# ON-SITE EMERGENCY PLAN

**FOR**

नालको NALCO

National Aluminium Company Limited

# CAPTIVE POWER PLANT

## National Aluminium Company Limited

## ANGUL, ODISHA

**13 – 15 May 2015**

**BY**


## NATIONAL SAFETY COUNCIL

**98-A, Sector 15, Institutional Area,**
**CBD Belapur, Navi Mumbai-400 614**
**Tel. 022-27579924/5/6/7, Fax: 022-27577351,**
**Email: safetyaudit@nsc.org.in, Website: www.nsc.org.in**

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# 1.0 GENERAL INFORMATION ABOUT THE FACTORY

## 1.1 BRIEF INFORMATION ABOUT THE COMPANY IN GENERAL AND FACTORY IN PARTICULAR

National Aluminium Company (NALCO) Ltd. is one of the Navaratna companies of Government of India. It has five units of operation, viz., Panchpatmali bauxite mines at Damanjodi, Alumina Refinery at Damanjodi, Aluminium Smelter Plant at Angul, Captive Power Plant at Angul and Port Facilities at Vizag. The first four units are located in Orissa and the Port Facility is in Andhra Pradesh. A captive railway system of NALCO transports refined alumina in special wagons from Damanjodi to Angul for manufacture of aluminium and also to Vizag for export. NALCO is operating a multi-location Bauxite Mines-Alumina-Aluminum complex along with a Captive Power Plant, in the State of Orissa, India. At present NALCO is one of largest aluminium mining and processing industries in the world. Captive Power Plant (CPP) of NALCO is located at Angul, Orissa on NH-55,around 140 km away from Bhubaneswar.(Latitude- $28^0$ 50' and Longitude- $85^0$ 6') The plant area including surroundings comprises 1460 acres with 953 acres of main plant area. It produces power for their smelter unit located at 4 km away.

## 1.2 POPULATION IN THE VICINITY:

| Sl.No. | Neighboring Locations | Approximate Distance from CPP | Direction from CPP | Population |
|---|---|---|---|---|
| 01 | Gotamara | 02 kms | North-East | 3000 |
| 02 | Banarpal | 03 kms | East | 2000 |
| 03 | Balaram Prasad | 02 kms | North | 2500 |

## 1.3 NAME OF THE OCCUPIER:

Shri V.Balasubramanyam
Director(Production), NALCO
Nalco Bhawan, P/1, Nayapalli
Bhubaneswar – 751061
Odisha

## 1.4 BRIEF MANUFACTURING PROCESS

**Basic Principle**: Pulverized coal is fed to the furnace. Water in tubes is converted into steam and then into superheated steam. The superheated stem is allowed to enter the steam turbine. Turbine rotates at 3000 rpm, Generator and exciter are coupled with the turbine rotor. Thus electrical power is generated. The generated power is stepped up to 220KV and connected to the grid.

The Plant have 10 Nos. of power generating Units of capacity 120 MW each ie. 1200 MW. It uses coal and water as its basic raw material. Coal to CPP is supplied from Mahanadi Coal Fields Limited, located around 28 km from CPP, through Captive Rail System. The present coal quality varies between 37 to 44% ash with average GCV of around 4000 Kcal/Kg. The crushed coal is fed in to the bowl mill for pulverization and Pulverized coal is fed to the furnace.

All the boilers and TG are supplied by M/s BHEL. Boilers are pulverized tangential coal fires reheat type water tube and turbines are 3 cylinders (HP, IP and LP) of 90 stages. Capacity of boilers is 410 T/hr and temp of superheated steam is $540^0$ C.

The super heated steam at this operating pressure and temperature is used for generation of power. The output power from generator at 10.5 KV is stepped up to 220 KV for onward transmission to smelter plant and Orissa grid.

Out of 10 Generators 6 Generators (Unit- 1,2,3,4,5 & 6) are Hydrogen cooled and 4 Generators (Unit-7,8,9 &10 )are air cooled. The furnace is of balanced draft type with forced and induced draft fan. After initial light up with LDO and HFO steam is generated in boilers and allowed to enter the turbines. Fire alarm, Fire fighting system and foam monitors are provided to control fire hazards. Boilers are protected by FSSS system..

The average coal requirement for CPP is 18,000 MT per day at present level of Smelter capacity (960 pots). M/s MCL supply the coal for CPP from Bharatpur mines of Talcher coalfields. CPP has a merry go round coal loading and unloading facility.

The total water requirement of the CPP NALCO is around 80,000 cubic meter per day is met from the nearby Brahmani river. This is excluding the recycled water from Ash Pond pollution control unit. Ash Pond. Water is drawn from river Brahmani. Intake pump house is located around 7 km away from the Plant. The water is pumped from the river through our intake pump house. Intake water is treated in a modern water treatment plant. Chlorination is done at CWPH (Cooling Water Pump House) and DM (De-Mineralized Water) Plant. There are three water reservoirs having capacity 2x4,00,000 and 1x5,00,000 $m^3$. Total water holding capacity of the reservoirs is 13,00,000 cub meter. The reservoirs are capable to supply water to the Plant for minimum 15 days including meeting the requirement of Smelter and Nalco township.

The ash collected from ESP and boiler bottom ash hopper is converted to slurry with help of ash water and pumped to the ash pond. The ash pond overflow water is clarified with clarifier installed at pollution control unit near the ash pond and pumped back to the plant to be used again as ash water for slurry transportation. The Ash pond is designed with three-pond system.Pond-3 carries the decanted water from pond 1 and 2 to Ash water recycling unit. In the Ash Water recycling unit, water is clarified further and pumped back to the ash water forebay for reuse. 100% of overflow water of ash pond is recycled back for reuse.Unit-7,8,9&10 are having dry ash collection system. Ash silos of capacity 3x500 MT and 2x1200MT are installed to store huge quantity of ash which is disposed of through end users. Of late Ash pond has been modifies as conststing of Ash Pond-1, Ash Pond-II , Ash Pond –III and Ash Pond- IV.

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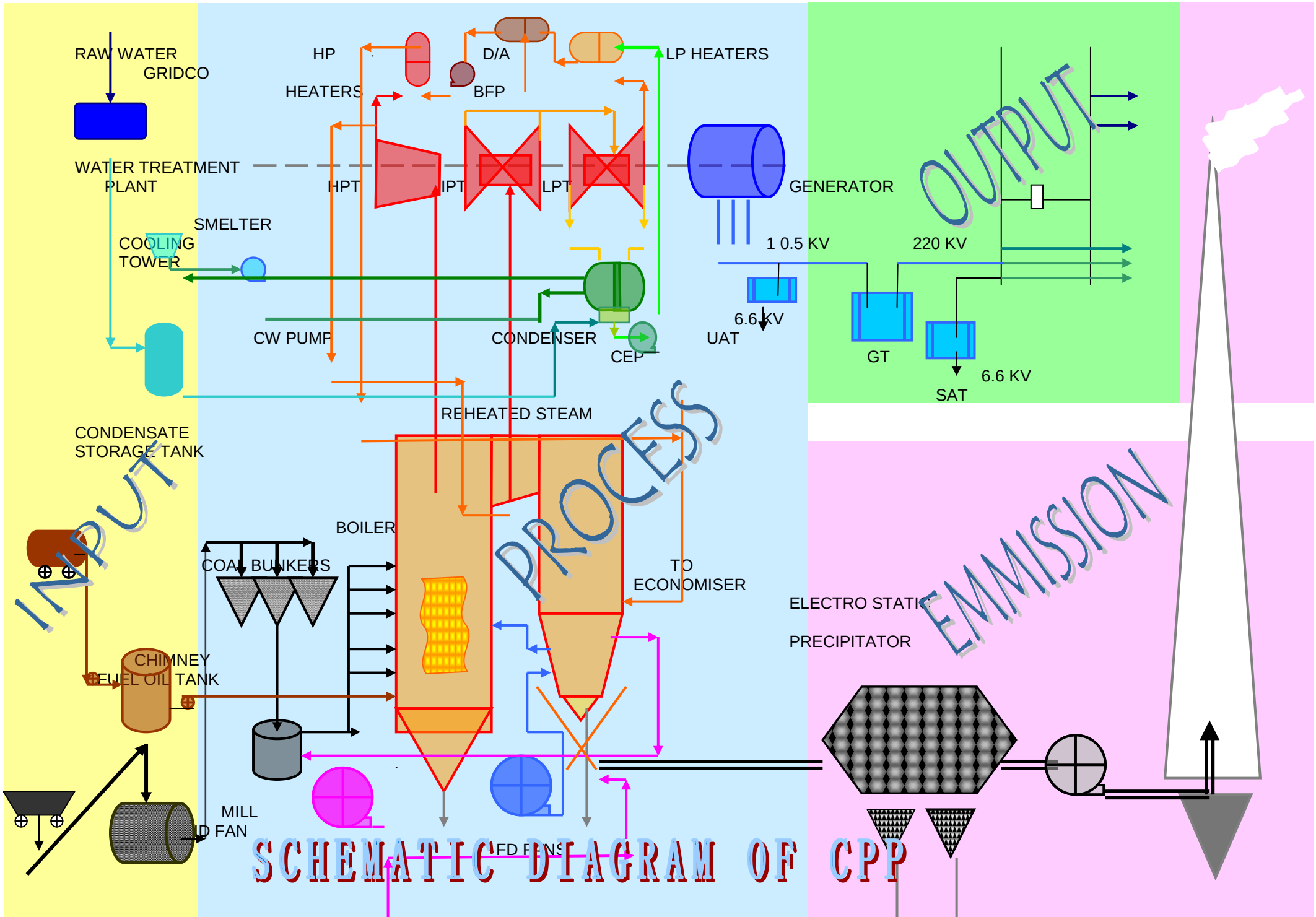
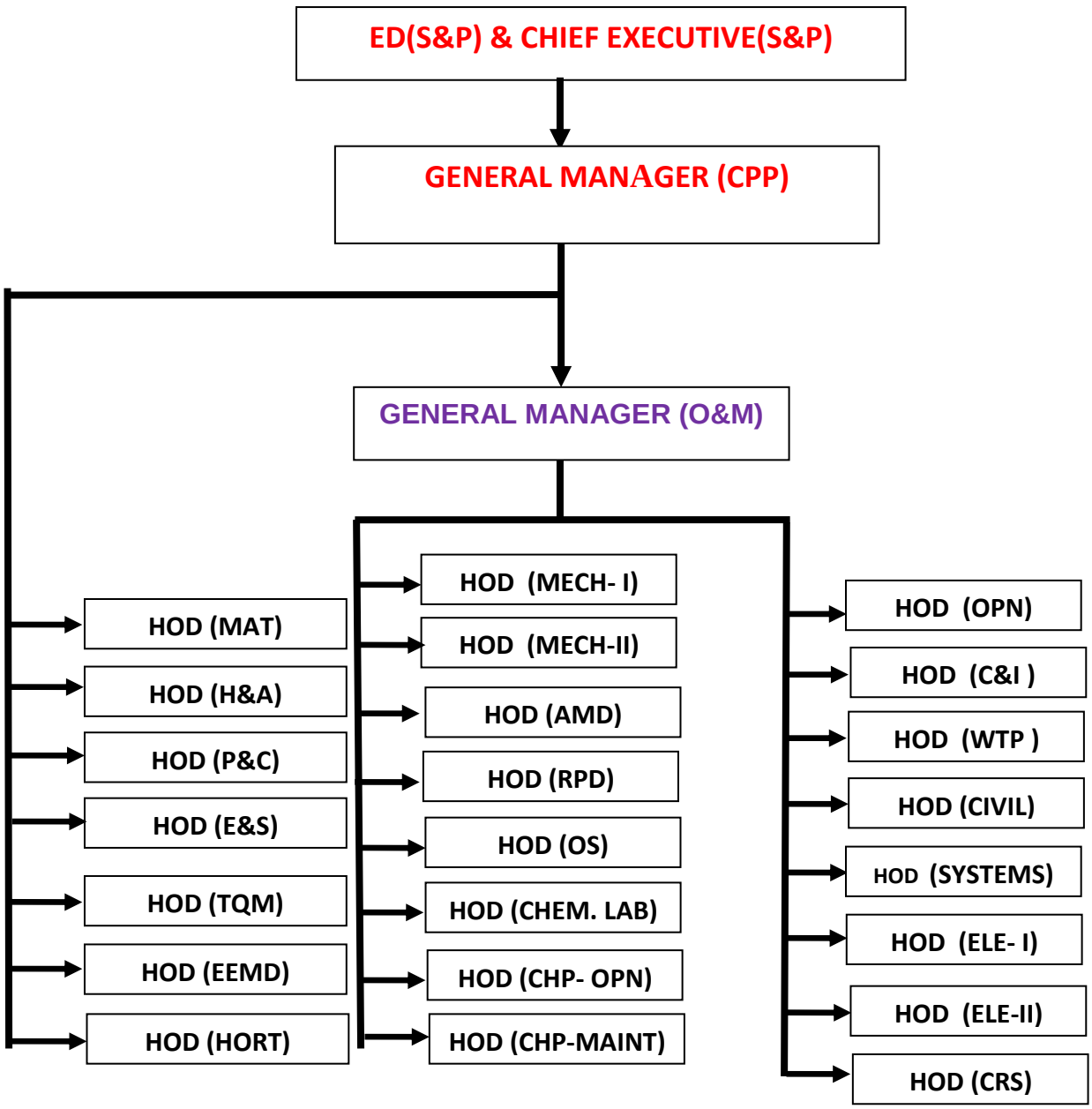

RAW WATER
GRIDCO
WATER TREATMENT PLANT
SMELTER
COOLING TOWER
CONDENSATE STORAGE TANK
HP HEATERS
D/A
BFP
LP HEATERS
HPT
IPT
LPT
GENERATOR
CW PUMP
CONDENSER
CEP
UAT
1 0.5 KV
6.6 KV
220 KV
GT
SAT
6.6 KV
OUTPUT
REHEATED STEAM
INPUT
PROCESS
EMMISSION
BOILER
COAL BUNKERS
TO ECONOMISER
ELECTRO STATIC PRECIPITATOR
CHIMNEY
FUEL OIL TANK
MILL
D FAN
FD FANS
SCHEMATIC DIAGRAM OF CPP

## 2.0 ORGANISATIONAL SET UP –HIERARCHI IN FORM OF TREE SHOWING THE UNIT HEAD AND HIS SUBORDINATES UPTO THE DEPARTMENTAL /SECTIONAL HEADS

# ORGANOGRAM OF CPP



## 3.0 SHIFT WISE MANPOWER BREAKUP FOR "A", "B", "C" AND "G" SHIFT IN TABULAR FORM

## 3.1 MAN POWER DETAILS AT CPP EXCLUDING ASH POND:

**License Manpower in CPP:- 5000**

**The present Manpower status is as follows.**

| Man Power | G shift 0800-1700 hrs | A shift 0600-1400 hrs | B shift 1400-2200 hrs. | C shift 2200-0600 hrs | Total |
|---|---|---|---|---|---|
| Regular manpower | 755 | 223 | 172 | 154 | 1304 |
| Contract manpower | 1390 | 292 | 264 | 173 | 2119 |
| Total | 2145 | 515 | 436 | 327 | 3423 |

## 3.2 MAN POWER DETAILS AT ASH POND

| Man Power | G shift 0800-1700 hrs | A shift 0600-1400 hrs | B shift 1400-2200 hrs. | C shift 2200-0600 hrs | Total |
|---|---|---|---|---|---|
| Regular manpower | 11 | -- | -- | 01 | 12 |
| Contract manpower | 87 | 06 | 05 | 05 | 103 |
| Total | 98 | 06 | 05 | 06 | 115 |

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## 4.0 NAME OF THE PRODUCT AND BYE PRODUCT AND THEIR QUANTITY PER DAY/ANNUM, STRORAGE TYPE IN TABULAR FORM

**PRODUCT ; ELECTRIC POWER : INSTALLED CAPACITY ; 10X120 MW**

**BYE PRODUCT: FLY ASH**

| PERIOD | ASH GENERATION ( KT) |
|---|---|
| 1986-2000 | 15306 |
| 2000-01 | 1258 |
| 2001-02 | 1314 |
| 2002-03 | 1481 |
| 2003-04 | 1760 |
| 2004-05 | 2253.26 |
| 2005-06 | 1992.49 |
| 2006-07 | 2051.084 |
| 2007-08 | 1885.391 |
| 2008-09 | 1835.801 |
| 2009-10 | 2138.18 |
| 2010-11 | 2187.214 |
| 2011-12 | 2142.174 |
| 2012-13 | 2244.539 |
| 2013-14 | 1921.804 |
| 2014-15 | 1995.489 |

