DIRECTORATE OF FACTORIES & BOILERS, ODISHA, BHUBANESWAR-751001
PH-2396070

No.IV(IH)(3)-139/15/ 18270 /Dt. 6/11/15

To

The occupier,
M/s.Talcher Super Themal Power Corporation Ltd., NTPC
AT/ P.O- Deepsikha,Kaniha
DIST- Angul

Sub:- Acceptance of On-Site Emergency Plan

Sir,

The On-Site Emergency plan submitted to this office vide your letter No. 09050/Safety/2152 dt. 02.11.2015 for mitigation of identified HAZARD due to **COAL, CHLORINE, HYDROGEN,LDO,LIQUID AMMONIA, HFO,LIQUID OXYGEN & TRANSFORMER OIL** stored/handled in the factory is provisionally accepted this day **5th of November, 2015** bearing receipt serial number **09/15** and copy thereof is sent here with for your record.

CONDITIONS

1. The occupier shall ensure that the document is updated taking into account any modification in the industrial activity/changes in inventory of hazardous substances/changes in key personnel before it is taken up and submitted for acceptance
2. The occupier shall put up prominent hoarding adjacent to the entrance gate (s) indicating the possible hazards associated with the factory and the "Dos" and "Don't" and also display at conspicuous places inside the factory together with measures to be taken in case of such incident.
3. The occupier shall ensure that every key personnel of the emergency command structure is provided with a "**WORKSHEET**" containing his duties & responsibilities.
4. The occupier shall ensure that a **MOCK DRILL** of the On-Site Emergency Plan is conducted involving zonal Asst.Director of Factories and Boilers once in every six months to review the activation and closing procedure laid down therein and also shall ensure that a **MOCK DRILL** is reviewed by the district administration in the month of May every year.

You are requested to forward a accepted copy of the On-Site Emergency Plan to each of the following authorities under intimation to this office.

- Asst.Director of Factories and Boilers , Angul zone-II
- Deputy Director of Factories & Boilers Angul Division

Receipt of this letter may be acknowledged.

Yours faithfully,

Director of Factories & Boilers, Odisha

Memo No_____/Dt_____

Copy forwarded to the Asst. Director of Factories & Boilers, Angul Zone-II for information and necessary action.

Director of Factories & Boilers, Odisha

6/11/15

SL·NO·09

ONSITE EMERGENCY PLAN

एनटीपीसी
NTPC

ACCEPTED
Date 05.11.15
BHUBANESWAR

5.11.15
Director of Factories & Boilers
Odisha, Bhubaneswar

NATIONAL THERMAL POWER CORPN. LTD.

TALCHER SUPER THERMAL POWER STATION

AT- KANIHA, DIST- ANGUL, ODISHA

CONTENTS

GENERAL INFORMATION ABOUT THE FACTORY

1.0 GENERAL INFORMATION ABOUT THE FACTORY:

Talcher Super Thermal Power Station has its production unit located in a medium populated area at Kaniha in Angul District of Odisha. The Industry is situated which is at a distance of 13 KM from NH 53 & at a distance of 55 Kms from the district headquarters, Angul. The nearest airport is at Bhubaneswar which is about 180 Kms away from the plant. The nearest bus stop is at Talcher which is about 25 Kms from the plant location & railway station is at Talcher which is about 30 Kms from the plant location.

Name & Address Of The Factory	**Talcher Super Thermal Power Station** At/Po- Deepshikha P.S.- Kaniha Dist- Angul Odisha: 759147 Web site-www.NTPC.co.in Telephone No.- 06760-247619 Telefax No.-06760-232423
Name & Address of Head Office	**NTPC Bhawan** Scope Complex, 7 Lodi Road, New Delhi Resi- A-05, NITI BAGH New Delhi- 110003 Contact No.- 011-24360044 011-24361199 E-mail:-info@ntpc.co.in Telefax No:-911124361018
Name & Designation Of Occupier	Name: Mr. N.K.KOTARI Group General Manager Cell:08280082804 E-mail:-nkkothari@ntpc.co.in
Name & Designation Of Manager	Name: Mr. ANANDA KHALATKAR General Manger Cell:- 9437483872 E-mail:-ANANDAKHALATKAR@.NTPC.co.in
Product	Power Generation
Plant Facilities	6 x 500 MW Power Plant

BRIEF MANUFACTURING PROCESS:

PROCESS DESCRIPTION

PROCESSES INVOLVED IN POWER GENERATION

- **Production of Steam**

Coal from the coal wagons is unloaded in the coal handling plant. This coal is transported up to the raw coalbunkers with the help of conveyor belts. Coal is transported to ball mill by coal feeders. The coal is pulverized in the ball mills, where it is grounded to a powder form. The ball mill in stage-I consists of a cylindrical drum having steel balls inside the mill. A motor through gear train to bring down speed rotates cylinder. The coal inside the mill is ground continuously by steel balls. This crushed coal is taken away to the furnace through coal pipes with the help of hot and cold air mixture from PA Fan. PA fan takes atmospheric air, a part of which is sent to Air-Preheaters for heating while a part goes directly to the mill for temperature control. Atmospheric air from FD fan is heated in the air pre-heaters and sent to the furnace as combustion air.

Stage-I

The steam generator is of tower type, once water circulation through tube, direct pulverized coal fired, balance draft, single reheat dry bottom type. In once through boiler evaporator tubes are in series with economizer and super heater. Consequently mass flow is equal all along the circuit at higher loads and at start up and low load operation. Boiler feed pump ensures minimum water flow through evaporator tubes. Non-vaporized excess water is drained to condenser from separator. Steam from separator is heated in super heater to 540^0 C before being led into turbine.

Stage-II

The steam generator is conventional drum type. The coal is grinded by pulverizes called bowl mills.

Flue gas from furnace is extracted by two nos. of ID fan after releasing heat to various heat exchangers like super heater. Re heater, Economizer, Primary and secondary air pre heater etc. and flue gas is passed through ESP where dust particles are separated and disposed in slurry form.

➢ ***STEAMS TO POWER***

As can be seen from figure of the boiler, a steam pipe conveys steam to be turbine through a stop valve (which can be used to shut off steam in an emergency) and through copies valves that automatically regulate the supply of steam to the turbine. Stop valve and control valves are located in a steam chest and a governor operates the control valves to regulate the amount of steam used (This depends upon the speed of the turbine and amount of electricity required from generators).

Steam from the control valves enters the high-pressure cylinder of the turbine, where it passes through a ring of stationary blades fixed to the cylinder wall. These act as nozzles and direct the steam into a second ring of moving blades mounted on a disc secured to the turbine shaft. This second ring turns the shaft as a result of the force of the steam. The stationary and moving blades together constitute a 'stage' of the turbine and in practice many stages are necessary. So the cylinder contains a number of rings of stationary blades with rings of moving blades arranged between them. The steam passes through each stage until it reaches the end of the high pressure cylinder and in its passage, the heat energy is converted into mechanical energy.

The steam leaving the high-pressure cylinder goes back to the boiler for re-heating and returns by a further pipe to the intermediate pressure cylinder. Here it passes through another series of stationary and moving blades.

Finally, the steam is taken to the low-pressure cylinders, each of which it enters at the centre flowing outwards in opposite directions through the rows of turbine blades of an arrangement known as double flow to the extremities of the cylinder. As the steam gives up its heat energy to drive the turbine, its temperature and pressure fall and it expands. Because of this expansion the blades are much large and longer towards the low-pressure ends of the turbine.

The turbine shaft usually rotates at 3,000 revolutions per minute. This speed is determined by the frequency of the electrical system used in this country and is the speed at which a 2 Pole generator must be driven to generate alternating current at a frequency of 50 cycles per second.

When as much energy as possible has been extracted from the steam, it is exhausted directly to the condenser. This runs along the length of the low-pressure part of the turbine and is beneath. The condenser consists of a large vessel containing around 30,000 tubes, each about 25 mm in diameter. Cold water is circulated through these tubes and as the steam

from the turbine passes round them, it is rapidly condensed into water. Because water has a much smaller comparative volume than steam, a vacuum is created in the condenser. This allows the steam to reduce down to pressure below that of the normal atmosphere and more energy can be utilized.

From the condenser, the condensate is pumped through low-pressured heaters by the extraction pump, after which its pressure is raised to boiler by the boiler feed pump. It is passed through further feed heaters to the economizer and the boiler for re-conversion into steam.

Where the cooling water for power stations is drawn from large rivers, estuaries or the coast, it can be returned directly to the source after use. Power stations situated on smaller rivers and inland do not have such vast water resources available, so the cooling water is passed through cooling towers (Where its heat is removed by evaporation and to used) .

A power station generating 200 MW of electricity requires about 120,000 cubic meters of water per hour for cooling purposes. Where cooling towers are used, about one hundred part of the cooling water evaporates and a certain amount is returned to its source to carry away any impurities that collect. Most of it, however, is re-circulated.

- **SWITCHING AND TRANSMISSION**

Electricity is usually produced in the stator windings of large modern generators at about 21,000 volts and is fed through terminal connections to one side of a generator transformer that step up the voltage to 400000 volts. From where conductors carry it to a series of three switches comprising an isolator, a circuit breaker and another isolator.

The circuit breaker, which is a heavy-duty switch capable of operating in a fraction of a second, is used to switch off the current flowing to the transmission lines. Once the current has been interrupted the isolators can be opened. These isolate the circuit breaker from all outside electrical sources, so that there is no chance of any high voltages being applied to its terminals. Maintenance or repair work can then be carried out in safely.

From the circuit breaker the current is taken to the bus bars conductors which run along the length of the switching compound and associated isolators. But the electricity generated is fed into a common set of bus bars.

Circuit breakers work like combined switches and fuse, but they have certain special features and are very different from the domestic switch and fuse. When electrical current is switched off by separating two contacts, an arc is created between them. At the voltage used in the home, this arc is very small and only lasts for a fraction of a second but at the very

high voltages used for transmission, the size and power of the arc is considerable and it must be quickly quenched to prevent damage.

One type of circuit breaker has its contacts immersed in insulating oil so that when the switch is opened, either by powerful electrical coils or mechanically by springs there is quickly extinguished by the oil. Another type works by compressed air which operators the switch and at the same 'blows out' the arc. At TSTPS circuit breakers use Sulpher hexa fluoride gas to quench the arc.

The center of the power station is the control room. Here engineers monitor the output of electricity, supervising and controlling the operating of generating plant and high voltage switchgear and directing power to the Grid system as required. Instruments on the control panels show the output and conditions, which exist on all the main plant, and a miniature diagram indicates the precise state of the electrical system.

- **MAJOR PLANT SECTIONS**

Considering the process and the material to be used Thermal Power Station following can be considered as main plant sections.

a) Coal handling plant and MGR system

b) Main Plant (Boiler, Turbo Generator etc.)

c) Water Treatment Plant

d) Hydrogen Generation Plant

e) Switchyard including sub-stations.

F) Fuel oil handling plant

g) Off site pump houses.

h) Ash Dyke Area

i) Cable Galleries

PROCESS FLOW DIAGRAM

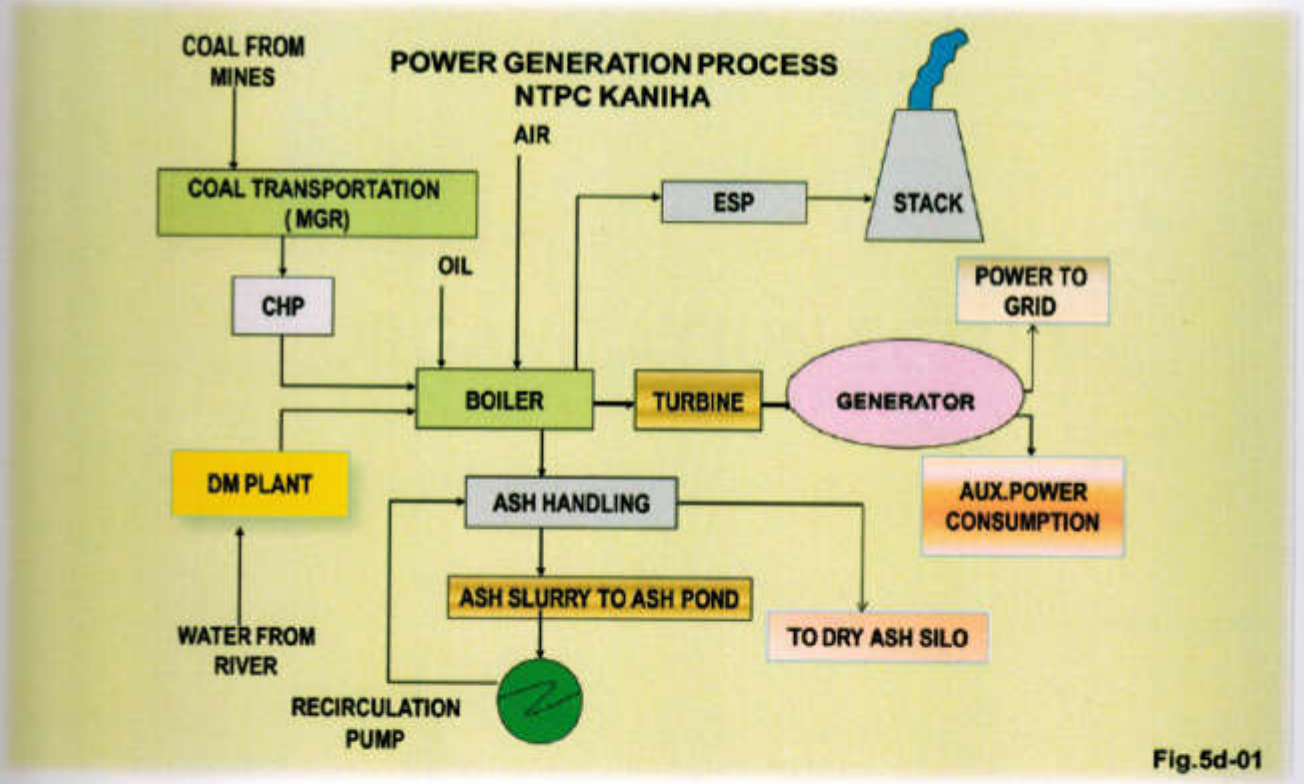
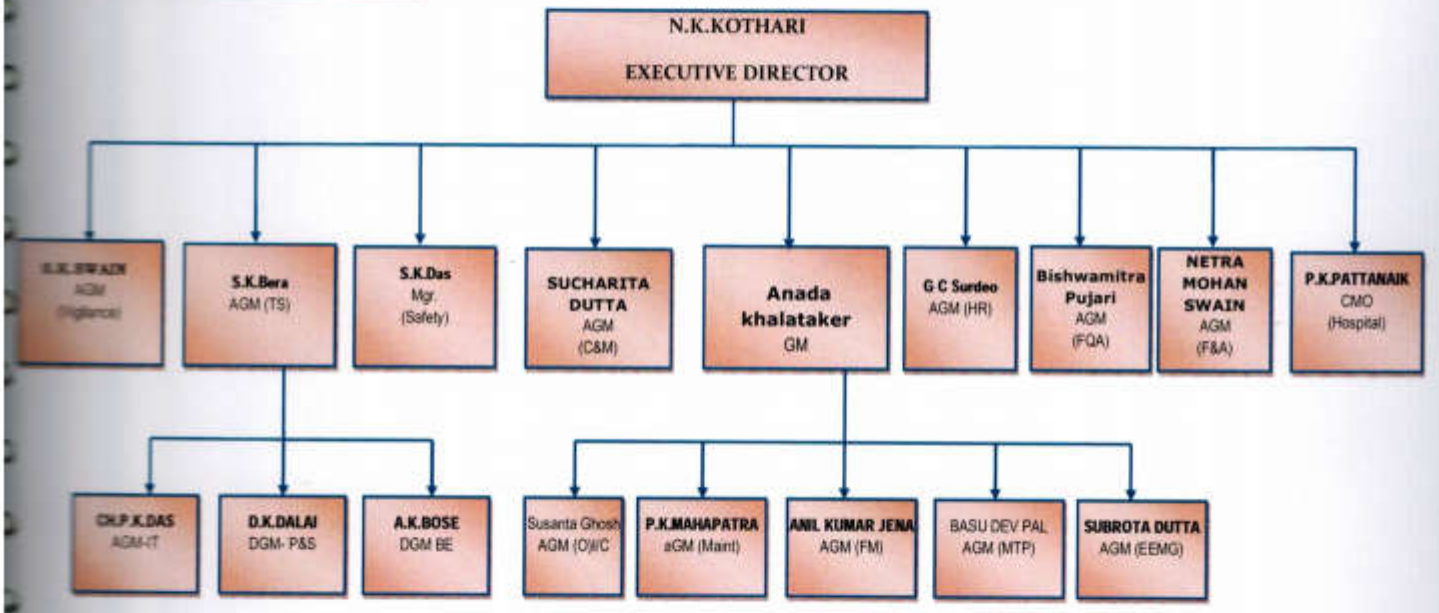


