**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,**

**Principal Bench, New Delhi**

Original Application No. 79/2021

**In the matter of: -**

In re: News item published in The Hindu dated 14.03.2021 titled "Safety lapses led to reactor blast at pharma unit"

**Index**



(Dinabandhu Gouda)
Scientist-E
Central Pollution Control Board,
Parivesh Bhawan, East Arjun Nagar,
Delhi- 110032.

Date: 10.06.2021
Place: Delhi

# REPORT OF THE JOINT COMMITTEE IN THE MATTER OF OA. NO. 79/2021 SUBMITTED TO HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH, DELHI IN COMPLIANCE TO HON'BLE NGT ORDER DATED MARCH 16, 2021

**Submitted to**

**Hon'ble National Green Tribunal**
**Principal Bench, New Delhi**

## I Preamble

Hon'ble NGT in light of the news item published in The Hindu dated 14.03.2021 titled *"Safety lapses led to reactor blast at pharma unit. The media report mentions the incident of explosion of 3000Kg reactor at the production wing of Tyche Industries Limited outskirts of Kakinada, Andhra Pradesh on March 11, 2021 due to lack of safety mechanism and risk assessment failure. Two supervisors were killed and four workers severely injured*." Hon'ble NGT Principle Bench, New Delhi in response to the media report vide order dated 16.03.2021 has constituted a five-member committee to give its report about the cause of the incident, the extent of damage caused, the extent of compensation required to be paid for damage to the environment as well as for loss of lives, injuries and steps required to be taken for preventing any such occurrence in future within one month. The nodal agency for coordination and compliance will be the CPCB and the State PCB.

## II Orders of the Hon'ble Tribunal dated 16.03.2021

Hon'ble NGT vide order dated 16.03.2021 has directed as follows

*"While directing issuance of notice to the CPCB, AP State PCB, Directorate of Factories, AP, the District Magistrate, Kakinada, AP and Tyche Industries Limited, Kakinada, AP by e-mail, we constitute a five-member joint committee comprising MoEF&CC, CPCB, AP State PCB, Directorate of Factories, AP and the District Magistrate, Kakinada, AP. The nodal agency for coordination and compliance will be the CPCB and the State PCB. The joint Committee may visit to the site and give its report about the cause of the incident, the extent of damage caused, the extent of compensation required to be paid for damage to the environment as well as for loss of lives, injuries and steps required to be taken for preventing any such occurrence in future. Except for visit to the site at least once, the Committee will be free to conduct its proceedings online. It will be free to take the assistance from any other expert/organization. The Committee may suitably interact with the stakeholders and, apart from considering the present incident, also consider remedial measures for preventing such incidents in the area or by other establishments, even beyond the said area. The Committee may compile information about existence and working of onsite and offsite plans in terms of 1989 Rules and conducting of mock drills and safety SOPs and compliance status of environment norms.*" Copy of the Hon'ble NGT order is enclosed as Annexure-I.

In compliance to Hon'ble NGT order, committee comprising of following members was composed:

| Sl.no. | Name and Address | E-Mail ID |
|---|---|---|
| 1. | Dr. Suresh Babu Pasupuleti, Scientist-C<br>Integrated Regional Office (IRO),<br>Ministry of Environment, Forest and<br>Climate Change, Green House Complex,<br>Gopalreddy Road, Vijayawada -520010,<br>Andhra Pradesh. | iro.vijayawada-mefcc@gov.in<br>suresh.pasupuleti@gov.in |
| 2. | Sri R. Trinadha Rao<br>Deputy Chief Inspector of Factories, Eluru,<br>3rd road, Chanakyapuri, RR Pet, Eluru | Dcifelr-ap@gov.in |
| 3. | Sri A. G. Chinni Krishna<br>Revenue Divisional Officer,<br>Kakinada-533001<br>East Godavari District, | rdokkn@nic.in,<br>collectoregd@ap.gov.in |
| 4. | Smt. Mahima T, Scientist-D<br>Central Pollution Control Board,<br>second Floor, 77-A, South Avenue Road,<br>Ambattur Industrial Estate,<br>Chennai-600058. | mahima.cpcb@nic.in |
| 5. | Sri A. Ramarao Naidu, Environmental<br>Engineer, A.P. Pollution Control Board,<br>Regional Office, Kakinada, East Godavari<br>District | rokkd-ee1@appcb.gov.in |