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## 5.0 NAMES OF THE RAW MATERIALS SHOWING THEIR QUANTITY ,TYPE OF STORAGE IN THE TABULAR FORM

| RAW MATERIALS | QUANTITIES |
|---|---|
| **Water** | Water is drawn from river Brahmani. Intake pump house is located around 7 km away from the Plant. The water is pumped from the river through intake pump house. There are three water reservoirs having capacity 2x4,00,000 and 1x5,00,000 $m^3$ . Total water holding capacity of the reservoirs is 13,00,000 cubic meter. The reservoirs are capable to supply water to the Plant for minimum 15 days including meeting the requirement of Smelter and Nalco township<br>The total water requirement is around 1,00,000 cubic meter per day excluding the recycled water from Ash Pond pollution control unit (this includes water supply to Smelter plant and Township also). For CPP water requirement is around 80,000$m^3$ /day excluding water recycled for Ash Pond. |
| **Raw coal in Track hopper** | The average coal requirement for CPP is 18,000 MT per day (i.e 2000 Mt/day for one unit.) Full train (consisting of 55 to 58 wagons) with coal are unloaded at 'Wagon Tippling' plant and coal is received in line bunkers, from where they are conveyed to coal silos. . |
| **Raw coal stock pile** | **The raw coal** is stacked in coal yard near track hopper at CPP. From there coal is reclaimed and fed to the power house . The fire hazard associated with stockpile is usually limited to spontaneous combustion. The meteorological data shows that temperature may go up to $47^0$C at CPP Angul during summer |
| | **Coal Pulverizer** |
| **Coal Bunkers** | **Coal Bunkers** store large quantity of coal and are potential to fire hazard |
| | **Coal Mill area :** The pulverised coal when transported alongwith air forms a mixture , which may burn in mill during milling operation |
| | **Conveyo**r |

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## 6.0 NAMES OF THE HAZARDOUS SUBSTANCES USED AS RAW MATERIALS SHOWING THEIR TANK/CONTAINERS CAPACITY AND MODE OF STORAGE IN A TABULAR FORM :

**DETAILS OF HAZARDOUS SUBSTANCES USED AND STORED**

| Hazardous chemical | Hazardous locations | Quantity of storage in a single vessel | Maximum storage (above Ground) | Permissible limit of storage | Threshold quantity required for a MAH unit (MS&IHC, 1989) |
|---|---|---|---|---|---|
| Hydrogen | Hydrogen storage shed | 5 $m^3$ | 300 cylinders | 420 Cylinders (210 Kg) | **(2 Tons: Threshold limit)** Hydrogen gas is handled in cylinders . maximum 420 hydrogen cylinders are present at a time. |
| | Hydrogen Manifold at Power house | 5 $m^3$ | 42 cylinders | | |
| Chlorine | CWPH Chlorination Plant | 900 kg (Tonner) | 2700 Kg | 50 Tonners (45 Tones) | **(10 Tons Threshold Limit)** Clorine is stored in Tonners . Each tonner carries 900Kgs of Chlorine. Maximum 50 tonners are vailable at a time which ammounts to 45000 kgs of Chlorine |
| | Chemical House Chlorination plant | 900 kg (Tonner) | 2700 Kg | | |
| | Unit 7& 8 | 900 kg (Tonner) | 1800 Kg | | |
| HFO | FOPH Tank Farm Area | 1750 Kl | 4100 Kl in 06 tanks | - | **(Not listed)** 3500Kls in two tanks and 600kl in 4 tanks |
| LDO | FOPH Tank Farm area | 1100 KL | 2700 Kl in 04 tanks | | (**Not listed)** 2200Kl in 2 tanks and 500Kl in two tanks |
| Station Auxiliary Transformer - 6 Nos. | '0' mtr at 220 kv swyd & near GT of #7,8 & 9 | 21,130 ltrs – 29,000 ltrs | Stored individually in 6 .transformers-,Total 1,42,000 ltrs. | Oil top up has been made as per transformer design/capacity. | Not listed. Transformer oil is being used for cooling purpose |
| Generating Transformer - 10 Nos. | At '0' mtr near MOT of each units. | 49,440 ltrs – 50,725 ltrs. | Stored individually in 10 .transformers-,Total 500000 ltrs. | Oil top up has been made as per transformer design/capacity. | Not listed. Transformer oil is being used for cooling purpose |
| Unit Auxuliary transformer-10 Nos. | At '0' mtr near MOT of each units. | 8,340 ltrs – 15,700 ltrs. | Stored individually in 10 .transformers-,Total 500000 ltrs. | Oil top up has been made as per transformer design/capacity | Oil top up has been made as per transformer design/capacity |

## 6.1 DETAIL OF TRANSFORMERS AND OIL STORED

| Sl No | Name of the Transformenrs | Transformer Oil (in ltrs) | Capcity |
|---|---|---|---|
| 1. | SAT-1 | 21,130 | 35MVA |
| 2. | SAT-2 | 21,130 | 35MVA |
| 3. | SAT-3 | 21,130 | 35MVA |
| 4. | SAT-4 | 24,430 | 31.5MVA |
| 5. | SAT-5 | 24.950 | 31.5MVA |
| 6. | SAT-6 | 29,000 | 31.5 MVA |
| 7. | ST-1 | 49,440 | 150MVA |
| 8. | ST-2 | 50,725 | 140MV |
| 9. | ST-3 | 50,725 | 140MVA |
| 10. | ST-4 | 50,725 | 140MVA |
| 11. | ST-5 | 50,725 | 150MVA |
| 12. | ST-6 | 50,725 | 140MVA |
| 13. | ST-7 | 49,440 | 150 MVA |
| 14. | ST-8 | 49,440 | 140MVA |
| 15. | ST-9 | 49,440 | 150MVA |
| 16. | ST-10 | 49,440 | 150MVA |
| 17. | UAT-1 | 8,340 | 150MVA |
| 18. | UAT-2 | 8,340 | 16MVA |
| 19. | UAT-3 | 8,340 | 16MVA |
| 20. | UAT-4 | 8,340 | 16MVA |
| 21. | UAT-5 | 8,340 | 16MVA |
| 22. | UAT-6 | 8,340 | 16MVA |
| 23. | UAT-7 | 15,700 | 16MVA |
| 24. | UAT-8 | 15,700 | 16MVA |
| 25. | UAT-9 | 15,700 | 16MVA |
| 26. | UAT-10 | 15,700 | 16MVA |

## 7.0 NAMES OF THE HAZARDOUS SUBSTANCES / GASES PRODUCED / GENERATED DURING THE PROCESS WITH THEIR QUANTITIES IN TABULAR FORM

**nil**

## 8.0 IDENTIFICATION OF HAZARDS

**TYPE OF CREDIBLE HAZARDS(FIRE, EXPLOSION &TOXIC )LIKELY TO BE OCCURRED DUE TO HAZARDOUS SUBSTANCES /CHEMICALS/GASES STORED/HANDLED/USED**

| Sl. no. | Hazardous substance/ system | Type of credible hazard | Safety Measures Provided |
|---|---|---|---|
| | | | |
| 1 | Hydrogen gas storage area | Fire/ explosion/ leakage | 1. Gas detector / sensor have been installed.<br>2. No electrical connection has been provided inside the storage room.<br>3. Fire hydrants and fire extinguishers have been provided.<br>4. To discharge the static charge of human body, a copper plate has been fixed at the entry of the storage shed. The person entering the storage shed first touches the copper plate for discharge of static energy .<br>5. Shed is within a boundary wall and kept under lock & key.<br>6. Cylinders are chained in the storage stand and all the cylinders are kept in vertical position.<br>7. Caution boards have been installed.<br>8. Unauthorized entry is prohibited.<br>9. No telephone connection has been given and mobile phones are not allowed inside the storage yard.<br>10. Only trained persons are deployed to carry out the job.<br>11 Dry grass and bush cutting is done on regular basis**.**<br>12. It is a No Smoking Zone. |
| | | | |
| 2 | HFO/ /LDO storage area | Pool Fire | 1. Water sprinkler system has been provided.<br>2. Foam monitors have been installed at all four corners.<br>3. Fire hydrant system is provided all around the tanks.<br>4. Air breather facility is available on the tanks.<br>5. Dyke wall have been made around the tanks to accommodate oil in case of leakage.<br>6. Also barbed wire fencing has been made around the storage tanks for extra safety.<br>7. Caution boards have been displayed.<br>8. “No Smoking Zone” is declared.<br>9. Hot Work Permit system has been implemented during maintenance job.<br>10. Leakage oil collection pit with pumping facility have been made to collect the leaked oil.<br>11. Floor has been concretized to avoid any soil contamination.<br>12. Cleaning of dry grass, bushes and housekeeping at a regular interval is done. |

| Sl. no. | Hazardous substance/ system | Type of credible hazard | Safety Measures Provided |
|---|---|---|---|
| | | | |
| 3 | Chlorination plant | Toxic release | 1. Chlorine detectors / sensors with alarm have been installed at<br>i) CWPH(Cooling Water Pump House)<br>ii) RCPH(Re-circulation Water Pump House)<br>iii) Chemical House(WTP Plant)<br>2. Chlorine absorption systems have been provided.<br>3. Chlorine leak arresting emergency kits available in chlorination plant.<br>4. Self Contained Breathing Apparatus (SCBA) sets are available at CWPH and RCPH.<br>5. Neutralization tank with NaOH is available.<br>6. Paging system also provided to contact the control rooms.<br>7. Caution boards have been made in regional as well as English language.<br>8. Wind socks have been provided at the top of the chlorination building to know the wind direction.<br>9. Safety showers / drench showers have been installed.<br>10. Mock drill is being conducted at regular interval.<br>11. Telephone numbers of rescue team, first-aid, Hospital, Safety officer, General Manager are written on the wall. |
| | | | |
| 4 | Transformer | Fire / Explosion / Bursting of Transformer | 1. Earthing has been made.<br>2. Lightening arrestors have been provided.<br>3. Pressure release valves have been installed.<br>4. Electrical protection devices are installed.<br>5. Mulsifier system is installed in all transformers except EHT (extra high tension transformer).<br>6. Transformers are kept & protected inside a fence.<br>7. Unauthorized entry is restricted; message has been displayed at the entry gate of the transformers.<br>8. Caution boards have been displayed.<br>9. SOP / SMP are displayed.<br>10. Buchholz relay has been provided in all the transformers.<br>11. Separation fire wall has been provided between the transformers.<br>12. Oil water separators have been provided to collect any leaked oil. |
| | | | |
| 5. | Boilers | Bursting of Boiler drum/ | 1) Eight safety valves have been installed on Boilers<br>2) Boilers are equipped with Furnace Safe guard |

| Sl. no. | Hazardous substance/ system | Type of credible hazard | Safety Measures Provided |
|---|---|---|---|
| | | Furnace explosion | Supervisory System(FSSS) and Distributed Digital Control System(DDCS).<br>3). Following tripping devices and interlocks have been provided.<br>(a) Flame failure trip<br>(b) Loss of all fuel trip<br>(c) Drum level very high and very low trip<br>(d) Furnace pressure very high and very low trip.<br>(e) Loss of DC supply trip<br>(f) Re-heater protection trip<br>(g) Loss of AC supply trip |
| | | | |
| 6 | Turbo Genereator | Explosion hazard if the purity of $H_2$ goes down. | To maintain 99.9% purity the following are the safety measures:<br>a) Provision of H2 gas charging system.<br>b) DC seal oil pump for sealing of hydrogen gas.<br>c) On-line hydrogen meter with annunciation system.<br>d) LLD(liquid level detection) to know any ingress of water.<br>e) If the purity comes down, then annunciation comes in control room. |
| | | | |
| 7 | Ash Pond | Breach of the Ash Pond | 1. Mock drill is conducted under On-Site Emergency Management Plan.<br>2. “Assembly Points” have been made / earmarked.<br>3. Stability test is done by M/s.IISc., Bangalore.<br>4. Pre-Monsoon and Post-monsoon inspection of dyke safety is done by Supt.Engineer, Irrigation Dept. Angul.<br>5. Civil materials like sand bags, chips, cement, and contract labors, tractors, tippers, rollers, hydra etc. have been kept ready to meet the emergency.<br>6. Provision of ECR (Emergency Control room) has been made at Ash Pond equipped with VHF, WLL phone, mobile phone, Ash Pond layouts etc.<br>7. Ash Pond is manned round the clock to take care of any emergency.<br>8. Patrolling is carried out by CISF personnel.<br>9. High mast lights are installed all around the Ash Pond.<br>10 Watch towers have been made for vigilance of Ash Pond.<br>11. Water sprinkler system is installed for dust suppression.<br>12. Polythene covering system has been made to control the dust during summer. |

| Sl. no. | Hazardous substance/ system | Type of credible hazard | Safety Measures Provided |
|---|---|---|---|
| | | | 13. High audible sirens have been provided to declare any emergency. |

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## 9.0 IDENTIFICATION OF MOST CREDIBLE HAZARDS (FROM SAFETY REPORT)

According to the MS&IHC Rules and as is evident from MSDS Chlorine comes under highly toxic, hydrogen under highly flammable gas and HFO/LDO comes under flammable liquids.

The $LC_{50}$ value of Chlorine is 35 ppm for 30 minutes of release duration. The lower flammability/explosivity limit (LFL/LEL) and upper flammability/explosivity limit (UFL/UEL) of hydrogen is 4.1% and 74.5% by volume of air respectively. HFO/LDO is a flammable liquid and has high flash point of > $66^{O}C$. It implies that normally it does not present a major fire hazard.

**BRIEF DESCRIPTION OF MCLS POSSIBLE IN CPP**

**CHLORINE**

Since $Cl_2$ is a toxic chemical, maximum loss scenarios will be atmospheric dense gas dispersion in the form of gas clouds. Maximum downwind distances for dispersed cloud of chlorine in all release scenarios for various concentration levels have been considered

**MAXIMUM AFFECTED DOWNWIND DISTANCES (IN METER) FOR CHLORINE RELEASE FROM TONNER (STABILITY CLASS: D AND WIND SPEED = 4.0 M/S)**

Maximum Inventory = 900 kg. Status*:* In-building storages

| Sr. No. | Scenario | Maximum Downwind Distances (m) from location point within 30 minutes | | |
|---|---|---|---|---|
| | | $LC_{50}$ = 35 ppm | IDLH =10 ppm | STEL = 3 ppm |
| 1. | Catastrophic Failure of a Chlorine tonner | 248 | 531 | 1079 |

The consequence results for chlorine ($Cl_2$) vapour cloud for various release scenarios under neutral stability class and wind speed of 4 m/s have been considered. Chlorine is stored (in tonners) in three *indoor locations*: CWPH chlorination plant, RCPH (unit area 7 & 8) and chemical house.

The Table shows the maximum downwind distances of chlorine cloud due to catastrophic rupture of a tonner (inventory = 900 kg). It is seen from the table that a $Cl_2$ vapour cloud with concentration level of 35 ppm can be felt within the maximum downwind distance of 248 m from release point when a catastrophic rupture of $Cl_2$ tonner occurs with the release of 900 kg. The frequency of occurrence of catastrophic failure of tonner or cylinders is very low.

**HYDROGEN**

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 atmospheric pressure, 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. Radiation levels ($Kw/m^2$) and overpressure (psi) for fire and explosion associated with hydrogen have been considered.

**MAXIMUM AFFECTED DISTANCES (IN METER) FOR VARIOUS FIRE AND EXPLOSION SCENARIOS OF HYDROGEN (UNDER D CLASS WITH WIND SPEED OF 4.0 M/S)**

| Scenario | Maximum hazard distance (in m) to LEL/ LFL | Maximum affected distances (in meter) corresponding to the following levels | | | | | |
|---|---|---|---|---|---|---|---|
| | | Thermal radiation (in $Kw/m^2$) levels for Fire | | | Overpressures (psi) for explosion | | |
| | | 4.5 $Kw/m^2$ | 12.5 $Kw/m^2$ | 37.5 $Kw/m^2$ | 1 psi | 3 psi | 5 psi |
| Bursting of 420 Hydrogen Cylinders. Inventory: 210 Kg | 40 | 172 | 105 | 61 | 111 | 54 | 39 |
| Bursting of a Hydrogen Cylinder. Inventory: 0.5 Kg | 4.8 | 27 | 15 | 9 | 15 | 7 | 5 |

Since hydrogen has flammable and explosive properties, the major release scenarios are fire and explosion. Hydrogen is stored (in cylinders) in two locations: storage shed and manifold at powerhouse. Worst-case scenarios of catastrophic failure of hydrogen cylinders (i.e., bursting of a cylinder) have been considered for the consequence analysis. One cylinder with inventory of 0.5 kg and 420 cylinders at a time with total inventory of 210 kg have been chosen for the analysis. In case of bursting of a cylinder with capacity of 0.5 kg under pressure of 150 $kgf/cm^2$, a radiation level of secondary damage will be confined within the distance of only 15 m from the location of cylinder. This result is 105 m for the case of bursting scenario of 420 cylinders at a time. There is a possibility of fireball and a radiation level corresponding to severe damage will be confined within the distance of 61m from the ignition point. Vapour cloud explosion with moderate levels of overpressures would have impact within 54 m from the point of explosion. The maximum hazard distance to Lower Explosive limit (LEL)/Lower Flammable Limit (LFL) of hydrogen is only 40 m from the location of explosion in case of release of 210 Kg of hydrogen.