Fig.5d-01

ORGANIZATION SETUP

2.0 ORGANIZATION SET UP-



MAN POWER

3.0 MAN POWER:

Manpower as per license is 3941 and shift wise distribution of employees is as follows:

Shift	Employee (NTPC)	Security	Canteen	Fire	Contractor Workmen
A	134	49	0	12	400
B	134	49	24	12	400
C	134	49	14	12	400
Gen.	804	108	36	27	1090
TOTAL	**1206**	**255**	**74**	**63**	**2290**
ALL TOTAL		**3888**			

PRODUCT

&

BY-PRODUCT

4.0 PRODUCT:

Sl. No.	Name of Product	Quantity Produced (T/Y)
1	Power	3000 MW (6 x 500 MW)

4.1. BY-PRODUCT:

Sl. No.	Name	Quantity Produced (T/Y)	Quantity of One Time Storage	Storage Type	Size of The Storage area	Type of disposal
1	Fly Ash	65 Lac. MT	60 Lac MT	Ash Dyke	1600 acres For stage 1= 750 For stage 2=850	Lean Slurry
2	Dry Ash	1000m/day	995ton	Dry ash silo	2360m^2	Dry through bulker and open tank

INVENTORY OF RAW MATERIAL

5.0 INVENTORY OF RAW MATERIALS:

Sl. No.	Name	Quantity of One Time Storage	total Storage Capacity	Type of Storage	Size of The Storage Area
1	Coal	795000 MT	800000 MT	Stack yard	Pile- 1,2,3,4 (width- 40m, length- 400m)
					Pile -5,6 (Width – 50m, length - 420 m) Length-7m
					Pile -7,8 (width-50 m, lenth-470meter) Length-7m

INVENTORY OF HAZARDOUS SUBSTANCES

6.0 INVENTORY OF HAZARDOUS SUBSTANCES

SL No.	Chemical Stored	Type of Container (AG/UG)	No's	Location	Maximum One Time Storage	Maximum Storage Capacity	Max inventory	Dimension of the storage container
01	HCL (30% Conc.)	4.5mm thick inner Rubber lined mild (AG)	04	DM Plant Stage-I	$50m^3$	50 M^3 Each	270 MT	d-2750mm L-8938mm
			04	DM Plant Stage-II	$50m^3$			
		Steel tank (AG)	**02**	CP Unit	$25m^3$	25 M^3 Each		D-2500mm L-4100mm
						Total- 450 M^3		
02	Caustic Soda (48% Conc.)	Rubber lined mild (AG)	02	DM Plant Stage-I	$50M^3$	50 M^3 Each	200MT	d-2750mm L-8938mm
			02	DM Plant Stage-II	$50M^3$			
		Steel tank (AG)	02	CP Unit	$20M^3$	25 M^3 Each		D-2500mm L-4100mm
						Total- 250 M^3		
05	Liquid Chlorine	Chlorine Tonner (AG)	44	PreTreatment-1	05	0.9T each Max.	22.5mt	d-782mm L-2083mm Each tonner
				Pre Treatment-2	06	**Total- 39.6 MT**		
				Circulating Water Chlorination-1-	05			
				Circulating Water Chlorination-2-	09			
06	Hydrogen	Steel Cylinder (AG)	215	Hydrogen plant-1	215	215 filled cylinder	< 215filled cylinder	d-0.23m. h-1.46m. EACH
				Hydrogen plant-2				
07	Anhydrous Ammonia gas	Steel cylinder (AG)	80	Boiler-1 to 6	80	80	10 cylinder	d-0.356m. h-1.350m.EACH

08	Petrol	Concrete Tank (UG)	01	Petrol pump	19kl	20 KL	20KL	
09	Diesel	Concrete Tank (UG)	02	Petrol pump	14 KL each	15 KL each	30KL	
10	HFO	Steel Tank (AG) Vertical	03	FOPH –STAGE-1	4000	4000 KL each	<8000KL	d-22m H=10.2m EACH
				FOPH –STAGE-2		**Total- 12000 KL**		
11	LDO	Steel Tank (AG) Vertical	02	FOPH –STAGE-1	500kl	500 KL Each	<700KL	d-10m H-7.2m EACH
				FOPH –STAGE-1	**500kl**	**Total- 1000 KL**		
13	Oxygen	Steel cylinder (AG)	30	Gas Godown	30	30	30 Cyliner Avg Inventory	d-0.29495m. h-1.397m. EACH

NOTE: AG-Above Ground
UG-Under Ground

Transformer Details

SL.	AREA	CAPACITY, MVA	OIL QTY/UNIT	NOS	TOTAL QTY OF OIL
1.	Stage-I Units	200	31	7	217
		40	12	4	48
		50	25	1	25
		8	5	4	20
2	Stage-II Units	200	51	13	663
		45	21	8	168
		50	31	2	62
		16	11	8	88
3	Switch Yard	315	83	2	166
		50	35	2	70
4	Central Store	Stock at Store	83	1	83
5	Other Distribution Transformer	630	0.6	7	4.2
		1000	1	26	26
		1600	1.5	61	91.5
		2000	1.5	2	3
		3150	2	16	32
		3200	2	20	40
		4000	2.5	3	7.5
		7500	3.5	4	14
		8000	5	8	40
		10000	5	3	15
		12500	6	3	18
	Total Quantity of Oil				1901.2

SL NO	LOCATION	MAXIMUM STORAGE CAPACITY	ONE TIME STORAGE CAPACITY	MODE OF RECEIPT
01	Central store	83KL	83KL	209 LT BAREL.

INVENTORY OF HAZARDOUS GASES / SUBSTANCES PRODUCED / GENERATED DURING THE PROCESS

7.0 INVENTORY OF HAZARDOUS GASES / SUBSTANCES PRODUCED / GENERATED DURING THE PROCESS

Sl. No.	Name	Quantity of One Time Storage	Storage Capacity	Type of Storage	Size of The Storage Area
1	NIL				

IDENTIFICATION OF HAZARDS

8.0 IDENTIFICATION OF HAZARDS:-

SL NO	HAZARD	PREDICTABLE HAZARD SCENARIO	IMPACT
1	Coal	Fire Hazard	Fire may propagate within the coal storage yard
2	Chlorine	Toxic gas release	Damage/ loss of property, life and environment may occur
3	Hydrogen	Toxic gas release	Lungs dizziness due to air hunger and possible nausea and eventual unconsciousness.
4	HCL Storage Tank Area	Toxic iffect	May cause damage organs: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth.
5	Light Diesel Oil (LDO)	Pool fire may occur due to rupture in the Tank and Subsequent release and instantaneous ignition.	Fire may propagate to the nearby area
6	Liquid Ammonia	Release of ammonia from atmospheric storage tank due to nozzle failure or bottom plate failure. Leakage of ammonia from flange joints.	Severe irritation of the nose and throat and blindness can result.
7	HFO	Pool fire / Fire ball may occur due to rupture in the Tank and Subsequent release and instantaneous ignition.	Fire may propagate to the nearby area
8	Liquid Oxygen	Fire may aggravate due to leakage of the oxygen gas from the tank subject to any naked fire near the leakage are.	This zone does not consider as credible hazard scenario.
	Transformer Oil	Fire may occur due to leakage of Transformer Oil from the storage barrels and subsequently comes in contact with naked flame	Fire may propagate within the storage area

IDENTIFICATION OF MOST CREDIBLE HAZARD

9.0 IDENTIFICATION OF MOST CREDIBLE HAZARD

Case-1:

Fire in Coal Storage Yard

Fire Hazard in Coal Storage Yard is considered as a Credible Scenario because of the following reasons;

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

However, in the present situation, the following precautions are taken for prevention of spontaneous ignition of Coal.

- ⇒ The exposed surface area of the coal heap is restricted to the minimum possible so as to avoid the contact of oxygen with coal.
- ⇒ The exposed surface area is reduced by avoiding segregation and by packing the coal tightly and uniformly.
- ⇒ The ventilation at the coal heap is suppressed so that weathering is avoided due to cut-off of oxygen.
- ⇒ Coals of different sizes stored in a pile so that air voids are reduced to a great extent.
- ⇒ The coal is consumed before the critical temperature is reached.
- ⇒ Water Sprinkling is done to reduce the temperature.
- ⇒ Coal is stored away from the heat source.
- ⇒ In view of the above consideration it is quite evident that in the present situation the coal is not easily susceptible to catch fire.

Case - 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/ FO and has flash point of >145^{0}C. Besides National Fire Prevention Association (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 or flammable substance is stored near the tank. Besides; this area is declared as no smoking zone. As hazard assessment has already been done for HSD, having more sustainable fire hazard, the hazard assessment for Transformer Oil has not done. The combat situation adopted for the emergency due to fire in HSD tank will cater the emergency arises due to fire in transformer Oil.

CASE- 3: HCL

HCL is a toxic gas as per schedule-1, Part-II (b) (v) non-flammable gas. Health classification as per NFPA, it comes under hazard Category-4*. The Threshold Limit Value (**TLV**) is 7 MG/M^3, Short Time Exposure Limit (**STEL**) is 7 MG/M^3 for 10 minits & Immediate Danger to Life and Health (**IDLH**) is 50 PPM. The hazard assessment is done through modeling in different seasons as mentioned below.

Storage details	Significant toxic level ppm	Experience at distance in m.						Indication
		Summer day	Summer night	Rainy day	Rainy night	Winter day	Winter night	
HCL	1.8 ppm	123 m.	50 m.	102 m.	58 m.	102 m.	110 m.	No adverse effect
	22 ppm	34 m.	14 m.	28 m.	16 m.	28 m.	31 m.	Pungent, Choking, irritating Odor
	100 ppm	15m.	10 m.	12 m.	10 m.	12 m.	14 m.	Irritation of eyes, mucous membranes, respiratory tract

*Materials which upon very limited exposure could cause death or major residual injury even though prompt medical treatment is given, including those which are too dangerous to be approached without specialized protective equipment. This degree should include:

- Materials which can penetrate ordinary rubber protective clothing;

Materials which under normal conditions or under fire conditions give off gases which are extremely hazardous (i.e., toxic or corrosive) through inhalation or through contact with or absorption through the skin.

Case-4

Leakage of Chlorine gas from Chlorine Storage Tank

Leakage of Chlorine from Chlorine Storage Tank is considered as most Credible Scenario because of the following reasons;

Chlorine is a toxic gas as per schedule-1, Part-II (b) (v) non-flammable gas. Health classification as per NFPA, it comes under hazard Category-4*. The Threshold Limit Value (**TLV**) is 1 PPM, Short Time Exposure Limit (**STEL**) is 3 PPM & Immediate Danger to Life and Health (**IDLH**) is 10 PPM. The hazard assessment is done through modeling in different seasons as mentioned below.

Storage details	Significant heat level ppm	Experience at distance in Kms						Indication
		Summer day	Summer night	Rainy day	Rainy night	Winter day	Winter night	
CHLORINE 39.6 MT	0.5 ppm	8km	7.2km	6.8km	7.2km	6.0km	5.3km	No adverse effect
	2 ppm	5km	4.5km	4.3km	4.5km	3.8km	3.2km	Pungent, Choking, irritating Odor
	20 ppm	2.2km	1.9km	1.9km	1.9km	1.7km	14km	Irritation of eyes, mucous membranes, respiratory tract

*Materials which upon very limited exposure could cause death or major residual injury even though prompt medical treatment is given, including those which are too dangerous to be approached without specialized protective equipment. This degree should include:

- Materials which can penetrate ordinary rubber protective clothing;
- Materials which under normal conditions or under fire conditions give off gases which are extremely hazardous (i.e., toxic or corrosive) through inhalation or through contact with or absorption through the skin.

Case-5:

Fire on LDO Storage Tank

Fire Hazard in LDO Storage Tank is considered as most Credible Scenario because of the following reasons;

LDO is a flammable liquid as per schedule-1, Part-II (b) (v) having flash point of > 52^0C and auto ignition temperature of 257^0C and explosive limit of lower value 0.6% & upper value 4.7% by volume in air. Fire classification as per OSHA, it comes under category Flammability-2 (Moderate). So, it is susceptible to fire hazard. Whenever LDO catches fire it shall manifest in the form of pool fire. Taking into consideration of the metrological data of the area, one time storage quantity of LDO and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant heat radiation level of 2.0 Kw /m^2,5.0 Kw/m^2 and 10.0 Kw/m^2 for different season in case of fire on LDO storage tank as assessed through modeling in different season as per modeling is given in table below.

Storage details	Significant heat level Kw/m^2	Experience at distance in Mtrs.						Indication
		Summer DAY	SUMMER NIGHT	Rainy DAY	RAINY NIGHT	Winter DAY	WINTER NIGHT	
LDO 500 KL	2.0	57m	49m	56m	48m	48m	49m	Causes pain if unable cove the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
	5.0	42m	40m	41m	39m	39m	40m	Minimum energy required for melting of plastic
	10.0	36m	37m	56m	37m	37m	38m	Sufficient to cause damage to the equipment.

Case-6

Fire & Explosion due to catastrophic failure of hydrogen cylinder

Fire & Explosion due to Catastrophic failure of hydrogen cylinder is considered as **Credible Scenario** because of the following reasons: -

Hydrogen is a flammable gas and lighter than air. In case of leak it may catch fire if it comes in contact with any ignition source. When it is released from high pressure to atmosphere, it may catch fire without ignition. Due to its wide range of explosive limits (4.1-74.5% volume), there is also a possibility of explosion.

