up with absorbent material .

MODELLING

10.0 IDENTIFICATION OF MOST CREDIBLE HAZARD SCENARIO:

9.1 FIRE IN CLEAN COAL/ RAW COAL/ REJECT COAL

Significant heat flux experienced at distance due fire on Clean coal area in different season.

Storage details	Significant heat level Kw/m^2	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Clean coal 20,000 MT	4.5	6.2	5.3	7.4	*Causes pain if unable cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.*
	12.5	4.5	3.5	5	*Minimum energy required for melting of plastic*
	37.5	2.3	2.2	3.4	*Sufficient to cause damage to the equipment.*

Significant heat flux experienced at distance due fire on Raw coal area in different season.

Storage details	Significant heat level Kw/m^2	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Raw coal 60,000 MT	4.5	7.1	6.4	8.4	*Causes pain if unable cove rthe body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.*
	12.5	4.1	5.6	5	*Minimum energy required for melting of plastic*
	37.5	3.5	3.2	3.8	*Sufficient to cause damage to the equipment.*

Significant heat flux experienced at distance due fire on Reject coal area in different season.

Storage details	Significant heat level Kw/m²	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
Reject coal 50,000 MT	4.5	5.8	5.2	7.1	*Causes pain if unable cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.*
	12.5	4.3	3.4	4.8	*Minimum energy required for melting of plastic*
	37.5	2.1	2.0	3.3	*Sufficient to cause damage to the equipment.*

9.1 FIRE MODELLING FOR CLEAN COAL

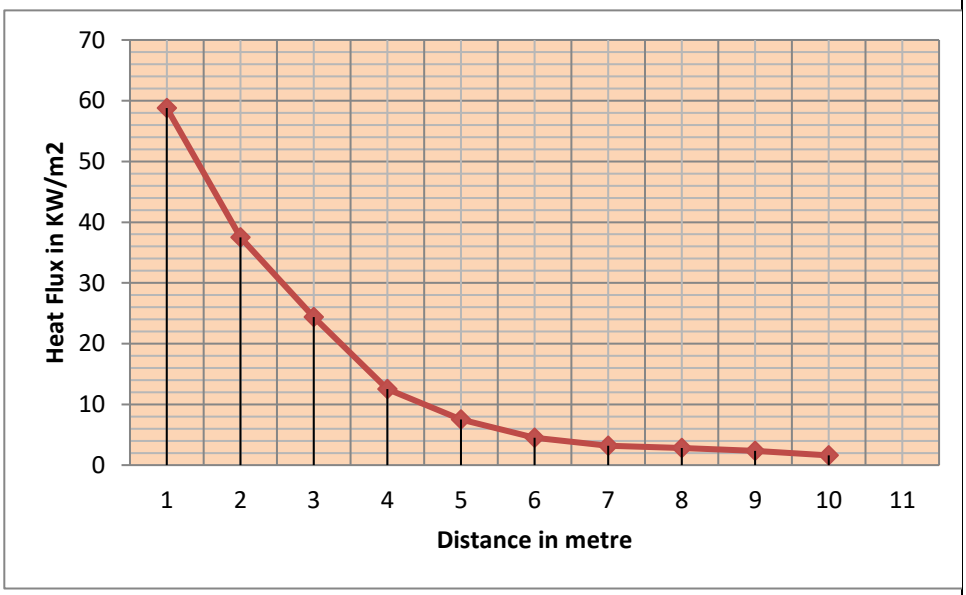
Storage detail			Input data for Summer Season
Storage type	Open Ground		
Capacity	20,000 MT		
Size	Stack tube Dia-44 m,H-21.5 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

HEAT FLUX DATA FOR SUMMER SEASON:

Distance (M)	Heat Flux (KW/m^2)
1	58.8
2	37.5
3	24.4
4	12.5
5	7.5
6	4.5
7	3.2
8	2.8
9	2.36
10	1.6

