Annexure-I

SL.NO-215/16

ON SITE EMERGENCY PLAN

FOR

DIRECTORATE OF FACTORIES & BOILERS
ACCEPTED
Date 25.10.16
ORISSA, BHUBANESWAR

25.10.16
Director of Factories & Boilers
Odisha, Bhubaneswar

BHUSHAN

M/s Bhushan Energy Limited

AT: Ganthigadia, PO: Nuahata
VIA:Banarpal,
DIST:Angul, ODISHA

CONTENTS

ANNEXURE

1.0 GENERAL INFRMATION ABOUT THE FACTORY

1.1 INTRODUCTION:

M/s. Bhushan Energy . . . Limited (BEL) is a subsidiary of M/s Bhushan Steel Limited. It has got the Environmrntal clearnce for setting up 465 MW, CFBC based Thermal power plant adjacent to the integrated steel plant of M/s. Bhushan Steel Limited at Meramandali in the district of Dhenkanal, Odisha.

1.2 PLANT LOCATION:

The power plant is located on land measuring about 100 acres at village Ganthigadia, Nuahata, Dist- Angul of Odisha. The existing BEL plant is located about 6 km from Meramandali Railway Stations. (on Angul -Cuttack broad gauge main railway line). The national highway No. 55 passes northern side of site. The plant location is 20 km from Angul and 43 km from Dhenkanal. Nearest Railway Station is Meramandali on eastcost railway and nearest port is Paradeep which is more than 215 km away.

Name & Address of the Factory	BHUSHAN ENERGY LIMITED AT-Ganthigadia, PO.- Nuahata VIA-Banarpal, DIST-Angul PIN CODE– 759128 (ODISHA)
Regd. Office Address	Bhushan Center, Ground Floor, Hyatt Regency Complex, Bhikaji Came Place, New Delhi-110066.India
Name & Designation of Occupier	**Mr. Sanker Batra** DIRECTOR Ph. No.-09811009366
Name & Designation of Manager	**Mr. Subhash Mishra** AVP(Power Plant) Ph. No -07077756925
Products Handled	Generation of Electrical Power

1.3 MAJOR PLANT FACILITIES:

The proposed project is CFBC based Thermal Power Plant having capacity 465 MW (2 x 150 MW + 1x165MW). The major facilities are as mentioned below.

Table1.1
Major plant facilities

SL.No	UNITS	CAPACITY/NOS
1	Turbo generator	2x150MW & 1x165MW
2	Boiler (CFBC-Circulating Fluidized Bed Combustion)	06nos of boiler(4x250 TPH & 2x425TPH)
3	ESP	04 nos of 2x150MW. 02nos of 1x165MW.
4	Stack	02 nos (125 Mtr each) of 2x150MW & 01 no (185Mtr) of 165MW.
5	Cooling Tower	16 cells (4000 M^3/ Hr. Per cell) of 2x150MW 06 cell(4167 M^3/Hr. per cell) of 1x 165MW
6	Ash Handling system Main Silo -Fly Ash & bed ash	Fly ash-04nos (Capacity-1000 MT) Bed ash – 04nos (Capacity-1000 MT)
	Intermediate Silo-Fly Ash & Bed Ash	Fly ash-02nos (Capacity-250 MT) Bed ash – 02nos (Capacity-250 MT)

1.4 PLANT DESCRIPTION:

The CFBC based Thermal Power Plant of M/s Bhushan Energey Limited have 465MW generation capacity. The units will have certain common auxiliary facilities like Raw Water Reservoir, Water Treatment System, DM Water Plant, Cooling Water Pump House, a Coal Handling Plant (comprising stock piles and separate truck hopper), switch yard etc. Plant layout is shown in **Annexure-8.** There is common provision with Bhushan steel for water reservoir which will serve the total water requirement of Bhushan Energy also.

1.4.1 Main Plant Equipment

The Power Plant mainly consists of the following facilities:

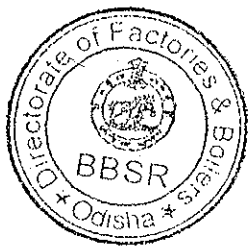
- Circulating Fluidized Bed Combustion (CFBC) Boiler = 4 x 250 TPH & 2 x 425TPH along with auxiliary facilities.
- Turbo Generator = 2 x 150 MW & 1 x 165MW along with auxiliary facilities.
- De-aerator = 2 Nos. (1 for 150MW each) & 01no (1x165MW)

- Boiler Feed Pumps = Total 9 Nos. For the plant.
- ESP = 6 Nos. (attached to each of the boilers)
- In addition to above there will be condensate pumps, chemical dosing system, compressed air system and chimneys attached to each boiler.

CFBC boiler and Accessories: the CFBC boiler is circulation fluidized bed combustion with single drum system suitable for multi solid fuel firing type. Each of the boiler is single drum, balanced draft and dry bottom type, rated to deliver 250 TPH(2x150MW) & 425TPH (1x165MW) of Superheated steam at 105 kg/ cm^2 (a) pressure and 545^0C temperature, when supplied with feed water at 235^0C temoerature. The boiler is complete with radiant pass, evaporator, cyclones, super heater, economizer, air heaters, draft system, fuel firing system and other auxiliary as required.

The furnace is gas tight enclousure fabricated from water cooled memberane construction consisting of welded fin tube panels. The lower combustion chamber is a refractory-lined water cooled enclosure. Circulation system of boiler will be complete with down comers, riser and water header. The openings are provided in the furnace to allow for the following connections:

- Solid return inlets from compact separator
- Ash outlets
- Fuel feed penetrations
- Secondary air inlets
- Temperature and pressure instrument penetrations
- Gas inlet to compact separators
- Access openings
- Opening for start up burners.



The floor of boiler furnace is refractory lined water cooled grid. Pig tail nozzles are welded to the memberane fines between the water cooled tubes. Primary air from the wind box flows through these nozzles to provide combustion air as well as fluidization of the bed material. The design of these nozzles minimizes back shifting of bed material to the wind box when the unit is offline or operating at low loads.

The boiler is equipped with 2 nos. of induced draft fans. Each fan is capable of independently meeting 60% MCR load condition of boiler. The ID fans are arranged for paralled operation

to evacuate/ draw out the flue gases from the boiler through the ESP unit and feed it to the stack. ID fans will maintain required draft at the fluid bed furnace upper section. Fly ash hoppers will be provided for collection of fly ash.

The fluidized bed combustor section is provided with 2 nos. bed ash transfer line. Each transfer line is equipped with bed ash cooler each sized to handle 100% of bed ash flow arranged one on either side of the combustor section. These bed ash coolers are essentially of air/ water cooled design and provided with cooling coil in the mini fluid bed chamber.

Steam Turbine Generators and Accessories:

The steam turbine is of extraction-cum-condensing type complete with condenser, air evacuation system, pumps. Each of the Steam Turbine Generator (STG) to be rated for 150 MW (2x150MW) & 165MW(1x165MW). Maximum continuous out put at the generator terminals, with throttlle steam conditions of 100 kg/cm^2 (a) 540^{0}C steam temperature. The turbine generator is complete with all accessories such as protection system, lube and control oil system, 30% MCR HP bypass system, electro-hydraulic control system, oil purfication unit with transfer pumps etc. and necessary instrumentation. The generators will have air cooled stator windings, stator core and rotor. The turbines will be fed with main steam from CFBC boilers through a common steam header.

De-aerator and feed water system:

There is 03nos de-aerator, one de-aerator for each 150 MW set & one de-aerator for 165MW. The condensate coming out of the condenser of steam turbine is pumped through LP heaters to respective de-aeators. Boiler feed pumps provided for the above turbines are feed water to respective boilers. The steam generated from the CFBC boilers are collected in a common main steam header which in turn will feed to the turbo generators.

Ashcollection and Disposal System:

The quantity of bottom ash generated from the fluidized bed boiler is approximately 43800 tpa from each boiler which will be collected and dumped as per guideline of CEA. The fly ash generated per boiler approximately 175200 tpa, which will be used to manufacturing of bricks, cement manufacturing and excess will be transported to the coal mines area for back filling of mines.

Compressed Air System:

Total 10nos compressors, 4 nos. compressors each of 13980cmh for 2x150MW & 06nos Compressor each of 15418cmh for 1x165MW capacities is provided capacities to cater to instrument and service air requirements.

Power Evacuation System:

Each generator is connected to the 220 kV systems through three phases 220 MVA, 230kv/15.75 kv Generator Transformer. The power plant auxliary loads are fed from 6.6 kv switch board through one of 25 MVA, ONAF, 15.75/6.9 kv unit auxiliary transformer as well as from 220kv network through one no. 63MVA, ONAF, 220/6.9 kv station transformer for 165MW and Two nos. 20MVA, ONAF 15.75kv/6.9KV unit auxiliary transformer & two nos 30MVA, 33/6.9KV station transformer for 2x150MW. Generated power minus plant auxiliary consumption is transmitted through double ckt line to the switchyard of the steel plant.

All provisions in the steam generator design and fuel firing system are made to reduce the NOx emission from steam generator.

1.4.2 Coal Transportation, Unloading Facilities and Handling Plant

About 10000 TPD of E&F and Indonesian per day will be received from BSL by way of conveyor belt. The coal will be received in BSL plant boundary by railway wagons. The rack of wagons will be brought in approach of side arm charge (SAC) by loco. The SAC will place wagons one by one on wagon tippler table for unloading. Tippled material will be collected in 2 no. Of concrete hoppers. Retrieval of raw material from wagon tippler hopper shall by don by 2 numbers of belt feeders for onward transforation to screening and crushing station through servies of conveyors.

The coal will be conveyed to the yard through servies of conveyors and stored with the help of stacker cum re-claimer. This yard is planned for the storage of 45 days requirement of coal by BSL.

The coal will be conveyed to the boiler bunker through services of conveyors. The coal will be distributed in various bunkers with the help of mobile tipplers.

1.4.3 Ash Handling System

Considering mixture of E&F and Indonesian coal (ash content as 40%), at maximum continuous rating, ash generation will be 180 TPH per six boilers. Thus total quantity of ash generation per day will be around 4320 TPD. Considering 80% fly ash and 20% bottom and economizer ash, the proposed power plant (465 MW capacity) will generate about 3456 TPD of fly ash and about 864 TPD of bottom ash). The ash generated will be collected in the following forms.

Bottom Ash

Fly Ash

The bottom ash of six CFBC boiler will be collected in silo from stripper cooler outlet hopper. There will be four main silos of around 1000 m^3 capacity made of RCC. A two stage conveying system has been envisaged. The first stage will include extraction of dry bottom ash from stripper cooler hoppers to intermediate silo. The second stage will include conveying of bottom ash from intermediate silo to main silo.

The fly ash of six CFBC boiler will be collected in silo from the ESP, Air Pre-heaters and stack hopper. There will be four main silos of around 1000 m^3 capacity made of RCC. A two stage conveying system has been envisaged. The first stage will include extraction of dry fly ash from ESP/APH/stack hoppers to intermediate silo. The second stage will include conveying of fly ash from intermediate silo to main silo.

The dry fly ash transportation system from buffer hoppers to the storage silos located near plant boundary will be basically a pneumatic conveying system comparising of air locks/pumps, tanks, air compressors.etc.

The ash disposal from the silo will have dust conditioners to reduce the dust while unloading the ash. Each storage silo will be provided with four (4) outlets at the bottom. Two outlet are be fitted with water mix conditioner for loading the ash into open trucks. 3rd outlet is provided with telescopic chute and rotary feeder for loading the ash into closed tankers. And 4th outlet are provided for stand by.

Ash Disposal System

The ash will ne utilized as per MoEF guide lined and any unutilized ash will be disposed off in ash dyke. The fly ash handling system capacity will be for 80% of total ash. This ash will be disposed off in 6 hours for the ash collected in 8 hours. Four (4) numbers ash silos for collection of fly ash each of 1000 tones capacity will be provided and provision will be made for disposal of ash by trucks.

The ash will ne utilized as per MoEF guide lined and any unutilized ash will be disposed off in ash dyke. The bottom ash handling system capacity will be for 20% of total ash. This ash will be disposed off in 2 hours for the ash collected in 8 hours. Four (4) numbers ash silos for collection of bottom ash each of 1000 tones capacity will be provided and provision will be made for disposal of ash by trucks.

1.44 Water

The main source of raw water for the power plant is from Bhushan Steel Limited reservoir, water being pumped to raw water reservoir of plant though pipeline. The storage capacity of raw water reservoir will be with a storage capacity of about 30 days aggregate requriment of raw water for the plant.the maximum water requriment for the project is bout 1385 m3/hr or 33240m3/d.

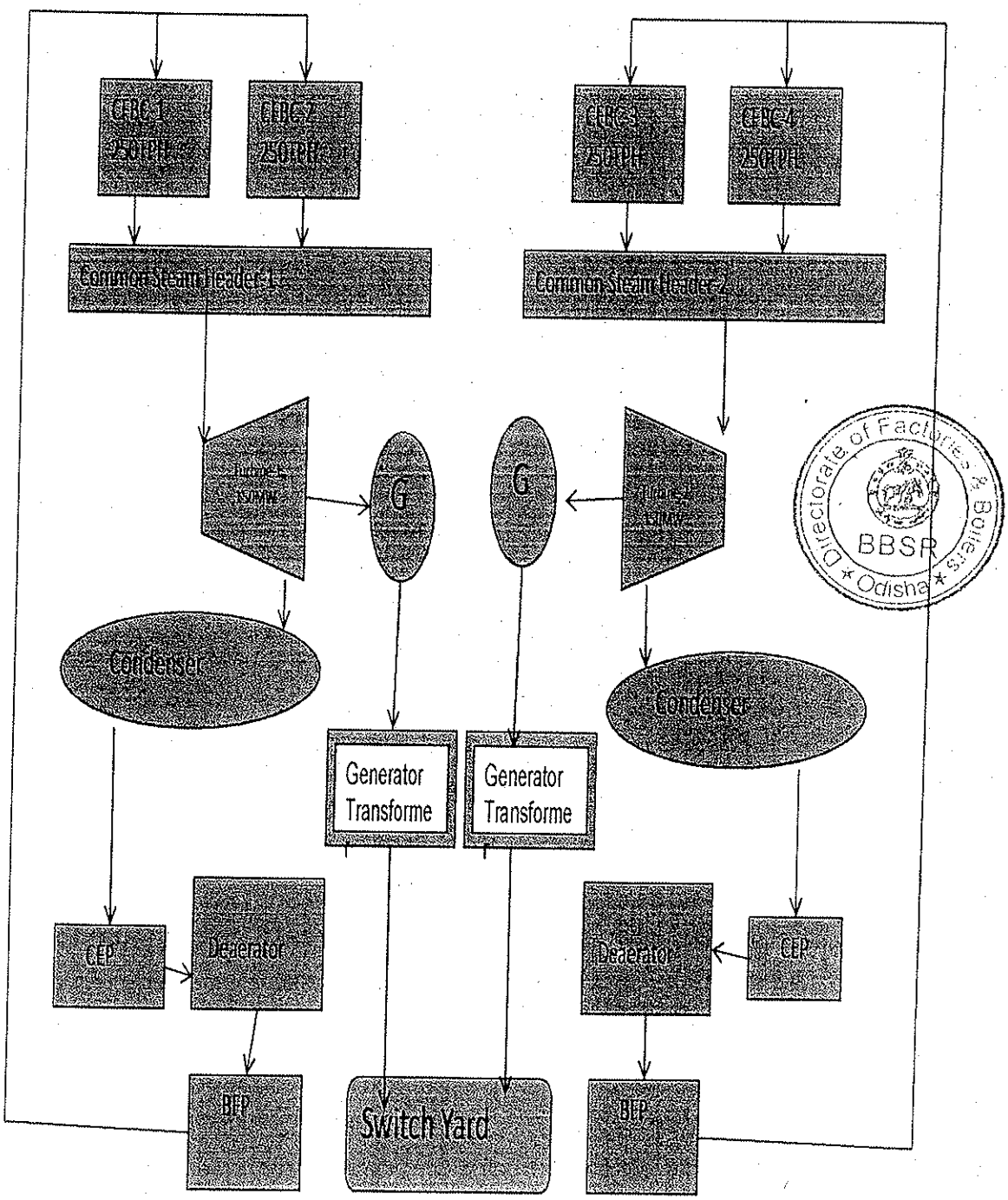
The highlits of the water balance are as follows:

DM water: out of total make up water 77m^3/h, 65m^3/hr is used for boiler and auxiliaries. 11.0 m^3/hr of DM plant waste re-generant will be taken to neutralization plant. Finally send to ETP.