**HFO/LDO**

HFO/LDO is a flammable liquid and has high flash point of > $66^OC$. It implies that normally it does not present a major fire hazard. In case of accidental spillage, it will remain within the available dyke. Under major persistent external heat source in the vicinity, pools of HFO can be ignited to start pool fire.

**MAXIMUM AFFECTED DISTANCES (IN METER) FOR FIRE SCENARIO OF HFO**

Stability class: D  Wind speed = 4.0 m/s  Dyke area = 800 $m^2$

| Scenarios | Maximum downwind distances (in meter) to thermal radiation levels for pool fire | | | Maximum hazard distance (in meter) to LFL/LEL |
|---|---|---|---|---|
| | 4.5 $Kw/m^2$ | 12.5 $Kw/m^2$ | 37.5 $Kw/m^2$ | |
| Pool Fire on Bursting of two HFO tanks. Inventory: (3500 Kl) | 54 | 19 | Not Reached | 50 |

Since HFO has flammable properties, the major release scenario is fire as shown in Table . In CPP, HFO is stored in two tanks having dimension of 2 x 14 m x 14 m, dyke area of 800 $m^2$ and each having capacity of 1750 Kl. Worst-case scenarios of catastrophic failure of two tanks with inventory of 3500 Kl and fire on the liquid pool have been considered for the consequence analysis. A radiation level of secondary damage corresponding to pool fire will be confined within the distance of only 19 m from the location of tank. Maximum hazard distance to LFL/LEL of HFO is about 50 m for wind speed of 4 m/s. This typical scenario has very low frequency of occurrence as the flash point of HFO is very high.

It shows that catastrophic failure of chlorine tonner may lead to off-site consequences. In case of bursting of 420 hydrogen cylinders with capacity of 210 kg under pressure of 150 $kgf/cm^2$, an explosion overpressure level of secondary damage will be confined within the distance of 54 m only from the location of cylinders. There is a possibility of fireball and a radiation level corresponding to severe damage will be confined within the distance of 61 m from the ignition point.

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## 10.0 PLOT PLAN

**PLAN LAYOUT PLAN SHOWING HAZARD ZONE ISO RISK CONTOUR AROUND**

**THE HAZARD ZONE, EMERGENCY CONTROL ROOM, ASSEMBLY POINT, EMERGENCY EXITS AND OTHER RELEVANT DETAILS IN COLOUR CODE**

**(Layout of CPP ,NALCO is enclosed in separate sheet at the end of the report)**

## 11.0 EMERGENCY COMMAND STRUCTURE

### I EMERGENCY ORGANISATION

The Plan takes into account the transition from normal operations to emergency operations and the delegation of authority from operations personnel to emergency response personnel. For this purpose, it identifies an emergency response organisation with appropriate lines of authority and the way response management would come into action. It also identifies mission, position, responsibilities and reporting relationships of each responder.

**II CONCEPT OF EMERGENCY RESPONSE OPERATION:** In an emergency, information must be communicated quickly and accurately throughout the factory / plant. The purpose is to establish an effective emergency communication network and a procedure for the prompt notification and actions of individuals and agencies involved in an emergency response operation.

The section must identify means for 24-hour notification of first responders and officials who can provide direction and control to the response effort and who can authorise evacuation. To prevent the system breakdown, an "alternate" person should be designated for each key position of designated responsibility. A notification guide should also include a list of alternate personnel for emergency response and their telephone numbers (Mobile, Office and Residence numbers).

The notification procedure may include flow-charts and checklists indicating who should be involved, who has the responsibility to notify these individuals, how the notification is accomplished and the use of "fan out" (a call to one person/agency who in turn calls one or more key individuals during emergency). .

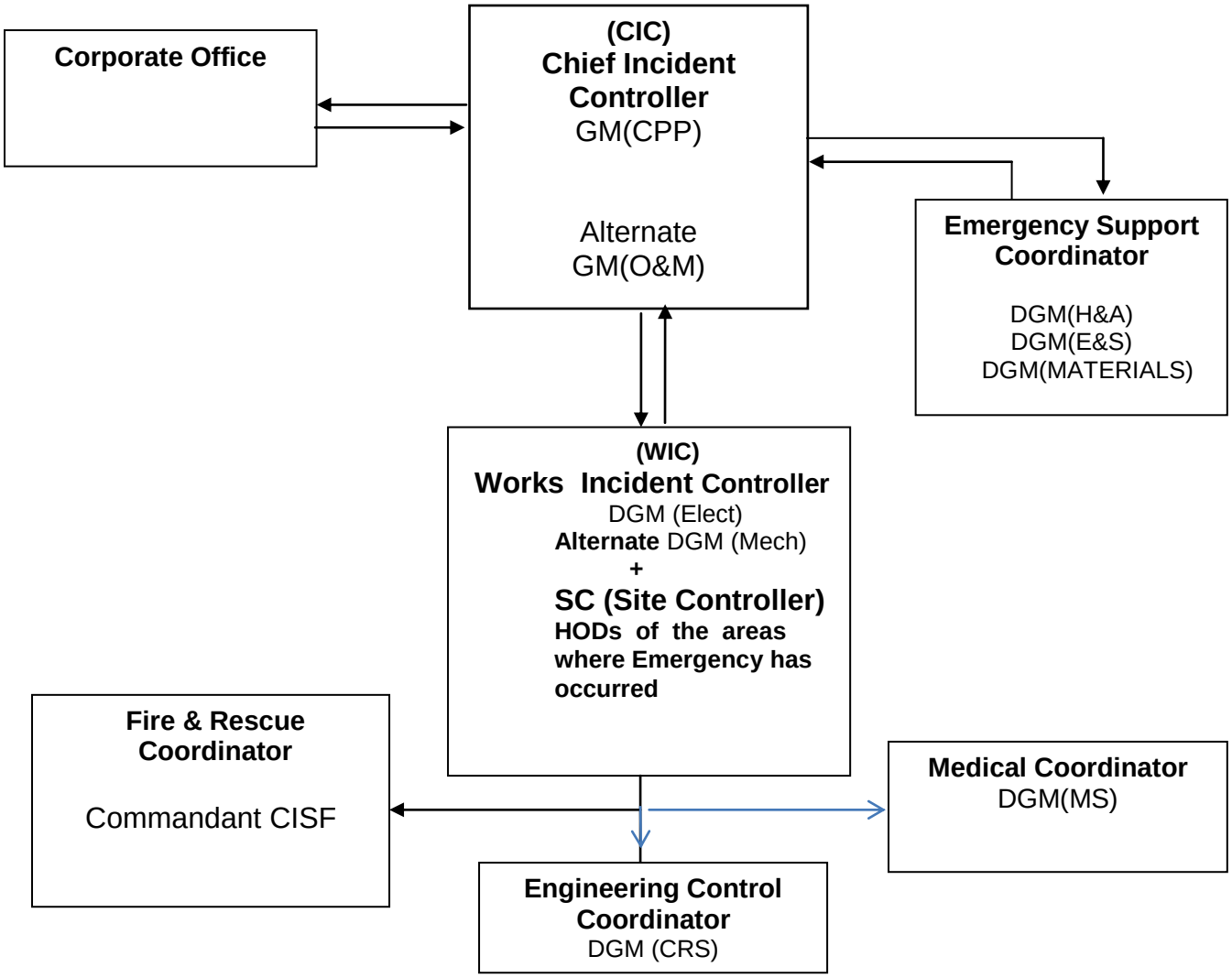
The Emergency Response Organisation is deployed even during those periods when the Plant is operating in shifts with reduced personnel. Therefore, the responsibility of co-ordinating the emergency response action lies with the Shift In-charge until he is relieved by higher-ranking personnel, such as Section Head/HOD.

**III FUNCTIONS OF EMERGENCY RESPONSE ORGANISATION:** Command and control of an emergency condition encompasses the key management functions necessary to ensure the health and safety of employees, as well as public living in the vicinity. In addition, the implementation of an Emergency Response Plan relies on a number of response functions, which deal with different aspects of emergency, with the most important ones being:

- Communication and Co-ordination
- Fire and Rescue (Emergency Mitigation)
- Emergency Control Team at Incident Site
- Medical Services
- Security
- Administration (Logistics and Welfare)
- Liaison with external agencies

The factory is spread over at large area having two identified areas viz. i)Power plant area ii) Ash pond area. The factory is headed by Unit Head (GM-CCP), who has got overall responsibility, and identified as Chief Incident Controller(CIC). For smooth functioning of emergency response organisation, GM(CPP)—I/C has been assigned as alternate Chief Incident Controller and would always be in ECC during emergency. In absence of CIC.

## EMERGENCY RESPONSE ORGANISATION

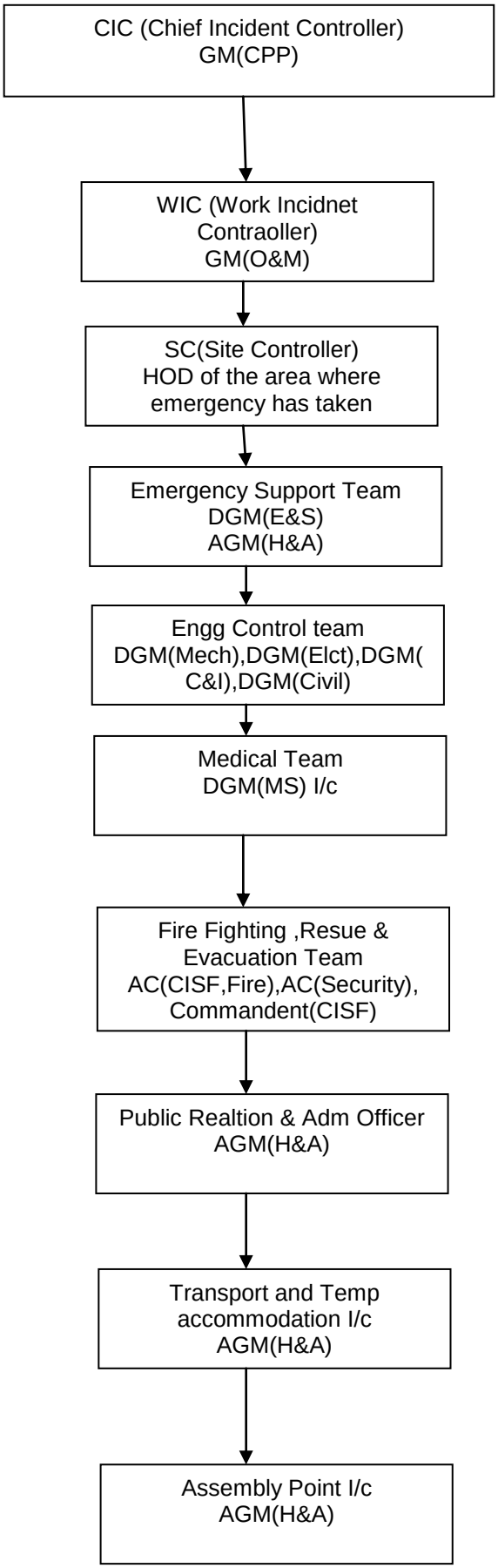


## RESPONSE LEVEL MATRIX DURING EMERGENCY

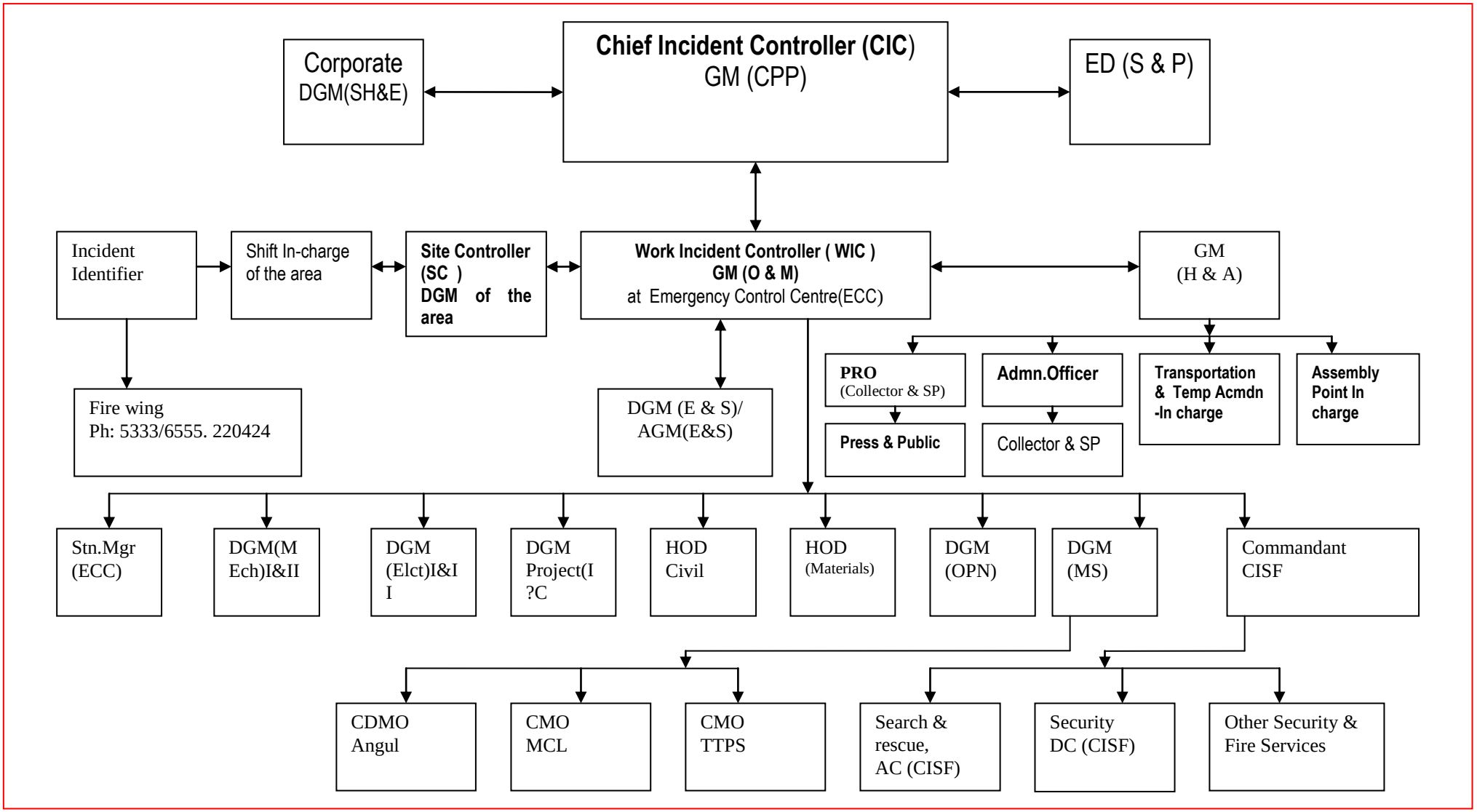
| SN. | Designation of Emergency Team Member | Officer In-charge | In absence of Officer In-charge |
|---|---|---|---|
| 01 | CIC (Chief Incident Controller) | GM (CPP) | GM (CPP)-I/c |
| 02 | WIC (Work Incident Controller) | GM(O&M) | Senior Most DGM |
| 03 | SC (Site Controller) of different areas of the Plant | HODs of the area where Emergency has taken place or likely to take place | Respective DGM-I/cs & AGM-I/cs |
| 04 | Emergency Support Team | DGM (H&A)--Coordinator | -DGM-I/c.- |
| | | DGM ( E&S) | AGM ( E&S) |
| | | DGM(Material) | Manager (Material.) |
| 05 | Engineering Control Team | DGM (Mech.)-I Coordinator<br>DGM(Mech)-II<br>DGM (Elect.)-I<br>DGM(Elect)-II<br>DGM (C & I)<br>DGM (Civil) | Respective DGM-I/c |
| 06 | Medical Team | DGM (MS)…Coordinator | DGM (MS)-I/c. |
| 07 | Firefighting , Rescue & Evacuation Team | Commandant (CISF).....Coordinator, supported by AC (CISF)-Security,<br>AC (Fire)-CISF | Commandant (CISF) |
| 08 | Public Relation & Administrative Officer | DGM (H&A) assisted by AGM (H&A) for liaising with District Administration, Press & Public. | DGM (H & A)-I/c. |
| 09 | Transportation & Temporary Accommodation In-charge. | AGM (H&A) | AGM (H&A)- I/c. |
| 10 | Assembly Point In-charge | AGM (H&A) | AGM (H&A)- I/c. |

In absence of GM(CPP), GM (CPP)-I/c would act as Chief Incident Controller.Shift In-charge of the incident area will work as Site Controller till arrival of senior personnel or as indicated above.