Since hydrogen has flammable and explosive properties, the major release scenarios are fire and explosion. Worst-case scenarios of catastrophic failure of hydrogen cylinders (i.e. bursting of cylinder) have been considered for the consequence analysis. In case of bursting of a cylinder under pressure of 150kg/cm^2, the maximum hazard distance of significant heat radiation level of secondary damage corresponding to fire in different season and overpressure is given in the table given below.

Maximum hazard distance for fire on hydrogen release from cylinder

Scenario	Significant heat level ppm	Experience at distance in Mtrs.						Indication
		Summe day	Summe r night	Rain y day	Ranny night	Winter day	Winter night	
Fire due on hydrogen gas leakage	4000	53m	58m	56m	58m	75m	71m	Causes pain if unable cove the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
	2400	22m	23m	23m	23m	30m	29m	Minimum energy required for melting of plastic
	24000	22m	23m	23m	23m	30m	29m	Sufficient to cause damage to the equipment.

Case-7

Leakage of Ammonia from Ammonia Storage Tank

Health Hazard from Ammonia Storage Tank is considered as most Credible Scenario because of the following reasons;

Ammonia is a toxic gas as per schedule-1, Part-II (b) (v) having auto ignition temperature of 651^{0}C and explosive limit of 15-28% volume in air. Fire classification as per NFPA, it comes under category Flammability-1 & Health Hazard-3. So, it is much susceptible to health hazard than fire hazard. The hazard assessment is done through modeling in different seasons as mentioned below.

Storage details	Significant heat level ppm	Experience at distance in meters						Indication
		Summer day	Summer night	Rainy day	Rainy night	Winter day	Winter night	
Ammonia	30 ppm	356m	405m	363m	422m	473m	444m	No adverse effect
	160 ppm	148m	167m	151m	176m	195m	185m	Pungent, Choking, irritating Odor
	1100 ppm	55m	62m	56m	65m	69m	62m	Irritation of eyes, mucous membranes, respiratory tract

Case-8

Fire on HFO Storage Tank

Fire Hazard in HFO Storage Tank is considered as most Credible Scenario because of the following reasons;

HFO is a flammable liquid having flash point of > 62^0C and auto ignition temperature of 220-300^0C and explosive limit of lower value 0.6% & upper value 7.5% by volume in air. So, it is susceptible to fire hazard. Whenever HFO catches fire it shall manifest in the form of pool fire. Taking into consideration of the metrological data of the area, one time storage quantity of HFO and its physical and chemical property, it is considered credible Hazard scenario.

The effect of significant heat radiation level of 4.5 Kw /m^2,12.5 Kw/m^2 and 37.5 Kw/m^2 for different season in case of fire on HFO storage tank as assessed through modeling in different season as per modeling is given in table below.

Storage details	Significant heat level ppm	Experience at distance in k.m						Indication
		Summer DAY	SUMMER NIGHT	Rainy DAY	RAINY NIGHT	Winter DAY	WINTER NIGHT	
Hfo 4000 KL	0.05ppm	7.1k.m	6.1 k.m	6.1 k.m	6.7k.m	8.9 k.m	5.1 k.m	Causes pain if unable cove the body within 20 seconds. However blistering of the skin (2nd degree burn) is likely caused with no lethality.
	0.3ppm	2.5k.m	2.6 k.m	2.2 k.m	2.9k.m	3.9 k.m	2.2 k.m	Sufficient to cause damage to the equipment.

Case-9

Leakage of Oxygen from Oxygen Tank

Fire Hazard in Oxygen from Oxygen Tank is considered as Credible Scenario because of the following reasons;

Dispersion modeling is done for release of liquid Oxygen Gas during storage and handling in Bullets. The Dispersion Modeling is done on the Basis of aloha Model. aloha Model is used to predict any of gas disperses in the atmosphere. According to this model, "Wind" and Atmospheric Turbulence are the main forces are that move the molecules of a released gas through the air, as an escaped cloud is blown down the wind. The 'turbulent mixing" causes it to spread over in the crosswind and upward directions. According to the Gaussian Model, any cross wind slice of a moving pollutant cloud looks like a bell- shaped curve, high in the centre and lower on the sides.

Storage details	Significant heat level ppm	Experience at distance in meters						
		Summer day	Summer night	Rainy day	Rainy night	Winter day	Winter night	
oxygen	50 ppm	157m	203m	168m	206m	224m	235m	
	100 ppm	112m	143m	119m	145m	155m	163m	
	200 ppm	77m	99m	82m	101m	108m	115m	

Case-3

Fire on Petrol Storage Tank

Fire Hazard in Petrol Storage Tank is considered as most Credible Scenario because of the following reasons;

Petrol is a flammable liquid as per schedule-1, Part-II (b) (v) having flash point of (-38) – (-42)^{0}C and auto ignition temperature of 456^{0}C and explosive limit of 1.4-7.6% volume in air. Fire classification as per NFPA, it comes under category Flammability-3. So, it is susceptible to fire hazard. Whenever Petrol catches fire it shall manifest in the form of pool fire. The Hazard assessment is done through modeling in different seasons as mentioned below.

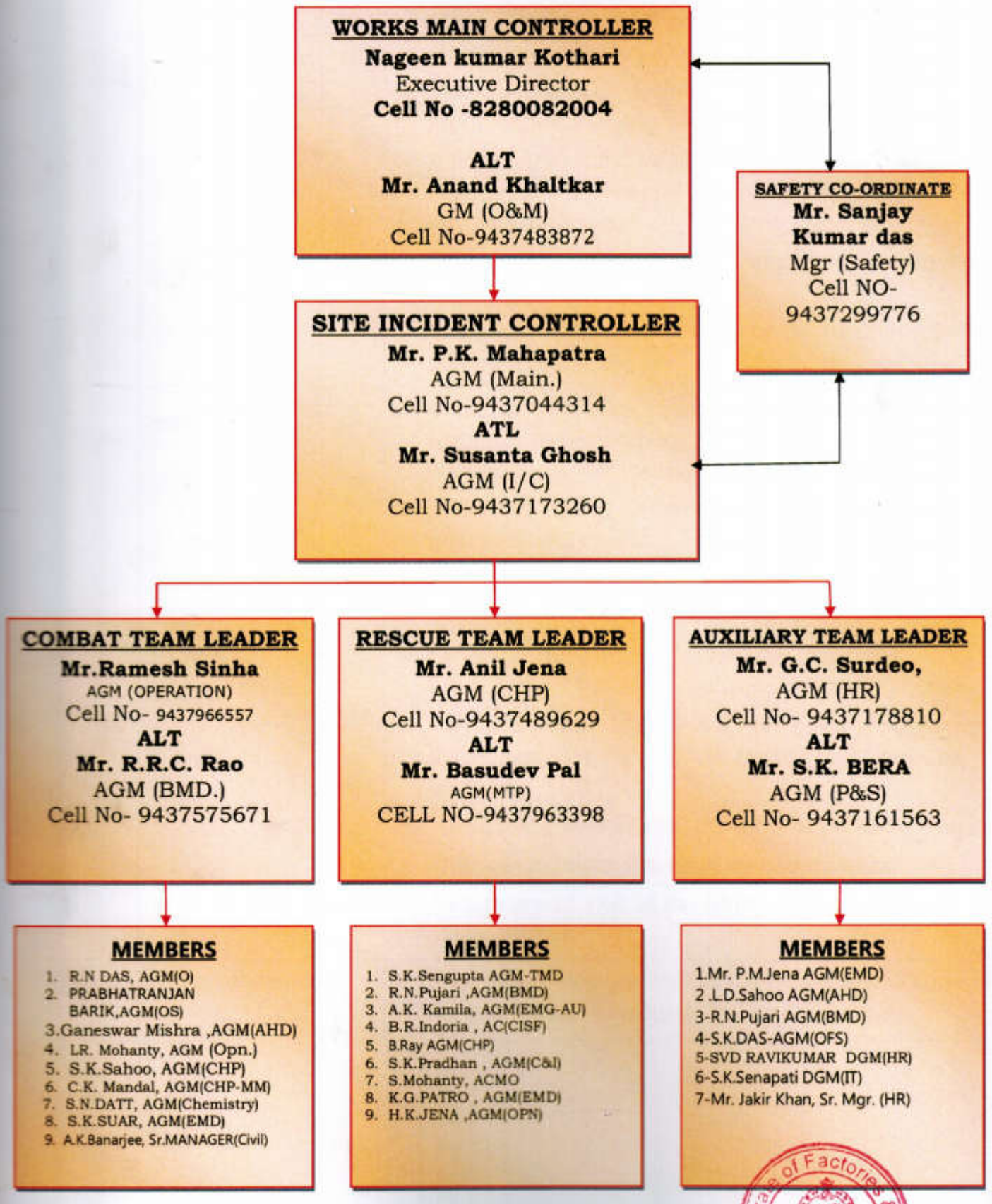
PLOT PLAN

10.0 PLOT PLAN

The plot-plan showing Hazard Zone, Iso-Risk Contour, Emergency Control Room, Assembly points, Main, Material & Emergency Exit and Fire Hydrant line along with its no. of Hydrant Points in different colour codes.

EMERGENCY COMMAND STRUCTURE

11.0 EMERGENCY COMMAND STRUCTURE (RECHECK)



ROLE OF KEY PERSONS OF EMERGENCY COMMAND STRUCTURE

12.0 ROLE OF KEY PERSONS OF EMERGENCY COMMAND STRUCTURE:

12.1 WORKS MAIN CONTROLLER (WMC):-

- On being informed, rushes to the scene and takes overall charges of the situation.
- Makes quick assessment of the situation and decides declaration of emergency, by blowing the siren in appropriate code **[five times intermittently (each 10 seconds)]**.
- Directs leaders of the Combat, Rescue & Auxiliary teams through Site Incident Controller to take control of the situation in the affected area.
- Makes continuous review and assess the possible developments to determine the extent of damage to plant and human beings.
- Directs shut-down of the plant, if necessary.
- Orders evacuation process by consulting with key persons.
- Ensures that casualties are receiving adequate attention.
- Liaises with the fire services, police services and other statutory authorities.
- Declares closure of the emergency by blowing the siren **[only once long siren for 3 minutes continuously]**
- Issues the authorized statements to the media services.
- Reports all statutory authorities in the prescribed manner.

12.2 SITE INCIDENT CONTROLLER:-

- On hearing Emergency siren, rushes to the scene and reports to the Works Main Controller.
- Carries out the instructions of Works Main Controller.
- Makes quick assessment about the gravity of the situation and appraises Works Main Controller.
- Orders Combat Team Leader, Rescue Team Leader and Auxiliary Team Leader to discharge their responsibilities immediately.
- Extends all sorts of help through different agencies, to minimize the damage to human being, plant, property and environment.
- Reports the development of the situation, time to time to Works Main Controller.
- Provides the required information to the Govt. fire brigade team for firefighting.
- Preserves the evidences for the subsequent inquiries.

12.3 COMBAT TEAM LEADER:-

- On hearing the emergency siren, rushes to the scene along with the firefighting team, with sufficient equipments in the minimum possible time and reports to Site Incident Controller time to time.
- Carries out the instructions of Site Incident Controller.
- Ensures that, the team members resume their position with appropriate equipments.
- Monitors the firefighting operation to control the situation.
- Ensures that, the situation is controlled by arresting spillage, shutting/closing of the valves etc. by the team, in consultation with Site Incident Controller.
- Assists the Site Incident Controller, till the situation is under control.

12.4 COMBAT TEAM MEMBERS:-

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

12.5 RESCUE TEAM LEADER:-

- On hearing the emergency siren, rushes to the scene and reports to the Site Incident Controller.
- Carries out the instruction of the Site Incident Controller.
- Ensures the arrival of his team members.
- Keeps necessary equipments of first-aid for preliminary treatment.
- Keeps the ambulance ready to carry the injure persons to the hospital.
- Ensures the use of proper personal protective equipments by the team members, before the rescue operation.
- Informs the Works Main Controller about the development time to time.
- Guides the Mutual Aid Partners for their course of action at the site.
- Guides the rescued workers to reach the assembly point.
- Searches the missing person(s) on the roll call basis.

12.6 RESCUE TEAM MEMBERS:-

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

12.7 AUXILIARY TEAM LEADER:-

- On hearing the emergency siren rushes to the site and reports to the Site Incident Controller.
- Carries out the instruction of Site Incident Controller.
- Ensures the arrival of his team members.
- Intimates statutory authorities over phone.
- Intimates nearest Fire Station over phone.
- Intimates Mutual-Aid Partners over phone.
- Keeps the first-aid trainers ready with essential medicines & dressing materials, to give first- aid to victims.
- Takes care of victims' family.
- Makes all arrangements like transport, other needs, finance etc.
- Ensures that all casualties are shifted to hospital for medical treatment.
- Keeps records of casualties and provide information of the matter to Works Main Controller time to time.

12.8 AUXILIARY TEAM MEMBERS:-

- On hearing emergency siren, rushes to the site and reports to their team leader.
- Carry out the orders of the team leader.

ACTION PLAN FOR ON-SITE EMERGENCY

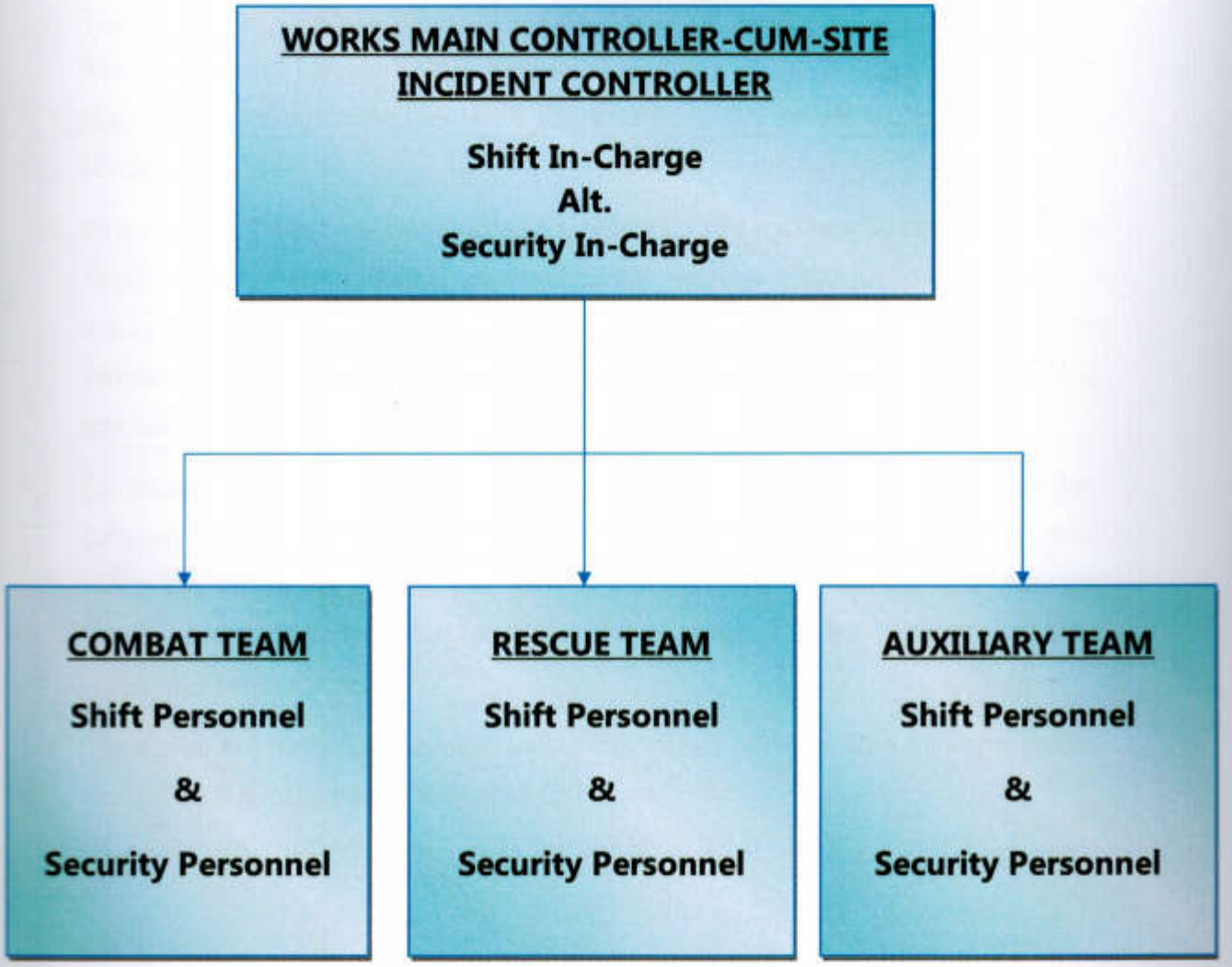
13.0 ACTION PLAN FOR ON-SITE EMERGENCY:

STEP NO.	INITIATOR	ACTION TO TAKE
1.	The person noticing the emergency (fire)	➢ Informs the Security Gate and the concerned Shift-in-charge who in turn informs Combat Team Leader immediately regarding the fire hazard.
2.	Works Main Controller (WMC)	➢ Informs Site Incident Controller (SIC) through common dialing system and rushes to the spot for combating the situation. Takes charge of the situation, arranges for evacuation of people from the affected area. ➢ Organizes trained personnel equipped with fire fighting appliances. ➢ Start combating by shutdown plant &equipments and takes steps to extinguish fire with available firefighting facilities. ➢ Finds out the root cause of fire and to takes necessary action for prevention of fire.
3.	Site Incident Controller (SIC)	➢ Informs Works Main Controller (WMC) and rushes to site. In case of failure of the electronic communication system, arranges the standby available provision i.e. a runner with bike to convey the message about the emergency to the works Main Controller ➢ Discusses with the Combat Team Leader (CTL), assesses the situation and call the Rescue Team Leader (RTL) & Auxiliary Team Leader (ATL) to the site. ➢ Arranges to evacuate the unwanted persons and call for additional help. ➢ To Passes information to the Works Main Controller (WMC) about the situation of site, time to time.

4.	Combat Team Leader (CTL)	➢ Rushes to Emergency Site and observe the ongoing activities. ➢ Takes stock of the situation in consultation with the Site Incident Controller. ➢ Moves to Emergency Control Room. ➢ Takes decision on declaration of emergency and asks for emergency wailing siren. ➢ Advises the Auxiliary Team Leader to inform the statutory authorities and to seek help from Mutual- aid Partners, if required. ➢ Decides the declaration of normalcy of emergency, after the situation is overcome. ➢ Ensures that the emergency operations are recorded chronologically.
5.	Rescue Team Leader	➢ Consults with Site Incident Controller (SIC) and rushes to the emergency site through safe route along with the team members and starts rescue work. ➢ Shifts the injured persons to hospital by ambulance after necessary first aid. ➢ Informs the Auxiliary Team Leader for necessary help from Mutual Aid Partners.
6.	Auxiliary Team Leader	➢ On being directed by Works Main Controller (WMC) informs about the emergency to Statutory Authorities. ➢ Seeks help from Mutual- Aid Partners and coordinate the Mutual Aid Partners to render their services, if required. ➢ Takes role call to find out the missing persons, if any. ➢ Arranges to inform the relatives of casualties. ➢ Takes care of visit of the Statutory Authorities to the emergency site.
7.	Team Members	➢ Each team member should follow the instructions of his team leader to mitigate the emergency.

SILENT HOUR
COMMAND STRUCTURE

14.0 SILENT HOUR COMMAND STRUCTURE



14.1 ROLE OF KEY PERSONS IN SILENT HOUR COMMAND STRUCTURE

- Silent Hour is the time when General Shift people are not available.
- The command structure for the silent hour shall be same as during normal hour, however, during the silent hour the Shift / Security in-charge shall act as Works Main Controller-cum Site Incidence Controller , till the arrival of the Works Main Controller.
- Since during these hours Works Main Controller, Site Incident Controller, Combat Team Leader, Rescue Team Leader and the Auxiliary Team Leader may not be available inside the plant, they shall be informed by the Security In-charge (Works Main Controller during Silent Hour) either by telephone or by sending special messenger to their residences .
- On receiving the information the Works Main Controller, Site Incident Controller, Combat Team Leader, Rescue Team Leader and Auxiliary Team Leader shall reach the site at the earliest and simultaneously Combat Team Leader, Rescue Team Leader and Auxiliary Team Leader shall ensure the presence of their respective team members.
- Thereafter the action plan as well as the role of key persons shall be same as the normal hour execution of Command Structure.

ACTIVATION AND CLOSING PROCEDURE FOR ON-SITE EMERGENCY

15.0 ACTIVATION AND CLOSING PROCEDURE FOR ON-SITE EMERGENCY

- Anybody notices FIRE/GASLEAK, shout "FIRE, FIRE", "FIRE"/"GAS GAS", "GAS" and informs to the Shift-in-charge.
- Being informed about fire, the Shift-in-charge informs Works Main Controller and Site Incident Controller.
- On hearing about the fire, the Works Main Controller and the Site Incident Controller rush to the site and make quick assessment of the situation.
- On quick assessment of the situation, the Works Main Controller rushes to the emergency control room and declares emergency by blowing appropriate siren code.
- On hearing of Emergency siren, the key personnel of Emergency Combat Structure perform their duties and responsibilities as per the worksheet instruction.
- During the emergency operation, the Works Main Controller keeps records of activities carried on, supervises overall, maintains liaison with Mutual Aiders and Statutory Authorities
- After control of the situation, the Works Main Controller declares normalcy by blowing appropriate siren **[One minute continuously]**

ANNEXURE

Annexure	Description	Page No
Annexure-I	Details of facilities available	
Annexure-II	Mutual Aid	
Annexure-III	Details of telephone numbers of key personnel	
Annexure-IV	Material Safety Data Sheet	

ANNEXURE-I

DETAILS OF FACILITIES AVAILABLE

❖ FIRE FIGHTING FACILITIES AVAILABLE AT TSTPP

The plant is protected against fire hazard and it is well equipped with fire protection systems. The plant has its own FIRE STATION also. The detail of the fire fighting facilities available at TSTPP is furnished under.

➢ FIRE STATION AT TSTPP

a) Foam tender: : 02 No's

Capacities : 4500 liters & 3600 liters

The tender are equipped with 1000 liters & 500 liters foam and 6 no's of 22 kg CO_2 cylinders.

b) Portable Fire Pumps : 02 No's

(The pump has petrol engine of M/s KIROLSKAR make 300 rpm having discharge capacity of 1600 lpm).

c) Under ground water tank (1 no) : 50 M^3

d) Motor Cycle : 01 No's

e) Bicycle : 08 No's

Apart from all necessary safety and fire fighting appliances, the fire station is equipped with the following special facilities also:

- All the five units have fire hydrant system complying with the minimum requirement as per TAC guidelines.
- All the five units shall maintain the system for efficient fire fighting.

➢ FIRE FIGHTING EQUIPMENTS AND APPLIANCES INSTALLED AT TSTPP PLANT FIRE WATER PUMP HOUSE

The firewater pump house is situated in right side of CW Pump House & adjacent to clarifloculator area. The source of water for firewater pump house is drawn from CW inlet channel, which remains full of water. The Firewater pump house is equipped with the following facilities:

Sl. No.	Particulars of Pump	No's	H.P.	R.P.M	Outlet	MAKE	Remarks
1	Elec. Driven pump I for Hyd.	04	220 KW	1480	410 m^3/hr.	Mather & Platt	Vertical mounted
4	Diesel Driven pump for Hyd.	03	220 KW	1480	410 m^3/hr.	Mather &Platt	
7	Jockey Pump	01	18.5 KW 25 H.P	2920	30 m^3/hr.	Mather &Platt	Vertical mounted
8	Compressor	02	7.5 KW 10 H.P	1460	30 m3/hr.	Ingusolovand	Reciprocable compressor
9	Hydro pneumatic tank	01	18 cub meter	--	15 kg/m2	Mather &Platt	Storing capacity 18 M^3

*The high-pressure tank is filled with water by jockey pump and its pressure is maintained upto 12 Kg/Cm^2 so as to get at least 7.0 Kg/Cm^2 pressure in hydrant lines.

1) No .of fire Hydrant point: S-I- 345
S-II- 349

2) Size of the fire hydrant hose: Yard Hydrant: 63 mm.
Landing Valve: 63 mm.

HAZARD ZONE WITH ITS PREVENTION FACILITIES

Kindly provide the number of prevention kits available in the hazard zone

SL.NO.	NAME OF HAZARD ZONE	HAZARD ASSOCIATED	FACILITIES AVAILABLE/PROVIDED
01	PRE TREATMENT -I	CHLORINE	BA SET , GAS MASK, LEAK ARRESTING KIT , EYE WASH, SENSOR , CHLORINE ABSORPTION , NEUTRALIZATION PIT, ALARMING SYSTEM
02	PRE TREATMENT -II	CHLORINE	BA SET , GAS MASK, LEAK ARRESTING KIT , EYE WASH, SENSOR , CHLORINE ABSORPTION , NEUTRALIZATION PIT, ALARMING SYSTEM
03	CIRCULATING WATER CHLORINATION-I	CHLORINE	BA SET , GAS MASK, LEAK ARRESTING KIT , EYE WASH, SENSOR , CHLORINE ABSORPTION , NEUTRALIZATION PIT, ALARMING SYSTEM
04	CIRCULATING WATER CHLORINATION -II	CHLORINE	BA SET , GAS MASK, LEAK ARRESTING KIT , EYE WASH, SENSOR , CHLORINE ABSORPTION , NEUTRALIZATION PIT, ALARMING SYSTEM
05	DE MINERALIZED WATER -I	ACID AND CAUSTIC	EYE WASHER
06	DE MINERALIZED WATER -II	ACID AND CAUSTIC	EYE WASHER
07	HFO	FIRE	FOAM FLOODING SYSTEM
08	LDO	FIRE	FOAM FLOODING SYSTEM
09	CHP	FIRE	SPRINKLER SYSTEM, LEANER HEAT SENSOR,

LOOP LINES

All pumps at firewater pump house are connected with a main header. There are four loop lines which go to different locations of the plant area from main header.

LOOP NO. 1

This loop covers main power plant, compressor house, switchyard & CW pump house.

LOOP NO. 2

This loop covers fuel oil tank area, hydrogen plant, fire station, telephone exchange, central store area, petrol pump house and auto base.

LOOP No. 3

This loop covers the auxiliary boiler, DM plant, Chlorination plant and its adjoining area, coal yard from tack hopper to T.P areas.

LOOP No. 4

This loop covers all the transformers viz. ST- 1 & 2, UAT –1 to 6, RT-1 to 4, IAT – 1 to 2. It also covers all the boiler burners. The cable vault and cable galleries are the main turbine oil tanks and the oil tanks at central purification plant.

HYDRANT LANDING VALVES / YARD HYDRANT

- There are altogether 345 hydrant landing valves/yard hydrants fitted at various locations of the all three loop lines which are manually operated, whenever water is required for fire-fighting work.
- The different areas/ locations of the loop lines 1 to 3 as mentioned, above are well approachable / connected through hydrant landing valve / yard hydrant net work.

DISTRIBUTION OF HYDRANT VALVE / YARD HYDRANT

Loop No.	Hydrant (YH)	Landing Valve (LV)
1.	55	92
2.	110	0
3.	73	15
Total	238	107

Total hydrant (YH + LV) in Stage-I = 345 No's.

Total hydrant (YH + LV) in Stage-II = 349 No's

Loop No 3: All sprinkler systems covered in this loop.

HV SPRAY SYSTEM FOR TRANSFORMER

The high velocity spray system protection has been given in all transformers viz. GTs, UATs, STs, Ats and RTs, CDEV and the turbine oil tanks are also covered under this system. All coal conveyors are also provided with this system.

This system is an automatic one and gets activated through fire detection network provided around the equipment covered under protection. This high-velocity spray waters on the equipment completely re-gulfs the equipment. The entry of the oxygen in fire zone is restricted through this system and the fire is completely extinguished.

FIXED FOAM SYSTEM FOR HFO & LDO TANKS

HFO & LDO oil tanks (5 no's) have been provided with fixed foam system. The foam station is situated closed to the HFOT no. 1 where foam concentrate has been kept in the foam tanks. The mixtures of water coal foams concentrate goes to the HFOT where foam water concrete into foam and throw it on to the top surface of the tank oil to extinguish the fire.

SMOKE DETECTION AND FIRE ALARM SYSTEM

This type of system has been installed at switchyard control room, CHP control room, DCDBS at "0" meter PDCs at 8.5 mtr and HT/LT switchgear room at 3.5 mtr elevation of the main power house. As soon as the smoke / fire is detected at any particular location through detection system available there, the same is transmitted to the control panel and an alarm sounds accordingly. Separate panels are provided and installed at different locations as per above-mentioned locations.

Sl. No.	Location	Quantity
1	Unit#1	477
2	Unit#2	336
3	Unit#3	812
4	Unit#4	780
5	Unit#5	818
6	Unit#6	654

Ammonia gas detectors

Sl.No.	Location	No's
1	Boiler #1	01
2	Boiler #2	01
3	Boiler #3	01
4	Boiler #4	01

Ambulance Room:

1. Ambulance/ Ambulance room: YES
2. If Yes then, No. of Ambulance Provided: 03
3. Doctor/Pharmacist: -15 Doctors.
4. Nurse: 8 NOS

SMOKE DETECTION CUM NV SPRINKLER FIRE PROTECTION SYSTEM

This system is provided in cable vaults at "0" mtr. 5m , 8.5m, 13.2 m, 17m & 24m elevations at each unit. A network of smoke detectors is installed in these locations with a piping network containing water under pressure with provision of detonator sprinklers.

As soon as smoke is detected at a particular location, electrical impulse is transmitted through smoke detector the sprinkler side where a small amount of explosives is provided in built which gets charged and detonates resulting in movement of the plunger. Due to forward (out ward) movement of the plunger, the bulb provided there breaks away and water comes out in spray with heavy pressure to arrest the fire.

In addition to the smoke detector, another kind of smoke detecting net work is provided in cable vaults and cable galleries. The additional system, known as linear heat sensor cable (LHS) has a net work of the cable which fuses at 79 degree centigrade facilitating the detection due to short circuiting of the net work. As soon as the detection is made, a fire alarm annunciation is transmitted to the UCBs to take all possible measure in arresting the fire.