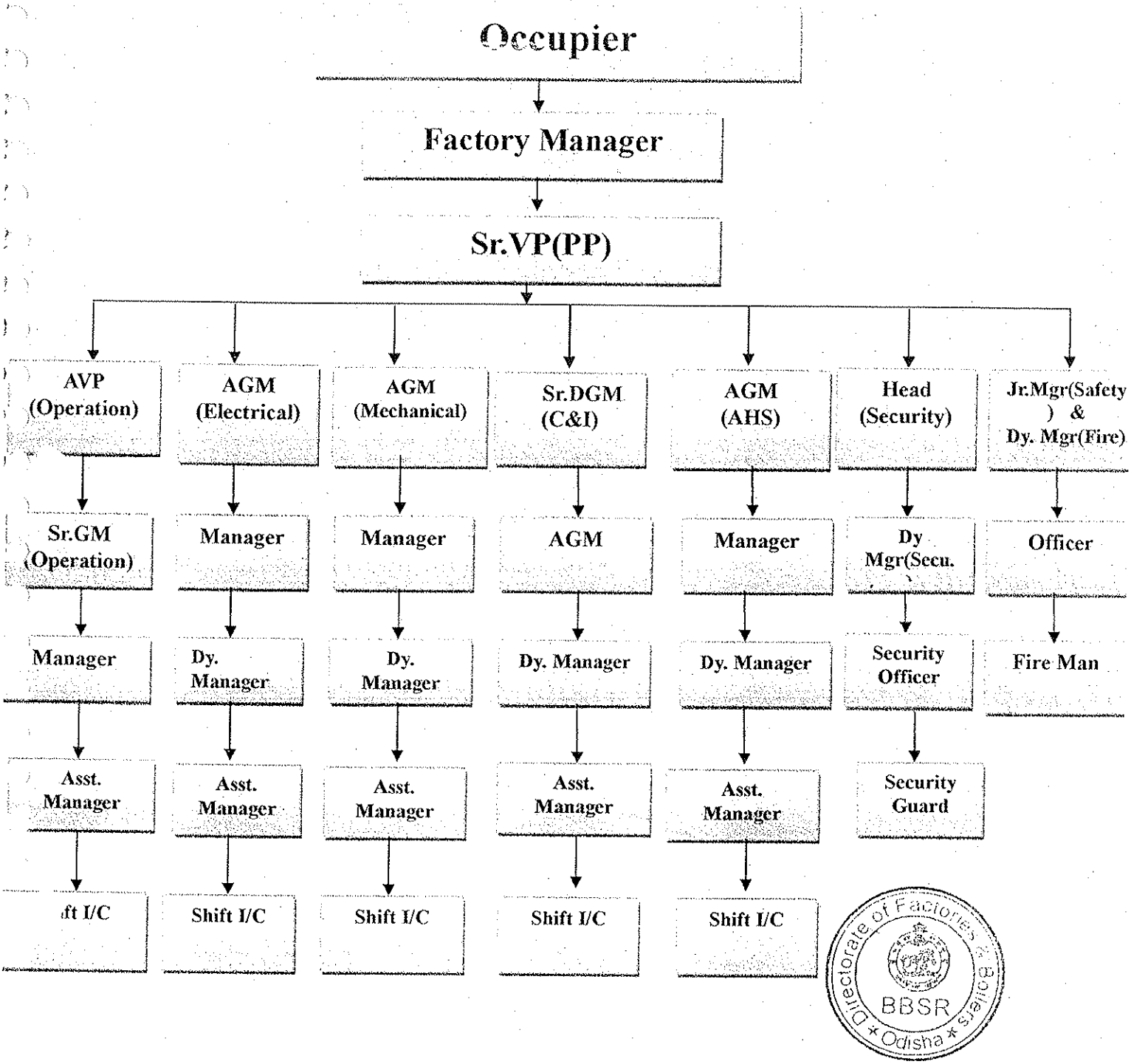
The plant's water requirements are met through treated water suplly from BSL. The treatment in BEL has been divided into two parts comprising a pretreatment system to meet the water requirements of services (condenser cooling, air-conditioning system, and plant auxiliary cooling). The other part inclusive of filtration and chlorination to the meet the water quality as required for drinking and also for influent to the D M Plant.

The D M Plant will consist of pressure sand filter,ACF(activated carbon Filter), cation Exchange Unit, degasser system, anion exchange unit, UF(ultra filtration) mixed bed unit regeneration system and water re-generant neutralizing system. A two-steam (both working) DM plants each steam with a normal production of suitable capacity will be provided to meet the makeup water requirements for the boiler and other auxiliaries.

Process Flow Digram



2.0 ORGANISATIONAL SET UP



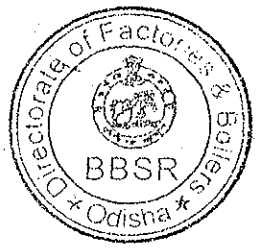
3.0 MAN POWER

Table no. 1.2

3.1 Shift-Wise Total Man Power

Man power as per license is 1490, However 521 employees are employed as mention below.

SHIFT	SHIFT TIMING	MAN POWEER		
		Regular	Contract	Total
General	09.00 AM – 06.00 PM	73	205	278
A	06.00 AM – 02.00 PM	26	48	74
B	02.00 AM – 10.00 PM	31	50	81
C	10.00 PM – 06.00 AM	20	68	88
	TOTAL	150	371	521



4.0PRODUCT/ BY-PRODUCT

Table No. 1.3

Sl.No	Product	Quantity
1.	ELECTRIC POWER	465 MW

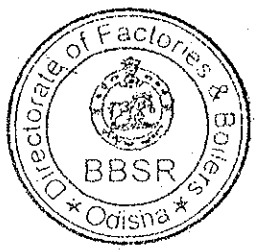
- **There is no generation of by-Product**

5.0 INVENTRY OF RAW MATERIAL

Table No.1.4

Sl.No	MATERIAL (Coal)	REQUIREMENT IN T/Yr.	SOURCE	MODE OF TRANSPORT
1	E & F	29,20,000	Market Purchase	Internal conveying system
2	Indonesian	7,30,000	Do	Do
Total		36,50,000		

Max. Stock – 4, 50,000 T
Min. Stock – 1, 00,000 T



6.0 INVENTORY OF HAZARDOUS SUBSTANCES

Name of hazardous dubstances used as raw material showing their tank/container capacity in tabular form.

Table No. 1.5

Sl.No	Name of the Chemicals.	Narmal Storage Capacity	Mixium Storage Capacity	Storage details.
1	High Speed Diesel (HSD)	15KL and 20KL	20 KL and 35KL	Storage tank (OG-Over Ground)
2	Hydrochloric Acid	35KL	40 KL	Storage Tank (OH-Over Head)
3	Caustic Soda	20KL	25 KL	Storage Tank (OH-Over Head)

DETAILS OF TRANSFORMER & TRANSFORMER OIL:

List of Transformers with rated Transformer oil capacity installation in different areas in power plant.

SL. No	Item Description	Power in KVA	Unit	Quantity (In Liters)	Location / Area	Tank Dimension (In mm) (LxWxH)
1	Generator Transformer-1	2,20,000	1	73660	Transformer Yard	8000x4000x 5000
3	Generator Transformer-2	2,20,000	2	73,660	Transformer Yard	8000x4000x 5000
4	Generator Transformer-3	2,20,000	3	77,300	Transformer Yard	6000x6000x 2500
5	Unit Auxiliary Transformer-1	20,000	1	15110	Transformer Yard	5000x1500x 2500
6	Unit Auxiliary Transformer-2	20,000	2	15110	Transformer Yard	5000x1500x 2500
7	Unit Auxiliary Transformer-3	25,000	3	17345	Transformer Yard	4500x3000x 2000
8	Station Transformer-1	30,000	1	13,200	Transformer Yard	5600x1500x 2500
9	Station Transformer-2	30,000	2	13,200	Transformer Yard	5000x1500x 2500
10	Station Transformer-3	63,000	3	48,000	Transformer Yard	4500x4000x 2000

DETAILS OF TRANSFORMER OIL FOR TOP UP PURPOSE:

SL.No	Quantity of one time storage	Maximum storage capacity	Type of Storage	Dimention of the storage area	Dimention of the storage container
1	8000 Ltr	23000 Ltr	Closed Tank	6mx3m	5000x1500x1000

7.0 HAZARDOUS SUBSTANCES/ GASES PRODUCED / GENERATED DURING THE PROCESS.

Table No. 1.6

Sl.No	Name of the Hazardous Substances	Quantity generated per Annum	Management Details
1.	Nill	-	-

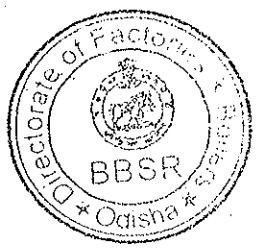
8.0 IDENTIFICATION OF HAZARDS

Hazard is in fact the charactristics of system/plant/storage that presents potential for on accident and risk is the probability of occurrence of hazard. Hence hazard identifection is of prime significationce for the quantification of risk and for cost-effective control of accidents in any industrial installation. Various techniques of predictive hazard evaluation and quantitative risk analysis suggest identification of hazard has very important role in estimation of probability of an undesired event and its consequences on the basis of risk quantification in terms of damage to personnel property and environment.

Hazards are mostly manifested in the from of fire/ explosion or leakage of gas. Each anticipated hazard scenario asspciated in the unit is described along with its assessment of impact on plant in the following table:

Table No: 1.7

SL No	Area/Activity	Hazard	Impact
1	Storage of HSD in main storage tank.	Pool fire / Fire ball may occur in case of direct contact with flame	Fire may propagate to the near by areas leading into fire hazard.
2	Transformer Oil	Fire may occur due to leakage of Transformer Oil from the transformer/ storage tanks subsequently comes in contact with any naked fire.	Fire may propagate to the nearby area



9.0 IDENTIFICATION OF MOST CREDIBLE HAZARD SCENARIO

All the anticipated hazard screnarios associated with the factory (as listed in point no.8) are critically analysed and the following scenarios are identified as Credible scenarios:

Most Credible Scenario- A: Pool Fire in HSD Storage Tank.

9.1 Scenario No-A: Pool Fire is HSD Storage Tank.

Fire hazard in HSD storage tank is considered as a Credible Scenario because of the following reasons.

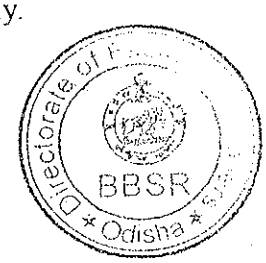
HSD is a flammable liquid as per Schedule-1, Part-II (b)(v) having flash point of 32^0C and/auto ignition temperature of 225^0C. Explosive limit of lower 0.06% & upper value 6% by volume in air. So, it is susceptible to fire hazard. When ever HSD catches fire it shall manifest in the form of pool fire. Hence, pool fire modelling of HSD storage tank is done for different situations (Summer Day Time, Summer Night Time, Rainy Day Time, Rainy Night Time, Winter Day Time, Winter Night Time) using fire equation and the results are tabulated followed by Heat Propagation Curve.

Study of all the six situations indicates that the effect of pool fire shall be maximum in summer season at night time as indicated in the following table:

Table. 1.10

Significant Heat Level	Value	Experience at Distance Of	Indication
SHL-1	4.5 kW/m^2	6.2m	Causes pain if unable to reach a protective cover within 20sec.
SHL-2	12.5 KW/m^2	3.4m	Minimum energy required for melting of plastic.
SHL-3	37.5kW/m^2	2.6m	Sufficient to cause damage to the equipment.

Therefore, the three levels of themal radiations of interest i.e. 4.5 KW/m^2, 12.5 KW/m^2, 37. 5KW/m^2 are experience at a distance of 6.2m, 3.4m, 2.6m respectively.



9.2 Fire on Transformer Oil Storage Tank

Fire Hazard in Transformer oil in Transformer is considered as a credible scenario because of the following reasons:

Transformer Oil is a less flammable liquid in comparison to HSD and has flash point of $>140^0$C. Beside National Fire Prevention Associate (NFPA) Flammability class is not applicable for this material as per its material safety data sheet. Transformer Oil may burn, but will not ignite readily. It implies that normally it does not present a major fire hazard. The cause of fire may due to leakage of Transformer Oil from the transformer/ transformer oil storage tank and subsequently comes in contact with any naked fire. To avoid any fire in transformer storage area no combustible material of flammable substance is stored near the tank. Beside, this area is declared as no smoking zone. The combat situation adopted for emergency due to fire in HSD tank will cater the emergency arises due to fire in transformer oil.

Safety measure for Preventive Fire:

- **FDS system: (Preventing transformer explosions):** We have already installed advance version of proactive FDS(Fast Depressurization System) & procured the same from M/s Sentry De-pressurization System, US.

  It is working as below

  During a short circuit/fire , the FDS(Fast Depressurization System) is activated within milliseconds by the first dynamic pressure peak of the shock wave, avoiding explosions by preventing static pressure increase.