Heat propagation Curve SOFTWARE-ALOHA

Clean Coal- Summer season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

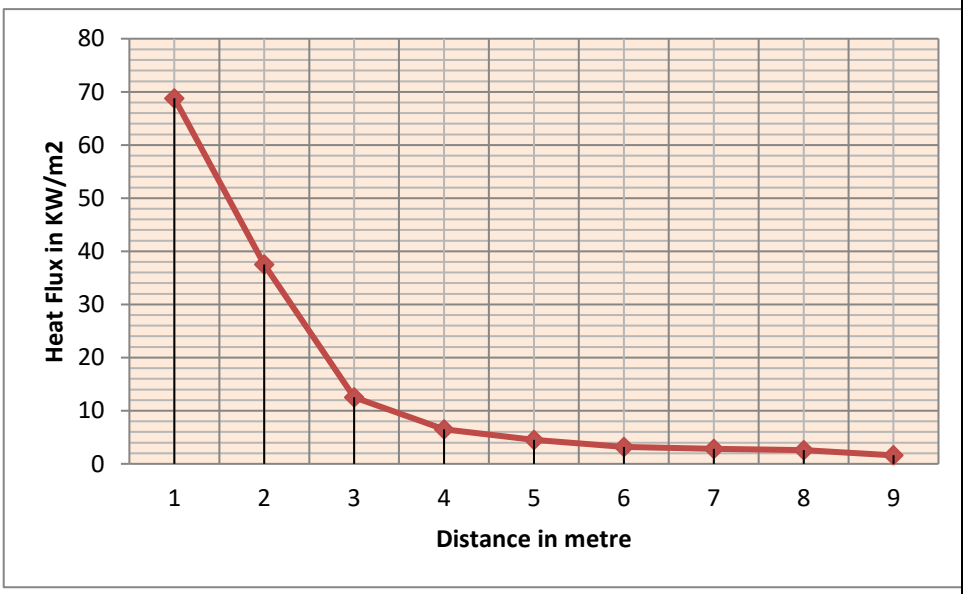
Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	6.2	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	4.5	Minimum energy required for melting of plastic
37.5	2.3	Sufficient to cause damage to the equipment.

9.2 FIRE MODELLING FOR CLEAN COAL

Storage detail			Input data for Rainy
Storage type	Open Ground		
Capacity	20,000 MT		
Size	Stack tube Dia-44 m,H-21.5 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

HEAT FLUX DATA FOR RAINY SEASON:

Distance (M)	Heat Flux (KW/m^2)	Heat propagation Curve SOFTWARE-ALOHA
1	68.8	Clean coal- Rainy season:
2	37.5	
3	12.5	
4	6.5	
5	4.5	
6	3.2	
7	2.8	
8	2.6	
9	1.6	



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	5.3	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	3.5	Minimum energy required for melting of plastic
37.5	2.2	Sufficient to cause damage to the equipment.