RATE OF RISE TYPE (ROR) TEMPERATURE DETECTOR

This type of system is provided in coal conveyors to prevent moving of fire. In this system, the temperature of two different planes are continuously monitored and if any change of temperature is detected, the concerned conveyor is brought to the half of its existing speed to prevent spread of moving fire.

In addition to above, LHS cable net work also provided all along these conveyors which transmit alarming signal to CHP control room through communication panel to make the personnel alert and to take preventive measures as soon as it fuses due to rise of temperature at 79 degree centigrade and above.

FIRE WING OF CISF UNIT NTPC KANIHA

➢ **Man Power of Fire Wing:**

CISF Fire in NTPC Kaniha had been inducted on 20th April 1995. Fire Station is located at approximate 70 mtr. Away from main gate of this plant. The following strength has been recommended and released by the Force HQrs. Pm the basis of survey report.

PART	AC Fire	INSP/ Fire	SI/F	SI/M	ASI/ F	HC / F	HC / DCPO	Ct./F	Foll	Total
Strength	01	01	02	01	06	16	08	24	04	63

➢ **Active & Passive fire protection arrangements :-**

a) Deluge Valve -- 323 Nos. (187 Nos. in coal handling plant area 04 no's in FOPH area and 132 in main plant.

b) Automatic Co2 Flooding system -- Provided in Unit 1 & 2 at '0' mtr. In mill area.

c) Foam pourer system -- Provided at FOPH area to cover four no. of HFO & LDO

d) Sprinkler System -- Provided at cable galleries, static transformers area MOT Conveyor belt, Coal bunked in CHP.

e) Water Hydrants -- Provided 1031 Nos. of Hydrant charged with water at 07 Kg/Cm^2 pressure round the clock.

f) Water Monitor -- 47 Nos. Of Water monitors are provided in plant area.
Stage-I : 08 No's ,
Stage-II: 20 No's
CHP area: 19 Nos.

Fire Water Facilities available with Fire wing of CISF

Trailor Pump	01 No
Kirlosker Pump (Petrol)	01 No
Wadia portable pump	01 No
Portable Pump (diesel)	03 No's
Static tank :- One static underground water tank of 50 M^3 capacity is located at fire station. One no. Of static tank is provided at MGR Workshop.	

Major fire fighting appliances.

Following major fire fighting appliances are available in this fire Unit.

i). Foam Tender : 02 Nos.

A). 4500 liter. Water & 1000 liter. Foam.
B). 3600 liter. Water & 500 liter. Foam.

ii). DCP Tender : 01 No. (2000 Kg DCP)

➢ **Fire alarm, detection and annunciation systems :-**

a). Linear heat sensor cable : Provided at all cable galleries and all conveyors.

b). Smoke Detectors :Provided at all cable galleries Battery rooms & all plant control room.

c). INFRA Red Detectors : 10 No's provided in conveyors.

d). C.C.T.V. : 45 cameras provided in '0' mtr.

Condenser pit area, seal oil tank 12.5 mtr, MOT & 17 mtr. TG hall of all units and in conveyor.

SIREN CODES ()

Sl. No.	Type	Duration
1.	Normal Factory Siren	Continuous 1 Minute
2.	In case of fire	10 seconds on, 5 seconds off, 3 times
3.	Emergency siren	for 20 seconds on, 5 seconds off, 3 times
4.	Heavy Chlorine leak	Off-site emergency siren, 25 seconds on 5 seconds off, 5 times for heavy chlorine leak.
5.	All clear signal	Continuous siren for 3 minutes only once.

➢ **Communication facilities** :-

Fire station control room is provided with 3 intercom telephone No. 7777, 7778 & 7909 with DID facility and P &T telephone No. in addition to these phones has been provided in offices & residences of AC/F and Coy. Commander/Fire. One siren is also provided on the top of the hose tower to alert the employees & worker s of the U.T. in case of any Major emergency . Six No's walkie talkies sets and one base station set are provided to fire wing for communication between Fire control room and turn out and officers of fire wing.

➢ **First Aid Fire fighting arrangements:-**

UNIT # 1

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
01	U#1, T.G-I (TOP TO 17mtr)	04	--	03	--	03	--	01	16	--	01	28
02	U#1,24mtr C/Gallery	01	02	--	--	--	--	04	--	--	--	07
03	U#1,LTSWGR 27 mtr.	--		--	--	--	--	10	--	--	--	10
04	U#1,CPU & Lab	--	01	--	--	--	--	01	02	--	--	04
05	5.1 mtr C/G & LTSWGR	04	--	--	--	--	--	03	06	--	--	13
06	U#1,8.5 mtr C/G	--	--	01	--	--	--	--	02	02	--	05
07	U#1, '0' MTR C/G	--	--	01	--	--	--	--	07	01	02	11
08	U#1,HTSWGR	--	--	--	--	--	01	02	01	--	--	04
09	U#1,MOT 8.5 MTR	--	--	--	--	--	--	--	02	--	--	02
10	U#1, '0' MTR	02	--	--	--	08	--	--	04	--	--	14
11	U#1 BOILER,92 MTR	03	--	--	01	03	--	02	--	--	--	09
12	60 MTR	--	--	--	01	01	--	01	--	--	--	03
13	BUNKER-1	01	02	--	03	--	--	03	--	--	--	09
14	BUNKER-2	02	--	--	02	01	--		--	--	--	05
15	35 MTR	01	--	--	01	05	--	01	--	--	--	08
16	26 MTR	03	--	--	04	04	--	01	--	--	--	12
17	17 MTR	--	--	--	01	02	--	--	--	--	--	03
18	A/C Compressor	01	--	--	--	--	--	--	--	02	--	03
19	"0" MTR	--	01	--	--	01	--	--	--	--	--	02
20	U#1 ESP	08	--	--	--	04	--	06	--	--	--	18
21	ASH P/H ST-1	03	02	--	--	02	--	02	03	--	--	12
22	#1, GT out side	--	--	--	02	--	--	05	--	--	--	07
23	#1, GT in side	--	--	03	02	--	--	05	--	--	01	11
24	AIR COM.WATER P/H	03	--	--	03	--	--	01	--	--	--	07
												TOTAL= 207

UNIT # 2

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	U#2, TG-2 (Top to 17mtr)	--	--	03	--	09	03	--	10	--	--	25
2	U#2, UCB	--	--	--	--	--	--	--	07	--	--	07
3	U#2, 24 MTR C/G	--	01	--	--	--	--	01	04	--	--	06
4	U#2, ST ROOM	--		--	--	--	--	09	--	--	--	09
5	U#2, 13.5MTR C/G	--	01	--	--	--	--	--	12	--	--	13
6	U#2, 12.5 LTSWGR	--	--	--	--	--	--	01	03	--	--	04
7	U#2, MOT	01	02	--	--	--	01	--	--	--	--	04
8	U#2, 8.5MTR C/G	--	02	01	--	--	--	--	04	--	--	07
9	U#2, 5.5.MTR C/G	01	--	01	--	--	--	--	02	--	01	05
10	U#2, '0MTR TG	03	--	--	--	--	--	--	03	--	03	09
11	U#2 BOILER 6TH FLR	03	01	--	04	05	--	--	--	--	--	13
12	3RD FLR	01	--	--	--	02	--	--	--	--	--	03
13	FEEDER	02	02	--	--	04	--	--	--	--	--	08
14	A/C Compressor	01	--	--	--	01	--	--	04	01	--	07
15	12TH FLR	02	02	--	--	01	--	--	--	--	--	05
16	11TH FLR	02	--	--	--	--	--	--	--	--	--	02
17	10TH FLR	02	01	--	01	--	--	--	--	--	--	04
18	8TH FLR	02	--	--	02	--	--	--	--	--	--	04
19	BUNKER	04	02	--	02	01	--	03	--	--	--	12
20	"0" MTR	02	--	--	--	--	--	--	--	--	--	02
21	U#2 ESP	06	--	--	01	06	--	05	02	--	--	20
22	#,2GT out side	01	--	01	02	01	--	--	02	--	01	08
23	#2,GT in side	--	--	01	--	01	--	01	06	--	--	09
24	OSB MCC	01	--	01	--	02	--	04	01	--	01	10
										TOTAL= 196		

UNIT # 3

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	U#3, TG-3 (Top to 17mtr)	03	--	--	02	--	--	04	--	--	--	09
2	U#3, 24MTR C/G	03	--	--	--	--	--		--	--	--	03
3	U#3, TG 17MTR	01	--	--	01	13	01	05	--	--	01	22
4	U#3, LTSWGR	07	--	--	02	--	--	08	--	--	--	17
5	U#3, 8.5MTR	01	--	--	01	--	--	04	01	--	--	07
6	U#3, HTSWGR	02	--	--	--	--	--	04	--	--	--	06
7	U#3, 'O' MTR	03	--	01	02	--	01	05	--	--	--	12
8	U#3 BOILER 61 MTR	02	--	--	08	03	--	--	--	--	--	13
9	BUNKER-1	02	--	--	03	--	--	--	--	--	--	05
10	BUNKER-2	09	--	--	07	--	--	01	--	--	--	17
11	FEEDER-2	01	--	--	--	--	--	01	--	--	--	02
12	FEEDER-1	04	--	--	07	--	--	01	--	--	--	12
13	U#3 ESP	--	--	--	01	--	--	09	--	--	--	10
14	ASH P/H ST-2	05	--	--		--	--	04	--	--	--	09
15	#3,GT out side	03	--	03	02	--	--	02	01	--	03	14
16	#3,GT In side	--	--	01	--	--	--	--	--	--	03	04
17	D/G SAT	--	--	--	--	03	--	02	01	01	--	07
18	AIR COM.ROOM	01	--	--	--	02	--	--	01	--	--	04
19	CCR 3,4,5,6 G FLR	--	--	--	--	--	--	04	--	--	--	04
20	C/G	02	--	--	--	--	--	17	--	--	--	19
21	CCR ROOM	--	--	--	--	--	--	03	--	--	--	03
										TOTAL= 199		

UNIT#4

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	U#4, TG-4 (Top to 17mtr)	02	--	--	02	--	--	06	--	--	--	10
2	U#4, 27MTR	02	--	--	--	--	--	04	--	--	--	06
3	U#4, 24MTR C/G	02	--	--	--	--	--	--	--	--	--	02
4	U#4, 13.5MTR C/G	--	--	--	--	--	--	02	--	--	--	02
5	U#4, 5.5Mtr C/G MOT	01	--	--	02	--	--	--	--	--	--	03
6	U#4, 17MTR TG FLOOR	07	--	01	03	12	01	08	--	--	01	33
7	U#4, 12.5MTR LTSWGR	02	--	--	--	--	--	01	--	--	--	03
8	U#4, 8.5MTR C/G	03	--	--	03	--	--	08	01	--	--	15
9	U#4, HTSWGR	02	--	--	--	--	--	02	--	--	--	04
10	U#4, '0'MTR	03	--	--	04	01	01	07	--	--	--	16
11	U#4 BOILER	04	--	--	01	--	--	--	--	--	--	05
12	BUNKER	04	--	--	04	--	--	02	--	--	--	10
13	8^{TH} FLR	02	--	--	02	--	--	--	--	--	--	04
14	7^{TH} FLR	02	--	--	04	03	--	--	--	--	--	09
15	FEEDER	02	--	--	09	01	--	--	--	--	--	12
16	U#4 ESP	08	--	--	02	--	--	07	--	--	--	17
17	#4,GT Out side	01	--	02	02	--	--	01	--	--	04	10
18	#4,GT In side	--	--	02	--	--	--	--	--		02	04
19	C.T. S P/H	--	01	--	--	--	--	01	--	--	01	03
TOTAL= 168												

UNIT# 5

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	U#5, TG-5 (Top to 32mtr)	02	--	--	03	--	--	02	--	--	--	07
2	U#5, 27MTR MCC	03	--	--	01	--	--	05	--	--	--	09
3	U#5, 5.1MTR C/G	05	--	--	05	02	--	02	--	--	--	14
4	U#5, 12.5Mtr LTSWGR	02	--	--	--	--	--	02	--	--	--	04
5	U#5, MOT	01	--	--	--	--	--	01	--	--	--	02
6	U#5, '0' MTR	06	--	--	07	--	01	05	--	--	--	09
7	U#5, HTSWGR	--	--	--	--	--	--	04	--	--	--	04
8	U#5, TG 17MTR	06	--	--	01	03	--	11	--	--	01	21
9	U#5,LTSWGR	04	--	--	03	--	--	10	--	--	--	17
10	U#5, UPS # 4&5	03	--	--	--	--	--	10	01	--	--	14
11	U#5, HTSWGR	04	--	--	--	--	--	--	--	--	--	04
12	U#5 BOILER	03	--	--	03	--	--	--	--	--	--	06
13	13TH FLR	02	--	--	02	--	--	--	--	--	--	04
14	BUNKER	03	--	--	05	03	--	02	--	--	--	13
15	BOILER	08	--	--	14	05	--	02	--	--	--	29
16	U#5 ESP	07	--	--	02	--	--	08	--	--	--	17
17	#5,GT Out side	03	--	03	03	01	--	02	--	--	07	19
18	#5,GT In side	--	--	02	--	--	--	--	--	--	02	04
										TOTAL= 197		

UNIT # 6

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	U#6, TG-6 HALL	03	02	--	01	01	--	04	--	--	01	12
2	U#6, 17MTR C/G	03	--	01	02	01	01	03	--	--	--	11
3	U#6, TG TOP	06	--	--	01	--	--	07	--	--	--	14
4	U#6, '0'MTR	05	--	--	04	--	01	04	01	--	--	15
5	U#6 BOILER	07	--	--	03	--	--		--	--	--	10
6	BUNKER	05	--	--	06	--	--	02	--	--	--	13
7	8^{TH} FLR	03	--	--	02	03	--		--	--	--	08
8	FEEDER	03	--	--	10	05	--	01	--	--	--	19
9	U#6 ESP	06	--	--	02	--	--	08	--	--	--	16
10	#6,GT OUT SIDE	01	--	02	02	02	--	01	--	--	04	12
11	#6,GT IN SIDE	--	--	02	--	--	02	--	--	--	--	04
12	ASH EX.SWGR ROOM	--	--	--	--	--	--	04	--	--	--	04
										TOTAL= 138		