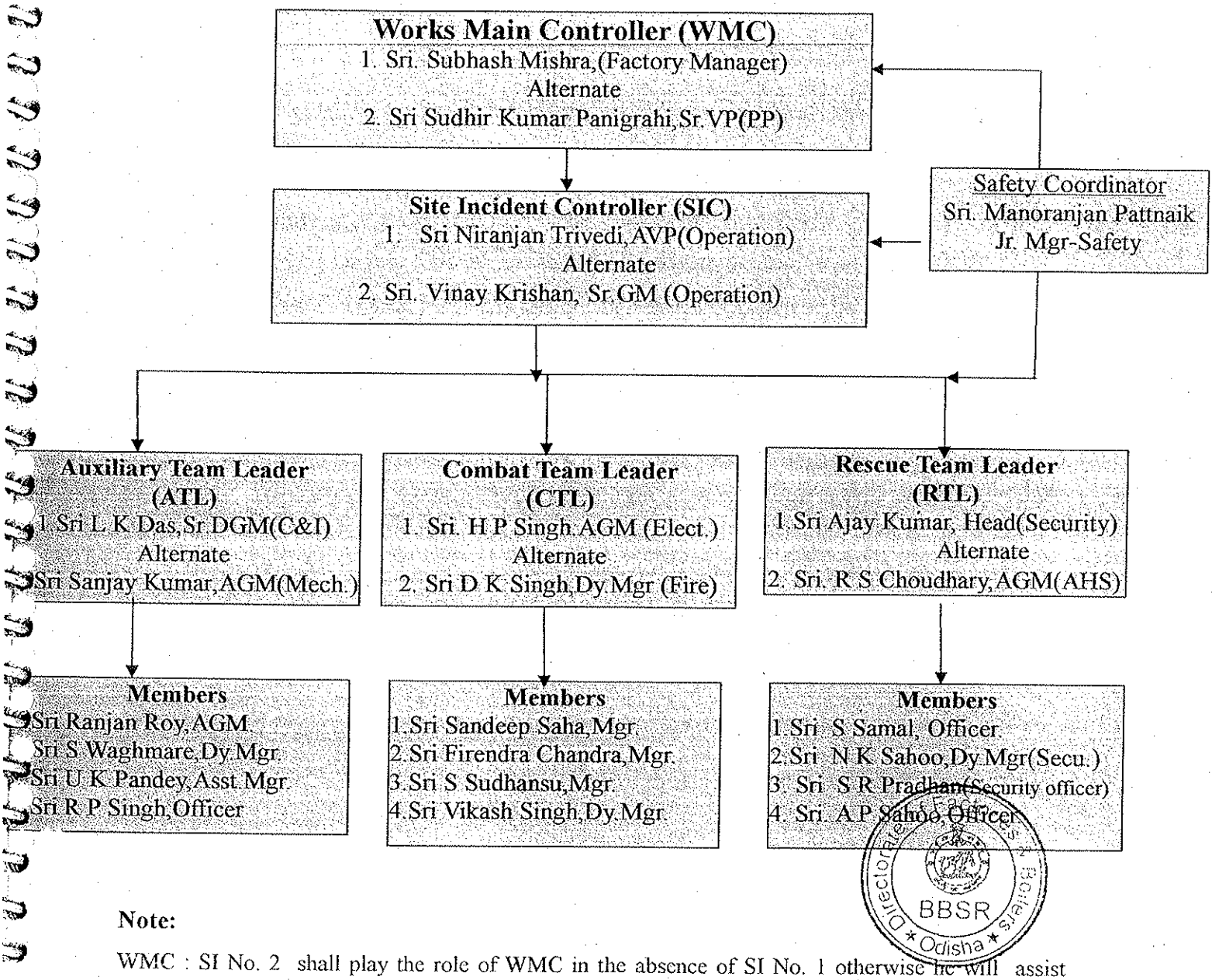
- **Nitrogen Purging System:** We have already installed the fire protection system of nitrogen Injection System for the transformer. Which are installed as a additional measure of fire protection.

10.0 PLOT PLAN

The plot plan attached shos the plant location and location of HSD storage tank and risk contour around the hazard zones, emergency control room and roads leading to all gate etc.

(Plot plan is enclosed as Annexure-8).

11.0 EMERGENCY COMMAND STRUCTURE



Note:

WMC : SI No. 2 shall play the role of WMC in the absence of SI No. 1 otherwise he will assist WMC

SIC : SI No. 2 shall play the role of SIC in the absence of SI No. 1 otherwise he will assist SIC

CTL : SI No. 2 shall act as CTLin absence of SI No. 1 otherwise he will assist the CTL.

ATL: SL No.2 shall play the role of ATL in the absence of SI No. 1 otherwise he will assist the ATL.

RTL: SL No. 2 shall act as RTL in absence of SI No. 1 otherwise he will assist RTL.

12.0 ROLE OF KEY PERSONS

12.1 WORKS MAIN CONTROLLER:

He is the Head at the works and is generally available in the factory except on tour. On emergency, can reach work site at any odd hour within 20 minutes time. In his absence, Sr.VP(Power Plant) shall take up his charge as Works Main Controller (WMC).
On being informed of an incident, he has to:

- Rush to the emergency Site, collect all information from SIC.
- Decide if emergency is to be declared and advise site incident controller (SIC) accordingly and reach emergency control room (ECR).
- Advise Rescue Team Leader (RTL) / Security Gate to blow the wailing siren with appropriate code for declaration of emergency.

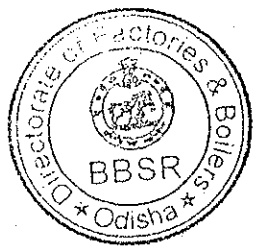
  One minute high pitched wailing siren followed by short siren with a pause for 5times.

  [For Hydrochloric Acid]

  Two Minutes with a pause for 3 times.

  [For fire Hazard]

  One Minutes long continuous siren for all clearance.



- Advice (Auxiliary Team Leader) ATL for communication to statutory authorities and for mutual aid as required.
- Through (Auxiliary Team Leader) ATL ensure constant communication to Statutory Authorities and to mutual aid partners as required.
- Maintain continuous communication with site incident Controller (SIC) to review the situation and assess the possible course of action for emergency operations.
- To declare normalcy at the end of operation and advise Rescue Team Leader (RTL) / Security Gate to blow "all clear siren". **["For 1 Minute continuously"].**
- Ensure the record keeping of emergency operations chronologically.

12. 2 SITE INCIDENT CONTROLLER:

Hi is available at the factory or in the colony near by at any point of time and on being informed about the incident, he has to:

- Intimate the Works Main Controller (WMC) and proceed to the emergency site.
- Take the necessary instruction for Combat Team Leader (CTL), assess the situation and call Rescue Team Leader (RTL) and Auxiliary Team Leader (ATL).
- Inform Works Main Controller (WMC) regarding the situation.
- Take necessary steps and provided guidance to Combat Team, Rescue Team, Auxiliary Team Leaders to mitigate the emergency situation.
- Examine for major emergency shut down operation activities, decide safe escape routes and announce for evacuation to Assembly point.
- Inform Works Main Controller (WMC) about the status of the situation at regular intervals.

12.3 COMBAT TEAM LEADER

He is the leader to attend to the emergency and should be available in the factory or in the colony at any instant.

On being informed about the incident, he has to:

- Immediately rush to the site and lead the team to control the situation.
- Inform Site Incident Controller (SIC) about the incident and request him to rush to the spot.
- Instruct the Rescue Team Leader (RTL) for rescue and medical assistance.
- Co-ordinate the activities of team members and combat the emergency, so as to eliminate the route cause of the hazard.
- Shut-down the plant if necessary to take up repair measures.
- To arrest the leakage and spillage from various equipments, shut down the concerned equipments.
- Take necessary action to remove unwanted persons from the site of the incident.
- Keep informed about the developments to Site Incident Controller (SIC).

12.4 RESCUE TEAM LEADER

He is the person who conducts rescue operations and should be available at any instant.

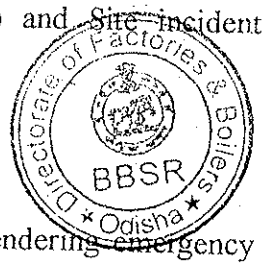
On receiving the information about the incident he has to:

- Rush to the site of emergency through safe route.
- Ensure presence of all his team members. Availability of fire fighting facilities and take necessary action to arrest the fire/ gas leakage.
- Arrange for safe escape of entrapped persons.
- Make necessary arrangements to send the affected persons for immediately medical attention through the medical officer.
- Search for the missing persons on the basis of role call taken by Auxiliary Team Leader (ATL).
- Give the feedback to the Site Incident Controller (SIC) about the developments.

12.5 AUXILIARY TEAM LEADER:-

He is the communication manager for the crisis management. On being informed of the emergency, the should proceed to Emergency Control Room (ECR) and:

- Keep in constant touch with works Main Controller (WMC) and Site incident Controller (SIC)
- Inform the Statutory Authorities and District Administration.
- Communicate to Mutual Aid Partners, Fire service stations.
- Send communications to ESI Hospital and Govt. Hospital for rendering emergency medical services.
- Inform the relatives of causalities and send them to their residence or hospital as the case may be.
- Take roll call to find out the list of missing persons.
- Take care of visit of the authorities to the Emergency Site.
- Give feed back to Works Main Controller (WMC) about the Status with respect to his areas of activities.



12.6 SAFETY COORDINATOR:-

- The role of safety coordinator is to coordinate the work among the works main controller, Site incident controller, Combat team leader, Rescue team leader and Auxiliary team leader.

13.0 ACTION PLAN FOR FIRE HAZARD (On Site Emergency Plan)

Table No. 1.11-A

STEP No	INITIATOR	ACTION TO TAKE
1	The person noticing the emergency	Inform the Security Gate and the concerned Shift-in -charge who in turn will inform Combat Team Leader immediately regarding the fire hazard.
2	Combat Team Leader (CTL)	➢ Inform Site Incident Controller (SIC) through common dialing system and rush to spot for combating the situation. Take charge of the situation, arange for evacuation of people not directly concerned. ➢ To organise for trained personnel equipped with fire fighting appliances. And call for fire tender at the place of fire. ➢ To start combating, shutdown equipments and taken steps to extinguish fire with fire fighting facilities. ➢ To find out the root cause of fire and to take necessary action for prevention of fire.
3	Site Incident Controller (SIC)	➢ Inform Works Main Controller (WMC) and will rush to Site. In case of failure electronic communication system, the standby available provision for runner with bike, will be their to pass on the command as advised. ➢ Discuss with Combat Team Leader (CTL), assesses the situation and call the Rescue Team Leader (RTL) & Auxiliary Team Leader (ATL). ➢ Inform to the Rescue Team Leader, and Auxiliary Team Leader to send the Rescue Team to site. ➢ Arrange to evacuate the unwanted persons and call for additional help. ➢ Time to time to pass information to the Works Main Controller (WMC) about the situation at site.
4	Works Main Controller (WMC)	➢ Rush to Emergency Site and observe the ongoing activities. ➢ Take stock of the situation in consultation with the SIC. ➢ Move to Emergency Control Room. ➢ Take decision on declaration of emergency and ask for emergency wailing siren. ➢ Advise Auxiliary Team Leader to inform the statutory authorities and seek help of mutual aid if required. ➢ Decide on declaration of normalcy of emergency after combating the situation. ➢ Ensure that the emergency operations are recorded chronologically.
5	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.
6.	Auxiliary Team (ATL)	➢ On being directed by Works Main Controller (WMC) inform about the emergency to Statutory Authorities depending upon the situation. ➢ Seek help of Mutual Aid Partners and Coordinate 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.
7	Team Members	Each of the team members should follow the instruction of concerned team leader to mitigate the emergency.

14.0 SILENT HOUR COMMAND STRUCTURE

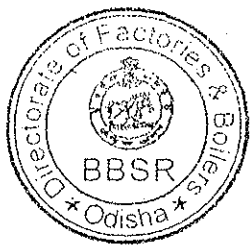
- Silent hour period is from 6.00PM to 10AM. During that hour the Works main controller (WMC), Site incident controller (SIC), Auxiliary team leader (ATL), Combat Team Leader (CTL) and Rescue Team Leader (RTL) will be not available at site as their duty is in general shift.

- During the silent hour also the action plan is the same as during normal hour.

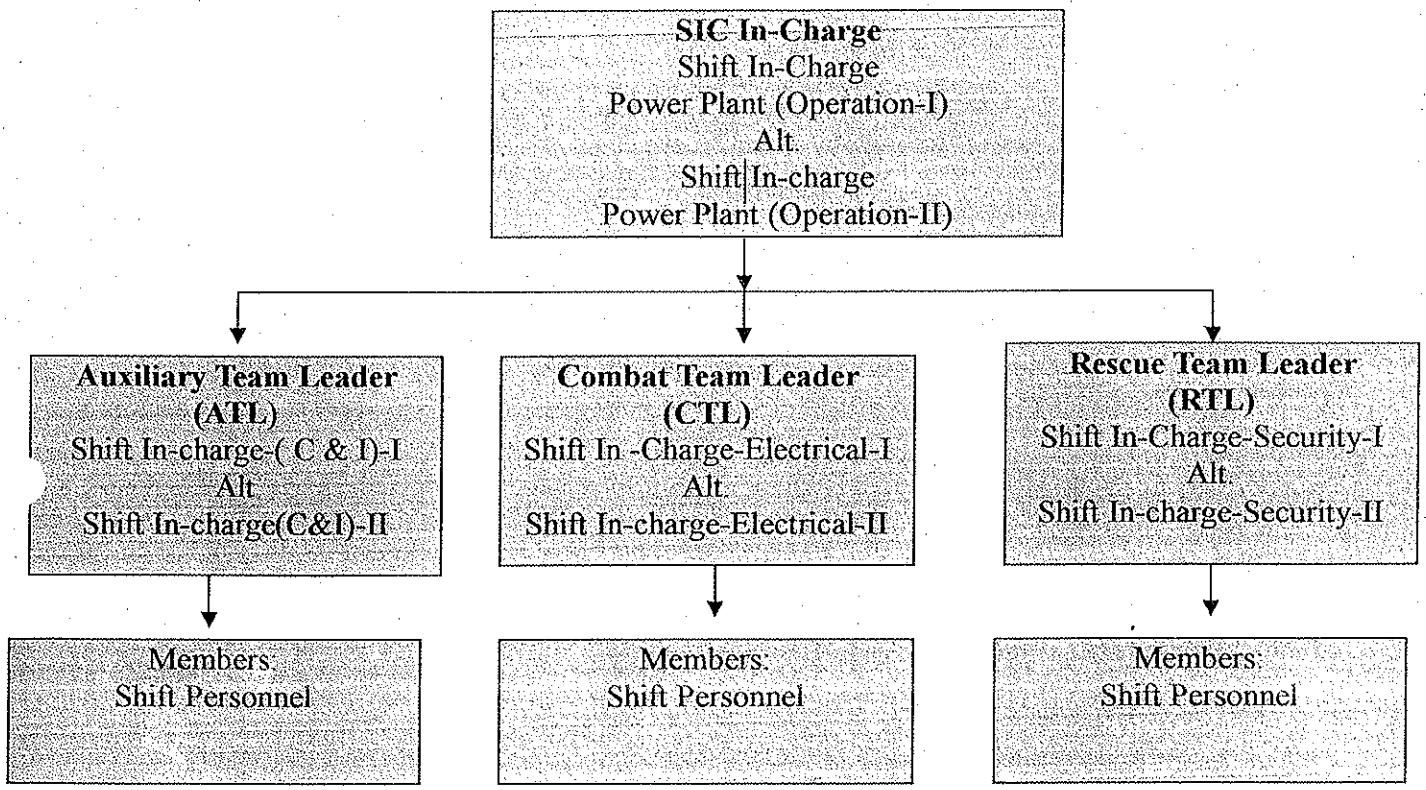
- As the WMC, SIC, ATL, CTL, RTL will not be available in the odd hour, they will be informed by the acting site incident controller (shift incharge) over telephone or by sending special messenger on urgent basis for their quick arrival.

- Till their arrival persons of silent hour command structure will work actively as per scheduled procedure for mitigating the situation.

- After the arrival of the designated (WMC), SIC, ATL, CTL, RTL) shall immediately take the charge without lapse of time, from silent hour team and will actively take further action judiciously as per normal hour command structure activities procedure.



14.1 SILENT HOUR COMMAND Structure (Shape of a tree)



14.2 Important Telephone numbers during Silent Hour Command

SL No	Position	Mobile No.
1	Shift-Incharge (Operation) as SIC	7077758417
2	Shift-Incharge (C&1) as ATL	7077758471
3	Shift-Incharge (Electrical) As CTL	7077759437
4	Shift-Incharge (Security) as RTL	7077757922
5	Shift-Incharge (First Aid Centre)	7077757946
6	Shift-Incharge (Fire Service)	7077757614
7	Shift-Incharge (Utility)	7077757981

15.0 ACTIVATION & CLOSING PROCEDURE FOR ON- SITE EMERGENCY

15.1 ACTIVATION PROCEDURE

- The person noticing the incident of Fire or leakage of gas, shall inform about the location & nature of Fire/Leakage of gas to the Security Gate and concerned Shift-in-charge, who in turn shall inform Combat Team Leader (CTL).