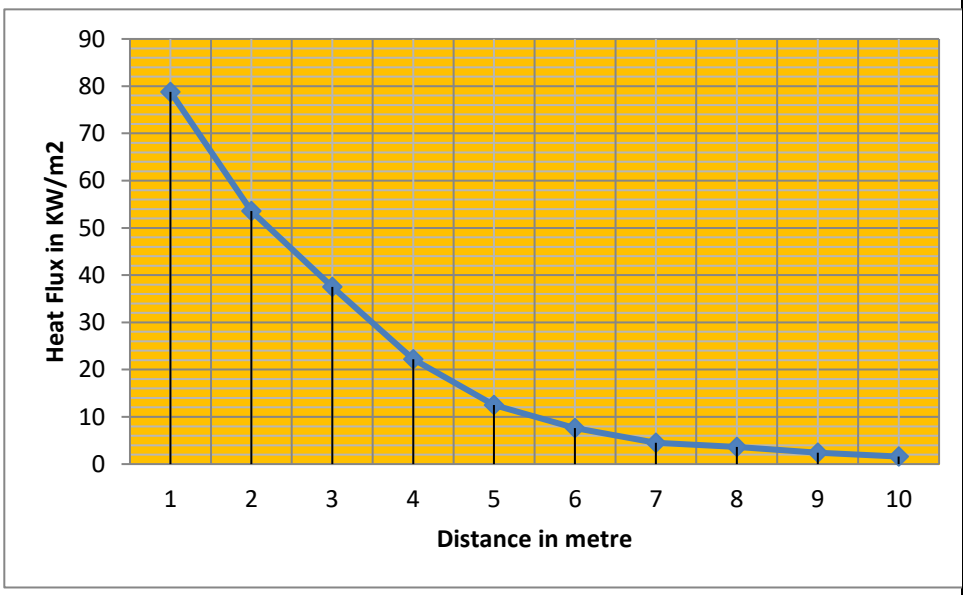
9.3 FIRE MODELLING FOR CLEAN COAL

Storage detail			Input data for Winter
Storage type	Open Ground		
Capacity	20,000 MT		
Size	Stack tube Dia-44 m,H-21.5 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

Distance (M)	Heat Flux (KW/m^2)
1	78.8
2	53.6
3	37.5
4	22.2
5	12.5
6	7.6
7	4.5
8	3.6
9	2.4
10	1.6

Heat propagation Curve
SOFTWARE-ALOHA

Clean coal- Winter season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	7.4	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	5	Minimum energy required for melting of plastic
37.5	3.4	Sufficient to cause damage to the equipment.

9.4 FIRE MODELLING FOR RAW COAL

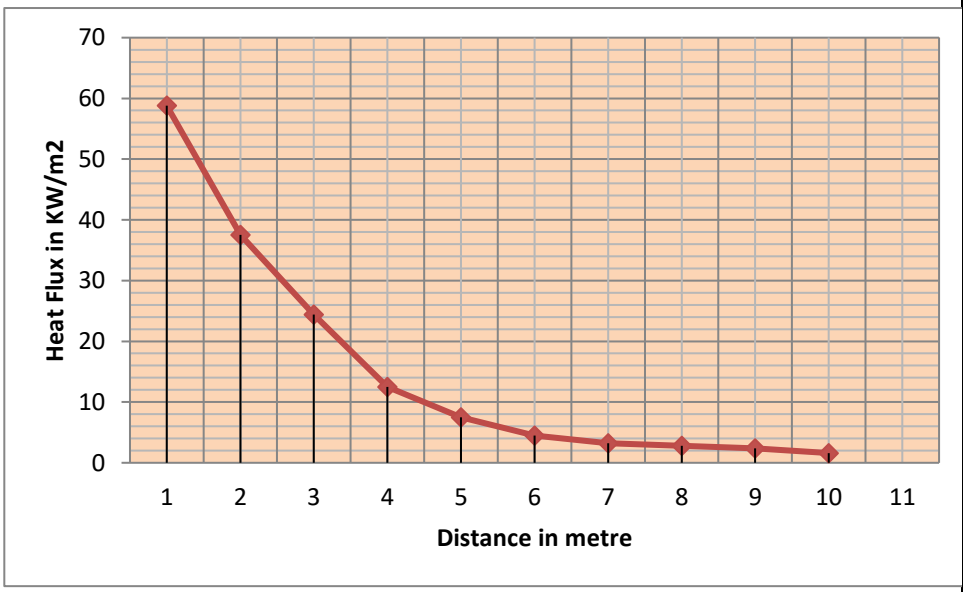
Storage detail			Input data for Summer Season
Storage type	Open Ground		
Capacity	60,000 MT		
Size	Stack tube Dia-46 m,H-23.5 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

HEAT FLUX DATA FOR SUMMER SEASON:

Distance (M)	Heat Flux (KW/m^2)
1	58.8
2	37.5
3	24.4
4	12.5
5	7.5
6	4.5
7	3.2
8	2.8
9	2.36
10	1.6

Heat propagation Curve SOFTWARE-ALOHA

Raw Coal- Summer season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	7.1	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	5.2	Minimum energy required for melting of plastic
37.5	305	Sufficient to cause damage to the equipment.