# EMERGENCY COMMAND STRUCTURE:



# DETAILED EMERGENCY COMMAND STRUCTURE FOR CPP,NALCO



## 11.1 Emergency Commnad Structure during Silent Hour:

Silent Hour refers to the time during the period beyond general shift hours on working days and on all holidays including Sundays.

During the period ,only shift-in-charge will take the initial whole-sole responsibility and communicate to WIC/ECC/Site Contraoller through the available landline or mobile phones.

On arrival at the accident site , the site controller or his alternate assumes the charge and activates the smae command structure as shown above.

## 12.1 FUNCTIONS OF DESIGNATED PERSONS DURING EMERGENCY

### A) CHIEF INCIDENT CONTROLLER(CIC)

The Chief Incident Controller (CIC) has an overall responsibility for directing operations and calling outside help. GM(CPP) assumes the role of CIC. The alternate would be as given above. His functions/duties includes :

- On being informed, reaches quickly at Emergency Control Centre.
- Continually reviews and assesses existing and possible developments to determine the most probable course of events and effective methods to deal with them.
- Decides in consultation with WIC and Key personnel for declaration of Emergency by directing to operate the siren .
- Ensures that Fire and Rescue Co-ordinator, Engineering Control Co-ordinators and Medical Co-ordinators have reached the area, where emergency exists and another group is ready to proceed to site if required.
- Directs a safe shut down and evacuation of section/factory, if required, in consultation with the Works Incident Controller and key personnel.
- Ensures that casualties are receiving adequate attention.
- If the Emergency is getting extended, he will assess the situation and initiate appropriate and adequate measures after consultation with key personnel available at Emergency Control Centre. If required additional rescue teams should be sent at the incident site.
- If off Site Emergency is anticipated**,** arrange to inform District authorities in consultation with Works Incident Controller**.**
- Declare ceasation / termination of emergency after having full control on emergency event.
- Ensures rehabilitation of affected area after the emergency is over.
- Reports to ED(S&P) and Corporate management as required

### B) WORKS INCIDENT CONTROLLER

- Dy.GM of the a section will assume the charge of Works Incident Controller .In absence of the Dy.General Manager, senior most officer will be the Works Incident Controller. He will retain overall responsibility for the section and its personnel. As he gets information of emergency, he rushes to the scene of the occurrence and takes overall charge and report to the Chief Incident Controller (CIC) .

- He will assess the situation and decide for declaration of emergency in consultation with Chief Incident Controller.
- Maintains a continuous review of possible development and assesses in consultation with Site Controller and other Key personnel as to whether shutting down of the plant or any section of the plant and evacuation of persons is required. He informs C I C accordingly.
- He will assess the scale of emergency and inform to the Fire and Rescue Coordinator and Medical Coordinator accordingly. (Rescue Team)
- He will depute sufficient number of persons at the point fixed for receiving rescue Team.
- He will provide the information to the rescue team members as and when they arrive.
- He will ensure that all non-essential workers /staff of the area affected are evacuated to the appropriate assembly points and the areas are searched for causalities.
- He will report on all significant developments to the Chief Incident Controller.

## C) SITE CONTROLLER (S C)

- Site Controller operates from the nearest accident area. Site Controllers are identified location wise .
- On getting information of the incident from an employee/Shift Incharge he will rush to the scene of the occurrence and take overall charge and report to Works Incident Controller. He will assess the scale of emergency and inform to the Rescue Team accordingly
- Direct all operations within the affected areas with the priorities for safety of personnel, minimum damage to the plant, property and loss of materials.
- He will work as Work Incident Controller till Works Incident Controller(Dy.GM) reaches the affected area
- Report on all significant developments to the Works Incident Controller.
- Have regard to the need for preservation of evidence, so as to facilitate any inquiry into the causes and circumstances, which caused or escalated the emergency.
- Site controller informs Security office at main gate, DGM(H&A) and Emergency Control Centre
- As per practice / norms Security office at main gate also informs Emergency Control Centre, DGM(H&A)

## D) FIRST RESPONDER

- Any employee noticing an unusual event such as smoke, fire and/ or explosion should immediately act as follows:
- He should inform and warn others about emergency
- He should contact Supervisor on duty, Engineer on duty. Dial Security office at main gate. (Tel No.)
- Inform shift in-charge and move to fire spot and try to extinguish the fire with the help of others. Shift Incharge initiates appropriate action to combat the situation and informs about the incident to Security Supervisor at Emergency Control Center
- The person reporting the incident will remain near the location to guide emergency crew arriving at the scene.

- If the fire is extinguished at its initial stage inform Safety Department and Security Department (It should be done by the 1st observer).
- While giving the information about the fire/emergency he should inform his name, location of incident, type of incident)

**E) INCHARGE SECURITY OFFICE MAIN GATE (I.E SECURITY CONTROL ROOM)**

Incharge Security Control Room, on receipt of information about emergency shall arrange opening of ECC-1 and ECC-2 and divert Security Supervisor along with other staff to Emergency Control Centre. Incharge Security Control Room will also inform CIC and DGM (H&A) about the emergency

**F) SECURITY SUPERVISOR IN EMERGENCY CONTROL CENTRE:**

Security Supervisor in Emergency Control Centre, will inform to all key personnel with the help of telephone list kept in Emergency Control Centre. He will also inform Safety coordinator, Medical Coordinator,Fire and Rescue coordinator, Emergency Support Coordinator DGM (H&A), Engineering Control Coordinator DGM(Mech)-1.

**G) EMERGENCY SUPPORT COORDINATOR**

DGM(H&A) works as Emergency Support Coordinator. He will contact DGM(Material) and AGM (E&S). He would also be the authorized spokesperson of the factory to deal with any external agency such as District Collector and other Government officials, press, media, etc. On hearing the emergency siren or getting the information about emergency he shall immediately try to reach Emergency Control Centre and provide necessary instructions to his team members.

i) Discloses all necessary information as required so as to avoid rumours and confusion.
ii) Maintain liaison with the press& public regarding the emergency under instructions from Chief Incident Controller.
iii) Arrange to send time keepers to the Assembly points for counting the persons assembled at the assembly points.(Assembly point incharge will keep upto date list of persons((employees/contractor workers/suppliers/visitors) as available in the plant.
iv) He will handle the responsibilities for arranging transportation, monitoring and controlling the these vehicles. He will also arrange temporary shelters if requited,
v) Arrange to inform the relatives of the injured persons after taking permission from Chief Incident Controller. movement of
vi) If emergency prolongs, arrange relief for the personnel who are engaged in controlling emergency and organize refreshment or other canteen facilities.
vii) Keep proper liaison with District Authorities, Media, Press etc.
viii) Inform union representatives, if required.

**H) MATERIALS COORDINATOR**

DGM(Materials) would be the Materials Coordinator. On hearing the emergency siren or getting the information about emergency, he shall immediately come to Emergency Control Centre and provide necessary instructions to his team members. His duties are to:

i) Get the stores opened for requirement of the Firefighting /Safety and other materials, which may be required during emergency.
ii) Assess the situation in consultation with CIC and WIC/SC for any material requirement help at the affected site.
iii) Ensure free movement of trucks of bulk material, if required.

## I) FIRE & RESCUE COORDINATOR

Commandant( CISF) would be the Fire & Rescue Coordinator. On getting message on telephone or by other means about emergency he shall immediately rush to the affected site with his fully equipped team and augment Fire Fighting and Rescue work, as per the circumstances under intimation to Site Controller/Works Incident Controller.

I. The Fire Team members shall immediately start fire-fighting operation by utilizing existing fire hydrant system ..
II. The Rescue Team members shall search for any missing person/casualty, carry out rescue operation and take to the nearest first aid Centre, where ambulance is available.
III. Arrange for cordoning off the area, if required and advise fire personnel for rescue/ firefighting, if required
IV. Arrange to provide water curtains, at affected locations, if required.
V. Organize and supervise fire-fighting operations, if called for.
VI. Provide necessary respiratory equipment to plant personnel for emergency use.
VII. Advise Site Controller to arrange additional help, if required.
VIII. Ensure safety of the personnel engaged in rescue work.
IX. Guide the Outside agencies such as Fire Brigade, ambulances, etc. (if required) to reach the emergency site.

## J) ENGINEERING CONTROL COORDINATOR --DGM (Mech-1)

On being informed about the emergency, Engineering Control Coordinator ”DGM(Mech-1) will contact his team members i.e. DGM(Mech)-II, DGM (Elect.)-I, DGM(Elect)-II, DGM (C & I) and DGM (Civil). He will also make arrangements for necessary tools, forklift, etc. for carrying out salvage operation to save the unaffected material from the affected site.
Similarly DGM(Elect.) may be required to arrange electrical shut down of the affected plant or portion thereof after getting information from the Works Incident Controller / Site Controller. We will make arrangements for emergency illumination/ lighting in case of power failure during nighttime

## K) MEDICAL COORDINATOR DGM(MS)

DGM(MS), after getting the information about emergency, shall immediately perform following duties.

i) Ensure that injuries can be adequately treated at these available medical facilities.(Nearby First Aid Centers/Occupational Health Centers/Dispensaries)
ii) Make arrangement for treating and transporting the injured to the hospitals wherein arrangements are made to handle such emergencies. Seriously injured persons are sent to pre-identified hospitals.
iii) Maintain the list of Blood group of each employee with special reference to rare blood group.
iv) Remain in touch with Chief Incident Controller/works Incident Controller.

## L) SECURITY COORDINATOR

Commandant (CISF) would be the Security Coordinator. On getting message on telephone or by other means about emergency, he shall immediately rush to the main security gate and arrange as follows:

1. Advise the security person at security department to activate the barrack alarm to call additional security personnel at colony
2. Arrange to send the Security Guards at the affected site for providing the help to Emergency teams.
3. Arrange to close all the Security gates except Main Gate for any kind of unauthorized entry in the plant.
4. Arrange for traffic and mob control.
5. Arrange to take the transporter trucks/vehicles outside the main gate.

## M) SAFETY COORDINATOR

AGM(E&S) would be the Safety Coordinator. On hearing the emergency siren or getting the information about emergency he shall immediately rush to Emergency Control Centre and provide necessary instructions to his team members and advise them to report at emergency site. His duties are :

i) To advise CIC on Occupational Health and Safety matters.

ii) To provide /arrange all necessary safety equipment, e.g. BA Set, Personal CO Monitor, etc

## N) ALL EMPLOYEES ON DUTY

a) All employees of the factory /section where emergency has not taken place will bring their operation to safe shut down stage and wait for further announcement . They will not leave their section.

b) All employees of the factory/section in case they belong to area where Emergency has been declared, they will initiate safe/emergency shut down and after shut down proceed to assembly area.

## O) ALL VISITORS

All visitors in side the factory, on hearing the emergency siren, will immediately rush back to the Security office at main gate, and treat their gate pass as cancelled. They should wait at main gate for further instructions.

## P) ALL FACTORIES EMPLOYEES AVAILABLE IN THE COLONY (NOT ON DUTY)

They should make themselves available nearest to their residence till all clear siren is given. They should make themselves ready to proceed to the site provided called for any help during emergency.

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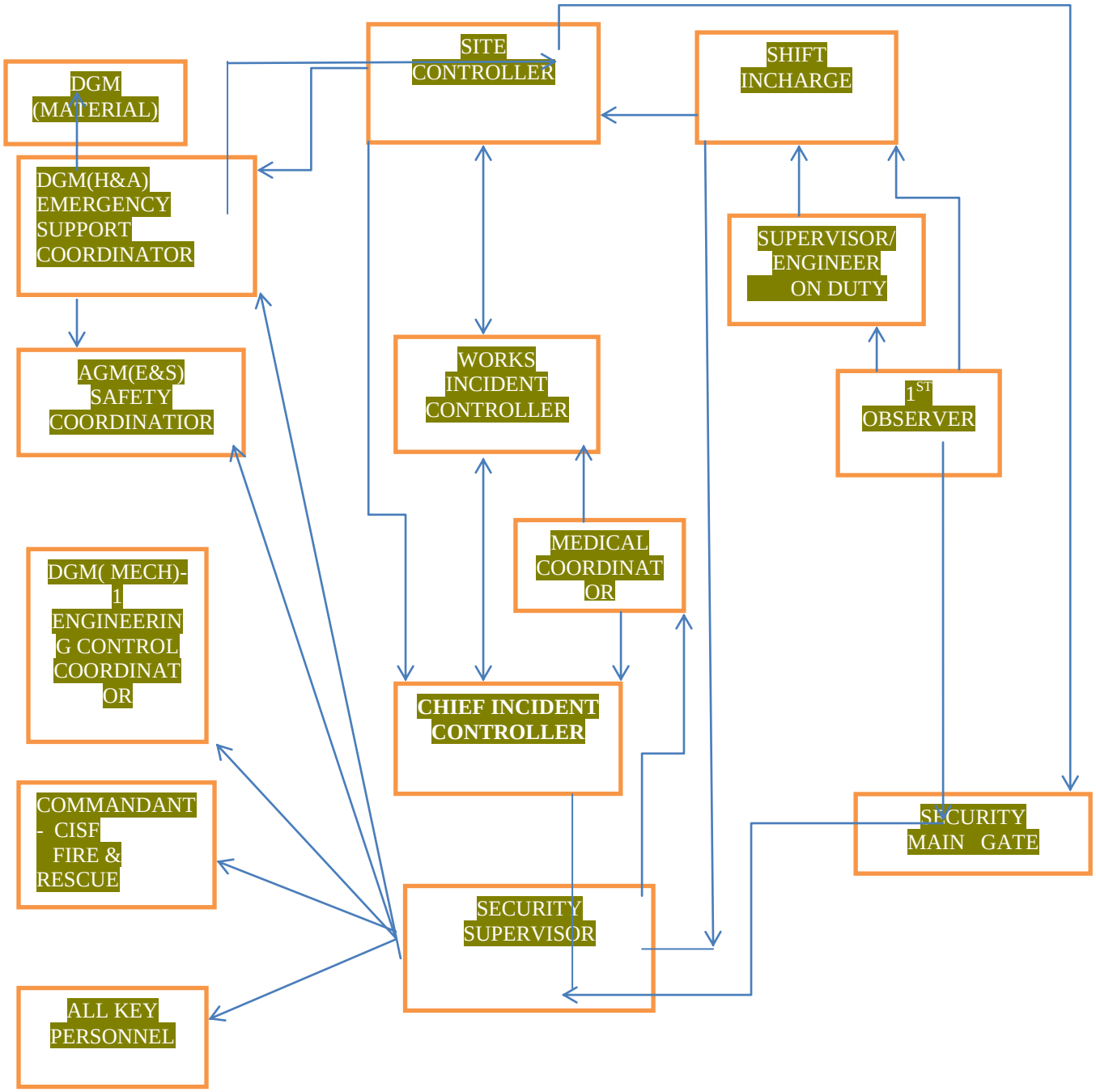


CHAIN OF COMMAND

## 12.0 EMERGENCY CONTROL CENTRE AND ASSEMBLY POINT

The Emergency Control Centre (ECC) is a place from where the Chief Incident Controller (CIC) would provide direction/guidance and coordinate various agencies/activities to effectively handle the emergency situation.

Depending on the location of the emergency site and the prevailing wind direction, Chief Incident Controller will decide and use one of the two Emergency Control Centres for handling and controlling the emergency. He will then proceed to that ECC and take overall control of the emergency. All the key personnel (except Works Incident Controller and Site Controller) would assemble in ECC. While selecting the location of ECC, due care has to be taken that it should not fall under any risk.

## 12.1 LOCATION OF ECC AND FACILITIES AVAILABLE AT ECC

The ECC is located at the following two locations:

**ECC-1 is located near CISF Main Gate, CPP, NALCO.**

**ECC-2 is located at Power House #1 control Room , CPP NALCO**

Equipment and Facilities Available In ECC

This is the main centre from where the operations to manage the response to emergency are directed and coordinated. Facilities to be made available in the emergency control are:-

- Adequate number of internal and external telephone lines separately .
- Site plan of CPP showing clearly

-The location of hazardous chemicals stored and processed.
-Key transport facilities for emergency services.
-Fire fighting facilities at HFO/LDO tank farm area.
-Fire hydrant system
-Location of assembly points.
-Location of health Centre
-Location of Safety Equipment
-Stock of firefighting equipment
-Habitation within 1 kilometer distance
-Location Map of the Factory.