- Combat Team Leader (CTL) shall inform Site Incident Controller (SIC) and shall rush to the site immediately. He shall arrange for fire fighting and first aid available at site. He shall arrange to take necessary steps to eliminate the root cause of fire/leakage of gas.

- Site Incident Controller (SIC) on getting information shall inform the WMC and reach the site at the earliest. He shall take over the charge and shall direct Rescue Team Leader (RTL) to carry out rescue operations including fire fighting and medical attention. Site incident Controller (SIC) shall co-ordinate with Combat Team Leader (CTL) to eliminate the root cause of fire/leakage of gas.

- Works Main Controller (WMC), on arrival at site shall take stock of the situation from Site Incident Controller (SIC) and then rush to Emergency Control Room (ECR) to declare emergency on the basis of assessment made by (Site Incident Controller (SIC). He shall give direction to the Security Gate/ (RescueTeam Leader) RTL to activate siren.

  [Two Minutes wailing siren with a pause for 3 times For fire Hazard]

- Rescue Team Leader (RTL) shall mobilise fire fighting and medical resources to site and shall assist (Site Incident Controller) SIC.

- Chief of Safety / Fire Fighting (member of Rescue Team) shall co-ordinate the safety aspects of emergency rescue team. He shall ensure safety of all working personnel and equipments etc.

- Auxiliary Team Leader (ATL) shall take charge of Emergency Control Room (ECR), shall ensure smooth operation of ECR and shall inform relatives of casualties. Informs Mutual Aid Partners and ensures their arrival at site if required.

- Auxiliary Team Leader (ATL) informs statutory authorizes and district administration regarding emergency suitably and coordinates their visit at site.

- Works Main Controller (WMC) coordinates and keeps the track of all the activities at site and off the site and arranges the recording of the activities in a chronological manner for review of the On Site Emergency Plan.

15.2 CLOSING PROCEDURES

- Works Main Controller (WMC) shall declare normalcy after full control of the emergency situation.
- Works Main Controller (WMC) Shall direct Auxiliary Team Leader (ATL) / Security Gate to blow " **all clear siren continuously for duration of one minute**".
- Information is sent to statutory authorities by Chief of Personnel.
- Information is given to police (if required) & local authorities by ATL.
- Analysis of emergency and future precautionary measures shall be taken up by the On-Site Emergency Plan Committee consisting of following members: WMC, SIC, ATL,CTL, RTL, Chief of Safety, and Chief of Security.

- Review of On Site Emergency Plan (if required) shall be done by the above Committee. Revision shall be approved by Work Main Controller (WMC) for implementation.

Note: As a rule, On Site Emergency Plan shall be reviewed normally once in a year. Any modification / updating are approved by the Work Main Controller (WMC).

ANNEXURE-1(A)

DETAILS OF FIRE FIGHTING FACILITIES AVAILABLE IN THE UNIT FOR COMBAT. LOCATION WISE LISTS OF FIRE EXTINGUISHERS

Sl.No	EXCT. LOCATION	TYPE	CAPASITY
1	Trans. Yard GT -1	DCP	10 KG
2	Trans. Yard GT -1	CO2	4.5 KG
3	Trans. Yard GT -1	CO2	4.5 KG
4	Trans. Yard GT -2	DCP	10 KG
5	Trans. yard ST-1	CO2	4.5 KG
6	Trans. yard ST-1	CO2	4.5 KG
7	Trans. yard ST-1	CO2	4.5 KG
8	Trans. yard ST-2	CO2	4.5 KG
9	Trans. yard ST-2	DCP	10 KG
10	Trans. yard ST-2	CO2	4.5 KG
11	T G Building G/floor Unit-1	FOAM	50 LTR
12	T G Building G/floor Unit-1	FOAM	9 LTR
13	T G Building G/floor Unit-1	CO2	4.5 KG
14	T G Building G/floor Unit-1	CO2	4.5 KG
15	T G Building o Mtr Celler	DCP	4 KG
16	T G Building o Mtr Celler	DCP	4 KG
17	T G Building o Mtr Celler	DCP	4 KG
18	T G Building o Mtr Celler	DCP	4 KG
19	T G Building G/floor Unit-2	CO2	9 KG
20	T G Building G/floor Unit-2	CO2	4.5 KG
21	T G Building G/floor Unit-2	CO2	4.5 KG
22	8.5 Mtr Caller	DCP	10 KG
23	8.5 Mtr Caller	DCP	10 KG
24	T G Building SWGR 3.8 MTR Unit-2	CO2	4.5 KG
25	VD MCC-1 Unit-1	CO2	9 KG
26	Turbine Floor 06 MTR Unit-2	DCP	5 KG
27	VD MCC-1 Unit-1	CO2	4.5 KG
28	VD MCC-1 Unit-1	CO2	4.5 KG
29	VD MCC-1 Unit-2	CO2	4.5 KG
30	VD MCC-1 Unit-2	CO2	4.5 KG
31	VD MCC-2 Unit-1	CO2	4.5 KG
32	VD MCC-2 Unit-1	CO2	4.5 KG
33	VD MCC-2 Unit-1	CO2	9 KG
34	VD MCC-2 Unit-2	CO2	4.5 KG
35	VD MCC-2 Unit-2	CO2	4.5 KG
36	VD MCC-2 Unit-2	CO2	9 KG
37	Control Room	CO2	4.5 KG
38	Control Room	CO2	4.5 KG
39	Control Room	CO2	9 KG
40	ESP 1 & 2 cable cellar Room	DCP	10 KG
41	ESP 1 & 2 (2 MVA Trans)	CO2	4.5 KG
42	ESP 1 & 2 MCC Room	CO2	4.5 KG
43	ESP 1 & 2 MCC Room	CO2	4.5 KG
44	ESP 1 & 2 (2 MVA Trans)	CO2	4.5 KG

45	ESP 3 & 4 Cable Cellar	DCP	10 KG
46	ESP 3 & 4 Cable Cellar	DCP	10 KG
47	ESP 3 & 4 (2 MVA Trans)	FOAM	9 LTR
48	ESP 3 & 4 MCC Room	CO2	4.5 KG
49	ESP 3 & 4 MCC Room	CO2	4.5 KG
50	CT & CW SWGR	CO2	4.5 KG
51	CT & CW SWGR	CO2	4.5 KG
52	CT & CW SWGR	CO2	4.5 KG
53	CT & CW SWGR	CO2	4.5 KG
54	CT & CW Trans	CO2	4.5 KG
55	CW Pump House	CO2	4.5 KG
56	CW Pump House	CO2	4.5 KG
57	Pump House	CO2	4.5 KG
58	Silo MCC Room	CO2	4.5 KG
59	Silo MCC Room	CO2	4.5 KG
60	Silo first floor	CO2	4.5 KG
61	Silo first floor	ABC	4 Kg
62	Silo first floor	ABC	4 Kg
63	GT-2	CO2	4.5 KG
64	TG Building 0 Mtr Unit-2	FOAM	9 LTR
65	TG Building 6.8 Mtr Unit-2	DCP	5 KG
66	TG Building 5.5 MTR	DCP	5 KG
67	Battery Charger Room 11.5 MTR	CO2	4.5 KG
68	Battery Room 11.5 MTR	CO2	4.5 KG
69	Battery Room 11.5 MTR	CO2	4.5 KG
70	DCS Panel Room 11.5 MTR	DCP	5 KG
71	DCS Panel Room 11.5 MTR	CO2	9 KG
72	Turbine Floor 11.5 MTR	DCP	4 KG
73	Turbine Floor 11.5 MTR	CO2	9 KG
75	DG area	DCP	4 KG
76	LDO Tank	FOAM	9 LTR
77	Chimney No-1	FOAM	9 LTR
78	LDO Tank	CO2	4.5 KG
79	LDO Tank	FOAM	9 LTR
80	LDO Tank	FOAM	9 LTR
81	LDO Tank	ABC	4 KG
82	Main Elect Build. Comp/PH MCC	CO2	4.5 KG
83	Main Elect Building Comp & P.H.	CO2	4.5 KG
84	Main Elect Building Comp & P.H.	CO2	4.5 KG
85	Main Elect Building Comp & P.H.	CO2	4.5 KG
86	Main Elect Building Comp & P.H.	CO2	9 KG
87	3.3 MTR SWGR	CO2	4.5 KG
88	3.3 MTR SWGR	CO2	9 KG
89	3.3 MTR SWGR	CO2	9 KG
90	Boiler -6	DCP	5 KG

91	Boiler -6	DCP	5 KG
92	Boiler -6	FOAM	9 LTR
93	ESP-6 G floor trans site	CO2	4.5 KG
94	ESP-6 1st floor MCC Room	CO2	4.5 KG
95	ESP-6 1st floor MCC Room	CO2	4.5 KG
96	DCS Panel Room 11.5 MTR	CO2	4.5 KG
97	DCS Panel Room 11.5 MTR	CO2	4.5 KG
98	DCS Panel Room 11.5 MTR	CO2	4.5 KG
99	3.3 MTR SWGR	CO2	4.5 KG
100	3.3 MTR SWGR	CO2	4.5 KG
101	3.3 MTR SWGR	CO2	4.5 KG
102	Boiler-5 0 Mtr	CO2	4.5 KG
103	Cable celler 0 Mtr	CO2	4.5 KG
104	Cable cellar 0 Mtr	CO2	4.5 KG
105	Cable cellar 0 Mtr	CO2	4.5 KG
106	Cable cellar 0 Mtr	DCP	10 KG
107	Comp PH	DCP	10 KG
108	220 MVA Trans TRF 3	DCP	10 KG
109	220 MVA Trans TRF 3	DCP	10 KG
110	220 MVA Trans TRF 2	DCP	10 KG
111	220 MVA Trans TRF 2	DCP	10 KG
112	220 MVA Trans TRF 2	CO2	4.5 KG
113	TG Building Ground floor	CO2	4.5 KG
114	TG Building Ground floor	ABC	5 KG
115	TG 11 Mtr	DCP	10 KG
116	CW/ACW HT FDR-6	DCP	10 KG
117	CW/ACW HT FDR-7	DCP	10 KG
118	TG 11 Mtr	CO2	4.5 KG
119	TG 11 Mtr	CO2	4.5 KG
120	TG 11 Mtr	CO2	4.5 KG
121	TG 11 Mtr	CO2	4.5 KG
122	TG 11 Mtr	DCP	10 KG
123	TG 11 Mtr	DCP	10 KG
124	TG Floor	DCP	10 KG
125	TG Floor 6 mtr	CO2	9 KG
126	TG Floor 6 mtr	CO2	9 KG
127	TG Floor 6 mtr	CO2	9 KG
128	TG Floor 6 mtr	DCP	10 KG
129	TG Floor 6 mtr	DCP	10 KG
130	TG Floor 6 mtr	DCP	5 KG
131	TG Floor 6 mtr	DCP	5 KG
132	TG Floor 6 mtr	DCP	5 KG
133	TG Floor 6 mtr	DCP	5 KG

Total 133 nos of fire extinguisher (DCP-38nos.CO2-82nos,ABC-4nos. and Foam-9Nos.)

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Annexure-1(B)

FACILITIES AVAILABLE

Facilities Available for Fire Extinguishing

SL.No	Facility Available	Capacity of
1	Water Reservoir No-1 &2	5,60,00M^3 & 5,50,00 M^3
2	Emergency DG set	2x1010=2020KVA
3	Water Pump	185x1=185KVA Main pump=30HP
4	Water Hydrant line with discharge pressure	Jockey Pump=30HP 8kg/cm^2

Fire Extinguisher

Required type of fire extinguisher have been provided at deferent locations of the plant. Total 133 nos of fire extinguisher have been provided(.DCP-38nos.CO2-82nos,ABC-4nos. and Foam-9Nos.)

Fire Hydrant System:

Total 52 nos of fire hydrant landing valves have been provided at deferent locations of the plant and water pressure 7kg/cm^2 being maintain in hydrant line & pressure gauge are fitted in all hydrant line.

Fire Buckets

Total 18nos of Fire buckets filled with dray sand are provided in different locations of the plant.

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Siren

Company has siren / hooter arrangement, which can be activated manually during fire / explosion emergency.

Emergency Control Room

The emergency control room shall be set up at a safe location and marked on the site plan and should be manned round the clock. The control room will be activated in case of an emergency to direct and co-ordinate the operations to handle the emergency. It should be furnished with external and internal telephone connections, plot plan, list of essential telephone numbers; list of key personnel and their address; fire fighting system and site plan.

Communication

Public adders system and EPA by telephone is available for effective communications inside the plant. Telephone directory is available in the entire dept. almost all the staff member as well as the workmen have mobile phone for easy communication with each other during emergency crisis, leaving all these electronic system, there is also special stand by provision of runner, who is always alert with a bike for communicating to the concerned person after getting the command. There are 36 nos of walky talkies are available for communication.

First Aid Box:-

Company has provided First aid box with required first aid medicines at different locations inside the plant for any injury. First aid boxes are being checked once in a month & medicines are replaced. Total 18 nos of First aid box have been provided with 08 nos of first aider.

Ambulance Room:-

Ambulance room is functional headed by qualified doctor and other medical staff, with necessary infrastructure and necessary antidote to meet the emergency situation, there is also the provision of full fledged ambulance van.

Mobile Equipments:-

Mobile equipment like JCB, Dozer, Hydra & Tipper etc. are available for rescue services.

General safety Precaution to hazards:-

1. Wear only cotton / approved work clothes while on duty in the plant.
2. Don t attempt to operate any equipment to which you are not specifically assigned.
3. Don t resort to short cuts.
4. Don t use the defective equipment of any kind.
5. Use the PPEs 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. Reporting all injuries / dangerous occurrence to your superior.
9. During emergency be strictly guided by the emergency action plan.

Amount of Water required for fire fighting , in liters per minute, as calculated below the formula = A+B+C+D/20

SL.No	Formula	Area covered	Square meters	Total square meters
1	A -for The total areas in square meters of all floors and galleries in all building of the factory	TG building,	3588	3588
2	B- for the total areas in square meters of all floors and galleries including open spaces in which combustible materials are handled or stored.	HSD Tank area, Transformer area	95+3528	3623
3	C- for The total areas in square meters of all floors over 15meters above ground level	Boiler area	1716+1156	2872
4	D- for the total areas in square meters of all floors of all buildings other than those of fire resisting construction	ESP control room	808+408	1216
			Total	11299

Formula = A+B+C+D/20= 3588 + 3623+2872+1216 / 20 = 564.95 in liters per minute.

Per hour = 60 minutes X 564.95 in liters per minute= 33897 liters/ hour.