**IIIa** *Scope of Committee*

The Committee has been vested with the mandate to visit and inspect the site in question and vested with following scope vide the Order dated 16.03.2021:

a. Sequence of events, Causes of failure, ascertain facts
b. Determine responsibility

c. Extent of damage to human life and environment
d. Assess final compensation for the victims and environment
e. Steps taken for compensating the victims and for restoration of the environment
f. Measures to prevent recurrence and other incidental issues
g. to consider the view point of all the stakeholders.
h. Compile information about existence and working of onsite and offsite plans in terms of 1989 Rules and conducting of mock drills and safety

**IIIb** *Site Visit by the Committee*

The committee inspected the unit on 15.04.2021, interacted with unit management, unit personnel who were present during the accident. As per the preliminary discussions, the accident occurred on 11.03.2021 at around 14:30 hrs in reactor 504 while the reaction was in progress. During the accident two persons died and four were injured. The committee interacted with the family of the deceased and the injured personnel. Deputy Chief Inspectorate of Factories issued Prohibitory orders to the unit on 13.03.2021 and also issued Show-Cause Notice on 22.03.2021. On the day of inspection, the unit is not in operation and was under safe shutdown.

## IV About M/s Tyche Industries Ltd, Kakinada

**IV.a.** *General information*: M/s Tyche industries is located in Sarpavaram, Kakinada, East Godavari district-533 005 16°59'47.38"N 82°12'49.49"E. The unit is spread in an area of 21 acres. The company was started in the year 1969 as M/s Subbaraya Solvents oil extraction Pvt Ltd as solvent extraction plant. In 1988 M/s Siris Agro Ltd purchased M/s Subbaraya solvents. In 2004 Tyche Indusries Ltd purchased M/s Siris Agro Ltd and M/s Tyche industries went for public hearing in 2008. Presently 240 employees are working, out of which 100 no.s skilled, 58 no.s semi-skilled and 82 non-skilled employees. There are total 06 production blocks, out of which two blocks are pilot and kilo lab block.


**IV.b** *Status of Environment Clearance and Consent for operation*

Ministry of Environment, Forest and Climate Change (MoEFCC) has granted the following environmental clearances (ECs) to the unit:

| SN | EC no and date | Production capacity |
|---|---|---|
| 1 | J-11011/678/2007 – IA II (I) dated 13.05.2008 | 25 TPM |
| 2 | J-11011/302/2012 – IA II (I) dated 27.08.2014 | 68.51 TPM |
| TPM – Tones per month | | |

As per latest EC dated 27.08.2014 the following products shall be manufactured (Copy of EC is enclosed as Annexure-II):

| SN | Product | TPM |
|---|---|---|
| 1 | Glucosamine hydrochloride | 45 |
| 2 | Di-Chloro Hydroxy Qulnoline | 10 |
| 3 | Lpsartan potassium | 2.0 |
| 4 | 2-chloro-np (2-chloro 4-methyl)-3-pyridinyl)3-pyridine carboxamide (RAP-5) | 7.0 |
| 5 | Tamsulosin hydrochloride | 0.01 |
| 6 | 1-(2-chloroethyl) piperdine hydrochloride (CPH) | 2.50 |
| 7 | Sertraline hydrochloride | 2.0 |

| | |
|---|---|
| Total | 68.51 |
| TPM – Tones per month | |

The unit was having consent under the Water Act, the Air act and Authorization under Hazardous Waste Rules, 2016 from APPCB valid from 13.11.2020 to 31.08.2025 with a total maximum production capacity of 68.46 TPM for any 21 products (RAP-5 is one among the consented 21 products). Copy of CFO is enclosed as Annexure-III. The unit had valid EC from MoEFCC and CFO from APPCB for manufacture of RAP-5.

**IV.c** *Process description*: The unit has six production block, administration block, solvent storage section and ETP. The accident occurred in production block 5 in reactor 504. In production block-5, reactors & day tanks are housed in first floor. Reactor 504 is a glassline reactor installed during 2012. It was informed by the unit officials that the average life of the reactor is 10 years. The committee observed that other reactors in production block 5 seem to be very old and outer body of the reactor is worn out. It is observed that there is no proper labelling (on date of cleaning, cleaning due date, reaction mixture present inside the reactor etc) in other reactors.