9.5 FIRE MODELLING FOR RAW COAL

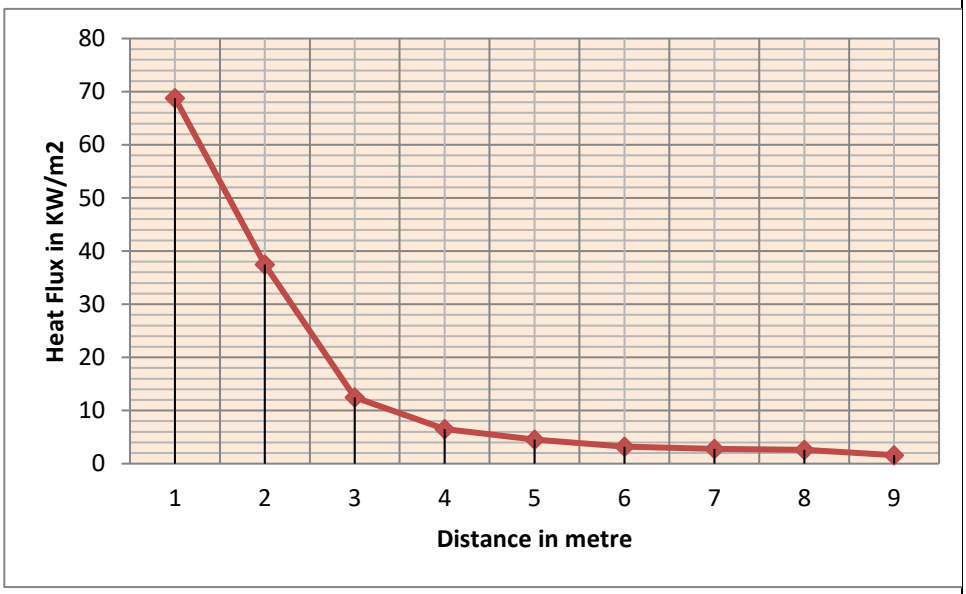
Storage detail			Input data for Rainy
Storage type	Open Ground		
Capacity	60,000 MT		
Size	Stack tube Dia-46 m,H-23.5 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

HEAT FLUX DATA FOR RAINY SEASON:

Distance (M)	Heat Flux (KW/m^2)
1	68.8
2	37.5
3	12.5
4	6.5
5	4.5
6	3.2
7	2.8
8	2.6
9	1.6

Heat propagation Curve
SOFTWARE-ALOHA

Raw coal- Rainy season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

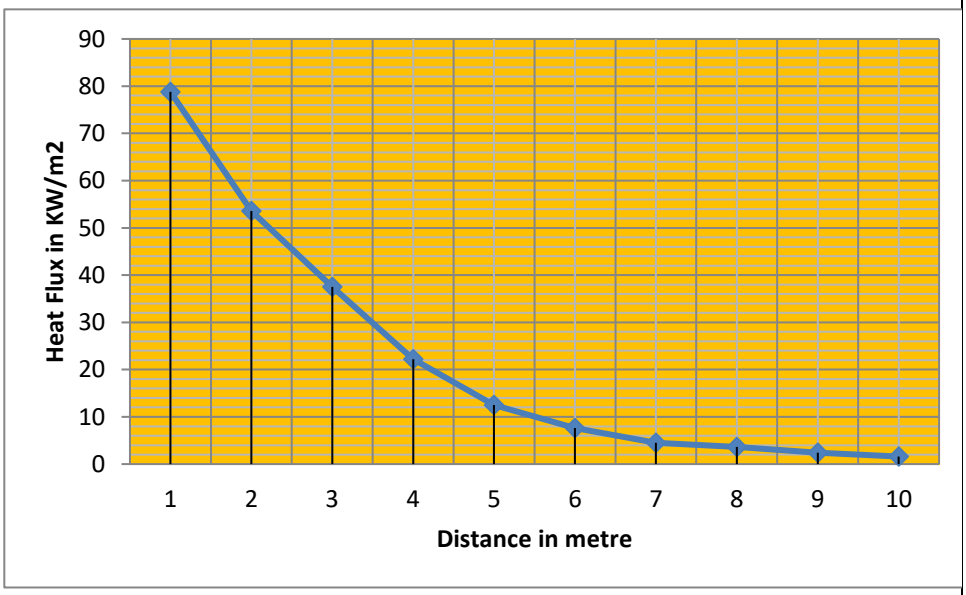
Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	6.4	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	4.1	Minimum energy required for melting of plastic
37.5	3.2	Sufficient to cause damage to the equipment.