MUTUAL AGREEMENT

Annexure-2

Date-12.09.2016

Between M/s Bhushan Energy Limited & M/s Bhushan Steel Limited

1.	Name of the factory which will receive mutual aid. M/s Bhushan Energy limited At-Ganthigadia, Po: Nuahata, Dist-Angul, Odisha.	1.	Name of the factory which will provide mutual aid. M/s Bhushan Steel Limited. At- Narendrapur,Po-Meramundali, Dist-Dhenkanal,Odisha.
2.	Hazards associated with the factory. I. Fire hazards due to storage & handling of HSD/ LDO. II. Cable gallery, conveyor belt, and Transformer. III. Coal fire.	2.	Hazards associated with the factory. I. Fire hazards due to storage & handling of HSD/ LDO, LPG, Crude Benzole & Crude Tar. II. Fire and Gas poisoning due to storage & handling of BF, CO & LD Gas in Gas Holders & interplant gas pipe network.. III. Cryogenic hazards of Liquid Oxygen & Liquid Argon. IV. Fire in cable Tunnels. V. Fire & emergency due to hot metal spillage.
3.	Facilities available. Fire hydrant network, Fire extinguishers, Medical facilities, Vehicles, trained first aiders, Gas detectors, SCBA, Cryogenic suits, Gas mask, Fire proximity Suit, CAFS.	3.	Facilities available. Two fire tenders, Fire hydrant network, Fire extinguishers, Vehicles, trained first aiders, Gas detectors, SCBA, Cryogenic suits, Gas mask, Fire proximity Suit, CAFS, Light Rescue Kit, fire hydrant pump house.
4.	Facilities to be provided during emergency. Ambulance, Medical aid, Fire extinguishers SCBA, Gas mask, Fire proximity Suit.	4.	Facilities to be provided during emergency. Fire hydrant pump house including water , fire tender, Fire extinguishers, Fire water, SCBA, Gas mask, Fire proximity Suit.
5.	Contact person with designation and Mobile No. Name :- Mr R S Choudhary Designation :- AGM(AHS) Mobile No. :- 7077758473	5.	Contact person with designation and Mobile No. Name :- Mr. P K Gupta Designation :- AGM (Utilities) Mobile No. :- 7077757981

Directorate of Factories & Boilers BBSR Odisha

S.K. Panigrahi
Sr. Vice President (PP)
M/s Bhushan Energy Limited

Atul Misra
Executive Director (In-Charge)
M/s Bhushan Steel Limited

Annexure-3

DETAILS OF MUTUAL AID AVAILABLE

Sl No	Name & Address	Distance	Role During Emergency	Contract Person Telephone Number	Facility Available
A	Industries				
	Bhushan Steel Limited Meramandali, Dhenkanal.	"0" km (Adjacent to Bhushan Steel)	To assist for mitigating emergency situation	Head of Safety 7077760107	Fire fighting equipments, Fire Hydrant network, fire hydrant pump house, & other equipments required for mitigating the emergency situation is confirmed.
B	Fire Services				
1	Fire station, Angul.	15Km	To assist for extinguishes fire	06764-230222	Availability of fire tanders & group of experinenced & trained personnel confirmed.
2	Firs Station Dhenkanal	45Km	-do-	06762-230222	"
3	Firs station Hindol Rood	14Km	-do-	06732-256022	"
C	MEDICALS				
1	CDMO, Dhenkanal	45 Km	For midical help during emergency	06762-226423	Adequate necessary antidotes, infrastructures and trained personnel availability conformed
2	CDMO Angul	15 Kms	-do-	06764-234055	Adequate necessary antidotes, infrastructures and trained personnel availability conformed
3	Medical Officer I/C Banarpal	06 Kms	-do-	06764-229629	Adequate necessary antidotes, infrastructures and trained personnel availability conformed

Directorate of Factories & Boilers BBSR Odisha

Annexure-4

Telephone number of key persons of Emergency Command structure

Sl.No	Team Name	Name & Designation	Designation as per emergency command structure	Mobile Number
1	**Work Main Controller**	Mr. Subhash Mishra(Factory Manager)	Work Main Controller	7077756925
2	Work Main Controller(Alt)	Mr. Sudhir Kumar Panigrahi,Sr.VP(PP)	Work Main Controller(Alt)	7077757105
3	**Site Incident Controller**	Mr. Niranjan Trivedi,AVP(Operation)	Site Incident Controller	7077759386
4	Site Incident Controller(Alt)	Mr. Vinay Krishna,Sr.GM(Operation)	Site Incident Controller(Alt)	7077758059
5	**Auxiliary Team Leader**	Mr. L K Das,Sr. DGM(C&I)	Auxiliary Team Leader	7077757001
6	Auxiliary Team Leader(Alt)	Mr. Sanjay Kumar,AGM,Mech	Auxiliary Team Leader(Alt)	7077759394
7	Auxiliary Team Member	Mr. Ranjan Roy,AGM	Member(AT)	7077758471
8		Mr. S Waghmare,Dy.Mgr	Member(AT)	7077757975
9		Mr. Umakant Pandey, Asst.Mgr	Member(AT)	7077758406
10		Mr. R P Singh,officer	Member(AT)	7077758427
11	**Combat Team Leader**	Mr. H P Singh,AGM(Elect.)	Combat Team Leader	7077759393
12	Combat Team Leader(Alt)	Mr. D K singh,Dy. Mgr(Fire)	Combat Team Leader(Alt)	7077757614
13	Combat Team Member	Mr. Sandeep Saha,Mgr	Member(CT)	7077759392
14		Mr. Firendra Chandra,Mgr	Member(CT)	7077759437
15		Mr.S Sudhansu,Mgr	Member(CT)	7077762096
16		Mr. Vikash Singh,Dy,Mgr	Member(CT)	7077758478
17	**Rescue Team Leader**	Mr. Ajay Kumar, Head(Security)	Rescue Team Leader	7077756128
18	Rescue Team Leader(Alt)	Mr. R S Choudhary, AGM(AHS)	Rescue Team Leader(Alt)	7077758473
19	Rescue Team Member	Mr. S Samal,officer	Member(RT)	7077757590
20		Mr.N K Sahoo,Dy.Mgr(Secu.)	Member(RT)	7077757922
21		Mr. S R Pradhan, (security officer)	Member(RT)	7077758081
22		Mr. A P Sahoo,officer	Member(RT)	7077757946
23	Safety Co-ordinator	Mr. Manoranjan Pattnaik,Jr.Mgr(safety)	Safety Co-ordinator	7077757603

Details of phone nos. of local administration and statutory authorities

Local Administration	Office	Residence
Collector & District Magistrate	06764-230567	06764-230234
Superintendent of Police	06764-230316	06764-220616
Additional District magistrate	06764-230491	06764-236052
Sub Collector	06764-230302	06764-030301
District Fire Officer	06764-230222	
Public Relation Officer	06764-230462	
District medical Officer	06764-234055	
District Labour Officer	06764-231125	06764-236337
Regional Officer(SPCB)	06764-236389	
Block Development officer	06764-229222	
I/c Banarpal PS		9937911792
Police station ,BSL, PS		9437155190
Statutory Authorities		
Director of Factories & Boilers	0674-2396070	
Joint Director of F & B	0674-2396481	
Deputy Director of F &B,Angul	06764-220164	9437214668
Asst. Director of F & B,Angul	06764-220164	9437686256

MUTUAL AID AGREEMENT

Annexure-5

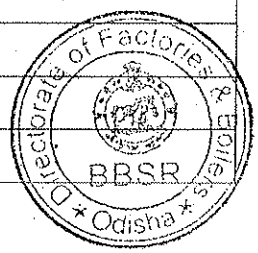
On this day of 25/4/16, we agree to have this Mutual Agreement in between our Industries, that in event of any emergency situation arises due to storage / handling hazardous substances / gases in our plant, we shall act upon as Mutual Aid Partners to each other to combat the eventuality with the available resources.

1. M/s. Bhushan Energy Ltd. At-Ganthigadia, Po-Nuahata, Dist-Angul, Odisha.	1. M/s. Bhushan Steel Ltd At-Narendrapur, Po-Meramundali, Dist-Dhenkanal, Odisha.
2. Hazards associate with the factory: I. Fire hazards due to storage & handling of HSD/ LDO. II. Cable gallery, conveyor belt, and Transformer. III. coal fire	2. Hazards associate with the factory: i. Fire hazards due to storage & handling of HSD/ LDO, LPG, Crude Benzole & Crude Tar. ii. Fire and Gas poisoning due to storage & handling of BF, CO & LD Gas in Gas Holders & interplant gas pipe network.. iii. Cryogenic hazards of Liquid Oxygen & Liquid Argon. iv. Fire in cable Tunnels. v. Fire & emergency due to hot metal spillage.
3. Facilities available with the factory i. Fire hydrant network, Fire extinguishers, Medical facilities, Vehicles, trained first aiders, Gas detectors, SCBA, Cryogenic suits, Gas mask, Fire proximity Suit, CAFS.	3. Facilities available with the factory i. Two fire tenders, Fire hydrant network, Fire extinguishers, Two ambulances, First Aid Centre, Vehicles, trained first aiders, Gas detectors, SCBA, Cryogenic suits, Gas mask, Fire proximity Suit, CAFS, Light Rescue Kit.
4. Facilities to be provided i. Ambulance, Fire extinguishers, Medical aid, SCBA, Gas mask, Fire proximity Suit.	4. Facilities to be provided i. One fire tender, One ambulance, Fire extinguishers, Fire water, Medical aid, SCBA, Gas mask, Fire proximity Suit.
5. Name, Designation & contact no of the contact person Sri Manorajan Pattnaik, Jr. Mgr - Safety , 7077757603 ALTERNATE Sri Ranjan Roy,AGM(PP),7077758471	5. Name, Designation & contact no of the contact person Sri Asish Panda, AVP – Safety,7077760107 ALTERNATE Sri Dharmendra Kumar Singh,Dy.Manager-Fire, 7077757614
Subhash Mishra Asst.Vice President cum-Factory Manager (Signature, Seal of Occupier or Manager of the Factory)	Directorate of Factories & Boilers BBSR Odisha Atul Misra Executive Director (In-Charge)

ANNEXURE-6

MATERIAL SAFETY DATA SHEET FOR HSD

1	**Colour**	**Straw red**
2	Physical State	Liquid
3	Odor	Petroleum Odor
4	pH	Not Applicable
5	Vapour Pressure	0.04 kPa (Approx.)
6	Vapor Density (Air=1)	>1
7	Boiling Point	175.6^{0}C
8	Solubility	Soluble in hydrocarbons
9	Freezing Point	Not Applicable
10	Melting Point	Not Applicable
11	Specific Gravity	0.8-0.88
12	Viscosity	1.9cSt-4. 1CSt @ 40^{0}C
13	Flash Point	32^{0}C
14	Auto ignition Temp	225^{0}C



A. **POTENTIAL HEATH EFFECTS**

- **Inhalation:** - Irrtation of the upper respiratory tract and eyes, with possible euphoria, dizziness, headache, disco ordination, ring 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 in nausea and vomiting; central nervous system depression may occur, if absorbed (Sec inhalation symptoms above). If aspirated, chemical pneumonitis may occur with potentially fatal results. Possible kindney 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.

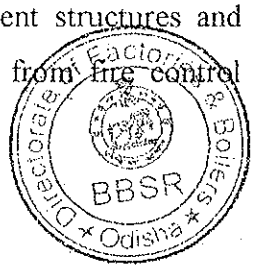
B. FIRSTAID MEASURES

- **Inhalation:** Get Person out of contaminated area to freh air. If 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 cleaning. 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 ATTTENTION.
- **Note to Physician:** Do not induce vomiting, use gastric lavage only. Aspration of liquid into the lungs could result in Chemical pneumonitis. Use of adrenaline is not advised. Treat symptomatically.

C. FIRE FIGHTING MEASURES

- **Fire Fighting Instrcuctions:-** Use water fog, CO_2, from dry chemical 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 driking 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 kerosone or diesel fuels, and for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

E. PERSONAL PROTECTION

- Air borne Exposure Limited: 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.

F. 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 litters, 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/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.

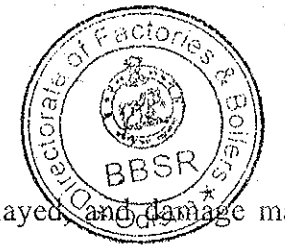
MATERIAL SAFETY DATA SHEET FOR HYDROCHLORIC ACID

1	Chemical Name	Hydochloric Acid
2	Chemical Family	Inorganic Acid
3	Molecular Formula	Inorganic Acid
4	Molecular Weight	36.46
5	Apperance	Colorless, or slightly yellow liquid
6	Odor	Pungent oder
7	pH	Less than 1
8	Solubility (Water)	Miscible in all proportions in water
9	Solubility (Other)	Solible in alcohol, ethers, benzene
10	% Volatile by Volume	100
11	% Volatile Organic Compounds	Zero

A. POTENTIAL HEALTH EFFECTS

- **General:** Hydrachloric Acid (HCI) is a very strong acid. Solutions can be extremely corrosive. The severirty of effects depends on the concentration of the solution and the duration of contact. In general, HCI solutions and mists with a pH of 3 or less are a significant health concern.
- **Inhalation:** Vapor or mist from concentrated solutions can cause severe nasal irritation, sore throat, choking, choking coughing and difficulty breathing (50-100 PPM). Prolonged exposures (e.g. 1000-2000 ppm), for even a few minutes, can cause a life-threatening accumulation of fluid in the lungs lungs (Pulmonary edema). Symptoms of pulmonary edema such as shortness of earth can be delayed for several hours after the exposure.
- **Skin Contact:** Corrosive! Concentrated solutions may cause pain and deep and severe burns to the skin. Prolonged and repeated exposure to dilute solutions often causes irritation, redness, pain and drying and racking of the skin.
- **Eye Contact:** Immediate pain, servere burns and coeneal damage, which may result in permanent blindness. Low concentrations of vapor or mist (10-35 ppm) can be immediately irritating, causing redness.

- **Ingestion**:Casuses severe irritation or corrosive burns to mouth, throat, esophagus and stomach. Symptoms may include diffeiculty in swallowing, intense thirst, nausea, vomiting, diarrhea and in severe cases, collapse and death.
- **Existing Medical Conditions Possibly Aggravated by Exposure:** Skin irritation may be aggravated in individuals with existing skin lesions. Breathing of vapors or sprays (mists) may aggravate acute or chronic sthma and chronic pulmonarydisease such as emplysema and bronchits.
- **Chronic Effects:** Repeated exposure to low concentrations of acid mist or vapor may cause redness, swelling and pain (dermatitis). Exposure to low concentration of acid mist or vapor by inhalation may cause bleeding of nose and gums, bronchitis, stomach pain (gastritis), and brownish discoloration and damage to tooth enamel. Dental erosion becomes more severe with increased exposure.



B. FIRST AID MEASURES

- **General:** Corrosive effects on the skin and eyes may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential. SEED IS ESSENTIAL. OBTAIN IMMEDIATE MEDICAL ATTENTION.
- **Inhalation:** Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Do not use mouth –to-mouth method if victim ingested or inhaled the substance : induce artificial respiration with the aid of a pocket mask equipped with a one –way valve or other proper respiratory medical device. Give cardiopulmonary resuscitation(CPR) if there is no pulse and no breathing. obtain medical attention immediately. Symptoms may appear up to 48hrs after exposure.
- **Skin Contact:**Immediately flush skin with running water for a minimum of 20 minutes. Start flushing while removin contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim unless the recommended flushing period is completed or flushing can e continued during transport.

  While the patient is being transported to a medical facility, apply compresses of iced water. If medical treatment must be delayed, immerse the affected area in iced water. If immersion is not practical, compresses iced water can be applied. Avoid freezing tissues.

discard heavily contaminated clothing and shoes in manner, which limits further exposure. Otherwise, wash clothing separately before reuse.