CHP AREA

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
01	TRACK HOPPER-1	04	01	--	02	--	--	03	04	--	01	15
02	TP-1	--	03	--	--	--	--	--	--	--	--	03
03	C/R HOUSE-I	01	01	--	--	--	--	01	02	--	--	05
04	TP-2	02	--	--	--	--	--	01	01	--	--	04
05	TP MCC	--	--	01	--	--	--	03	08	01	01	14
06	TP-9	01	--	--	--	01	--	03	--	--	--	05
07	TP-10	01	--	--	01	--	--	02	01	--	--	05
08	TP-11	--	--	--	03	--	--	02	02	--	--	07
09	TP-12	02	01	--	--	--	--	01	--	--	--	04
10	TP-3	01	01	--	--	--	--	01	--	--	--	03
11	T/P NO-04	02	--	--	02	03	--	01	--	--	--	08
12	T/P NO-05	01	--	--	03	03	--	--	--	--	--	07
13	T/P NO-06	--	--	--	03	--	--	--	--	--	--	03
14	T/P NO-07	01	--	--	02	02	--	04	--	--	--	09
15	T/P NO-08	--	--	--	01	02	--	02	--	--	--	05
16	T/PNO-04 MCC G/F	--	02	--	--	01	--	--	--	01	01	05
17	TH-2 & MCC	04	--	--	--	--	--	01	--	01	--	06
18	C/R HOUSE-2	07	--	--	--	01	--	06	02	--	--	16
19	TP-13	01	--	--	02	--	--	01	--	--	--	04
20	TP-15	03	--	--	01	--	--	--	--	--	--	04
21	TP MCC & Transformer	03	--	--	--	02	--	01	--	--	--	06
22	TP-14	02	--	--	--	--	--	02	--	--	--	04
23	TP-22 & Transformer	02	--	--	--	02	--	03	--	--	--	07
24	ASH EXT # 04	02	--	--	--	--	--	04	--	--	--	06
25	T/P NO-16	02	--	--	04	02	--	06	--	--	--	14
26	T/P NO-17	01	--	--	02	--	--	02	--	--	--	05
27	T/P NO-18	01	--	--	02	--	--	02	--	--	--	05
28	T/P NO-19	01	--	--	03	--	--	03	--	--	--	07
29	T/P NO-20	01	--	--	05	--	--	03	--	--	--	09
30	TP-21	01	--	--	--	--	--	02	--	--	--	03
31	T/P NO-16 MCC G/F	02	--	--	--	--	--	02	--	--	--	04
32	TH-3 & MCC	03	--	--	--	--	--	02	--	--	--	05
33	C/R HOUSE-3	05	--	--	02	--	--	02	--	--	--	09
34	TP-23	--	--	--	--	--	--	02	02	--	--	04
35	T/P NO-24	--	--	--	04	--	--	01	--	--	--	05
36	T/P NO-25	--	--	--	04	--	--	02	--	--	--	06
37	T/P NO-26	02	--	--	05	--	--	02	--	--	--	09
38	T/P NO-27	01	--	--	04	--	--	02	--	--	--	07
39	T/P NO-28	01	--	--	04	--	--	02	--	--	--	07
40	T/P NO-24 MCC	03	--	--	--	--	--	06	--	--	--	09

P/ 1

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
41	Coal Settling Plant	02	--	--	--	--	--	02	--	--	--	04
42	ETP ST-II	--	--	--	02	02	--	01	--	--	--	05
43	CHP C/R ST-I& MCC	07	01	--	--	--	--	01	06	02	01	18
44	CHP C/R ST-II	02	--	--	--	--	--	02	04	--	--	08
45	C/WORK SHOP	01	01	--	01	02	--	04	--	--	--	09
46	DS PUMP HOUSE	03	--	--	--	--	--	04	--	--	--	07
47	CHP SWPH	02	--	--	--	--	--	02	--	--	--	04
48	COAL BHAWAN	01		--	--	--	--	02	03	--	--	06
49	CENTRAL W/S	--	--	--	01	01	--	04	--	--	--	06
50	RECLAIMER-1	--	01	--	--	--	--	02	--	--	--	03
51	RECLAIMER-2	01	--	--	--	--	--	02	--	--	--	03
52	RECLAIMER-3	--	01	--	--	--	--	02	--	--	--	03
53	RECLAIMER-4	--	--	--	--	--	--	02	--	--	--	02
											TOTAL =	341

OFFSITE AREA

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	FOPH -1	--	--	--	01	02	01	02	--	--	02	08
2	FOPH -2	02	--	01	--	01	02	02	--	--	03	11
3	P .STORE ST-1	--	02	--	02	--	--	01	01	--	--	06
4	P .STOER ST-2	04	--	--	04	01	--	14	--	--	--	23
5	Auxiliary Boiler	01	--	--	--	01	--	--	02	--	01	05
6	D M PLANT ST-1	04	04	--	03	01	--	04	08	--	--	24
7	D M PLANT ST-2	03	--	--	02	--	--	08	06	--	--	19
8	P T PLANT ST-1	01	--	--	02	--	--	--	--	--	--	03
9	P T PLANT ST-2	04	--	--	03	--	--	02	--	--	--	09
10	P T PLANT MCC R	01	--	--	--	--	--	04	--	--	--	05
11	FIRE P/H & ETP-1	01	--	--	--	--	--	06	--	--	--	07
12	CW P/H 1,2,3,4	04	--	--	02	--	--	06	--	--	--	12
13	Chlorination Plant ST-1	--	--	--	--	--	--	04	01	--	--	05
14	ASH WATER P/H MCC/ R	06	--	--	--	01	--	07	--	--	--	14
15	S/Yard & C/Room	05		01	--	--	--	14	03	--	--	23
16	OLD SERVICE BUILD	--	--	--	--	--	--	15	--	--	--	15
17	WORK SHOP	--	02	--	--	--	--	05	01	--	--	08
18	COOLING/T 1,2 MCC	01	--	01	--	--	--	05	--	--	--	07
19	COOLING/T 3,4 MCC	01	--	--	--	--	--	02	--	--	--	03
20	COOLING/T MCC 05	01	--	--	02	--	--	03	--	--	--	06
21	COOLING/T MCC 06	--	--	--	--	--	--	04	--	--	--	04
22	New Service Building	--	--	--	08	--	--	10	--	--	--	18
23	VIKAS DWAR	--	01	--	01	--	--	01	--	--	--	03
24	33 K/V Sub Station	01	--	--	--	--	01	04	--	--	--	06
25	Main Get	--	01	--	01	--	--	05	06	--	--	13
26	PETROL PUMP	--	--	01	--	03	--	01	01	--	--	06
27	AUTO BASE	--	--	--	--	--	--	02	05	--	--	07
28	C.STORE Gas Store	--	02	--	--	01	--	--	--	--	--	03
29	C.STORE NO - 01	06	--	--	--	--	--	01	--	--	--	07
30	C.STORE NO - 03	01	01	--	--	--	--	--	--	--	--	02
31	C.STORE NO - 05	01	03	--	01	--	--	01	--	--	--	06
32	C.STORE NO - 07	02		--	02	--	--	--	--	--	--	04

33	C.STORE NO - 08	03	--	--	--	--	--	--	01	--	--	04
34	Oil storage C/Store	02	--	--	--	03	--	--	--	--	--	05
35	I/T BUILD	01	01	--	--	--	--	09	--	--	--	11
36	ADM/ BUILD,MCC	02	--	--	--	--	--	02	--	--	--	04
37	ADM/ BUILD G/FLOOR	--	--	--	02	--	--	05	--	--	--	07
38	ADM/ B 1st/FLOOR	--	--	--	01	--	--	03	--	--	--	04
39	ADM/ B 2nd/FLOOR	--	--	--	01	--	--	04	--	--	--	05
40	ADM/ B3rd/FLOOR	--	--	--	02	--	--	06	--	--	--	08

P/ 2

Sl.No.	LOCATION	DCP-05KG	DCP-	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2	CO2 09	CO2	TOTAL
41	"H" BLOCK CIVIL/M	--	--	--	--	--	--	02	04	--	--	06
42	TELEPHONE EX.	02	--	--	--	--	--	03	03	--	--	08
43	ENVORMENT	--	--	--	--	--	--	--	05	--	--	05
44	MAIN OFFICE	--	4	--	--	--	--	05	--	--	--	09
45	FQA LAB	02	--	--	--	--	--	03	02	--	--	07
46	HYDROGEN PLANT	02	--	--	01	--	--	05	05	--	--	13
47	ICH Canteen	05	--	--	--	--	--	01	01	--	--	07
48	SHAKTI DWAR	--	1	--	01	--	--	01	--	--	--	03
49	WATCH TOWER NO-01	--	--	--	--	--	--	01	--	--	--	01
50	WATCH TOWER NO-02	--	--	--	--	--	--	01	--	--	--	01
51	WATCH TOWER NO-03	--	--	--	--	--	--	01	--	--	--	01
52	WATCH TOWER NO-04	--	--	--	--	--	--	01	--	--	--	01
53	WATCH TOWER NO-05	--	--	--	--	--	--	01	--	--	--	01
54	WATCH TOWER NO-06	--	--	--	--	--	--	01	--	--	--	01
55	WATCH TOWER NO-07	--	--	--	--	--	--	01	--	--	--	01
56	WATCH TOWER NO-08	--	--	--	--	--	--	01	--	--	--	01
57	WATCH TOWER NO-09	--	--	--	--	--	--	01	--	--	--	01
58	WATCH TOWER NO-10	--	--	--	--	--	--	01	--	--	--	01
											TOTAL = 408	

PLANT OUT SIDE AREA

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	M G R C ROOM	02	--	--	--	--	--	03	--	--	--	05
2	M G R OIL TANK	02	--	--	--	02	--	--	--	--	--	04
3	M G R & LOCO	33	05	--	--	--	--	26	--	--	--	64
4	PTS MAHANADI CLUB	01	--	--	--	--	--	01	04	--	--	06
5	HIMGIRI G/House.	--	--	--	02	--	--	09	01	--	--	12
6	S W PUMP/House	--	--	--	--	--	--	--	02	--	--	02
7	GAS OFFICE	02	02	--	--	--	--	01	--	--	--	05
8	TELIPHONE EXCH.	03	--	--	--	--	--	01	--	--	--	04
9	ELECTRIC SUB ST.	01	--	--	--	--	--	--	01	--	--	02
10	HOSPITAL	02	--	--	04	01	01	--	13	--	--	21
11	D G SET ROOM	01	--	--	--	--	--	--	01	--	--	02
12	R C CLUB	--	01	--	--	--	--	01	01	--	--	03
13	CENTRAL SCHOOL	--	--	--	--	--	--	05	11	--	--	16
14	BALBHAWAN	--	--	--	01	--	--	02	--	--	--	03
15	Central Library	--	--	--	01	--	--	02	--	--	--	03
16	ST. MARY's SCHOOL	02	--	--	02	--	--	01	01	--	--	06
17	E D C	01	--	--	01	--	--	01	--	--	--	03
18	TTS GANGATRI G/H	03	--	--	01	--	--	02	--	--	--	06
19	MANASAROBAR G/H	03	--	--	--	--	--	02	--	--	--	05
20	GAS GODOWN	04	01	--	--	--	--	--	02	--	--	07
21	Auditorium (TTS)	03	--	--	02	--	--	03	--	--	--	08
22	Electric Maint.	--	--	--	02	01	--	01	--	--	--	04
23	Saraswati S/Mandir vidya.	--	--	--	--	--	--	--	08	--	--	08
24	QUATAR GURD	01	--	--	01	01	--	02	--	--	--	05
25	QUATAR MASTER	--	--	--	01	--	--	02	--	--	--	03
26	NEW CISF LINE	--	--	--	--	--	--	02	--	--	--	02
27	PUMP HOUSE W/T	01	--	--	--	--	--	01	--	--	--	02
												Total= 211

OUT SIDE AREA

Sl.No.	LOCATION	DCP-05KG	DCP-10KG	DCP-50	W/TYPE 9LTR	M/FOAM 9LTR	M/FOAM 50 LTR	CO2 4.5KG	CO2 6.8KG	CO2 09 KG	CO2 22.5KG	TOTAL
1	Godiband Rly. Station	02	--	--	01	01	--	02	01	--		07
2	Scotlandpur Rly. Station	03	--	--	01	01	--	03	02	--		10
3	Ash Pond	05	--	--	--	02	--	10	--	--		17
4	Main Water pump House	01	03	02	--	02	--	--	11	--	01	20
5	Shamal Get	01	--	--	--	--	--	01	--	--		02
6	1ST T/OUT	02	--	--	01	02	--	03	--	--		08
7	2ND T/OUT	01	01	--	01	04	--	02	--	--		09
8	3RD T/OUT	04	02	--		03	--	01	--	--		10
9	Prevention class purpose	06	02	--	01	02	--	01				12
												Total= 95

Summary

SL.No	Location	Total nos. of different type extinguisher deployed
01	Unit # 1	207 Nos.
02	Unit # 2	196 Nos.
03	Unit # 3	199 Nos.
04	Unit # 4	168 Nos.
05	Unit # 5	197 Nos.
06	Unit # 6	138 Nos.
07	CHP Area	341 Nos.
08	Offsite Area	408 Nos.
09	Plant Outside Area	211 Nos.
10	Outside Area	95 Nos.
	Total	2160 Nos.

STATUS OF EXTINGUISHERS DEPLOYED AT NTPC KANIHA PLANT.

➢ Adequacy vis- a- vis requirement of fire appliances , life saving equipments (fire entry suits, B.A.Set), Fire water and fire extinguishing media (Foam concentrate & DCP). For firefighting two major fires simultaneously for four hours.

Presently Fire wing is having sufficient fire appliances, life saving equipments, fire water and fire extinguishing media (Foam conc., DCP) for firefighting two major fires simultaneously for four hours. If any type of in adequacy notices by the fire wing, demand is places to management and accordingly items are provided by the managements .

FIRE BUCKET ARRANGEMENT:-

SR NO.	Location	Numbers of fire bucket
1	SWITCH YARD	4
2	TRANSFORMER-GT UNIT-1	4
3	TRANSFORMER-GT UNIT-2	4
4	TRANSFORMER-GT UNIT-3	4
5	TRANSFORMER-GT UNIT-4	4
6	TRANSFORMER-GT UNIT-5	4
7	TRANSFORMER-GT UNIT-6	4
9	ESP TRANSFORMER- UNIT-1	4
10	ESP TRANSFORMER- UNIT-2	4
11	ESP TRANSFORMER- UNIT-3	4
12	ESP TRANSFORMER- UNIT-4	4
13	ESP TRANSFORMER- UNIT-5	4
14	ESP TRANSFORMER- UNIT-6	4
15	PETROL PUMP	4
16	CRUSHER HOUSE -1	4
17	CRUSHER HOUSE -2	4
18	CRUSHER HOUSE -3	4
19	MGR WORKSHOP	4

Details of above mentioned equipments, extinguishing media & life saving equipments. And their stocks are as under.

Sl. No.	Item/Equipment /Appliances	Qty./No.
01	Fire tenders	04 No's
02	B.A.Set, 1800 ltrs.	16 No's
04	Proximity suit	02 No's
05	Fire Entry suit	02 No's
06	AFFF (Foam Concentration)	17200 Liters
07	DCP (Powder)	19970 Kg.
08	Soda Acid (09 ltr.) refill	196 No's
09	Chlorine Suit	05 No's

Status of all Tenders capacity.

Sl.No.	Vehicle No	Total W.Capacity	Foam/Dcp Cap.
02.	OR-06-4927	3600 Ltr.	
03.	OR-06C-8882 DCP Tender	02 Tanks each powder capacity is 1000 kg.	08 Nitrogen cylinder each capacity is 50 Ltr.
04.	OR-06C-8882 Fire Jeep.	NA	NA
05	Tailor Pump	NA	NA
06	Petrol Pump	NA	NA
07	Diesel Pump	NA	NA

MEDICAL FACILITIES AVAILABLE

➢ AT TSTPP HOSPITAL

TSTPP hospital is situated in the township about 3 Km away from the main entrance gate. It is equipped with all necessary facilities leading to a medium size hospital. It has following facilities.

a) Ambulance : 4 No's
b) Bed Capacity : 50 No's
c) Doctors : 18 No's
d) Specialists Doctors : 12 No's

(Orthopedic, medicine, Gynic, Anesthesia, pediatrics, ENT, & Pathology).

e) Medical Staff : 46 No's (Other than Doctors)

➢ AT NEARBY PROJECTS UNDER ASSISTANCE AVAILABLE

➢ COMMUNICATION SYSTEM

Public address system has been provided in the plants. Telephone, intercom and CUG facilities are available at all required desks and with official, audio emergency alarm is available at chlorine storage shed and in UCB. An emergency hooter shall be provided chlorine storage shed for starting the neighboring plant areas in case of heavy leakage of chlorine. The message can be communicated from any location of the plant to Shift in charge Engineer by dialing the number 7700 Emergency message can be passed on to the safety office by dialing the number 7105/7106. Fire pump house and security office are also connected through local communication network.