The centrifuge is provided in ground floor. On the day of the accident the unit was involved in the manufacture of RAP-2. The unit is consented to manufacture RAP-5 which involves five stages and unit was manufacturing only upto stage-2 i.e RAP-2. Reported that the unit was manufacturing RAP-5 during 2015 and then due to less demand, the production of RAP-5 was stopped. The unit resumed the production of RAP-5 during January, 2021 but restricted it only upto stage-2 (RAP-2). During interaction with the injured employees it was learnt that though they were having more than 5 years experience in the unit but previously they had not worked in production of RAP-5. The accident occurred during the production of RAP-2 while Sulphuric acid was being added after nitration reaction.

RAP-2 manufacture comprises of two stages, In stage-1, 2-Amino-4-picoline is reacted with NaNo2 by addition of Sulphuric acid to produce RAP-1(2-hydroxy-4-picoline). RAP-1 is taken to stage-2. In stage-2, nitric acid is added to the reactor containing RAP-1 (2-hydroxy-4-picoline). After addition of nitric acid Sulphuric acid is added. The entire reaction is exothermic in nature. Temperature of less than $29^0$C has to be maintained in the reactor throughout the reaction period. Hence the reactor is cooled by brine and water circulation. Temperature, pressure and rate of

addition of acids are critical parameters in the reaction. It was reported that nitric acid and Sulphuric acid has to be slowly added into the reactor. In stage-2, 150 Kgs of nitric acid is added in a time period of three to four hours after which 5Kgs of Sulphuric acid is added manually in time period of around 1.5 hrs. The unit had installed temperature sensors with digital display in reactor 504 but however there was no interlocking mechanism to cool the reactor when temperature goes up or there was no alarm system to alert the employees when desired temperature was not maintained. Reported that data sheets pertaining to reactor-504 were damaged during the accident.

## V Sequence of Events and Causes of Accident

**V.a**. *The sequence of events are described as follows*

| | | |
|---|---|---|
| 11.03.2021 06:00 hrs | : | Shift-A started, RAP-1 (2-hydroxy pyridine) reaction mixture from stage-I (which was two days old) was charged into reactor 504 at vacuum pressure of 600mm. |
| 11.03.2021 11:50 hrs | | Addition of 150 Kgs nitric acid to reactor 504 started through valve control from the charging tank. |
| 11.03.2021 14:00 hrs | : | Shift-A stopped. Shift-B started. Sri K Srinivasa Rao took charge of Shift-B. |
| 11.03.2021 14:10 hrs | : | Addition of 150Kgs of nitric acid completed at 14:10 hrs. Post completion of addition of nitric acid, addition of 5 Kg Sulphuric acid was started at 14:10hr.<br>Out of 5Kgs of Sulphuric acid, 2Kgs of Sulphuric acid was added. The reaction is exothermic. Both quantity of Sulphuric acid added and rate of addition is crucial for the reaction. When Nitric acid is added, it has to be ensured that temperature of the reaction mixture is maintained at less than $26^0$C. Also at the time of Sulphuric acid addition, it has to be ensured that the temperature of the reaction mixture is less than $29^0$C. To maintain the requisite reaction temperature, brine is continuously circulated for cooling purpose |
| 11.03.2021 14:20 hrs to 14:30 hrs | : | The outer cover of Reactor 504 exploded, reactor placed in first floor of production block-5 fell on the ground floor. The hot reaction mixture |

| | | |
|---|---|---|
| | | consisting of 750 Kgs of RAP-1, 150 Kgs of nitric acid and around 2Kgs of Sulphuric acid evaporated. |
| 11.03.2021<br>14:30 hrs | : | Six employees were present in production block 5 at the time of accident. Soon after the accident, management shifted all six employees to the hospital where the two employees were declared brought dead<br>There was no fire, the accident happened due to sudden shoot-up in temperature and pressure. As per the reports out of six employees present in production block-5 where accident occured, two employees namely Sri. Kakrla Subrahmanyam and Sri Thotakura Venkataramana died on the spot and remaining four employees were injured. Out of the injured four employees, three employees have recovered and had joined to duty at the time of committee inspection while one injured is recovering. |

The possible causes of the accident are as follows:

1. It is very essential that the reaction temperature is maintained less than $29^0$C during Sulphuric acid addition. Though thermal sensors are installed in the unit, the employees had to manually record the temperature. There was no interlocking facility to cool the process during high temperature or to stop the feeding to the reactor. There was no alarm system to alert the employees of changes in crucial process parameters. The cooling may not have been effective and temperature may have increased to more than $29^0$C, but the employees may have continued with the addition of Sulphuric acid. The cooling system was not effectively designed to handle deviations in process parameter.
2. During interaction with the employees, it was understood that sulphuric acid needs to be added to the reactor slowly (drop-wise). The committee observed that SOP prepared for the manufacture of RAP-2 was not comprehensive in nature. During discussion with the unit management it is understood that as per standard procedure 5 Kgs of Sulphuric acid has to be added to the reactor in 1 ½ hrs but in this particular incident, within 10 mins 2Kgs of Sulphuric acid was added. (Sulphuric acid day tank was filled with 5Kgs of sulphuric acid before start of reaction and after the accident 3 Kgs of Sulphuric acid was remaining which indicates that 2 Kgs of Sulphuric acid was added into reaction mixture). Fast addition

of Sulphuric acid may be the trigger to the accident. The rate of addition of Sulphuric acid had to be regulated manually. The unit had not installed any flow regulator to reactor 504.

3. As per the report of the Deputy Chief Inspectorate of Factories, the following violations are observed:
    a. The vent size calculations were not done for the exothermic reaction for reactor 504
    b. Rupture disc of inadequate capacity and size was provided to the reactor due to which the excess pressure built-up could not be discharged safely without affecting reactor-504
    c. The studies related to ascertain the maximum heat generation potential in the nitration reaction were not carried out based on which reactor cooling system has to be designed. Due to this, cooling system could not handle the excess heat due to deviation of parameters in the reactor like pressure, temperature beyond safe limits which lead to the reaction becoming runaway.
    d. There was no arrangement of orifice or double valve arrangement, rotameter for flow measurement etc in reactor 504 and thereby the rate of addition of Nitric acid/ Sulphuric acid is prone for being faster than safe which could have rendered the reaction runaway leading to instantaneous pressure built-up.
    e. Nevirapine is being manufactured without getting HAZOP study done in order to identify and evaluate risks by considering the possible deviations during the process.
    f. Hazard Analysis and Risk Assessment (HARA) report was prepared without considering the product of Nevirapine.

4. During deviations in critical process parameters the feeding of raw material should have been cut-off and reaction should have been terminated by flooding with reaction terminators. But such interlocking facility or flooding of reaction terminators during any abnormal conditions was not provided by the unit.
5. The reactor may not have been designed to withstand any deviations in the load. It is essential to carry out third party assessment verify the safety of the reactors once in two years. The unit has carried out internal check of the reactors (copy of the internal test report is enclosed as Annexure-IV) but safety of the reactor was not ascertained through any

certified agency. Further it was reported that the reactor was around around 10 years old. Under such circumstance, the committee opines that it is essential to assess safety of the reactor to withstand deviations in the load.

6. Lack of training of employees in the manufacture of RAP-2/ RAP-5. The unit had resumed the production of RAP-2/ RAP-5 after a gap of six years. The committee interacted with the injured employees and as well as management & shift-1 employees and it was learnt that all six people involved in shift-2 in the production of RAP-2 were having less than 10 days experience in the production of RAP-2 and had no prior experience of manufacturing RAP-2.
7. Quick addition of Sulphuric acid and not maintaining the desired temperature in absence of effective cooling system has led to a runaway reaction. Since there were no reaction terminators, due to runaway reaction the temperature and pressure has shooted up, the vent size & rupture disc was not adequate to vent out temperature & pressure. Due to which reactor-504 exploded and has fallen from first floor to the ground floor. Only that portion of the civil structure where the reactor was housed has collapsed. The entire reaction mixture containing 600 Kg of RAP-1, 150 Kgs of nitric acid and 2 Kgs of Sulphuric acid spilled outside and evaporated. The adjacent reactors, day tanks are intact.
8. Lack of automation, Lack of comprehensive standard operating procedure on maintaining the desired reaction temperature & on rate of addition of chemicals, lack of training & experience of employees in manufacture of RAP-2, not checking the safety of the reactor, absence alarm system in the reactor to alert the personnel on not maintaining desired temperature, lack emergency preparedness are all the causes of accident. Immediate trigger is fast addition of Sulphuric acid and not maintaining the desired temperature of less than $29^0$C in the reactor.

The reactions involved in the process are as follows:

Stage-1 RAP-1

2-Amino 4-picoline+ $NaNO_2$ —(Sulphuric acid/)→ 2-hydroxy-4-picoline

Stage-2 RAP-2

2-hydroxy-4 picoline+ $HNO_3$ —(Sulphuric acid (tempr 26C) 5 Kgs; C.S lye 210 Kgs/water 1200 Kgs for cooling)→ 2-hydroxy-3-Nitro 4-picoline

600 Kgs 150 Kgs

During the accident 752 Kgs of reaction mixture and 210 Kgs of caustic lye &1200 Kgs of water (used for cooling) has spilled outside and evaporated.