9.6 FIRE MODELLING FOR RAW COAL

Storage detail			Input data for Winter
Storage type	Open Ground		
Capacity	60,000 MT		
Size	Stack tube Dia-46 m,H-23.5 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

Distance (M)	Heat Flux (KW/m^2)
1	78.8
2	53.6
3	37.5
4	22.2
5	12.5
6	7.6
7	4.5
8	3.6
9	2.4
10	1.6

Heat propagation Curve
SOFTWARE-ALOHA
Raw coal- Winter season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	8.4	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	5.6	Minimum energy required for melting of plastic
37.5	3.8	Sufficient to cause damage to the equipment.

9.7 FIRE MODELLING FOR REJECT COAL

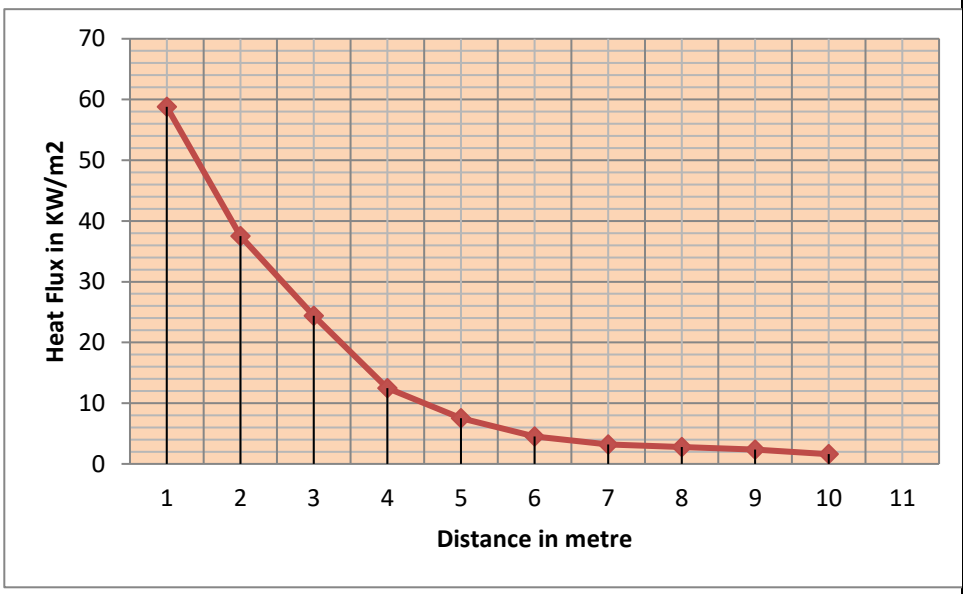
Storage detail			Input data for Summer Season
Storage type	Open Ground		
Capacity	50,000 MT		
Size	L-380 m, B-123 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

HEAT FLUX DATA FOR SUMMER SEASON:

Distance (M)	Heat Flux (KW/m^2)
1	58.8
2	37.5
3	24.4
4	12.5
5	7.5
6	4.5
7	3.2
8	2.8
9	2.36
10	1.6

Heat propagation Curve
SOFTWARE-ALOHA

Reject Coal- Summer season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	5.8	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	4.3	Minimum energy required for melting of plastic
37.5	2.1	Sufficient to cause damage to the equipment.

9.8 FIRE MODELLING FOR REJECT COAL

Storage detail			Input data for Rainy
Storage type	Open Ground		
Capacity	50,000 MT		
Size	L-380 m,B—123 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

HEAT FLUX DATA FOR RAINY SEASON:

Distance (M)	Heat Flux (KW/m^2)
1	68.8
2	37.5
3	12.5
4	6.5
5	4.5
6	3.2
7	2.8
8	2.6
9	1.6

Heat propagation Curve
SOFTWARE-ALOHA

Reject coal- Rainy season:

SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

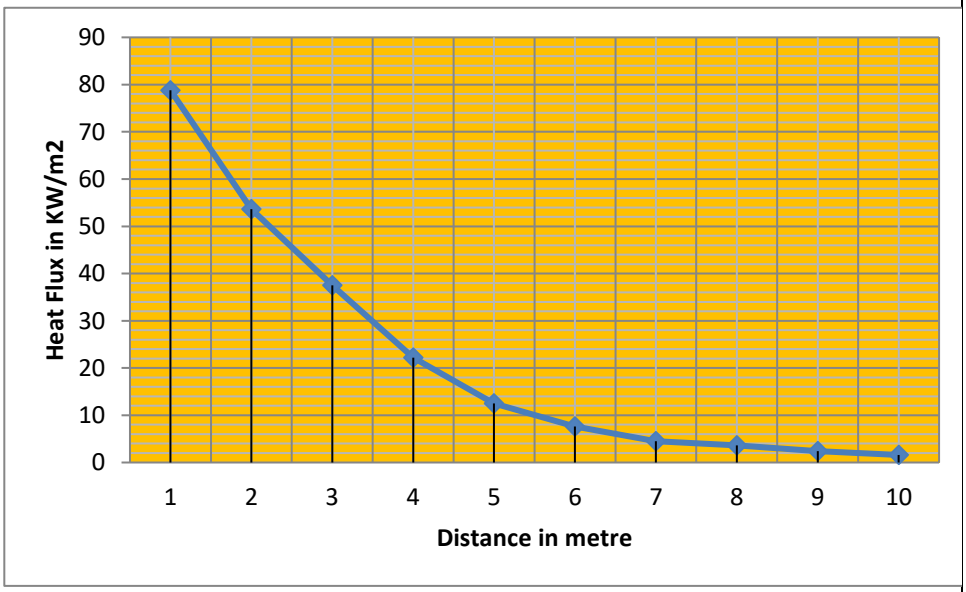
Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	5.3	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	3.5	Minimum energy required for melting of plastic
37.5	2.2	Sufficient to cause damage to the equipment.

9.9 FIRE MODELLING FOR REJECT COAL

Storage detail			Input data for Winter
Storage type	Open Ground		
Capacity	50,000 MT		
Size	L-380 m, B-123 m		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

Distance (M)	Heat Flux (KW/m^2)
1	78.8
2	53.6
3	37.5
4	22.2
5	12.5
6	7.6
7	4.5
8	3.6
9	2.4
10	1.6

Heat propagation Curve
SOFTWARE-ALOHA
Reject coal- Winter season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	7.1	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	4.8	Minimum energy required for melting of plastic
37.5	3.3	Sufficient to cause damage to the equipment.

9.10 FIRE HAZARD IN TRANSFORMER OIL IN TRANSFORMER

Transformer oil is a flammable liquid as per schedule-1, Part-II (b) (v) having flash point of 144^{0}C, auto ignition temperature of >270^{0}C and explosive limit of 0.7% volume in air. So, it is susceptible to fire hazard. Whenever Transformer oil catches fire it shall manifest in the form of pool fire. The significant heat flux that spread from the source in case of pool fire in transformer is mentioned below.

Significant heat flux experienced at distance due to fire on transformer containing transformer oil in different season.