- Nominal roll call of employees (to be provided by the Liaison Officer during emergency).
- List of key personnel with their addresses, telephone nos. and mobile nos.
- List of District level Government Authorities to be contacted in case of emergency.
- List of outside emergency control agencies with their telephone nos.
- Stationery items
- Mimic panel showing all locations of the factory.
- First aid box
- Arrangement for any announcement on Public address system
- Vehicle Parking Area.
- Procedure for tackling leakage of Chlorine gas
- Procedure for special fire fighting at HFO/LDO tank farm area
- Wind direction and speed indicator
- MSDS of hydrogen, Chlorine, LDO and HFO etc.

## 13.2 MANNING OF ECC- DURING EMERGENCY FOLLOWING PERSONS ARE AVAILABLE AT ECC

1. Chief Incident Controller.
2. Security Supervisor
3. Telephone Attendant
4. Messengers

***

## 13.0 ASSEMBLY POINTS AND HEAD-COUNTING

## 13.1 THERE ARE 8 ASSEMBLY POINTS. DETAILS ARE GIVEN BELOW:

i) Ash Ponds - 04 nos
ii) Chlorination Plants - 03 nos.
iii) Hydrogen shed - 01 no.

## 13.2 DETAILS OF ASSEMBLY POINTS AT ASH POND:

| SL No | Assembly Point | Locations |
|---|---|---|
| 1 | Assembly Point No-1 | Near K Point |
| 2 | Assembly Point No-2 | Near Flush Bar |
| 3 | Assembly Point No-3 | Near A Point |
| 4 | Assembly Point No-4 | Near Village Dighi and Kholua |

**13.3 HEAD COUNTING**: Assembly point incharge will keep upto date list of persons(employees/contractor workers/suppliers/visitors) as available in various plant. Assembly Point incharges will be decided by the time office under the guidance of Head HRD.

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Evacuating visitors would be the responsibility of the concerned officer with whose reference they were permitted to enter the factory.
Department Head should take care to evacuate any handicapped person in his area.

If the wind direction for a particular assembly point is not favourable, the concerned assembly point in-charge would have to take on the spot decision for shifting the personnel under their control, to a safer location. In case someone is suspected to have been entrapped in the emergency, they should immediately inform to CIC and SC.

After all clear siren, all assembly point in-charges will report to Chief Incident Controller at ECC with list of roll call where Chief Incident Contriller will conduct a de briefing meeting.

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## 14.0 DECLARATION OF EMERGENCY AND RESTORATION OF NORMALCY

### 14.1 EMRERGENCY:

The event which has the potential to cause serious injuries or damage to property/environment within and beyond the section limits or the nearby area but not beyond CPP premises should be considered as emergency.

### 14.2 LOCATION OF EMERGENCY SIREN SYSTEM

(a) Emergency siren has been located at Fire station Control Room/Emergency Control Centre near main gate. for CPP.
(b) PCU situated in ash pond area has been equipped with emergency siren.

### 14.3 DECLARATION OF EMERGENCY

Decision regarding declaration of emergency is taken by Chief Incident Controller in consultation with WIC and key personnel. Declaration of emergency at CPP is made by operating siren at ECC. Only CISF is authorised to operate the siren.
Afier operating the siren, announcement is made through Public Address System in Oriya, English and Hindi.
":A major emergency has occurred at Captive Power Plant NALCO, due to heavy release of ……. at ……. plant. All present in the field are requested to move to nearest assembly point . While moving cover mouth and nose with wet handkerchief /clothes. In house employees are requested to keep window and doors tightly closed .If found necessary we may evacuate you and be prepared for it.

| | **AT CPP NALCO** | | |
|---|---|---|---|
| Sl.no | Type of Emergency | Type of Alarm(Siren) | Duration |
| 1 | In case of fire | 10seconds…..ON & 05 Seconds…OFF | 4 times |
| 2 | For heavy chlorine leakage | 10 seconds…. ON & 05 seconds…..OFF | 8 times |
| 3 | Evacuation operation needed | Wailing sound | 180 Seconds |
| 4 | End of Emergency | Continuous siren | 180 Seconds |
| | **AT ASH POND AREA** | | |
| 1 | Rupture of Ash slurry pipelines | 10seconds…..ON & 05 Seconds…OFF | 4 times |
| 2 | Breach/High rise of water level | 10 seconds…. ON & 05 seconds…..OFF | 8 times |
| 3 | Evacuation operation needed | Wailing sounds | 180 seconds |
| 4 | End of Emergency | Continuous siren | 180 seconds |

### 14.4 RESTORATION OF NORMALCY

Only Chief Incident Controller is authorised to take the decision to "call off" the emergency. After consulting the Works Incident Controller and other key personnel if it is ensured that the situation is under control and the emergency is

over, CIC will order to actuate the ALL-CLEAR SIREN. All persons within and around the Plant are informed through the “ALL-CLEAR SIREN”.

External agencies, viz., District Collector Office, Factory Inspectorate, Police, and Office of Pollution Control Board are again contacted by DGM(H&A) or his Alternate to communicate the end of emergency.

The Corporate/Head Office are informed by Chief Incident Controller about ceasation of emergency.

## 14.5 SEQUENCE OF ACTIONS AFTER THE “ALL-CLEAR SIREN” IS ACTUATED

- CIC contacts all section to communicate them the emergency has been called off and instructs for actions to be taken by the person inside.
- The senior person in each section takes a small meeting of all workers present in the section and briefs them about the emergency and ensure resumption of normal work.
- The Site controller, in consultation with WIC , CIC and other senior-most official of the factory takes necessary steps to resume normal work.
- Any chemical or oil spilled during emergency, would be collected properly and if required treated at Effluent Treatment Plant. The other wastes generated due to accidents can be disposed off properly.

## 14.6 DE BRIEFING CHIEF INCIDENT CONTROLLER :

The Site controller will check the areas thoroughly for possible hazards such as toxic fumes or live wires after emergency and will inform Chief Incident Controllers accordingly. The key personnel will meet to evaluate their individual and overall performance in responding to the situation after the emergency is over .

The review shall determine

- Effectiveness of the emergency response plan
- Plant crew performance
- Any need for updation or revision of the emergency response plan
- Suitable arrangement for restart of the plant
- Evaluation and control of effluent arising out of mitigating measures like foam discharge and overflow of oil in water.
- Rehabilitate evacuated area and adopt measures to prevent similar reoccurrence.

Difficulty(ies) faced by any one in implementing the plan will be discussed . After discussion final dicision arrived at, will be recorded for incorporation while reviewing the plan.

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## 15.0 EMERGENCY COMMAND STRUCTURE DURING SILENT HOUR

Silent hour refers to the time during the period beyond general shift hours on working days and on all holidays.

During this period, shift-in-charge / plant-in-charge will take the initial whole-sole responsibility and communicate to CIC / WIC / ECC / Site Controller through the available landline or mobile phones. On arrival at the accident site, Site Controller or his alternate assumes the charge and activates the same command structure to combat the emergency.

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## 16.0 PREVENTIVE SAFETY MEASURES,EMERGENCY EQIPMENT &FACILITY:

### 16.1 MEDICAL FACILITIES AT CPP AND SURROUNDING

CPP alongwith Smelter complex has one NALCO Hospital with more than 60 beds. The Hospital is equipped with a team of qualified doctors , operation theatre and full range of emergency and normal treatment facilities. There is also a First Aid Centre within the complex for treatment for minor occupational injuries.The list of other hospitals surrounding the plant area is shown in the following table.

| Sl.no | Location |
|---|---|
| 1 | District Hospital Angul |
| | |
| 2 | Shatabdi Hospital Dera |
| | |
| 3 | NTPC Hospital Kaniha |
| | |
| 4 | TTPS Hospital Talcher |
| | |
| 5 | GOVT. HOSPITAL TALCHER |

### 16.2 COMMUNICATION FACILITIES AND EMERGENCY ALARMS

Public address system has been provided in the plant. Telephone, intercommunication facilities and walki-talkie etc. are available at all required desks or with officials. An emergency siren is audible throughout the factory and also to the general public in the surrounding residential area. Various pitches of alarms have been set to distinguish the onset of emergency (either release of chlorine or breakout of a major fire) from regular siren.

The CISF personnel from their Fire Station Control Room/ECR will sound the emergency siren. Emergency message can be passed on to Safety Office by dialing 5373, Fire station by 5333, CW pump house by 5334 and Security Office by 5965.
Emergency lights have been provided at all vulnerable areas for lighting arrangements as well as to operate basic minimum equipment for operating the minimum plant safely. All units have been provided with DG sets as well as DG battery system which will come on auto in case of power failure.

**ALARM SYSTEM:**

We have emergency alarm system in case of fire, Chlorine gas leakage and release of Hydrogen gas at the source. On being intimated by Control room CISF fire Wing take immediate appropriate action after reaching the site.

**EMERGENCY SIREN SYSTEM**

**LOCATION OF EMERGENCY SIREN SYSTEM**

(a) Emergency siren has been located at Fire station Control Room/Emergency Control Centre near main gate. for CPP.
(b) PCU situated in ash pond area has been equipped with emergency siren..(for ash pond).

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## 17.0 TRAINING AND EMERGENCY DRILLS

## 17.1 TRAINING

Training would be undertaken as follows:

**i) TRAINING OF TEAM LEADERS:**

All the Team Leaders would undergo training in the following areas:

a) Knowledge of hazardous chemicals handled; their physical and chemical properties, MSDS, what to do during emergency related to the chemical, etc.
b) Procedure for reporting emergency.
c) Siren System.
d) Location-wise types and the numbers of fire extinguishers, and how to use them, etc.
e) Types, numbers and locations of different types of PPE (including SCBA and fire suit), situations where they should be used, method of using, etc.
f) Fundamentals of rescue and first aid.
g) Evacuation Procedure, i.e., assembling at the designated Assembling Points, head-count, their records, followed by method of evacuation.
h) Documentation of emergencies.

**ii) TRAINING OF EMERGENCY RESPONDERS**

Different emergency responder teams would be given in-depth training on the various aspects of responses such as Fire Fighting, Role of Rescue Agencies , First Aid, Medical Response, Traffic Control, Head-Count at Assembly Point, etc.

**iii) TRAINING OF TEAM LEADERS, SITE CONTROLLERS(SI) , WORKS INCIDENT CONTROLLER (WIC) AND CHIEF INCIDENT CONTROLLER(CIC)**

A training workshop should be conducted to understand not only role of individual Team Leader, but also issue of coordination, chain of command, etc. through simulation and Table-Top Exercises. Periodic refresher training would also be needed.

The above training would be periodical. The training department should be responsible for organising such training.

## 17.2 EMERGENCY DRILLS

The emergency response plans and emergency preparedness level would be tested through the following drills:

1. Table-top exercise (TTE)
2. Functional exercise (FE)
3. Full-scale exercise (FSE)

All elements/procedures of the On-Site Emergency Plan would be first tested through TTE and perfected to the extent possible. If required the Plan would be modified/ updated. Functional Exercises basically to ensure proper functioning of various equipment such as the fire-fighting equipment and the fire hydrant system.

The Full-Scale Drill would be conducted to know the level of preparedness of all teams. Initially, TTE and FE would be conducted periodically.

The following drills should be conducted periodically:

1) Plant Emergency Drill for fire.
2) Fire Drills at offices and admin building.
3) Plant Emergency Drills (fire scenario involving evacuation).
4) Toxic Gas Release.

## 17.3 PERIODICITY AND RESPONSIBILITY

| Sl. No. | Type of Drill | Frequency | Responsibility |
|---|---|---|---|
| 1 | Plant emergency (fire scenario involving evacuation) | Once in a six month | AGM(E&S) |

After each drill, there should be a critical review by all participants (including the drill observers). All suggestions and recommendations should be noted for future reference. These should be the basis for the periodic review and updating of the On Site Emergency Plan. This way the plan gets more and more refined and updated.

***

## 18.0 PLAN REVIEW AND UPDATING

It is necessary that the on-site emergency plan be 'tested' periodically. The testing of the plan should be through Table-Top Exercises, Functional Exercises and Full-Scale Drills.

## 18.1 REVIEW OF THE PLAN

This plan is a dynamic document and would be reviewed/ updated in the following situations: -

i) The plan would be tested from time to time . Short comings/ lacunas that would be surfaced during testing of the plan, would be recorded/ documented, discussed during de briefing session following the test, decisions are taken to include them in the plan.

ii) If there were changes in process(es), which may add scenario(s) of possible emergencies, the plan would be modified taking into account these additional scenario(s).

iii) Change in contact details such as addresses and telephone numbers.

## 18.2 RESPONSIBILITY

Updating the Plans would be the responsibility of the Head (Safety). This would also include updating of contact information such as address, telephone numbers etc.

## 18.3 PROCEDURE

The Plan would be updated after approval by the occupier of the factory in writing. The Head (Safety) would submit the proposal duly supported by justifications to the GM(CPP). After its approval, update the plan and circulate it to the concerned persons. If there is any change in the Division/Department such as name, telephone no. then section head would inform in writing to the Head (Safety). For such change no authorisation is required.

## 18.4 CONTROLLED COPIES OF THE PLAN

The On-Site Emergency Plan when approved by the management, sufficient number of copies would be printed; each copy would be identified by a serial number and issued to different persons who have roles to play during the emergency. A register would be maintained indicating which identified copy is issued to a specific person. Complete responsibility of getting the management's approval, printing a number of copies, giving them identification numbers, issuing them, registering the issue, would be the responsibility of the AGM(E&S). It will also be his responsibility to replace the copies after each modification by giving them identification numbers and re-registering them. This is required to ensure that only up-dated copies are available with different personnel.

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## 19.0 OFF-SITE EMERGENCY RESPONSIBILITIES

In case of major emergency message would be sent to Districts Collector, Police and Factory Inspector and help from local administration would have to be requested.

In case an off site emergency is foreseen by Works Incident Controller will inform Chief Incident Controller and DGM(H&A). If it is decided to declare offsite emergency, Off-Site Action Plan in conjunction with On-site Emergency Plan, would immediately come in to force. DGM(H&A) would function as Off-site Controller for CCP NALCO in case of off-site emergency.

***

## 20.0 GLOSSARY OF TERMS

**Accident:** Unplanned event giving rise to death, ill health, injury, damage or other losses to personnel or property (IS-18001).

**Assembly Point:** A pre-designated place where people will gather after evacuation order by the Chief Incident Controller.

**Chief Incident Controller:** The Chief Incident Controller, who has got overall responsibility of the factory and during emergency he has the general responsibility of directing operations from the Emergency Control Centre.

**Emergency Control Centre:** It is a place from which the operations to handle the emergency are directed and coordinated.

**Emergency Plan:** A formal written plan which, on the basis of identified potential accidents together with their consequences, describes how such accidents and their consequences should be handled, either on-site or off-site.

**Emergency Response:** The efforts to minimize the severity of an accident by protecting the people, the environment or the property and bring back the scene to normal pre-emergency conditions.

**Evacuation:** Removal of persons from the accident site / neighbouring place and diverting them to assembly point.

**Hazard**: A chemical or physical condition that has the potential for causing damage to people, property, or the environment.

**Hazardous Chemical:** Hazardous chemicals means any chemical which satisfies any of the criteria laid down in part I of Schedule I or listed in column 2 of part 2, any chemical listed in Column 2 of Schedules 2 and 3 of the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.

**Incident**: The loss of containment of material/energy.
**Incident outcome**: Physical manifestation of the incident. For toxic chemicals, the Incident Outcome is a *toxic release*. For Flammable material, it could be a *Fire and/or explosion*.

**Incident Outcome case**: Quantitative definition of a single result of an Incident Outcome.

**Worst-case Release Scenario:** It deals with the maximum loss scenarios and associated with the furthest distance of impact.

**Alternative-case Release Scenario:** It is the most credible loss scenarios which is likely to be possible. Example, leak from copper tube from a tonner.

**Consequence**: A measure of the physical effects of an incident outcome case, expressed qualitatively or quantitatively.

**Likelihood** : A measure of the expected probability or frequency of occurrence of an event.

**Risk:** A measure of economic loss/human injury in terms of both the incident likelihood and the magnitude of the loss or injury.

**Risk Analysis**: A quantitative estimate of risk based on incident frequencies and consequences.

**Risk Assessment**: The process by which the results of a risk analysis is used to make decisions.

**Disaster/Emergency** : Deviation from standard operation or an occurrence which causes/threatens serious disruption of life, perhaps death or injury to a large number of people and requires a mobilization of efforts *in excess of that normally provided by the statutory emergency services*.

**On-Site Emergency:** An accident, which takes place within the boundaries and its effects are felt within the premises involving the people working within the specified boundaries.

**Off-site Emergency:**An accident, which takes place within the boundaries but its effects are also felt outside the premises involving the general public and environment in the vicinity.

**Vulnerable Zone:** It is an estimated geographical area that may be affected by the release / explosion at levels that could cause irreversible effect to both human and property within the area following an accidental release of chemicals.