EMERGENCY CONTROL CENTRE NUMBERS ARE

INTERCOM: 7777, 7778 P&T: 06760-243205

- P&T Telephone is provided in main office to contact nearby industries to ask for internal assistance. The facility is also can be used to contact District Authorities for information and help.
- The Plant is connected to Corporate Office through Satcom as well as P&T Telephone. Wireless system is also provided for use for emergency requirement.

AVAILABILITY OF EMERGENCY SAFETY EQUIPMENT

The following safety equipments are made available in the areas where there may be a need including chlorination plant, water treatment plant, UCBs, Fuel Oil Pump House, Shift In charge engineer's Office and Safety Office.

Personal Protective Equipments (Kindly give the number of eqipments present)

- Self contained breathing apparatus :16 No's
- Gas masks :10,000No's
- Chlorine leak arresting puts :15 No's
- Emergency suits : 20 No's
- Gum Boots : 500 No's
- Face shield :120 No's
- Hand gloves : 2000 No's
- Aprons etc : 250 No's
- Safety helmet :3000 No's
- Safety shoes :3000 No's
- Safety goggles :150 No's
- Ear plug :3000No's
- Safety belt :250No's

ANNEXURE-II

MUTUAL AID

At the moment there is a mutual understanding and co-ordination among TSTPP/ NTPC and nearby Project NALCO, TTPS, MCL etc. to aid each other at any event and agreed by all five parties under the 'Mutual AID Scheme' that the fire services of above plants shall respond at once on receipt of Fire / Emergency call from any one of the parties.

No monetary claims will be made from the services and materials, materials for actual fire fighting / emergency operation whenever there is a call.

Material taken on loan by a unit shall be returned by respective member at the earliest positively within a month or two after the stocks are replenished.

No monetary claims will be made as security deposit for any material taken on loan.

SL.NO	NAME & ADDRESS OF MUTUAL AIDDER	FACILITIES TO BE PROVIDED DURING EMERGENCY	CONTACT PERSON & TEL.NO
1	TTPS	AS PER MUTUAL AID	06760-249254

MUTUAL AID AGREEMENT

On this day of 25/08/2015, we agree to have this mutual agreement in between our industries, that an event of any emergency situation arises due to storage and handling of hazardous substances and / or in case of any unwanted situation in our plant, we shall act upon as **Mutual Aid Partners** to each other to combat the eventually with the available resources.

Name of Organization **NTPC- TALCHER SUPER THERMAL POWER STATION**	Name of the Concerned Organization **NTPC- TALCHER THERMAL POWER STATION**
Facilities to be provided:- 1) Fire Tender:- 04 nos 2)Portable Fire Extinguisher:-2206 nos **3)Security:-** a) Asst Commandant -04 b) Inspector -04 c) Sub Inspector- 12 d) Asst Sub Inspector -22 e) General Duty -270 **4) Hospital** a) Ambulance:-03 b) Doctor-14 Nos c) Paramedical staff-54 5)**Mobile equipments** a) Pay loader:-02 b) Dozer- 6 Nos c)Dumper/Tripper:-02 e) Mobile cranes/Hydra :- 09 f)Vehicle for Conveyance:-44 nos	Facilities to be provided:- 1. Fire Tender:-03 2. Portable Fire Extinguisher:-1330 3. Security a)Inspector-02 b) Sub-Inspector-07 c) Asst-Sub Inspector -08 d) General Duty -189 **4) Hospital** a)Ambulance:-02 b)Paramedical Staff:-24 **5)Mobile equipments** a)Pay loader:-02 b)Dumper:-01 c)mobile cranes:-03 d)Vehicle for Conveyance:-29nos
Name of the contract person: Sri ANAND KHALATKAR Designation :General Manager(O&M) Telephone No :06760-243342	Name of the contract person: Sri U.K. DASGUPTA Designation :General Manager(O&M) Telephone No :06760-249254
Signature Name and Designation with Seal आनंद खलतकर ANAND KHALATKAR महाप्रबन्धक (प्रभा. एवं अनु.) General Manager (O&M) एनटीपीसी लिमिटेड/तालचेर थर्मल NTPC Limited / Talcher Thermal	Signature 25/8/2015 Name and Designation with Seal U. K. DASGUPTA महाप्रबन्धक (ओ एंड एम) General Manager (O&M) एनटीपीसी लिमिटेड/तालचेर थर्मल NTPC Limited/Talcher Thermal

Directorate of Factories & Boilers
BBSR
Odisha

ANNEXURE-III

DETAILS OF TELEPHONE NUMBERS OF KEY PERSONNEL

Sl. No.	NAME & DESIGNATION	DESIGNATION AS PER EMERGENCY COMMAND STRUCTURE	TELEPHONE/ CELL NUMBER
1	**Nageen Kumar Kothari** Executive Director	WMC	**8280082004**
2	**Mr. Anand Khaltkar** GM (O&M)	Alt. WMC	9437483872
3	**Mr. P.K. Mahapatra** AGM (Main.)	SIC	9437044314
4	**Mr. Susanta Ghosh** AGM (I/C)	ALT.SIC	9437173260
5	**Mr. S.K. Sinha** SR.MGR(OPERATION)	CTL	9437966557
6	**Mr. R.R.C. Rao,** AGM (BMD.)	Alt. CTL	9437575671
7	**Mr. Anil Jena** AGM (CHP)	RTM	9437489629
8	**Mr. Basu.Dev.Pal** MGR (O&M CIVIL)	Alt. RTL	9437963398
9	**Mr. G.C. Surdeo,** AGM (HR)	ATL	9437178810
10	**Mr. S.K. BERA** AGM (P&S)	Alt. ATL	9437161563

DETAILS OF TELEPHONE NUMBERS OF STATUTORY AUTHORITY

Sl. No.	Authority	Address	Telephone No.	
			Office	Residence
01.	Director of Factories & Boilers Orissa Govt, ODISHA	Office of the Director of Factories & Boilers, Unit-III, Kharvel Nagar, Bhubaneswar, ODISA	0674 - 2396070	0674 - 2350369
02.	Dy. Director of Factories & Boilers Govt, ODISHA	Office of Dy. Director of Factories & Boilers, Bajrakabati Road, Behind Telephone Bhawan, Cuttack	0671-263398	0671-2303260
03.	Dy. Director of Factories & Boilers Orissa Govt, ODISA	Office of Dy. Director of Factories & Boilers, Nalco Nagar, Near Post Office, Angul	0671-263398	06760-222929 9437214668
04.	Astt Director of Factories & Boilers (Angul Zone) Government of Orissa	Office of the Asst Director of Factories & Boilers, Angul Zone, Nalco Nagar, Near Post Office, Angul	06760-220164	06760-222929 9437596340
05.	Collector & District Magistrate, Angul.	Office of District Collector, Angul ODISA	230567	230234
06.	Addl. District Magistrate Angul	Office of Addl. District Magistrate Angul,	230491	220101
07.	Supdt. Of Police Angul.	Office of Supdt. Of Police, Angul, ODISA	230316	223500
08.	Chief Medical Officer Dist. Hospital, Angul.	District Hospital	232507	231202
09.	Sub Collector, Talcher	Office of Sub-Collector,Talcher	240720	240444
10.	S.D.P.O, Talcher	Office of SDPO Talcher, Angul District, ODISA	240657	240337
11.	Incharge, NTPC Township, Police Station.	NTPC, Township Police Station, Kaniha , Angul, ODISA	243547	243327
12.	Asst. Labour Com Angul.	Office of Asst. Labour Commr.Angul.	230337	24330528
13	District Fire Officer	Angul	230222	230424
14	Fire Station	Talcher	240222	
15	Fire Station	Angul	230222	

ADDITIONAL IMPORTANT TELEPHONE NUMBERS

SL. NO.	LIST OF CONTROL ROOM	OFFICE		RESIDENCE	
		DOT	I/C	DOT	I/C
1.	PLANT CONTROL (MAIN EMERGENCY CONTROL ROOM)	2511005	7600		
2.	GAS CONTROL ROOM	2522029	7510		
3.	FIRE CONTROL ROOM	2510142	7000		
4.	MEDICAL CONTROL ROOM: (A) OHSC PLANT (B) IGH-CASUALITY	 2511238 2640324	7555 9114 4500		4573
5.	TRANSPORT CONTROL ROOM		7228		
6.	CIVIL DEFENCE		4156		
7.	CISF CONTROL ROOM	2510958	6000	8000	
8.	CANTEEN		8151	7235	

MATERIAL SAFETY DATA SHEET

DISPERSION MODEL

MATERIAL SAFETY DATA SHEET

HYDROCHLORIC ACID

Material Safety Data Sheet
Hydrochloric acid MSDS

Section 1: Chemical Product and Company Identification

Product Name: Hydrochloric acid

Catalog Codes: SLH1462, SLH3154

CAS#: Mixture.

RTECS: MW4025000

TSCA: TSCA 8(b) inventory: Hydrochloric acid

CI#: Not applicable.

Synonym: Hydrochloric Acid; Muriatic Acid

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Hydrogen chloride	7647-01-0	20-38
Water	7732-18-5	62-80

Toxicological Data on Ingredients: Hydrogen chloride: GAS (LC50): Acute: 4701 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Non-corrosive for lungs. Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth. Repeated or prolonged exposure to the substance can produce target

organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of metals

Explosion Hazards in Presence of Various Substances: Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Non combustible. Calcium carbide reacts with hydrogen chloride gas with incandescence. Uranium phosphide reacts with hydrochloric acid to release spontaneously flammable phosphine. Rubidium acetylene carbides burns with slightly warm hydrochloric acid. Lithium silicide in contact with hydrogen chloride becomes incandescent. When dilute hydrochloric acid is used, gas spontaneously flammable in air is evolved. Magnesium boride treated with concentrated hydrochloric acid produces spontaneously flammble gas. Cesium acetylene carbide burns hydrogen chloride gas. Cesium carbide ignites in contact with hydrochloric acid unless acid is dilute. Reacts with most metals to produce flammable Hydrodgen gas.

Special Remarks on Explosion Hazards:

Hydrogen chloride in contact with the following can cause an explosion, ignition on contact, or other violent/vigorous reaction: Acetic anhydride AgClO + CCl4 Alcohols + hydrogen cyanide, Aluminum Aluminum-titanium alloys (with HCl vapor), 2-Amino ethanol, Ammonium hydroxide, Calcium carbide Ca3P2 Chlorine + dinitroanilines (evolves gas), Chlorosulfonic acid Cesium carbide Cesium acetylene carbide, 1,1-Difluoroethylene Ethylene diamine Ethylene imine, Fluorine, HClO4 Hexalithium disilicide H2SO4 Metal acetylides or carbides, Magnesium boride, Mercuric sulfate, Oleum, Potassium permanganate, beta-Propiolactone Propylene oxide Rubidium carbide, Rubidium, acetylene carbide Sodium (with aqueous HCl), Sodium hydroxide Sodium tetraselenium, Sulfonic acid, Tetraselenium tetranitride, U3P4 , Vinyl acetate. Silver perchlorate with carbon tetrachloride in the presence of hydrochloric acid produces trichloromethyl perchlorate which detonates at 40 deg. C.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, organic materials, metals, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
CEIL: 5 (ppm) from OSHA (PEL) [United States] CEIL: 7 (mg/m3) from OSHA (PEL) [United States] CEIL: 5 from NIOSH CEIL: 7 (mg/m3) from NIOSH TWA: 1 STEL: 5 (ppm) [United Kingdom (UK)] TWA: 2 STEL: 8 (mg/m3) [United Kingdom (UK)]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Pungent. Irritating (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Acidic.

Boiling Point:
108.58 C @ 760 mm Hg (for 20.22% HCl in water) 83 C @ 760 mm Hg (for 31% HCl in water) 50.5 C (for 37% HCl in water)

Melting Point:
-62.25°C (-80°F) (20.69% HCl in water) -46.2 C (31.24% HCl in water) -25.4 C (39.17% HCl in water)

Critical Temperature: Not available.

Specific Gravity:
1.1- 1.19 (Water = 1) 1.10 (20%and 22% HCl solutions) 1.12 (24% HCl solution) 1.15 (29.57% HCl solution) 1.16 (32% HCl solution) 1.19 (37% and 38%HCl solutions)

Vapor Pressure: 16 kPa (@ 20°C) average

Vapor Density: 1.267 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.25 to 10 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Soluble in cold water, hot water, diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, water

Incompatibility with various substances:
Highly reactive with metals. Reactive with oxidizing agents, organic materials, alkalis, water.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper, of stainless steel(304), of stainless steel(316). Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Reacts with water especially when water is added to the product. Absorption of gaseous hydrogen chloride on mercuric sulfate becomes violent @ 125 deg. C. Sodium reacts very violently with gaseous hydrogen chloride. Calcium phosphide and hydrochloric acid undergo very energetic reaction. It reacts with oxidizers releasing chlorine gas. Incompatible with, alkali metals, carbides, borides, metal oxides, vinyl acetate, acetylides, sulphides, phosphides, cyanides, carbonates. Reacts with most metals to produce flammable Hydrogen gas. Reacts violently (moderate reaction with heat of evolution) with water especially when water is added to the product. Isolate hydrogen chloride from heat, direct sunlight, alkalies (reacts vigorously), organic materials, and oxidizers (especially nitric acid and chlorates), amines, metals, copper and alloys (e.g. brass), hydroxides, zinc (galvanized materials), lithium silicide (incandescence), sulfuric acid(increase in temperature and pressure) Hydrogen chloride gas is emitted when this product is in contact with sulfuric acid. Adsorption of Hydrochloric Acid onto silicon dioxide results in exothmeric reaction. Hydrogen chloride causes aldehydes and epoxides to violently polymerize. Hydrogen chloride or Hydrochloric Acid in contact with the folloiwng can cause explosion or ignition on contact or

Special Remarks on Corrosivity:

Highly corrosive. Incompatible with copper and copper alloys. It attacks nearly all metals (mercury, gold, platinium, tantalum, silver, and certain alloys are exceptions). It is one of the most corrosive of the nonoxidizing acids in contact with copper alloys. No corrosivity data on zinc, steel. Severe Corrosive effect on brass and bronze