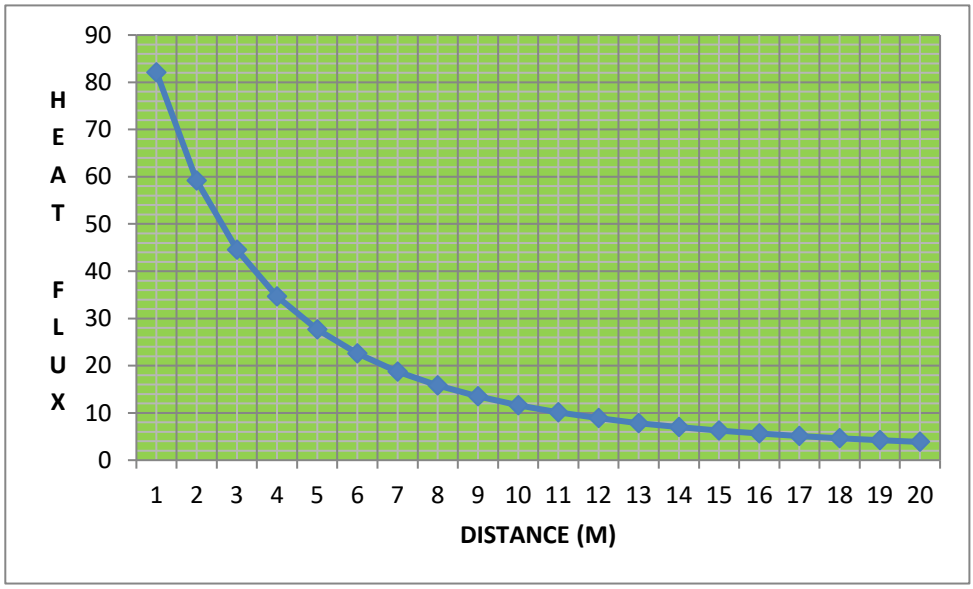
Storage details	Significant heat level Kw/m^2	Experience at distance in Mtrs.			Indication
		Summer	Rainy	Winter	
TRANSFORMER OIL 3435 L	4.5	17.9	17.2	15.5	Causes pain if unable cove the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
	12.5	9.8	9.5	8.3	Minimum energy required for melting of plastic
	37.5	3.0	3.8	2.9	Sufficient to cause damage to the equipment.

9.11 FIRE MODELING FOR TRANSFORMER OIL

Storage detail			Input data for Summer Season
Storage type	4000 KVATransformer		
Capacity	3435 L		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

Distance (M)	Heat Flux (KW/m^2)
1	82.11
2	59.2
3	44.57
4	34.68
5	27.7
6	22.6
7	18.76
8	15.81
9	13.48
10	11.63
11	10.12
12	8.88
13	7.85
14	6.99
15	6.26
16	5.63
17	5.09
18	4.62
19	4.22
20	3.86

Heat propagation Curve
SOFTWARE-ALOHA
4000 KVA Transformer: Summer Season:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

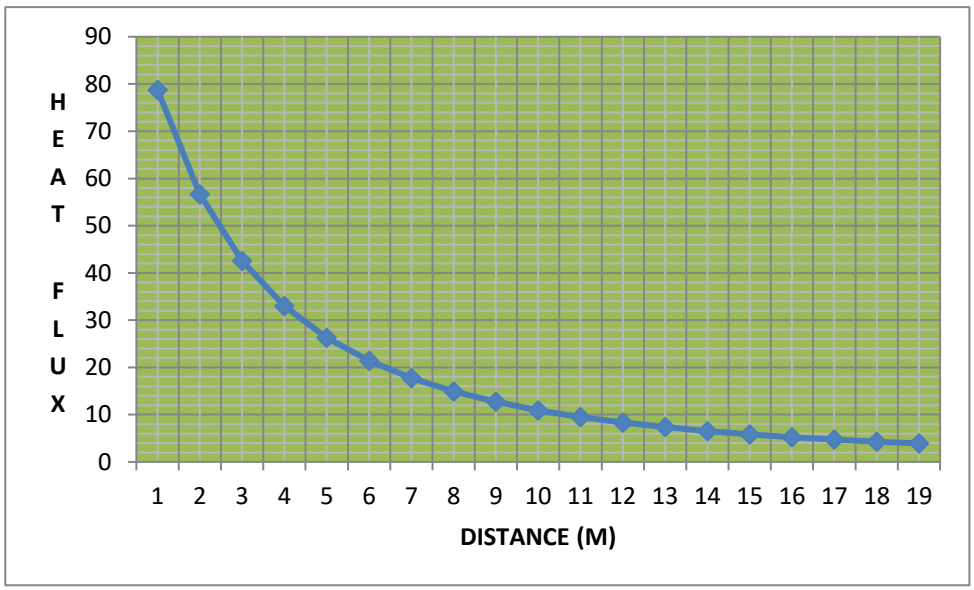
Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	17.9	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	9.8	Minimum energy required for melting of plastic
37.5	3	Sufficient to cause damage to the equipment.