**Preparedness**: Measures to ensure that communities and services are capable of coping with the effects of emergencies.

**Prevention:** Measures to eliminate or reduce the incidence or severity of emergencies.

**Mitigation:** Measures to reduce the severity of emergencies, primarily in prevention and preparedness.

**Response**: Measures taken in anticipation of, during and immediately after emergencies to ensure that the effects are minimised.

**Recovery:** Measures which support emergency-affected persons (on-site and off-site) in the reconstruction of the physical infrastructure and restoration of emotional, economic and physical well being.

**Stakeholders:** Those who may affect, be affected by or perceive themselves to be affected by the emergency risk management process.

**Site Controller:** The person who will take control of handling the emergency at the incident site.

***

Annexure-A

## NATIONAL SAFETY COUNCIL, NAVI MUMBAI

Review of OnSite Emergency Plan of Captive Power Plant , NALCO, Angul, Odisha

(13-15 May 2015)

List of Officials present in the the **Opening Meeting** held on 13.05.2015 at 1000 hrs.

| Sr. No. | Name | Designation | Department |
|---|---|---|---|
| 1 | SHRI C.R.SWAIN | GM(O&M) | |
| 2 | SHRI T.B.SINGH | DGM(MECH) | P&C |
| 3 | SHRI P.R.PARIJA | DGM(MECH) | COAL |
| 4 | SHRI S.K.PAL | DGM(TQM) | TQM |
| 5 | SHRI A.GHOSH | DGM | OPERATION |
| 6 | SHRI S.K.PANDA | DGM( E) | ELECTRICAL |
| 7 | SHRI G.S.RAY | AGM(C&I) | C&I |
| 8 | SHRI S.N.PATRA | AGM( E) | EEMD |
| 9 | SHRI S.K.PANIGRAHI | AGM(E ) | RPD |
| 10 | SHRI S.B.PRISTY | DGM ( MAT) | MM |
| 11 | SHRI N.R.MOHANTY | DGM | C&I |
| 12 | SHRI A.P. PANDA | DGM(MECH) | MECH.MAINT |
| 13 | SHRI CH.P.K.PATRO | DGM(ELECT) | ELECT.MAINT. |
| 14 | SHRI A.K.MOHAPATRA | AGM (MECH) | MECH.MAINT. |
| 15 | SHRI S.R.PATNAIK | DGM(M) AMD | AMD |
| 16 | SHRI P.K.SAHU | AGM(LAB) | CHEMICAL LAB |
| 17 | SHRI S.N., MISHRA | AGM(MECH ) | CHP |
| 18 | SHRI B.C.GHADIR | AGM(M) | CHP |
| 19 | SHRI S.K.KHUNTIA | AGM(M) | CHP |
| 20 | SHRI B.P.ACHRYA | DGM(CIVIL) | CIVIL ENGG |
| 21 | SHRI A.K.DAMSANE | AGM(MECH) | GM(CPP)'SECTT |
| 22 | SHRI P.L.PRADHAN | MGR (ENV) | ENV |
| 23 | SHRI P.K.SINGH | ASST.MGR) | E&S |
| 24 | SHRI G.DALEI | SR.FOREMAN | SAFETY |
| 25 | SHRI B.C.SAHU | AM(SAFETY) | SAFETY |
| 26 | SHRI S.KUMAR | AGM(E&S) | E&S |
| 27 | SHRI F.SAHU | SR.MGR | E&S |

Annexure-B

## NATIONAL SAFETY COUNCIL, NAVI MUMBAI

Review of OnSite Emergency Plan of Captive Power Plant , NALCO, Angul, Odisha

(13-15 May 2015)

List of Officials present in the the **CLOSING MEETING** held on 15.05.2015 at 1600 hrs.

| Sr. No. | Name | Designation | Department |
|---|---|---|---|
| 1. | SHRI C.R.SWAIN | GM(O&M) | |
| 2. | SHRI S.R.PATNAIK | DGM(M) | AMD |
| 3. | SHRI A.GHOSH | DGM(OPRN) | OPRN |
| 4. | SHRI M.R.ACHARYA | AGM | OPERATION |
| 5. | SHRI S.N.PATRA | AGM( E) | EEMD |
| 6. | SHRI S.K.NAIK | AGM | |
| 7. | SHRI A.P.PANDA | DGM(MAINT) | MAINT |
| 8. | SHRI S.KUMAR | AGM(ES) | E&S |
| 9. | SHRI Ch.P.K. PATRO | DGM ( E) | ELECT. |
| 10. | SHRI F.SAHU | SR.MGR | E&S |
| 11. | SHRI B.C.SINHA | AM | SAFETY |
| 12. | SHR P.K.SINGH | AM(SAFETY) | SAFETY |
| 13. | SHRI P.L. PRADHAN | MG(ENV) | E&S |

ANNEXURE- C

## ASH POND

### (F-1) BRIEF INFORMATION ABOUT ASH POND

Captive Power Plant of NALCO at ANGUL is a coal fired power plant. In such plant pulverised coal is used instead of lump coal. The pulverised coal on combustion produced fine residue known as ash. The quantity of ash generated due to burning of Pulverised coal is about 6500 $M^3$ per day. The ash thus produced may be identified as fly ash and bottom ash. Out of the total ash 20% is bottom ash and remaining is fly ash .

Water filled ash hoppers are used to receive the furnace bottom-ash and stored for periodic discharge. The fly ash extraction is done by installing the ESP prior to stack. This can collect the fly ash upto an extent of 90%. The dry free flowing ash called fly ash , collected in the fly ash hopper is handled by independent system. The ash is collected pneumatically from the fly ash hopper in a dry state and carried to collecting tank where it mixes with water to form slurry.

The ash handling system is designed on the basis of series of slurry pumping and recirculation of water . Fly ash is removed by vacuum created by hydro vectors and bottom ash by hydro ejectors and discharged into a common concrete sump. The slurry is then removed by hydro seal pumps in series through 300mm hard alloy steel pipe to the disposal area.

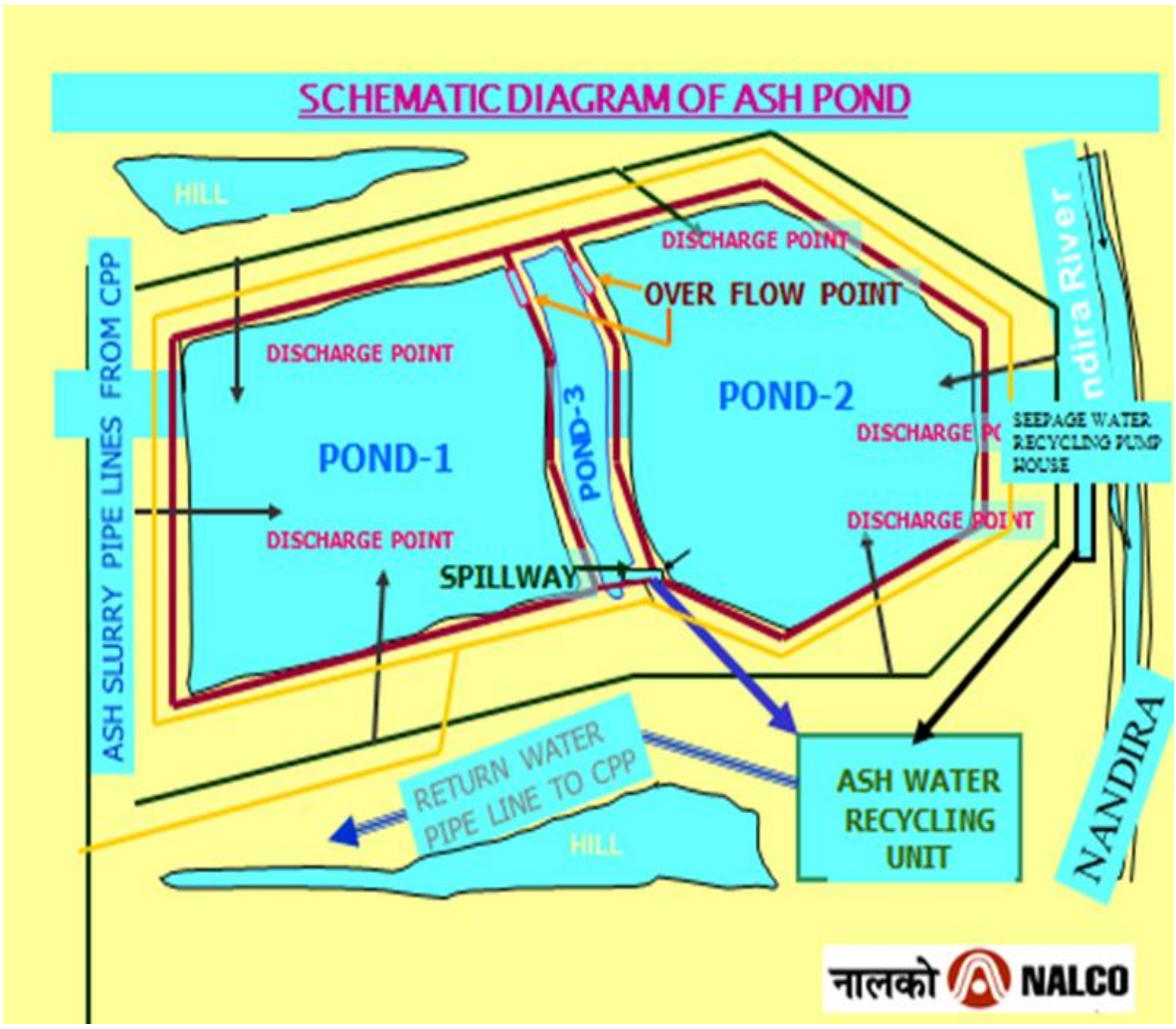
Ash pond in CPP is about 7 Km from main plant area. CPP has a Pollution control unit(PCU) in the north east side of the Ash Pond. Within a few hundred meters , there are Railway lines and 33KV HT Power lines in southern side. There is a hillock in the north eastern and western side of the ash pond. There is a rivulet called Nandira jhor in the northern side and it has a natural river course at a distance of approximately 12KM. The down stream area of ash pond is spread over to a distance of approximately 12 Km. The villages located in the downstream area are shown in the following table .

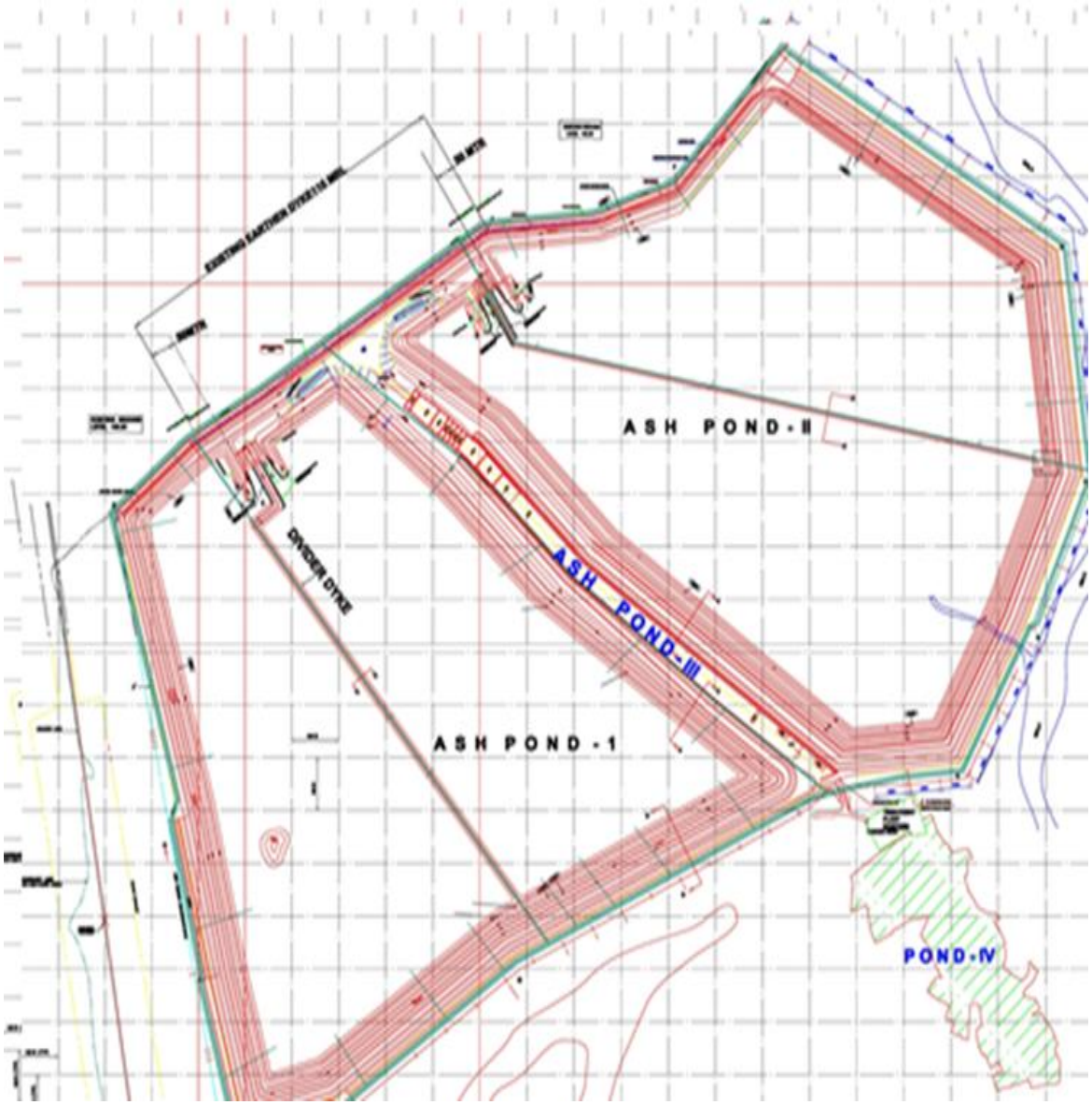
| Sr.no. | Name of the village | Division | Population | Orientation from Ash Pond | Distance from Ash Pond in Km. |
|---|---|---|---|---|---|
| 1 | Teheranpur | Talcher | 342 | N | 6.0 |
| 2 | Tentoi | Angul | 499 | N | 1.5 |
| 3 | Tentulei | Angul | 640 | N | 2.0 |
| 4 | Bhogaberini | Angul | 1360 | NE | 6.0 |
| 5 | Jagannathpur | Talcher | 2373 | NE | 5.0 |
| 6. | Santhapada | Talcher | 2498 | NE | 8.00 |
| 7. | Talakulundi | Talcher | 143 | E | 7.0 |
| 8 | Dasanali | Angul | 125 | E | 12.0 |
| 9. | Kholua | Talcher | 933 | E | 8.00 |
| 10. | Kansargudi | Angul | - | SW | 7.0 |
| 11. | Kukudanga | Angul | 3086 | NW | 0.5 |
| 12 | Bagachara | Angul | 265 | E | 10.0 |
| 13 | Balramprasad | Angul | 7153 | E | 1.00 |
| 14. | Digee | Talcher | 180 | NE | 5.0 |
| 15 | Sana Scotland pur | Talcher | NA | NE | 9.0 |
| 16 | Gurujangali | Talcher | 1336 | NE | 9.0 |

| | | | | | |
|---|---|---|---|---|---|
| 17 | Paniola | Angul | 268 | NE | 4.0 |
| 18 | Naugan | Talcher | 442 | E | 6.0 |

Initially single pond system was in use since 1984 with earthen embankments, over an area of land from RL 80m to RL 90m. The original single pond system has been divided into three pond system since 1994. In this system the two main ponds are of larger size each and the third pond is placed in between to collect the overflow from both the ponds. All these ponds were made of earthen embankment.
Since the adoption of three ponds system, these ponds have undergone vertical expansion i.e. raising dyke heights to accommodate more ash. A substantial quantity of fly ash was used as the core of embankment with soil cover. At present Ash Pond- IV has also come into existence.The current status of ash ponds are as follows

**Ash Pond #1** - Dyke height was raised in phased manner from 107 MRL to 110 MRL & the pond is in operation. The slurry discharge is now being carried out in Ash Pond- I. and IV. Ash Pond 1 occupies an area of about 200 acres.
**Ash Pond #2** - Dyke height was raised in phased manner from 104 MRL to 107 MRL . Ash Pond –II is completely exhausted . Ash mound work over Ash Pond-II is in progress. Ash pond 2 occupies an area of about 200 acres.
**Ash Pond#3**- Decantation channel is known as Ash pond 3. It occupies an area of about 51 acres.






**Ash Pond # 4** - Ash Pond 4 occupies an area of approximately 46 acres . Ash pond IV is meant for discharge of ash generagted by Unit# 7 to 10 in HCSD mode At present the slurry discharge is being done to Ash Pond- I & Ash pond-IV. Ash Pond-iv is meant only for ash disposal in HCSD mode.