- **Eye Contact:** Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDATELY. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.
- **Ingestion:** DO NOT INDUCE VOMITING. If victim is alert and not convulsing, rinse ,outh and give 240 to 300 ml (8 to 10 oz.) of water to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. IMMEDIATELY contact local poison control center IMMEDIATELY transport victim is repidly losing consciousness, or is unconscious or convulsing.

C. FIRE FIGHTING MEASURES

- **Flas Point:**
  Not Combustible
- **Auto-ignition:**
  N/Ap.
- **Fire and Explosion Hazards:**Reacts with many metals to liberate hydrogen gas, which can form explosive mixtures with air. Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage.
- **Fire Fighting Procedures**:As appropriate for surrounding materials/ equipment. Water spray should be used to cool containers. Water spray may be used to knock down escaping vapor.
- **Fire Fighting Protective Equipment:**Use self-contained breathing apparatus and special protective clothing.

D. ACCIDENTAL RELEASE MEASURES

- **Spill, Leak or Releases**:

  Restrict access to area until completion of clean up. Ensure trained personnel conduct clean up. Wear adequate personal protective equipment. Do not touch spilled material. Remove all ignition sources (no smoking, flares, sparks of flames). All equipment should be grounded. Ventilate area. Stop leak if possible without personal risk.

- **Small spills**: Cover with DRY earth sand or other non-combustible material. Use clean non sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

- **Large soills:** Isolate spill or leak area immediately for at least 50 meters (160 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Prevent entry into sewers and confined areas. Dike with inert material (sand, earth, foamed polyurethane, foamed concrete, etc..).consider in-situ neutralization and disposal. Absorb bulk liquid with fly ash or cement powder. Neutralize with recommended materials, taking care to avoid any foaming or splattering that may occur from the neutralization reaction of The acid with these materials. Make sure all liquid has been thoroughly contacted and absorbed by the dry materials. Transfer absorbed spill material and any contaninated underlying soil to a suitable chemical waste container. Ensure adequate decontamination of tools and equipment following clean up. Washing down of spills with water is not recommended as this tends to spread the contamination and increases the likelihood of percolating the acid down through the silo and/or uncontrolled flow of acid into sewers, streams, or other waters. Hydrochloric acid leaks or spills must not come in contact with any acid soluble sulphide wastes (such as sewers) because of the danger of evolving hydrogen sulphilde gas.

E. HANDLING AND STORAGE

- **Handling:** Take all precautions to avoid personal contact. Prevent release of vapour or mist into workplace air. Always ensure adequate ventilation in handling areas. Locate safety shower and eyewash station close to chemical handling area. Inspect containers for leaks before handling. Use EXTREME care is to be taken when diluting with water. Always add acid to water. CAUTION: Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage. Storage containers should be vented on a regular basis by

trained personnel ONLY. Label containers. Keep containers closed hen not in use. Empty containers may contain residues, which are hazardous.

- **Storage:** Store in a cool, dry well ventilated area, out of direct sunlight and away from heat sources. Store away from incompatible materials such as oxidizing materials, reducing materials, and storong bases. Use corrosion-resistant structural materials and lighting and ventilationSystems in the storage area. Use containers, which are securely labelled and protected from damage. Storage drums must be coated with an acid resistant material. Rubber-lined steel, PVC/FRP, FRP and tantalum, are the most commonly used corrosion-resistant materials
- **Storage Temperature:** Exposure to extremes of heat and cold should be avoided. Ideal storage temperatures 10-27^{0}C (50-80.6^{0}F). Do not expose sealed containers to temperatures above 40^0 C (104^{0}F).
- **Other Precautions:** If stored indoors, building floors should be acid resistant with drains to a recovery tank. Electrical equipment should be flameproof and protected against corrosive action. Wood and other oraganic materials should not be used on floors, structural materials and ventilation systems in the storage area.

E.EXPOSURE CONTROLAND PERSONAL PROTECTION

- **Preventive Measures:** Recommendations listed in this section indicate the type of equipment, which will provide protection against over exposure to this product. Conditions of use, adequacy of enginering or other control measures, and actual exposures will dicate the need for specific protective devices at your workplace.
- **EngineeringControls:** Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. The most effective measures are the total enclosure of processes and the mechanization of handling procedures to prevent all personal contact with hydrochloric acid. Because of the high potential hazard associated with this substance, stringent control measures such as enclosure or isolation are recommended when dealing with large quantities. Electrical installations should be protected against the corrosive action of acid vapours. Smoking should be prohibited in areas in which hydrochloric acid is stored or handled.

PERSONAL PROTETIVE EQUIPMENT

- **Eye Protection:** Wear splash resistant chemical goggles and full-face shield. Maintain eye wash fountain and quick-drench facilities in work area.
- **Skin Protection:** Wear impervious protective clothing, including boots, gloves, lab coat, apron or full body, as appropriate, to prevent skin contact.

G. STABILITY AND REACTIVITY

- **Hazardous Decomposition Products:**When heated to decomposition, emits toxic hydrogen chloride fumes. Thermal oxidative decomposition poduces toxic chlorine fumes and exposive hydrogen gas.
- **ChemicalStability:**Stable under conditions of normal use.
- **Conditions to Avoid:** Avoid heat, flames, sparks and other sources of ignition.
- **Incompatibility with other Substances:**A strong mineral acid, concentrated hydrochloric acid is incompatible with many substances and highly reactive with strong bases, metals, metaloxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulphides, sulphites, sulphuric acid and formaldehyde. Contact with metals may produce flammable hydrogen gas. When diluting, add acid to water. Do NOT add water to the acid.
- **Hazardous Polymerization:** Will not occur. Hydrochloric acid is a stable product and does not polymerize. However, it may induce hazardous polymerization with aldehydes and epoxides.

H. DISPOSAL CONSIDERATIONS

- **Waste Disposal Method:**

Review federal, state and local government requirements prior to disposal.

Do not dispose of waste with normal garbage, or to sewer systems. Whatever cannot be saved for recovery or recycling, including containers, should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options.

I.TRANSPORT INFORMATION:

Concentration: 30%

MATERIAL SAFETY DATA SHEET FOR SODIUM HYDROXIDE

1	Chemical Name	Sodium Hydroxide
2	Apperance	White, Deliquescent Pellets or Flackes.
3	Odor	Odorless.
4	Solubility	111 g/100g of Water
5	Specific Gravity	2.13
6	pH	13-14 (0.5% soln.)
7	% Volatiles by Volume @ 21C (70F)	0
8	Boiling Point	1390C
9	Melying Point	310C
10	Vapor Density (Air=1)	>1.0
11	Vapor Pressure (mm Hg)	Negligible
12	Evaporation Rate	No Information

A. POTENTIAL HEALTH EFFECTS:

- **Inhalation:**Severe irritant. Effects from inhalation of dust or mist very from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Servere pneumonitis may occur.
- **Ingestion:**Corrosive1 Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.
- **Skin Contact:**Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.
- **Eye Contact:**Corrosive1 Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.
- **Chronic Exposure:**Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.
- **Aggravation of pre-existing Conditions:**Persons with pre-existing skin sidorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

B. FIRST AID MEASURES:

- **Inhalation:**Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.Give
- **Ingestion:**DO NOT INDUCE VOMITING. Give large quantities of water or milk if available. Never give anything by month to an onconscious person. Get medical attention immrdiately.
- **Skin Contact:**Immediatelyflush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.
- **Eye Contact:**Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.
- **Note to Physician:**Perform endoscope in all cases of suspected sodium hydroxide ingestion. In cases ofsevere oesophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

C. FIRE FIGHTING MEASURES:

- **Fire**:Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminium, to generate flemmable hydrogen gas.
- **Explosion:**Not considered to be an explosion hazard.
- **Fire Extinguishing Media:**Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.
- **Special Information:**In the event of a fire, wear full protective clothing and self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

D. ACCIDENTIAL RELEASE MEASURES:

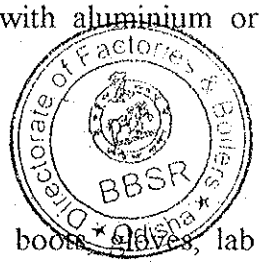
Ventiate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment.

Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with

water, neutralized with dilute acid such as acetic, hydrochloric or suphuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.

E. HANDLING AND STORAGE:

Kep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Always add the caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (dust, solods): observe all warnings and precautions listed for the product do not store with aluminium or magnesium. Do not mix with acids or organic materials.



F. EXPOSURE CONTROL AND PERSONAL PROTECTION

- **Skin Protection:** Wear impervious protective clothing, including boots, gloves, lab coat, apron as appropriate, to prevent skin contact.
- **Eye Protection:** Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilitites in work area.

G STABILITY AND REACTIVITY

- **Stability:** Stable under ordinary conditions of use and storage. Very hygroscopic. Can slowly pick up moisture from air and react with carbon dioxide from air to form sodium carbonate.
- **Hazardous Decomposition Products:** Sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.
- **Hazardous Polymerization:** Will not occur.
- **Incompatibilities:** Sodium hydroxide in contact with acids and organic halogen compounds, especially trichlorothylene, may causes violent reactions. Contact with metals such as aluminium, magnesium, tin and zine cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.

H. DISPOSAL CONSIDERATIONS

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to an approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

Do not dispose of wate with normal garbage, or to sewer systems. Whatever cannot be seved for recovery or recycling, including containers, should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management option.

I.TRANSPORT INFORMATION:

Concentration: 48%

MATERIAL SAFETY DATA SHEET(POWER OIL TO IS- 335)

Sr No	Characteristics	Unit	Test Method	Guaranteed Data	
				Min	Max
1	Appearance		Representative sample of the oil shall be examined in a100 mm thick layer at 27°C	Oil shall be clear, transparent and free from suspended matter or sediment	
2	Density at 29.5°C	g/ml	IS/1448P-16		0.89
3	Kinematic Viscosity at 27°C	cST	IS 1448 P25-1996		27
4	Flash Point, PMCC	°C	IS 1448 P21-1970	140	
5	Pour Point	°C	IS 1448 P10-1970		-6
6	Inter Facial Tension	N/m	Is 1448 -1971	0.04	
7	Neutralization Value				
	a) Total Acidity	Mg KOH/gm	IS 1448 P2-1967		0.03
	b) Inorganic Acidity/Alkalinity				NIL
8	Water content	ppm	IS 13567-1992		50
9	Specific Resistance				
	a) At 90 °C	Ohm-cm		$35x10^{12}$	
	b) At 27°C	Ohm-cm		$1500x10^{12}$	
10	Breakdown voltage		IS 6792-1972		
	New Unfiltered / After Filtration	kv		30/60	
11	Dielectric Dissipation Factor (Tan δ) at 90 ° C		IS 6262-1971		0.002
12	Corrosive Sulphur Copper Strip, 140 ° C, 19 Hrs		IS 335	Non-corrosive	
13	Presence of Oxidation Inhibitor	%	IS 13631-1992	The oil shall not contain antioxidant additive. Value of 0.05 % max shall be treated as absence of DBPC	
14	Oxidation stability at 100 ° C, 164 Hrs				
	a) Total Acidity	mg KOH /gm			0.4
	b) Sludge	%			0.1
15	Ageing characteristics after accelerated ageing (open beaker method with copper catalyst)		IS 12177 – 1987 Method A		
	Specific Resistance at 27 ° C	Ohm-cm		$2.5x10^{12}$	
	(Resistivity) at 90 ° C	Ohm-cm		$0.2x10^{12}$	
	Dielectric Dissipation Factor (Tan δ) at 90 ° C				0.20
	Total Acidity	mg KOH/ gm			0.05
	Total Sludge	%			0.05

Directorate of Factories & Boilers BBSR Odisha

A.HAZARDS IDENTIFICATION

Potential Health Effects:

- **Eye:** Contact may cause mild eye irritation including stinging, watering, and redness.
- **Skin:** Contact may cause mild skin irritation including redness, and a burning sensation. Prolonged or repeated contact can worsen irritation by causing drying and cracking of the skin leading to dermatitis (inflammation). No harmful effects from skin absorption are expected.
- **Inhalation (Breathing):** No information available. Studies by other exposure routes suggest a low degree of toxicity by inhalation.
- **Ingestion (Swallowing):** No harmful effects expected from ingestion.
- **Signs and Symptoms:** Effects of overexposure may include irritation of the nose and throat, irritation of the digestive tract, nausea and diarrhea.

B. FIRST AID MEASURES

- **Eye:** If irritation or redness develops, move victim away from exposure and into fresh air. Flush eyes with clean water. If symptoms persist, seek medical attention.
- **Skin:** Wipe material from skin and remove contaminated shoes and clothing. Cleanse affected area(s) thoroughly by washing with mild soap and water and, if necessary, a waterless skin cleanser.
- **Inhalation (Breathing):** If respiratory symptoms develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.
- **Ingestion (Swallowing):** First aid is not normally required; however , if swallowed

C. FIRE-FIGHTING MEASURES

- **Unusual Fire & Explosion Hazards:** This material may burn, but will not ignite readily. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.
- **Extinguishing Media:** Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F.

Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

D. Accidental Release Measures:

- **Personal Precautions:** Avoid contact with skin and eyes.
- **Personal Protection :** Wear impermeable glove and boots.
- **Environmental Precautions:** Prevent from spreading or entering into drains, ditches or rivers by using sand , earth or other appropriate barriers inform local authorities if this cannot be prevented.
- **Clean-up methods-small spillage:** Absorb liquid with sand or earth, sweep up and remove to a suitable , clearly marked container for disposal in accordance with local regulations.
- **Clean-up methods-** large spillage: prevent from spreading by making a barrier with sand , earth or other containment material reclaim liquid directly or in an absorbent dispose of as for small spills.

D. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: if current ventilation practices are not adequate to maintain airborn concentrations below the established exposure limits, additional engineering controls may be required

- Personal Protective Equipment (PPE):

  Hygine measure: wash hands before eating , drinking, smoking and using the toilet.

  Respiratory protection: carry out a health risk assessment to determine personal protection equipment that is necessary to avoid contact and exposure and that is appropriate to the job.

  Hand protection: wear PVC or nitril rubber gloves.

  Eye protection: wear safety glasses or full face shield if splashes are likely to occur.

  Body Protection: Minimize all forms of skin contact, wear overalls minimize contamination of personal clothing launder overalls and undergarments regularly.

E. Stability and reactivity:

Stability: stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Condition to avoid: Extend exposure to high temperatures can cause decomposition.

Material to avoid: Avoid contact with strong acids, strong bases, and oxidizing agents.

Hazards Decomposition Product: Combustion can yield and carbon, nitrogen and sulfur oxides.

Annesure-7

WORKSHEET (INSTRUCTION) FOR WORKS MAIN CONTROLLER (WMC), SITE INCIDENT CONTROLLER (SIC), EMERGENCY TEAM LEADERS (ATL, CTL, RTL)

WORKS MAIN CONTROLLER (WMC):

- On getting information about emergency, rush to emergency site; get details from Site Incident Controller (SIC) and then proseed to the Emergency Control Room (ECR). After reaching ECR, declares emergency, if the situation is so. Accordingly, he directs the security Gate/RTL to blow siren for of emergency.
- Advise Auxiliary Team Leader (ATL) to arrange for external communication with Mutual Aid Partners, Local Administration and Statutory Authorities.
- Maintain continuous communication with Site Incident Controller (SIC) to review the situation and assess posible course of events.
- Advise Auxiliary Team Leader (ATL) to communicate the relatives of the causalities and chief of personnel to communicate to statutory authorities.
- After normalcy is ensured, advise Rescue Team Leader (RTL) to blow all clear sire.
- Arrange for chronological recording of emergency operations and get in touch with outside experts if there is a need.