9.12 FIRE MODELING FOR TRANSFORMER OIL

Storage detail			Input data for Rainy Season
Storage type	4000 KVATransformer		
Capacity	3435L		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	11.4km/h	8.4km/h	5.4 km/h
Average wind direction	WN	NE & NW	W
Humidity (%)	57	81	63
Average ambient air temperature (^{0}C)	46	31	28

Distance (M)	Heat Flux (KW/m^2)
1	78.76
2	56.63
3	42.53
4	33.01
5	26.31
6	21.42
7	17.75
8	14.93
9	12.71
10	10.94
11	9.51
12	8.33
13	7.36
14	6.54
15	5.84
16	5.25
17	4.74
18	4.3
19	3.92

Heat propagation Curve for Rainy Season:
SOFTWARE-ALOHA
4000 KVA Transformer:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

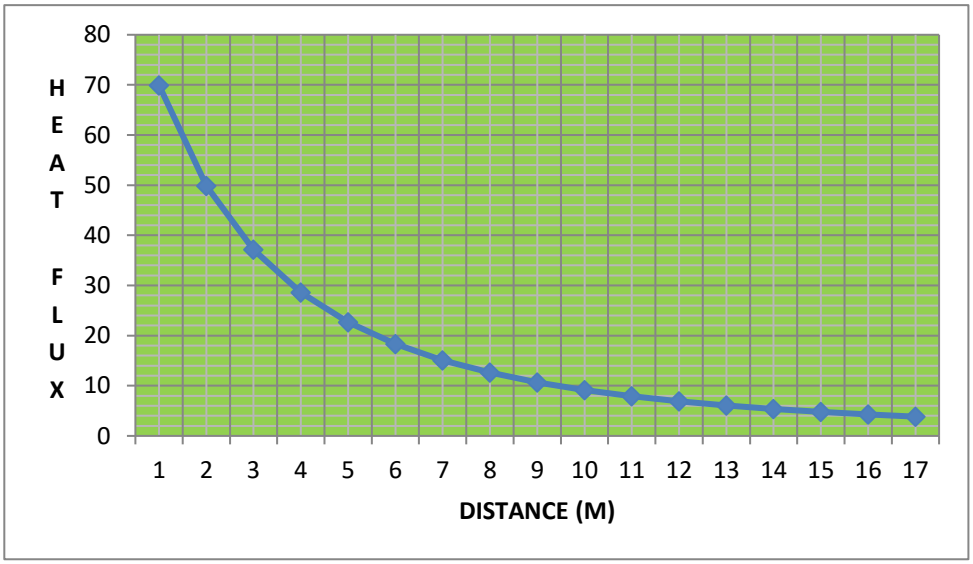
Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	17.2	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	9.5	Minimum energy required for melting of plastic
37.5	3.8	Sufficient to cause damage to the equipment.

9.13 FIRE MODELING FOR TRANSFORMER OIL

Storage detail			Input data for Winter Season
Storage type	4000 KVATransformer		
Capacity	3435L		
Meteorological data	Google net Season		
Parameter	Summer	Rainy	Winter
Average wind speed m/sec	Summer	Rainy	Winter
Average wind direction	11.4km/h	8.4km/h	5.4 km/h
Humidity (%)	WN	NE & NW	W
Average ambient air temperature (^{0}C)	57	81	63

Distance (M)	Heat Flux (KW/m^2)
1	69.93
2	49.85
3	37.15
4	28.63
5	22.66
6	18.33
7	15.1
8	12.62
9	10.69
10	9.15
11	7.91
12	6.9
13	6.06
14	5.36
15	4.77
16	4.27
17	3.84

Heat propagation Curve for Winter Season:
SOFTWARE-ALOHA
4000KVA Transformer:



SIGNIFICANT "HEAT LEVEL" EXPERIENCED AT DISTANCE

Significant Heat Level Value (KW/M^2)	Distance (M)	Indication
4.5	15.5	Causes pain if unable to cover the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
12.5	8.3	Minimum energy required for melting of plastic
37.5	2.9	Sufficient to cause damage to the equipment.