## ASH WATER RATIO FOR HCSD

The Ash Water rotio in HCSD is 60 : 40.
Ash 60 % to water 40%.

## IMPORTANT FEATURES OF ASH POND-4

The important parameter of the dykes are mentioned below :-

1. Ash core dyke.
2. Side slope of ash core is 1 vertical to 2.5 horizontal.
3. Maximum height of the dyke is 15mtr. on at the lowest ground counter.
4. Covering materials ll be of earth with minimum 2.4 mtr. thickness.
5. Side slope of the earth cover is 1 vertical to 2 horizontal.
6. mtr. thick vertical sand chimney has been provided at the center of the dyke.

7. Horizontal strip filter drains of 2.00 mtr. wide and 10.00 mtr. interval has been provided at the bottom.
8. Rock toe drain is provided at the down stream toe of the dyke.
9. Dyke slopes will be protected with grass turfing.
10. The dyke crest is of 5.00mtr. wide.
11. Through filter strip drains is provided at the bottom level for a length of
12. 300 mtr. at the lowest contour to release the accumulated water.
13. Stone pitched garland drain will be provided all-round the dyke to lead the seepage water from dyke and the catchment surface flow from surroundings.
14. Free board will be 2.00m.

**CAPACITY OF THE POND**

- Capacity of storage will be 5 lakh MT of Ash.
- Considering HCSD disposal of ash from 3 Units on continuous basis (360MW).
- With the use of Blended coal (average Ash content 35 %).
- The life period of the Ash pond will be 8.6 Months.

## (F-2) IDENTIFICATION OF HAZARDS

### WHAT MAY GO WRONG ?

1.Sudden breach of the pond embankment /overflow of ash water across spillway due to high rise of water level.

2.Full rupture of Ash slurry pipeline.

| Sl.no. | Hazardous Substance /system | Type of Hazard | Safety Measures Provided |
|---|---|---|---|
| | | | |
| | Ash Pond | Breach of the Ash Pond | 1. For dust suppression water sprinkler system is in Operation on continuous basis. Slurry spreading, earth spreading, polythene covering has been carried out.<br>2. Regular mock drills ( 2 times a year) under On –Site Emergency Management plan are conducted at Ash pond. for dyke safety..<br>3. Assembly Point Boards have been displayed prominently for easy identification during emergency.<br>4. The periphery of the Ash Pond has been marked from Point A to K for quick identification and maintenance works.<br>5. All the staffs including contract labourers working in Pollution control Unit & at ash pond are trained regarding Safety , environment protection, water conservation & use of Personnel Protective Equipments in local language for ease in |

| | | | |
|---|---|---|---|
| | | | understanding.<br>6. Piezometers are installed for dyke safety. The dyke safety is also inspected & approved by Superintendent Engineer Irrigation, Angul twice in a year.<br>7. Two nos. of high audible range sirens are available, one at pollution control unit and another at Flash Bar.<br>8. Four nos. of watch tower are available at Ash pond for continuous inspection of pond.<br>9. Watch and ward is done round the clock. CISF patrolling team keeps vigil on ash pond dyke for any unsafe situation.<br>10. (12 Nos.) high mast lights are installed at Ash Pond for clear visibility in night hours.<br>11. All important telephone numbers are displayed at Ash Pond to be contact during emergencies.<br>12. A well equipped Emergency Control Room has been made at PCU(Pollution Control Unit) of Ash Pond. Emergency Siren, WLL phone, VHF, Public address system(Mega Phones),Ash Pond Lay out drawing, Important Phone numbers are available at Ash Pond (ECR).<br>13. Stability test is done by M/s.IISc., Bangalore.<br>14. Pre-Monsoon and Post-monsoon inspection of dyke safety is done by Supt.Engineer, Irrigation Dept.<br>15. Civil materials like sand bags, chips, cement, and contract laboures, tractors, tippers, rollers, hydra etc. have been kept ready to meet the emergency.<br>16. Ash Pond is manned round the clock to take care of any emergency. |
| | | | |
| 2 | | Full rupture of Ash slurry pipeline | During full bore rupture of Ash slurry pipe lines, first of all diversion or stoppage of slurry from the CPP is ensured. The station engineer is informed for diversion or stoppage of the slurry from the plant. Security controller at the plant gate is informed about the nature and location of emergency. A press note is prepared and released |
| | | | |
| 3 | Ash | Shortage of | NALCO has already started the work for the |

| | | | |
|---|---|---|---|
| | generation is 6500$M^3$ /Day | land for storage . | project of lean slurry disposal to abandoned mine void at Bharatpur South of MCL. |

## (F-3) MAN POWER DETAILS AT ASH POND

| Man Power | G shift 0800-1700 hrs | A shift 0600-1400 hrs | B shift 1400-2200 hrs. | C shift 2200-0600 hrs | Total |
|---|---|---|---|---|---|
| Regular manpower | 11 | -- | -- | 01 | 12 |
| Contract manpower | 87 | 06 | 05 | 05 | 103 |
| Total | 98 | 06 | 05 | 06 | 115 |

During the working hours a total of four to five engineers (with background of Mechanical, Electrical, Civil and Chemical) are available at site.and are accessible at later hours also in case of need. Besides them three to four CISF personnel are available at all hours, on stationary and patrolling duty. Higher officials can be contacted and further assistance invited in case of major emergency.

## (F-4) THE FOLLOWING THREE GROUPS HAVE BEEN FORMED FOR COMBATING MAJOR EMERGENCY IN ASH POND

| GROUP | MEMBERS | FUNCTION |
|---|---|---|
| COMBAT GROUP | CM,(AMD)<br>Mgr(Mech),AMD<br>Mgr(Chem),AMD<br>JM(Civil), AMD<br>Incharge(Electrical), AMD | The team would assess the situation and take necessary action, try to control leakage , flow of slurry or any such occurrence on site Constantly inform and keep contact with site controller and Engineering Control Coordinator. |
| | | |
| RESCUE TEAM | Asst. Commandant (Fire) CISF. Inspector (Fire) CISF. HC (Fire) CISF.<br>Rest of the team under Asst Commandant CISF | Team has knowledge about rescue and search operation and transports the rescued persons to First Aid |
| | | |
| COMMUNICATION CO ORDINATION GROUP | GM(H&A) -for over all coordination<br>DGM (H&A)- Media coordination<br>DGM(MS)- Medical Services<br>CM(H&A)- Commn and PR-Roll call coordinator<br>Mgr. (Admin) -Transport PRO | They Would help supply information to all necessary sources for the easy dealing with the situation including the media and the administration. |

## (F-5) RESPONSE LEVEL MATRIX DURING EMERGENCY

| SN. | Designation of Emergency Team Member | Designation | Alternate |
|---|---|---|---|
| 01 | CIC (Chief Incident Controller) | GM (CPP) | GM (CPP)-I/c |
| 02 | WIC (Work Incident Controller) | DGM **(**Ash Management Division) | CM(AMD) |
| 03 | SC (Site Controller) | CM(AMD) | MGR(AMD) |
| 04 | Emergency Support Officer | AGM(E&S) | AGM(E&S)-I/c |
| 05 | Medical co ordinator | DGM (M&HS) | Casuality Medical Officer |
| 06 | Security Coordinator | Asstt. Comdt.(CISF) | Inspector (CISF) |
| 07 | Public Relation Officer | GM(H&A) | DGM (H & A). |
| 08 | Rescue Co ordinator | Asstt. Comdt.(Fire) CISF | Inspector Fire CISF |
| 9 | Assembly Point In-charge | AGM (H&A) | AGM (H&A)- I/c. |
| 10 | Incident identifier | Whoever is on supervision /patrolling duty. | |
| 11 | Engineering Control Coordinator | As in CPP | |

## (F-6) FUNCTIONS OF DESIGNATED PERSONS DURING EMERGENCY AT ASH POND AREA

**CHIEF INCIDENT CONTROLLER(CIC**) GM/CPP/GM) or GM/CPP(i/c)
Remains in touch with DGM (AMD), CSO,GM(H&A) and keeps himself informed of the situation.

- Oversees the smooth flow of material, funds and help from his end.
- Depending upon the extent of damage visits the site at his discretion to get first hand information and reviews the reports.

**WORKS INCIDENT CONTROLLER** (WIC) DGM(AMD)/CM (AMD)

- Reaches the site as soon as he gets information of Emergency.
- Decides on the type of emergency (On Site / Off Site) and informs the Unit Head.
- In consultation with CIC arranges for warning and instructions to the downstream population.
- Communication with all the members of the emergency management.
- Informs the station engineer for diversion or stoppage of slurry from the plant.
- Informs the Security personnel at the CPP main gate about the of emergency. He will assess the scale of emergency and inform to the rescue agencies accordingly. (List of rescue agencies with telephone number should be available.).
- He will depute sufficient number of persons at the point fixed for receiving rescue agencies.

**SITE CONTROLLER (SHIFT IN CHARGE)(SC)** CM-AMD/Manager –AMD

- On getting information of the incident from an employee he will rush to the scene of the occurrence and take overall charge and report to Works Incident Controller. He will assess the scale of emergency and inform to the rescue agencies accordingly.
- Considering priority for safety and property losses ensures stoppage of operation and evacuation of non essential workers in the effected areas.

- Provides information and assistance to rescue teams and other help group.
- Checks the weather forecasts to know the climate condition.
- Ensures that refreshment and other supplies are provided to Rescue teams and other help group.
- He will work as Work Incident Controller till Works Incident Controller(Dy.GM) reaches the affected area.
- Report on all significant developments to the Works Incident Controller.
- Site controller informs Security office at main gate, DGM(H&A) and Emergency Control Centre
- As per practice /norms Security office at main gate also informs Emergency Control Centre, DGM(H&A).

**RESCUE CO ORDINATOR ASST. COMMANDANT (FIRE) CISF/ INSPECTOR (FIRE), CISF**

- Reports to the SC about the rescue measures to be taken.
- Organizes and instructs his staff to combat the situation.
- Maintains contacts with District Authorities and police for additional help if required.
- Reviews effectiveness of rescue operations after rescue is over.

**SECURITY COORDINATOR - Commandant CISF/Asst. Commandant (Fire)**

- Contacts Site Controller, and deploys required number of safety personnel at the strategic positions ensuring protection of people and property.
- Commands the rescue co ordinator and takes assistance of Medical Team in rescue procedures.
- Takes control of Law and Order in emergency areas restricting entry to un desired persons. Informs CPP office of Security.

**PUBLIC RELATION OFFICER GM(H&A)/DGM(H&A)**

- Reaches the location and establishes contacts with site controller, Medical Coordinator and Rescue coordinator.
- Contacts the downstream villages and informs/instructs them as per the site controller's advice.
- Co ordinating with District Authorities for help in Off Site rescue work.
- Prepares the press note in consultation with Unit Head and deals with the media / press people for correct information flow.

**MEDICAL CO ORDINATOR DGM( MEDICAL SERVICES)**

- On receipt of information contacts DGM(H&A) and requests to provide necessary help.
- Organises First Aid at Site.
- Coordinates with nearby Hospitals and transfer the injured requiring further treatment if needed.
- Ensures availability of equipment and other aid like stretchers, medicines and blood.

**EMERGENCY SUPPORT OFFICER AGM(E&S) OR HIS REPRESENTATIVE AT ASH POND AREA.**

- Reports to Site Controller.
- Renders necessary advice to SC and Unit Head to manage the crises.
- Co ordinates Search, Rescue and First Aid etc,
- Ensures periodic mock drills and assesses it.
- Ensures effective functioning of the Emergency Organisation

**ENGINEERING CONTROL COORDINATOR - DGM (MECH-1)**

On being informed about the emergency Engineering Control Coordinator "DGM(Mech-1) will contact his team members i.e. DGM(Mech)-II, DGM (Elect.)-I, DGM(Elect)-II, DGM (C & I) and DGM (Civil). He will ensure that necessary tools, forklift, dump trucks and other heavy duty equipment etc. are available for carrying out salvage operation. **SIMILARLY DGM(ELECT.)** He may be required to make arrangements for emergency illumination/ lighting in case of power failure during night time.

**FIRST RESPONDER**

- Any employee noticing an unusual event such as breach of the wall of Ponds, Uncontrolled flow of water or slurry or ash should immediately act as follows:
- He should inform and warn others about emergency.
- He should contact Supervisor on duty, Engineer on duty. Dial Security Office.
- Inform shift in-charge and move to spot of concern. Shift Incharge initiates appropriate action to combat the situation and informs about the incident to Security Supervisor at Emergency Control Centre, who in tern informs all key personnel at Ash Pond Division as well as CPP NALCO.
- The person reporting the incident will remain near the location to guide emergency crew arriving at the scene.
- While giving the information about the fire/emergency he should inform his name, location of incident, type of incident).

## (F-7) EMERGENCY CONTROL CENTRE, ASSEMBLY POINT & SIREN SYSTEM

### AT ASH POND AREA

**LOCATION OF ECC AND FACILITIES AVAILABLE AT ECC**

The ECC is located at the following two locations:

**ECC-1 is located near PCU.**

**ECC-2 is located at the opposite side of the pond**

One Emergency Control Centre (ECC-1) is located at PCU's Shift office. Another Emergency Control Centre(ECC-2) is located diagonally opposite to PCU's Shift office. The centre is occupied to receive and transmit information and direction. Following are the list of facilities available at ECC.

1 Responsible person is available all the time.
2 VHF set & WLL facility.
3 Lay out of plant and Pond.
4 Four set of breathing Apparatus.
5 Writing material.
6 List and phone nos of key personnel.
7 Adequate number of internal and external telephone lines separately .
8 Site plan of CPP.
9 Site Plan of Ash Pond Area including.
10 Location of other ECC and assembly areas .

**ASSEMBLY POINTS AND HEAD-COUNTING**

## DETAILS OF ASSEMBLY POINTS AT ASH POND:

| SL No | Assembly Point | Locations |
|---|---|---|
| 1 | Assembly Point No-1 | Near K Point |
| 2 | Assembly Point No-2 | Near Flush Bar |
| 3 | Assembly Point No-3 | Near A Point |
| 4 | Assembly Point No-4 | Near Village Dighi and Kholua |

Assembly point incharge will keep upto date list of persons(employees/contractor workers/suppliers/visitors) as available in various plant. Assembly Point incharges will be decided by the time office under the guidance of Head HRD. After all clear siren, all assembly point in-charges will report to Chief Incident Controller at ECC with list of roll call where Chief Incident Controller will conduct a de briefing meeting.

### LOCATION OF EMERGENCY SIREN SYSTEM

PCU situated in ash pond area has been equipped with emergency siren..

## (F-8) DECLARATION OF EMERGENCY AND RESTORATION OF NORMALCY

### DECLARATION OF EMERGENCY

Decision regarding declaration of emergency is taken by CIC in consultation with WIC and key personnel. Declaration of emergency at Ash pond is made by operating siren at PUC. **Only CISF is authorised to operate the siren.**

After operating the siren, announcement is made through Public Address System in Oriya, English and Hindi.
":A major emergency has occurred at Ash Pond Area due to rupture of slurry pipe/breach in the pond. All present in the field are requested to move to nearest assembly point. While moving cover mouth and nose with wet handkerchief /clothes. In house employees are requested to keep window and doors tightly closed. If it becomes necessary we may evacuate you and be prepared for it.

| | AT ASH POND AREA | | |
|---|---|---|---|
| Sl.no | Type of emergency | Type of Alarm | Duration |
| 1 | Rupture of Ash slurry pipelines | 10seconds…..ON & 05 Seconds…OFF | 4 times |
| 2 | Breach/High rise of water level | 10 seconds…. ON & 05 seconds…..OFF | 8 times |
| 3 | Evacuation operation needed | Wailing sounds | 180 seconds |
| 4 | End of Emergency | Continuous siren | 180 seconds |

### RESTORATION OF NORMALCY

Only Chief Incident Controller is authorised to take the decision to "call off" the emergency. After consulting the Works Incident Controller and other key personnel if it is ensured that the situation is under control and the emergency is over, CIC will order to actuate the ALL-CLEAR SIREN. All persons within and around the Plant are informed through the "ALL-CLEAR SIREN".

External agencies, viz., District Collector Office, Factory Inspectorate, Police, and Office of Pollution Control Board. are again contacted by DGM(H&A) or his Alternate to communicate the end of emergency.

The Corporate / Head Office are informed by Chief Incident Controller about ceasation of emergency.

**SEQUENCE OF ACTIONS AFTER THE "ALL-CLEAR SIREN" IS ACTUATED**

- CIC contacts all section to communicate them the emergency has been called off and instructs for actions to be taken by the person inside.
- The senior person in at Ash Pond Area takes a small meeting of all workers present in the section and briefs them about the emergency and ensure resumption of normal work.
- The Site controller, in consultation with WIC, CIC and other senior-most official of the factory takes necessary steps to resume normal work.
- Any chemical or oil spilled during emergency, would be collected properly and if required treated at Effluent Treatment Plant. The other wastes generated due to accidents can be disposed off properly.