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SITE INCIDENT CONTROLLER (SIC):

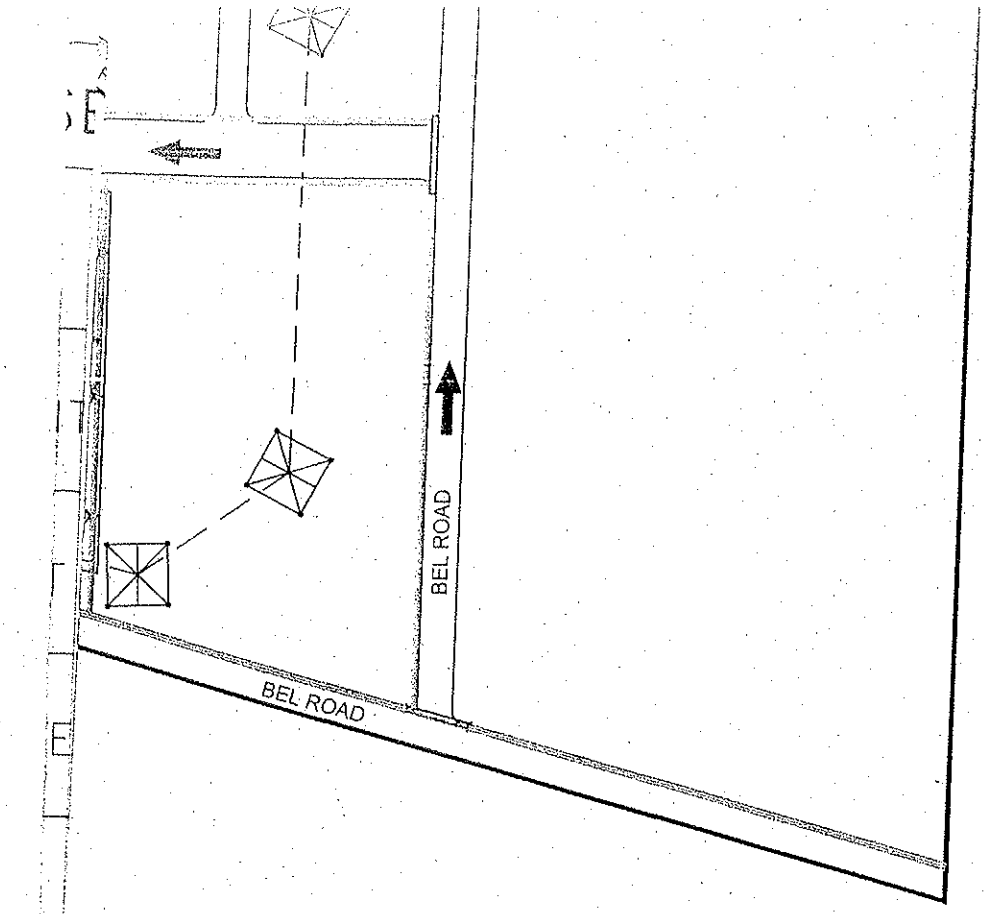
- On getting information about the incident proceed to site and inform the WMC.
- Assess the sitution and appraise the works Main Controller (WMC) about the situtation for declaration of emergency.
- Activate emergency procedure, call Rescue Team Leader (RTL) and Auxiliary Team Leader (ATL) direct them for execution of their jobs through their respective teams.
- To decide thhe safe route to be followed by fire fighter and ambulance services (if required) withinn the factory to reach the site of emergency.
- Instruct the Rescue Team Leader (RTL) to arrange for evacuation of non-essential persons to the Assembly Point.
- Utilise combat teama and rescue team in carrying out their function.keep in tocuch with different teams, advice and guide them. Arrange for additional help through works Main Controller (WMC) & Auxiliary Team Leader (ATL).
- Keep Works Main Controller (WMC) informed periodically about the progress made.

AUXILLIARY TEAM LEADER (ATL):

- On receiving information from WMC / SIC/CTL rush to the ECR.
- When advised by Works Main Controller (WMC), inform the required mutual aid partners to reach the site with their facilities immediately. If necessary, arrange their conveyance and coordinate so that they reach the site through safe route.
- Inform the relatives of the casualties. Arrange vechiles to send the causalities to their residence.
- Keep record of the actions taken at site chronologically for future reference by Work Main Controller (WMC).
- Organize counting of Personnel at Assembly Point.

Annesure-8

Plot Plan



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BBSR
Odisha

M/s BHUSHAN ENERGY LIMITED.

AT-GANTHIGADIA,PO-BANAHARPAL
ANGUL, ODISHA

TITLE :-

LAY-OUT PLAN OF
BHUSHAN ENERGY LIMITED

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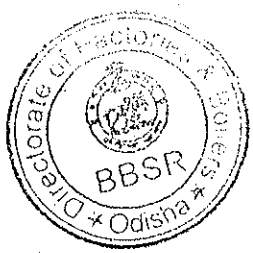
A B C D

1 2

WINDROSE DIAGRAM

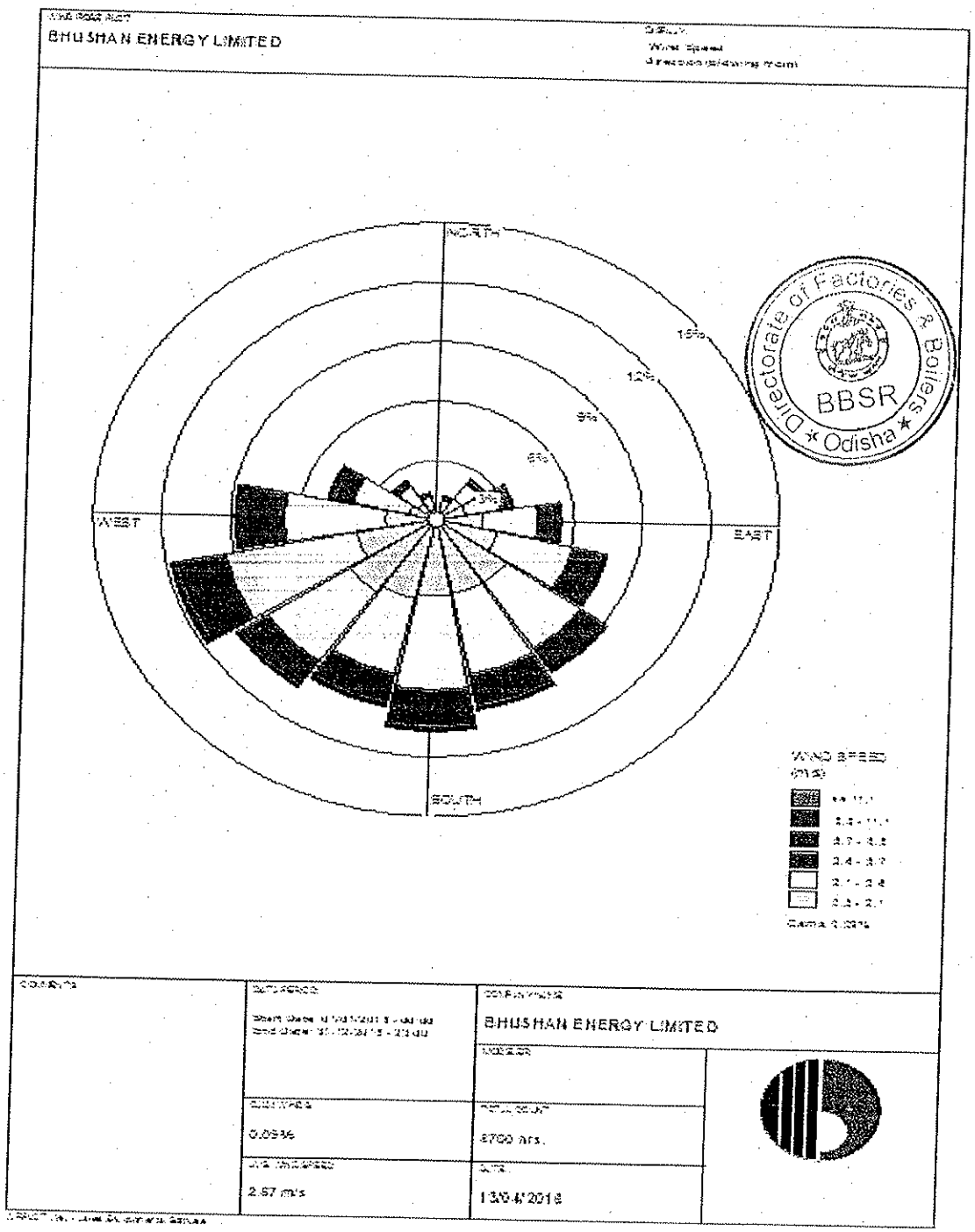
&

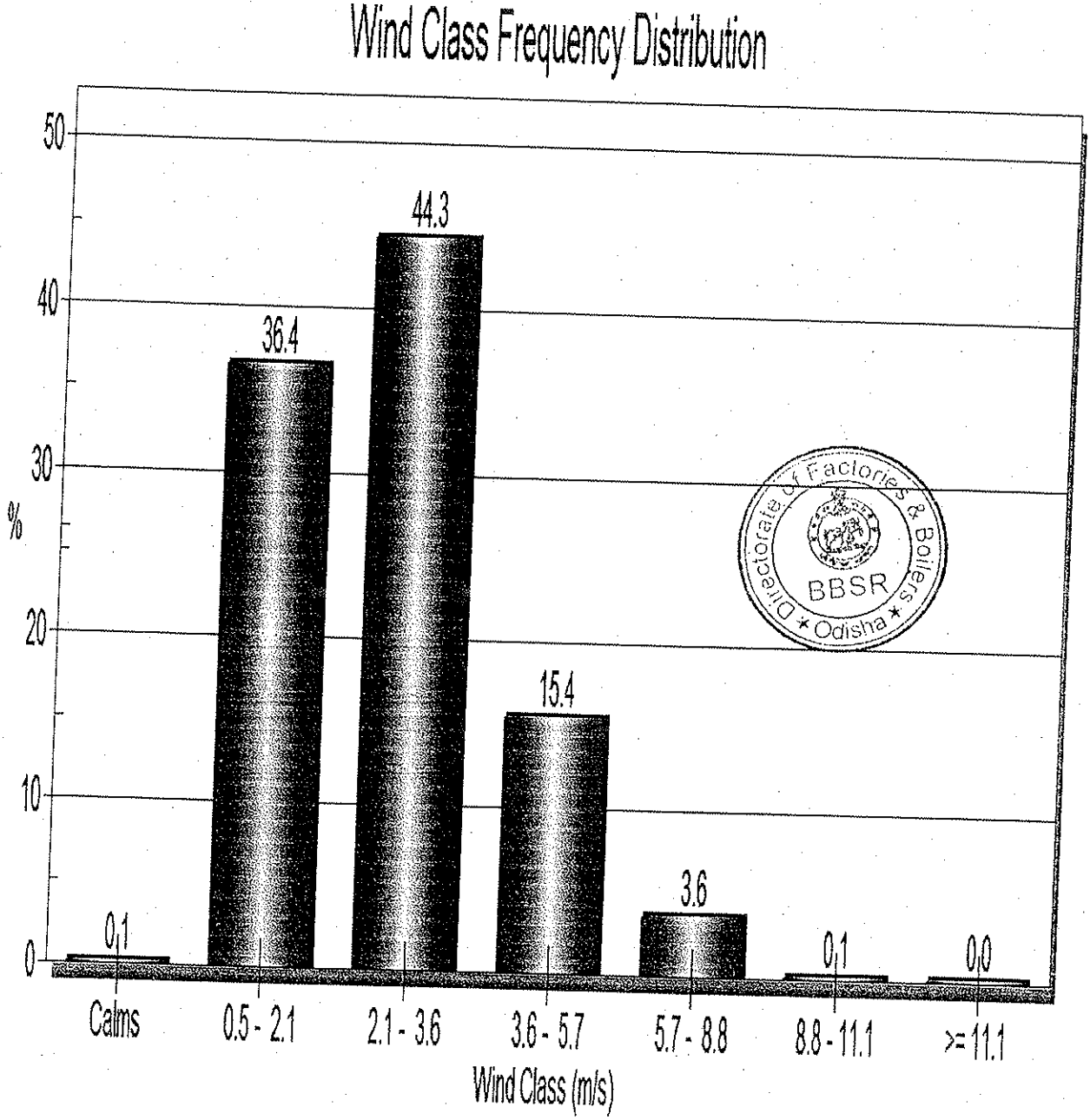
POOL FIRE MODELLING.



Annexure-9

SITE SPECIFIC ROSE





Annexure-10

POLL FIRE MODELLING FOR HSD IN STORAGE TANK

Input Data: For Summer Season in Day Time:

Storage Details:-

1. No. Of tanks : 01
2. Capacity : 20KL
3. Diameter : 2.7M
4. Height : 5.1m

Meteorological Data

	Summer		Rainy		Winter	
	Day	Night	Day	Night	Day	Night
a. Maximum wind speed m/sec.	6.2	3.8	5.1	3.5	4.5	2.3
b. Wind direction	SW		NW		N	NW
c. Humidity	85	67	92	83	65	45
d. Maximum Ambient Air teperatur ^{0}C	45	31	37	27	33	22

Fire Characteristics Data:

E_{max} = Maximum suface emissive power for the fuel(kw/m^2)
$\tau\beta$ = Mean began length corrector extinction coefficient product (m^{-1})
K_m = Extinction coefficient for fuel (m^{-1})
M'' = Mass burning rate of fuel kg/m^{2}s
U_{10} = Wind speed at a height of 10m (m/s)
χ_R = Unobscured ratio of upper flame zone

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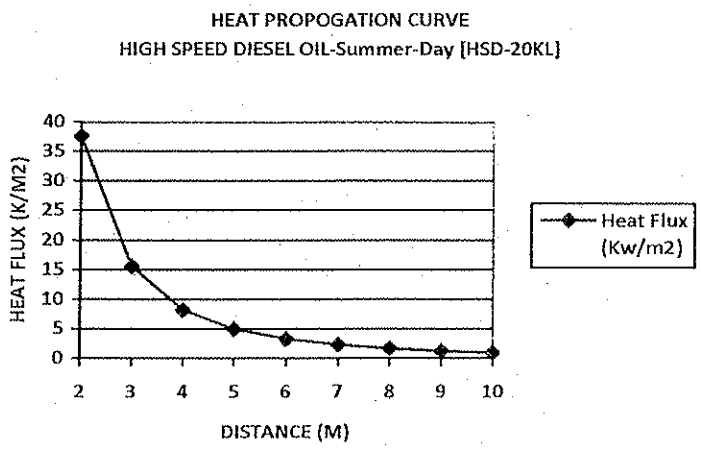
OUT PUT DATA for summer in day time:Heat Flux data : HSD

POOL FIRE MODEL – HIGH SPEED DIESEL OIL-Summer -day (HSD -20KL)

Distance (M)	Heat Flux (kw/m^2)
2	37.68
3	15.64
4	8.34
5	5.1
6	3.41
7	2.42
8	1.79
9	1.38
10	1.09



There are three significant "Heat levels" of interests which are as follows:

Significant Heat level	Value	Experience at Distance of	Indication
SHL-1	4.5km/ m^2	4.5m	Causes pain if unable to reach cover within 20sec.
SHL-2	12.5km/ m^2	3.2m	Minimum energy required for melting of plastic.
SHL-3	37.5km/ m^2	2.6m	Sufficient to cause damaged to the equipment.