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
Acute oral toxicity (LD50): 900 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 1108 ppm, 1 hours [Mouse]. Acute toxicity of the vapor (LC50): 3124 ppm, 1 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 3 (Not classifiable for human.) by IARC [Hydrochloric acid]. May cause damage to the following organs: kidneys, liver, mucous membranes, upper respiratory tract, skin, eyes, Circulatory System, teeth.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of ingestion, . Hazardous in case of eye contact (corrosive), of inhalation (lung corrosive).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Doses (LDL/LCL) LDL [Man] -Route: Oral; 2857 ug/kg LCL [Human] - Route: Inhalation; Dose: 1300 ppm/30M LCL [Rabbit] - Route: Inhalation; Dose: 4413 ppm/30M

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (fetoxicity). May affect genetic material.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Corrosive. Causes severe skin irritation and burns. Eyes: Corrosive. Causes severe eye irritation/conjuntivitis, burns, corneal necrosis. Inhalation: May be fatal if inhaled. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract. Inhalation of hydrochloric acid fumes produces nose, throat, and larryngeal burning, and irritation, pain and inflammation, coughing, sneezing, choking sensation, hoarseness, laryngeal spasms, upper respiratory tract edema, chest pains, as well has headache, and palpitations. Inhalation of high concentrations can result in corrosive burns, necrosis of bronchial epithelium, constriction of the larynx and bronchi, nasospetal perforation, giottal closure, occur, particularly if exposure is prolonged. May affect the liver. Ingestion: May be fatal if swallowed. Causes irritation and burning, ulceration, or perforation of the gastrointestinal tract and resultant peritonitis, gastric hemorrhage and infection. Can also cause nausea, vomitting (with "coffee ground" emesis), diarrhea, thirst, difficulty swallowing, salivation, chills, fever, uneasiness, shock, strictures and stenosis (esophogeal, gastric, pyloric). May affect behavior (excitement), the cardiovascular system (weak rapid pulse, tachycardia), respiration (shallow respiration), and urinary system (kidneys- renal failure, nephritis). Acute exposure via inhalation or ingestion can also cause erosion of tooth enamel. Chronic Potential Health Effects: dyspnea, bronchitis. Chemical pneumonitis and pulmonary edema can also

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Hydrochloric acid, solution UNNA: 1789 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Hydrochloric acid Illinois toxic substances disclosure to employee act: Hydrochloric acid Illinois chemical safety act: Hydrochloric acid New York release reporting list: Hydrochloric acid Rhode Island RTK hazardous substances: Hydrochloric acid Pennsylvania RTK: Hydrochloric acid Minnesota: Hydrochloric acid Massachusetts RTK: Hydrochloric acid Massachusetts spill list: Hydrochloric acid New Jersey: Hydrochloric acid New Jersey spill list: Hydrochloric acid Louisiana RTK reporting list: Hydrochloric acid Louisiana spill reporting: Hydrochloric acid California Director's List of Hazardous Substances: Hydrochloric acid TSCA 8(b) inventory: Hydrochloric acid TSCA 4(a) proposed test rules: Hydrochloric acid SARA 302/304/311/312 extremely hazardous substances: Hydrochloric acid SARA 313 toxic chemical notification and release reporting: Hydrochloric acid CERCLA: Hazardous substances.: Hydrochloric acid: 5000 lbs. (2268 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R34- Causes burns. R37- Irritating to respiratory system. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 1

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References:
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangeureuses au canada. Centre de conformité internatinal Ltée. 1986.

Other Special Considerations: Not available.

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CAUSTIC SODA

Material Safety Data Sheet: CAUSTIC SODA SOLUTION

1.CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product name	**Caustic Soda Solution**
Effective Date	September 17, 2012
Synonyms	Caustic soda, lye, white caustic, caustic, sodium hydroxide
Chemical formula	NaOH in H_2O Solution
CAS name & no.	Sodium hydroxide, 1310-73-2
Manufacturer's name and address	Georgia Gulf Chemicals and Vinyls, LLC P.O. Box 629 Plaquemine, LA 70765-0629
Emergency telephone number	For transportation emergencies: CHEMTREC: (800) 424-9300 USA and Canada +1-703-527-3887 International (collect calls accepted) For all other emergencies: (225) 685-2500
MSDS contact	Corporate Health & Safety Department P.O. Box 629 Plaquemine, LA 70765-0629 Phone Number (225) 685-2500 responsiblecare@ggc.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	Wt. %
Sodium Hydroxide	1310 73 2	Approx. 50
Water	7732-18-5	Approx. 50

3. HAZARDS IDENTIFICATION

PRECAUTIONARY INFORMATION

Corrosive. Can cause severe eye, skin and respiratory tract burns. Highly toxic by ingestion. Ingestion will cause severe burns of the mouth, throat and stomach. Avoid any skin or eye contact. Avoid breathing dusts or mist.

POTENTIAL HEALTH EFFECTS

Primary Routes of Entry

Inhalation, ingestion, skin, and eye contact.

Acute Effects

Ingestion causes immediate, severe pain in the mouth, throat, and stomach as well as diarrhea and vomiting, from which collapse may result. Vomitus usually contains blood and possibly tissue. All tissues which come in contact with this chemical may be damaged. Death may result from ingestion. If the patient survives, permanent damage to the gastrointestinal tract may occur and the person may have permanent difficulty in swallowing. Inhalation causes respiratory irritation, which may develop into serious lung injury depending upon the degree of exposure. Serious pneumonitis may develop. Eye contact with Caustic Soda solid, dust, mist or solution usually results in immediate pain and can cause permanent eye damage including blindness. Skin contact may result in irritation, which may not be immediately painful. Greater exposure results in severe burns with scarring.

Chronic Effects

Prolonged exposures may result in upper respiratory irritation and ulceration of the nasal passage. High levels may cause permanent lung injury.

Potential Adverse Chemical Interactions

Persons with skin or lung diseases may be at an increased risk due to the toxic effects of this chemical on these organs.

Carcinogen Status

Caustic Soda is not considered carcinogenic by OSHA, NIOSH, NTP, IARC or EPA.

4. FIRST AID MEASURES

Inhalation
If a person breathes a large amount of this chemical, move the exposed person to fresh air at once. Provide emergency airway support. Give 100% humidified supplemental oxygen with artificial respiration, if needed. Transport to emergency medical facility without delay.

Skin Contact
If this chemical contacts the skin, immediately flush the contaminated skin thoroughly with water for at least 15 minutes. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin thoroughly with water. Get medical attention promptly.

Eye Contact
If this chemical contacts the eyes, immediately flush the eyes with large amounts of room temperature water. Hold the eyelids apart during the flushing operation. Washing must be started within 10 seconds of contact and continued for 30 minutes to prevent permanent injury. Get medical attention immediately. Ophthalmology consultation is a must.

Ingestion
If this chemical has been swallowed and the person is conscious, give water and/or milk immediately to dilute the Caustic Soda; no more than 8 ounces in adults and 4 ounces in children is recommended to minimize the risk of vomiting. **Do not attempt to make the person vomit.** Get emergency medical attention immediately.

5. FIRE FIGHTING MEASURES

Flash Point	Not Applicable
Flammable Limits (% By Vol.)	
Lower Explosive Limit (LEL)	Not Applicable
Upper Explosive Limit (UEL)	Not Applicable
Autoignition Temperature	Not Applicable

Fire Fighting Procedures/Fire Extinguishing Media
Caustic Soda is not combustible. Avoid direct contact of Caustic Soda with water, as this can produce a violent exothermic reaction. Use fighting agent suitable for surrounding fire to extinguish fire. Use carbon dioxide or suitable dry chemical extinguisher. Structural fire fighter's protective clothing is recommended for fire situations only; it is not effective in spills. Wear full protective clothing and NIOSH approved self-contained respirator, with a full face piece, in the positive pressure mode.

Unusual Fire and Explosion Hazards
Caustic Soda will react with metals such as aluminum, tin, and zinc to generate flammable and explosive hydrogen gas. Caustic solutions generate heat when further diluted with water. With concentrations of 40% or greater, the heat generated can result in dangerous mists or splattering or boiling which may cause violent eruptions of the solution.

5. FIRE FIGHTING MEASURES (Continued)

National Fire Protection Association Hazard Rating

4= Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

6. ACCIDENTAL RELEASE MEASURES

Protect People:

Evacuate area. Clear non-emergency personnel from the area. Ventilate area of spill or leak. Allow only trained personnel wearing appropriate protective gear to be in the spill response.

Protect the Environment:

Contain material to prevent contamination of the soil, surface water or ground water. Dike spills immediately. Dilute acid (preferably acetic acid may be used to neutralize residual traces of caustic soda) after flushing. Small spills should be carefully flushed with water.

Clean Up:

(See MSDS Section 15 for Regulatory Information)

7. HANDLING AND STORAGE

Handling and Storage

Do not get into eyes, on skin, or on clothing. Avoid breathing mists or spray. All personal protective equipment should be selected in accordance with the hazard assessment required by 29 CFR 1910.132 (d).

Product can react violently with water and acids. Caustic solutions generate heat when further diluted with water. With concentrations greater than 40%, the heat generated can raise temperatures above the boiling point resulting in sporadic, violent eruptions or spattering. Store away from incompatible materials. . (See Section 10, Stability and Reactivity of this MSDS)

7. HANDLING AND STORAGE (continued)

Hazardous carbon monoxide gas can form upon contact with food and beverage products and various sugars in enclosed vessels. Precautions, including atmospheric monitoring for carbon monoxide, should be taken to ensure safety of personnel entering vessels.

Do not store in containers made from tin, aluminum, brass, zinc, and alloys containing these metals. Follow all federal, state, and local regulations as well as all insurance codes when storing and handling caustic soda.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

All personal protective equipment should be selected in accordance with the hazard assessment required by 29 CFR 1910.132 (d).

Respiratory Protection

Use appropriate NIOSH approved respirator in accordance with 29 CFR 1910.132 and 1910.134, to prevent overexposure. Respirators must be selected based on the airborne levels found in the workplace and must not exceed the working limits of the respirator.

Eye Protection

Use splash proof chemical safety goggles and/or appropriate full-face shield. Follow the eye and face protection guidelines of 29 CFR 1910.132 and 1910.133. An eye wash fountain (in accordance with 29 CFR 1910.151) should be within the immediate work area for emergency use.

Skin Protection

Chemical protective clothing and gloves must be used in accordance with 29 CFR 1910.132 and 29 CFR 1910.138.

Ventilation

Provide general and/or local ventilation to control airborne levels below exposure guidelines. Local exhaust ventilation should comply with OSHA regulations and the American Conference of Industrial Hygienists, Industrial Ventilation - A Manual of Recommended Practice.

Exposure Guidelines

OSHA	**PEL 8 hour TWA**	**2 mg/m^3**
ACGIH	**TLV - Ceiling**	**2 mg/m^3**

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (continued)

Other

Where there is any possibility of exposure of an individual's body to Caustic soda solutions, facilities for quick drenching of the body should be provided (in accordance with 29 CFR 1910.151) within the immediate work area for emergency use. Such individuals should be provided with and required to use impervious clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear to hazy liquid
Odor	Odorless
Boiling Point	Approximately 289° F (143° C)
Melting Point	Crystallization begins 54-59° F (12-15° C)
Solidification Point	41° F (5° C)
Solubility	Soluble in water, alcohol and glycerol
Specific Gravity (Water = 1.0)	1.53 at 60° F (15.6° C)
Vapor Density (Air = 1.0)	Not Applicable
Vapor Pressure	1.5mm Hg at 20° C
pH	> 14.0 at 20° C

10. STABILITY AND REACTIVITY

Stability

Stable under normal conditions. Product absorbs water and carbon dioxide from the air.

Polymerization

Hazardous polymerization does not occur.

Hazardous Decomposition Products

None known.

Incompatible Materials

Heat is generated when mixed with water. Spattering and boiling can occur. Flammable hydrogen may be generated from contact with metals such as: aluminum, brass, tin, zinc and alloys of these metals. Avoid contact with acids, halogenated organics, organic nitro compounds and glycols. Caustic soda solution reacts readily with various reducing sugars (i.e., fructose, galactose, maltose, dry whey solids) to produce carbon monoxide. Precautions should be taken including atmospheric monitoring of the tank to ensure safety of personnel.

11. TOXICOLOGICAL INFORMATION

Animal Toxicity

Oral:	Rabbit, LD_{LO}	500 mg/kg
Skin:	Rabbit, Adult	500 mg/24 H - Severe irritation
Eye:	Rabbit, Adult	50 µg/24 H - Severe irritation
Intra peritoneal:	Mouse, LD_{50}	40 mg/kg

LD_{LO} = Lowest lethal dose in a given species by a given route of exposure.
LD_{50} = Dose that is lethal to 50% of a given species by a given route of exposure.

12. ECOLOGICAL INFORMATION

Caution: Caustic soda solutions may react violently with acids and water. Do not allow drainage into sewers, streams or storm conduits. Spills on areas other than pavement, dirt or sand may be handled by removing the affected soils and placing in approved containers.

Environmental Fate: The following information on sodium hydroxide is extracted from the TOXNET database maintained by the National Library of Medicine.

Aquatic: A spill of an aqueous solution of sodium hydroxide may be able to penetrate the soil. Product could also raise the pH of surface water, depending on the size of the spill. The primary environmental concern during a spill is the impact of the high pH on aquatic and terrestrial life.

Biodegradation: Not Applicable

Ecotoxicity: Material is slightly toxic to aquatic organisms on an acute basis (LC50 between 10 and 100 mg/L in most sensitive species). May cause pH shifts outside the range of 5-10 standard units; this change may be toxic to aquatic organisms.

13. DISPOSAL CONSIDERATIONS

Waste Management Information: Do not dump into any sewers, on the ground, or into any body of water. Any disposal practice must be in compliance with local, state and federal laws and regulations (contact local or state environmental agency for specific rules). Waste characterization and compliance with applicable laws are the responsibility of the waste generator.

14. TRANSPORTATION INFORMATION

Proper Shipping Name	Sodium hydroxide solution
DOT Hazard Class	8, (Corrosive)
DOT Shipping I.D. No.	UN 1824
PG	II
Labeling	Corrosive
RQ (lbs)	1000

15. REGULATORY INFORMATION

Regulatory information is not meant to be all inclusive. It is the user's responsibility to ensure compliance with federal, state or provincial and local laws.

SARA Title III

Section 302 and 304 of the Act; Extremely Hazardous Substances (40 CFR 355)

COMPONENT	CAS No.	TPQ (lbs)	RQ (lbs)
None	Not Applicable	Not Applicable	Not Applicable

Note: TPQ - Threshold Planning Quantity RQ - Reportable Quantity

Specific state and locality regulations regarding reportable quantities should be reviewed prior to chemical use, as they may differ from the federal reportable quantity requirement as stated above.

Section 311 Hazard Categorization (40 CFR 370)

ACUTE	CHRONIC	FIRE	PRESSURE	REACTIVE
X				X

Section 313 Toxic Chemicals (40 CFR 372.65)

COMPONENT	CAS No.	WT.%
None	Not Applicable	Not Applicable

CERCLA

Section 102(a) Hazardous Substances (40 CFR 302.4)

COMPONENT	CAS No.	WT.%	RQ (lbs)
Sodium hydroxide	1310-73-2	Approx. 50	1,000

RCRA

40 CFR 261.22 Hazardous waste number:
Waste sodium hydroxide solution, unless extremely dilute, will exhibit a high pH (>=12.5) and thus will be regulated as a characteristic corrosive hazardous waste with the hazardous waste number D002.