**DE BRIEFING CHIEF INCIDENT CONTROLLER :**

The Site controller will check the areas thoroughly for possible hazards such as live wires after emergency and will inform Chief Incident Controllers accordingly. The key personnel will meet to evaluate their individual and overall performance in responding to the situation after the emergency is over .

The review shall determine

- Effectiveness of the emergency response plan.
- Plant crew performance.
- Any need for updation or revision of the emergency response plan.
- Suitable arrangement for restart of the plant.
- Evaluation and control of effluent arising out of mitigating measures like foam discharge and overflow of oil in water.
- Rehabilitate evacuated area and adopt measures to prevent similar reoccurrence.

Difficulty(ies) faced by any one in implementing the plan will be discussed. After discussion final decision taken will be recorded and it will be incorporated while reviewing the plan.

## (F-9) TELEPHONE NUMBERS

| SN. | Designation of Emergency Team Member | Designation | Tel. No |
|---|---|---|---|
| 01 | CIC (Chief Incident Controller) | GM (CPP) | 9437000323 |
| 02 | WIC (Work Incident Controller) | DGM (Ash Management Division**)** | 9437023599 |
| 03 | SC (Site Controller) | CM(AMD) | 06764292252 |
| 04 | Emergency Support Officer | AGM(E&S) | |
| 05 | Medical co ordinator | DGM (M&HS) | 6601,220225 |
| 06 | Security Controller | Asstt. Comdt.(CISF) | 5960,220725 |
| 07 | Public Relation Officer | GM(H&A) | 7007,220125 |
| 08 | Rescue Co ordinator | Asstt. Comdt.(Fire) CISF | 5961,220424 |
| 9 | Assembly Point In-charge | AGM (H&A) | |
| | | GM (O&M) | 9437000350 |
| | | CM(AMD) | 9437040806 |
| | | Manager(AMD) | WLL:6764292252 |

| | | | |
|---|---|---|---|
| | | AGM(E&S) | |
| | | Casuality Medical Officer | 6600,220350 |
| | | Inspector (CISF) | 5962 |
| | | DGM(H&A) | 9437036862 |
| | | Inspector Fire (CISF) | 5975,220424 |
| | | AGM (H&A) | |

## (F-10) AVAILABLE MATERIAL RESOURCES AT ASH POND

Minimum quantity of building materials have been stored at selected locations as shown in the following table. Larger stock of materials would be made available through suppliers in case it is needed.

| s.no. | Location | Sand bags (nos). | Boulders $M^3$ | Stone aggregate $M^3$ | Stone chips $M^3$ | Wooden Ballies Nos |
|---|---|---|---|---|---|---|
| 1 | B Point | 500 | 40 | 35 | 10 | - |
| 2 | C Point | 600 | 45 | 45 | 15 | - |
| 3 | D Point | 400 | 55 | 35 | 20 | - |
| 4 | F Point | 500 | - | - | 06 | - |
| 5 | G Point | 450 | - | | 20 | - |
| 6 | H Point | 500 | - | 10 | - | - |
| 7 | J Point | 500 | 135 | 25 | - | - |
| 8 | Flush Bar of DD-1 | 400 | 40 | 20 | - | - |
| 9 | Flush Bar of DD-1 | 400 | 30 | 20 | - | - |
| 10 | PCU | - | - | - | - | 15 |

*** * ***

## ANNEXURE-D

**The Facilities Available at CPP to combat the Emergency situation:**

**PREVENTIVE SAFETY MEASURES, EMERGENCY EQUIPMENT AND FACILITIES**

### 17.1 FIRE FIGHTING ARRANGEMENTS

Captive Power Plant of NALCO, Orissa has full fledged fire station operated by CISF personnel. The fire station is equipped with the following personnel to handle the fire promptly and actively:

a. Sr.Commandant (CISF)
b. Asst. Commandant (Fire) & Asst. Commandant (Security)
c. Inspector (Fire) and Inspector (Security)
d. Sub-inspector
e. Asst. sub-inspectors
f. Head Constables
g. Constables

**MAJOR FIRE FIGHTING EQUIPMENT AVAILABLE AT CPP NALCO**

| SN | Equipment | Quantity |
|---|---|---|
| 1. | Foam tender | 01 |
| 2. | Water tender | 02 |
| 3. | DCP tender | 01 |
| 4. | Smoke Exhauster | 02 |
| 5. | High capacity pump | 01 |
| 6. | High expansion foam generator | 04 |
| 7. | Mini Tender | 01 |
| 8. | Ejector Pump | 02 |
| 9. | BA Sets | 13 |
| 10. | Proximity Suit | 02 |
| 11. | Fire Entry Suit | 02 |

**DETAILS OF FIRE WATER PUMPS**

**COOLING WATER PUMP HOUSE**

Motor Driven Pump (132 KW) -02 Nos, Capacity: 273 $M^3$ /Hrs
Motor Driven Pump (48.2 KW) - 01 No, Capacity: 273 $M^3$/Hrs
Diesel Driven Pump (173BHP ) -03 Nos, Capacity: 273 $M^3$/Hrs

RCPH(Hydrant)

Motor Driven Pump (125 KW) - 02 Nos, Capacity : 273 $M^3$ /Hrs
Diesel Driven Pump (173BHP) - 01 No, Capacity : 273 $M^3$/Hrs
Jockey Pump (18.5 KW) - 01 No, Capacity : 273 $M^3$/Hrs

RCPH(Spray)

Motor Driven Pump (125 KW) - 02 Nos, Capacity : 273 $M^3$ /Hrs
Diesel Driven Pump (173BHP) - 01 No, Capacity : 273 $M^3$/Hrs
Jockey Pump (18.5 KW) - 01 No, Capacity : 273 $M^3$/Hrs

## FIXED FIRE FIGHTING INSTALLATIONS

1. Foam Pourer 04
2. Emulsifier Systems provided
3. MVWS provided
4. Deluge Valve installed
5. $CO_2$ Flooding Sys. 02
6 Monitors W/F 39
7.Fire Hydrants 696

## FIRE EXTINGUISHERS

(1). $CO_2$ 2 KG - 31, (2). $CO_2$ 4.5 KG -160, (3). $CO_2$ 6.8 KG -357, (4). $CO_2$ 22.5 KG -101, (5). DCP 5 KG -570, (6). DCP 10 KG - 05, (7). DCP 10 KG(SP) -80, (8). DCP 50 KG -10, (9). DCP 70 KG -08, (10). DCP 75 KG -29, (11). Foam 09 Ltrs -254, (12). Foam 50 Ltrs -42, (13). Water 09 Ltrs-239 and , (14). Water 09 Ltrs.(SP)-50

## ANNEXURE – E

**MUTUAL AGREEMENT WITH NEARBY FACTORY :**

### 17.4 MATERIAL HANDLING EQUIPMENTS AVAILABLE AT CPP

| SN | Machines & Equipments available | Quantity |
|---|---|---|
| 1 | Bull Dozers | 03 |
| 2 | Hydra crane | 01 |
| 3 | Forklift Truck | 02 |
| 4 | Jeep | 01 |
| 5 | Truck | 01 |
| 6 | Mini truck | 01 |

### 17.5 LIST OF FACILITIES AVAILABLE WITH SMELTER UNIT

| Sl.No. | Machines and equipments | Available in CPP | Available in Smelter |
|---|---|---|---|
| 1. | Bulidozers | 03 | - |
| 2. | Hydra Crane | 01 | 7(8-ton capacity) |
| 3. | Forklift Truck (FLT) | 02 | 92 |
| 4. | Front End Loader | - | 06(2 M3 capacity) |
| 5. | Cole's Crane | - | 01 m(25 ton) |
| 6. | TATA P&H Crane (Model 655 | 01(35 ton) | 01(70 ton) and 01 (90 ton) |
| 7. | Bus | - | 03 |
| 8. | Jeep | 01 | 03 |
| 9. | Pickup van | - | 01 |
| 10. | Poclain | - | 02 |
| 11. | Truck | 01 | 03 (10 ton ) |
| 12. | Mini Truck | 01 | 06 (TATA 407) |
| 13. | No. of Hospital Beds in S&P Complex. | 55 | - |

### 17.6 NEAREST HOSPITALS:

| **SN** | **Location** | **Telephone Numbers** |
|---|---|---|
| *01* | District Hospital, Angul | 232507 |
| *02* | Nehru Satabdi Hospital, Dera | 269678 |
| *03* | NTPC Hospital, Kaniha | 253534 |
| *04* | TTPS Hospital, Talcher Thermal | 249029 |
| *05* | Govt. Hospital, Talcher | 240226 |

### 17.7 NEAREST FIRE STATIONS:

| Sl.No. | Station Location | Telephone / Fax Nos. |
|---|---|---|
| 01 | Fire Station, CPP | 5333 / 06764-220424 |
| 02 | Fire Station, Smelter | 6333 / 06764-220323 |
| 03 | Orissa State Fire Service, Angul | 101 / 06764-253660 |
| 04 | TTPS Fire Station, Talcher Thermal | 06760-240222 |
| 05 | NTPC, Kaniha | 249530 |

### 17.8 MUTUAL AID

In case of emergencies, following mutual aid is available from nearby industries and local business houses:

a) All transporting vehicles available in Smelter plant can be utilized for transporting emergency equipments, materials and the affected persons of emergency.
b) All the fire fighting, dewatering facilities and rescue personnel available with Smelter plant will be utilized for combating emergency.
c) Transporting and medical facilities can also be made available from M/s Mahanadi Coalfield Limited (MCL) and Talcher Thermal Power Station of NTPC.

### 17.8.1 LIST OF MUTUAL AID EQUIPMENT AND FACILITIES AT MCL

| Sl.No. | Equipment | Quantity to be spared for Mutual Aid. |
|---|---|---|
| 1 | Stationary Pump | |
| | Pumpd with 6KV prime movers | One set |
| | Fire Tender | 1 |
| | | |
| 2 | Hospital services | |
| | Hospital Beds | 2 |
| | Doctors | 2 |
| | Nurses | 1 |
| | Surgical Equipment/medicines | Available |
| | | |
| 3. | Excavation Equipment | |
| | Bulldozers | 1 |
| | Mobile Cranes | 1 |
| | Trucks | 1 |
| | Water Tankers | 1 |
| | | |
| 4. | Trained First Aiders | Two teams(Each category ( 5 members of Bharatpur and Kalinga ) |
| 5. | Rescue Team | A team of six rescue trainer persons. |

### 17.8.2 LIST OF MUTUAL AID EQUIPMENT AND FACILITIES AT TTPS & NTPC.

| Sl.No. | Equipment | Quantity to be spared for Mutual Aid. |
|---|---|---|
| 1 | Stationary Pump | |
| | Water Tender | 1 |
| | Fire hose with branches | 10 |
| | Portable fire extinguishers | Different types |
| | Foam tender | 1 |
| 2. | Hospital Services | |
| | Hospitals Beds | 7 |
| | Doctors | 9 |
| 3. | Excavation Equipment | |
| | Bulldozers | 1 |
| | Pay Loader | 1 |
| | Hydfra Crane | 1 |
| | Truck | 1 |
| | Water Tanker | 1 |

## ANNEXURE-F

**THE TELEPHONE NUMBERS OF THE KEY PERSONS OF EMERGENCY COMMAND STRUCTURE.**

## KEY PERSONS OF CPP AND THEIR CONTACT DETAILS

| Sr. No. | Designation | Department | Phone (Off) | Phone (Res) | Qrs. No. | Mobile No. |
|---|---|---|---|---|---|---|
| 1 | ED(S&P) | Nalco-Angul | 7001/220110 | 4002/222020 | D-27 | 9437093500 |
| 2 | GM(CPP) | Nalco-CPP,Angul | 5201/220158 | 4273/220340 | D-44 | 9437024462 |
| 3 | GM(H&A) | Nalco-Angul | 7006/220220 | 4040/222443 | D-28 | 9437022443 |
| 4 | GM(O&M) | Nalco-CPP,Angul | 5202/220443 | 4202/221464 | D-08 | 9437087646 |
| 5 | DGM (O) | Operation | 5340/ 222799 | 4340/220718 | D-18 | 9437000767 |
| 6 | DGM ( AMD) | Ash Management | 5343/ 220710 | 4319/220279 | D-47 | 9437031279 |
| 7 | DGM (E&S) | E & S | 5372/ 220440 | 4372/220649 | D- 139 | 9437039649 |
| 8 | DGM (Elec)-I | Electrical | 5211/ 220035 | 4875/ 220985 | D-88 | 9437020985 |
| 9 | DGM (C&I) | C & I | 5804/ 220723 | 4802/ 222530 | D-169 | 9437055607 |
| 10 | DGM (CHP& CRS) | CHP & CRS | 5850/ | 4850/220518 | D-7 | 9437054493 |
| 11 | DGM (E&MS) | Operation Support | 5372/ 220440 | 4372/220649 | D- 139 | 9437039649 |
| 12 | DGM (MS) | Medical Services | 6618 | 4618/220521 | D-106 | 9437006108 |
| 13 | AM(E&S) | E & S | 5373/ 20460 | 4338/220203 | D- 77 | 9437060165 |
| 14 | PRO | Mr Raja Ram Mishra | | | | 9437496306 |
| 15 | Transportation & Temporary Accomodation - Incharge | Administration<br><br>Public Relation Mr.PC Baraha | 5486/ | 4686/223745 | C-211 | 437002658 |
| 16 | Assembly Point Incharge | Sr.Manager (HRD) / Jr. Manager (HRD) | 5926/ 220720 5931 | 4926/220475 4909 | TC-07 B-113 | 9437019260 9437028313 |
| 17 | Cmmandant (CISF) | Security & Fire, CPP | 7750 / 220128 | | TD-7 | 9437584320 |
| 18 | Asst.Cmmandant (CISF) Security | In-charge, Security, CPP | 5960 / 220725 | 4751/223634 | D-102 | 9437551291 |
| 19 | Asst.Cmmandant (CISF) ,Fire | In-charge, Fire Wing,CPP | 5967/2220424 | 4756/220277 | C-42 | 9437299877 |
| 20 | Personnel Manager | CM (H & A ) | 5922/220720 | 4200/220165 | D-59 | 9437050147 |
| 21 | Emergency | First aid | 5222 | 4604/22047 | D- 61 | 9437070476 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Medical Officer | Center,CPP | | | | |
| 22 | Station Engineer | Operation | 5300/ 220713 | | | |
| 23 | Shift-in-charge | CHP | 5840/ 220721 | | | |
| 24 | Shift-in-charge | WTP | 5361/ 222414 | | | |
| 25 | Shift-in-charge | Switch Yard | 6545/ 220151 | | | |
| 26 | Shift-in-charge | D.M.Plant | 5361/222414 | | | |
| 27 | Shift in-charge | CWPH, Chlorination Plant. | 5335 | | | |
| 28 | G-Shift in-charge | Ash Pond | 292252 | | | |
| 29 | Shift in-charge | Casualty,Nalco Hospital | 6600/220350 | | | |
| 30 | I/c- Search & Rescue Team | CISF (Fire wing) | 5333/ 220424 6555 | | | |
| 31 | Emergency Security Controller | In –charge, Plant Maingate (CISF) | 5965 / 220398 | | | |

## (D-1) EXTERNAL AGENCY:

| Sl.No. | Name | Designation/Address | Contact Numbers | |
|---|---|---|---|---|
| 01 | Mr.P Sahoo | AGM(E&S),Smelter | 7041 06764-220228 | 9437026365 |
| 02 | Mr.U K Samantaray | Asst. Director Factories & Boilers Angul Zone-I | 06764-220164 | 9437686256 |
| 03 | Mr H C Sahoo | Dy..Director Factories & Boilers Angul Division | 06764-220164 | 9437214668 |

## (D-2) COORDINATION WITH DISTRICT COLLECTOR OR THE DISTRICT EMERGENCY AUTHORITIES:

| Sl.No. | Name | Designation/Address | Contact Numbers |
|---|---|---|---|
| 01 | DEO (Angul) | District Emergency Officer | 06764-230980/ 9439853561 |
| 02 | Collector Angul | Collector ,Angul | 06764-230567 |

## (D-3) NEAREST POLICE STATION:

| Sl.No. | Station Location | Distance | Telephone/Fax Nos. |
|---|---|---|---|
| 01 | Nalconagar | 05 | 100 / 220232 |
| 02 | Banarpal | 04 | 100 / 229260 |
| 03 | Angul | 12 | 100 / 230444 |
| 04 | Talcher | 15 | 100 / 240236 |

**ANNEXURE-H**

# METROLOGICAL DATA