Therefore , the three levels of thermal radiations of interest i.e, , 4.5km/ m^2 , 12.5km/ m^2 , 37.5km/ m^2 , are experienced at a distance of 4.5m, 3.2m and 2.6m respectively.

Input Data: For Summer Season in Night Time: HSD in Storage Tank

Storage Details:-	
1. No. Of tanks	: 01
2. Capacity	: 20KL
3. Diameter	: 2.7M
4. Height	: 5.1m

Meteorological Data

	Summer		Rainy		Winter	
	Day	Night	Day	Night	Day	Night
a. Maximum wind speed m/sec.	6.2	3.8	5.1	3.5	4.5	2.3
b. Wind direction(from)	SW		NW		N	NW
c. Humidity	85	67	92	83	65	45
d. Maximum Ambient Air teperatur ^{0}C	45	31	37	27	33	22

Fire Characteristics Data:

E_{max} = Maximum suface emissive power for the fuel(kw/m^2)
KB = Mean began length corrector extinction coefficient product (m^{-1})
K_m = Extinction coefficient for fuel (m^{-1})
M" = Mass burning rate of fuel kg/m^{2}s
U_{10} = Wind speed at a height of 10m (m/s)
U_R = Unobscured ratio of upper flame zone

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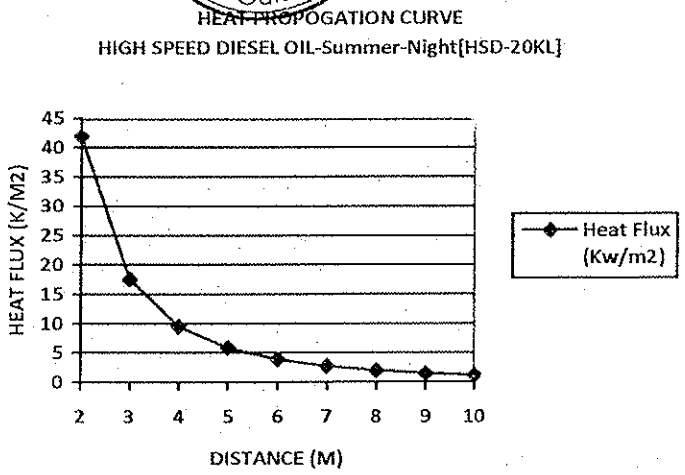
OUT PUT DATA for summer in night time:
Heat Flux data : HSD

POOL FIRE MODEL – HIGH SPEED DIESEL OIL-Summer - Night (HSD-20KL)	
Distance (M)	Heat Flux (kw/m^2)
2	42.06
3	17.7
4	9.58
5	5.93
6	4.0
7	2.86
8	2.14
9	1.66
10	1.3



There are three significant " Heat levels" of interests which are as follows:

Significant Heat level	Value	Experience at Distance of	Indication
SHL-1	4.5km/ m^2	6.2m	Causes pain if unable to reach cover within 20sec.
SHL-2	12.5km/ m^2	3.4m	Minimum energy required for melting of plastic.
SHL-3	37.5km/ m^2	2.6m	Sufficient to cause damaged to the equipment.

Therefore , the three levels of thermal radiations of interest i.e, , 4.5km/ m^2 , 12.5km/ m^2 , 37.5km/ m^2 , are experienced at a distance of 6.2m, 3.4m and 2.6m respectively.

Input Data: For Rainy Season in Day Time: HSD in storage Tank

Storage Details:-	
1. No. Of tanks	: 01
2. Capacity	: 20KL
3. Diameter	: 2.7M
4. Height	: 5.1m

Meteorological Data

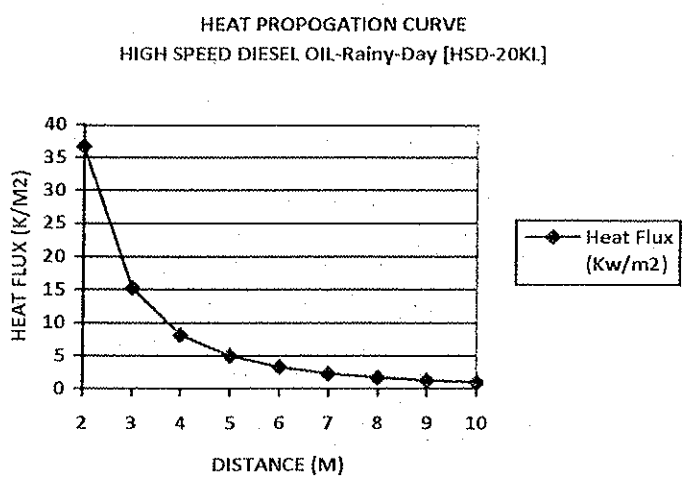
	Summer		Rainy		Winter	
	Day	Night	Day	Night	Day	Night
a. Maximum wind speed m/sec.	6.2	3.8	5.1	3.5	4.5	2.3
b.Wind direction	SW		NW		N	NW
c. Humidity	85	67	92	83	65	45
d. Maximum Ambient Air teperatur0C	45	31	37	27	33	22

ire Characteristics Data:

E_{max} = Maximum suface emissive power for the fuel(kw/m^2)
KB = Mean began length corrector extinction coefficient product (m^{-1})
K_m = Extinction coefficient for fuel (m^{-1})
M" = Mass burning rate of fuel kg/m^2s
U_{10} = Wind speed at a height of 10m (m/s)
U_R = Unobscured ratio of upper flame zone

OUT PUT DATA for Rainy in day time:
Heat Flux data : HSD

POOL FIRE MODEL –HIGH SPEED DIESEL OIL-Rainy -day (HSD-20KL)	
Distance (M)	Heat Flux (kw/m^2)
2	36.76
3	15.3
4	8.18
5	5.02
6	3.36
7	2.39
8	1.78
9	1.37
10	1.08



There are three significant " Heat levels" of interests which are as follows:

Significant Heat level	Value	Experience at Distance of	Indication
SHL-1	4.5km/ m^2	5.6m	Causes pain if unable to reach cover within 20sec.
SHL-2	12.5km/ m^2	3.2m	Minimum energy required for melting of plastic.
SHL-3	37.5km/ m^2	2.4m	Sufficient to cause damaged to the equipment.

Therefore , the three levels of thermal radiations of interest i.e, , 4.5km/ m^2 , 12.5km/ m^2 , 37.5km/ m^2 , are experienced at a distance of 5.6m, 3.2m and 2.4m respectively.

Input Data: For Rainy Season in Night Time: HSD in storage Tank

Storage Details:-

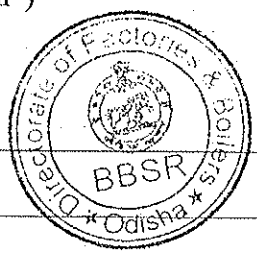
1. No. Of tanks	: 01
2. Capacity	: 20KL
3. Diameter	: 2.7M
4. Height	: 5.1m

Meteorological Data

	Summer		Rainy		Winter	
	Day	Night	Day	Night	Day	Night
a. Maximum wind speed m/sec.	6.2	3.8	5.1	3.5	4.5	2.3
b. wind direction	SW		NW		N	NW
c. Humidity	85	67	92	83	65	45
Maximum Ambient Air teperatur0C	45	31	37	27	33	22

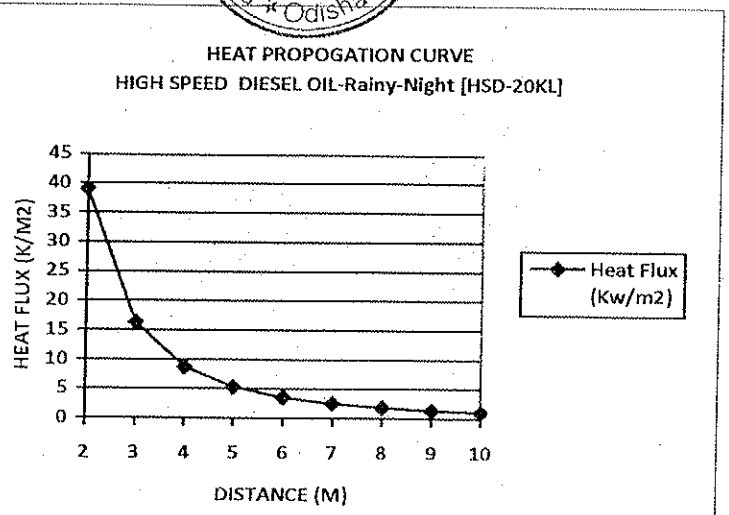
Fire Characteristics Data:

E_{max} = Maximum suface emissive power for the fuel(kw/m^2)
KB = Mean began length corrector extinction coefficient product (m^{-1})
K_m = Extinction coefficient for fuel (m^{-1})
M" = Mass burning rate of fuel kg/m^2s
U_{10} = Wind speed at a height of 10m (m/s)
U_R = Unobscured ratio of upper flame zone



OUT PUT DATA for Rainy in Night time:
Heat Flux data : HSD

POOL FIRE MODEL – HIGH SPEED DIESEL OIL-Rainy-Night (HSD-20KL)	
Distance (M)	Heat Flux (kw/m^2)
2	39.15
3	16.44
	8.85
5	5.46
6	3.68
7	2.63
8	1.96
9	1.52
10	1.2



There are three significant " Heat levels" of interests which are as follows:

Significant Heat level	Value	Experience at Distance of	Indication
SHL-1	4.5km/ m^2	5.0m	Causes pain if unable to reach cover within 20sec.
SHL-2	12.5km/ m^2	3.2m	Minimum energy required for melting of plastic.
SHL-3	37.5km/ m^2	2.6m	Sufficient to cause damaged to the equipment.

Therefore, the three levels of thermal radiations of interest i.e, , 4.5km/ m^2 , 12.5km/ m^2 , 37.5km/ m^2 , are experienced at a distance of 5.0m, 3.2m and 2.6m respectively.

Input Data: For Winter Season in Day Time: HSD in storage Tank

Storage Details:-

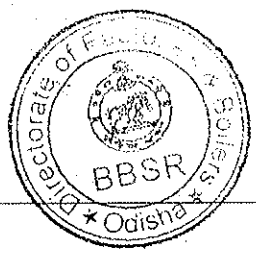
1. No. Of tanks : 01
2. Capacity : 20KL
3. Diameter : 2.7M
4. Height : 5.1m

Meteorological Data

	Summer		Rainy		Winter	
	Day	Night	Day	Night	Day	Night
a. Maximum wind speed m/sec.	6.2	3.8	5.1	3.5	4.5	2.3
b. Wind direction	SW		NW		N	NW
c. Humidity	85	67	92	83	65	45
Maximum Ambient Air teperatur0C	45	31	37	27	33	22

Fire Characteristics Data:

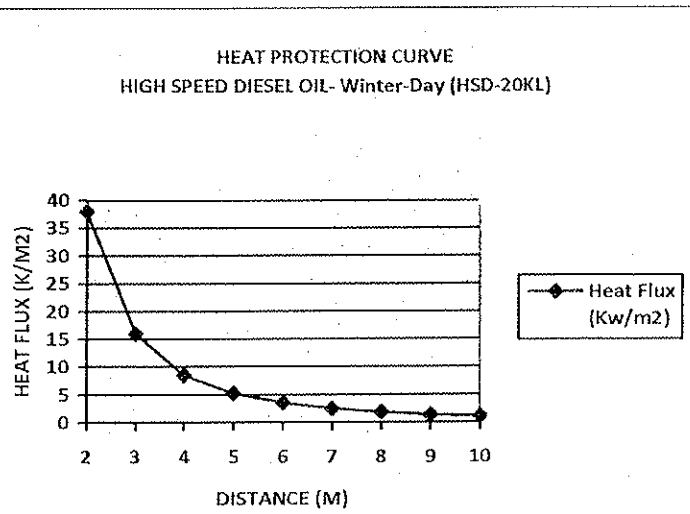
E_{max} = Maximum suface emissive power for the fuel(kw/m^2)
KB = Mean began length corrector extinction coefficient product (m^{-1})
K_m = Extinction coefficient for fuel (m^{-1})
M" = Mass burning rate of fuel kg/m^2s
U_{10} = Wind speed at a height of 10m (m/s)
U_R = Unobscured ratio of upper flame zone



OUT PUT DATA for winter in day time:

Heat Flux data : HSD

POOL FIRE MODEL – HIGH SPEED DIESEL OIL- Winter Day (HSD-20KL)	
Distance (M)	Heat Flux (kw/m^2)
2	38.05
3	16.03
4	8.65
5	5.35
6	3.61
7	2.58
8	1.93
9	1.49
10	1.19



There are three significant " Heat levels" of interests which are as follows:

Significant Heat level	Value	Experience at Distance of	Indication
SHL-1	4.5km/ m^2	5.2m	Causes pain if unable to reach cover within 20sec.
SHL-2	12.5km/ m^2	3.2m	Minimum energy required for melting of plastic.
SHL-3	37.5km/ m^2	2.0m	Sufficient to cause damaged to the equipment.

Therefore , the three levels of thermal radiations of interest i.e, , 4.5km/ m^2 , 12.5km/ m^2 , 37.5km/ m^2 , are experienced at a distance of 5.2m, 3.2m and 2.0m respectively.

Input Data: For Winter Season in Night Time: HSD in storage Tank

Storage Details:-	
1. No. Of tanks	: 01
2. Capacity	: 20KL
3. Diameter	: 2.7M
4. Height	: 5.1m

Meteorological Data

	Summer		Rainy		Winter	
	Day	Night	Day	Night	Day	Night
a. Maximum wind speed m/sec.	6.2	3.8	5.1	3.5	4.5	2.3
b. Wind direction	SW		NW		N	NW
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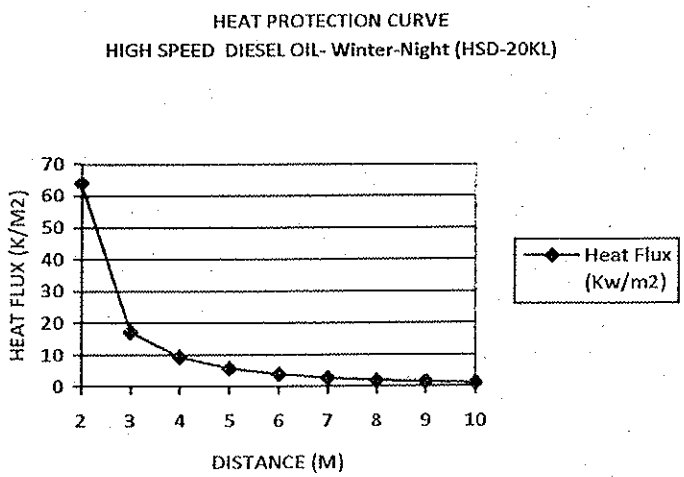
M" = Mass burning rate of fuel kg/m^2s
U_{10} = Wind speed at a height of 10m (m/s)
U_R = Unobscured ratio of upper flame zone

OUT PUT DATA for Winter in Night time:
Heat Flux data : HSD

POOL FIRE MODEL – HIGH SPEED DIESEL OIL- Winter Night (HSD-20KL)	
Distance (M)	Heat Flux (kw/m^2)
2	64.17
3	17.32
4	9.42
5	5.86
6	3.98
7	2.86
8	2.15
9	1.67
10	1.33



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Significant Heat level	Value	Experience at Distance of	Indication
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