Photos taken after the accident which indicates that there is no damage to other reactors or structure.

**V.b**. *Qualification & experience of deceased/ injured employees*: Six employees were present during shift-2 in the production block.

Table 1: Details of deceased and injured persons due to accident

| Sl.No | Name of the deceased | Age | Designation | Qualification | Experience in the unit |
|---|---|---|---|---|---|
| 1 | Thotakura Venkata Ramana | 37 | Senior Officer | B.Sc | 8 years |
| 2 | Kakarla Subrahmanyam | 31 | Deputy Officer | B.Sc | 7 years |

| Sl.No | Name of the injured | Age | Designation | Qualification | Experience in the unit | Present condition |
|---|---|---|---|---|---|---|
| 3 | N. Simhadri Rao | 29 | Asst Operator | $10^{th}$ | 7 years | Good |
| 4 | K. Srinivasa Rao | 49 | Operator | $10^{th}$ | 17 years | Good |
| 5 | R. Rajkumar | 35 | Operator | $10^{th}$ | 12 years | Good |
| 6 | K. Saibaba | 55 | Deputy Manager | B.Sc | 17 years | Good |

**V.c.** *Who is responsible for accident*: It is the primary responsibility of the unit to establish infrastructure facilities, to carry out safety check of reactors at regular interval through certified agencies, automation & interlocking for critical process parameters. Equal responsibility also lies with employees to comply with operational procedures stipulated by the unit, careful attitude & dedication towards work. It is the responsibility of the unit to comply with all statutory, regulatory, safety clearances stipulated by various concerned departments. In this particular incident the committee observed that both the unit M/s Tyche industries and its employees, both are responsible for the accident.

## VI Damage Assessment and Calculation of Compensation

The accident was restricted to only reactor 504 and this particular production block where reactor was housed. The other reactors are intact, no impacts observed outside the production block or outside the unit. The damages that occurred due to accident are as follows:

**VII.a.** *Loss of life and status of award of compensation*: six employees were present in the production during accident, out of which, two employees died in the accident spot and four

employees survived. During inspection, the committee interacted with injured employees and families of the deceased.

**VII.a.i** Late Sh. Thotukura Venkata Ramana aged 37 years died in the accident spot.

As per the post mortem report of Sh. Thotukura Venkata Ramana, it is indicated that there is ante-mortem crush injury of head and right shoulder. The post-mortem report has concluded that the cause of death is due to shock as a result of crush injury of head. The death is due to accident in the unit and is liable to be compensated.

**VII.a.ii** Late Sh. Kakarla Subrahmanyam aged 31 years died in the accident spot.

As per the post mortem report of Sh. Kakarla Subrahmanyam, it is indicated that there is ante-mortem fracture of head and multi superficial burns. The post-mortem report has concluded that the cause of death is due to shock as a result of polytrauma. The death is due to accident in the unit and is liable to be compensated.

To ascertain the adequacy of compensation, the committee has calculated compensation by two methods: 1. As per the Judgement dated 16th August 2019 of Hon'ble Supreme Court of India in civil appeal No. 6339 of 2019 and judgement in the matter of Sunita Tokas vs New India Insurance Co. Ltd**.** & civil appeal No.3483 of 2008 and as per Employee Compensation Act, 1923 and the highest among two is taken to determine whether compensation of Rs.40.00 lacs paid by the unit to the dependents of the deceased is adequate or not and assessment of calculation is explained in table 2 and table 3. The unit has already paid compensation of Rs. 40,00,000/- (Rupees Forty Lacs only) to the family each deceased.

**Table 2:** Assessment of compensation

| Name of the deceased | **A*** Amount of compensation in INR as per Hon'ble Supreme Court Judgement in civil appeal No. 6339 of 2019 and civil appeal No.3483 of 2008 | OR Whichever is more is considered by the committee to ascertain the adequacy of compensation | **B** As per Employee Compensation Act, 1923 |
|---|---|---|---|
| Thotakura Venkataramana | Rs. 29,10,720/- | | Compensation= fifty percent of the monthly wages of the deceased x relevant factor |

| | | | |
|---|---|---|---|
| | | | = Rs. 7500/- x 192.14 [&]<br>= Rs. 14,41,050/- |
| Kakarla Subtamanyam | Rs. 26,72,160/- | | Compensation= fifty percent of the monthly wages of the deceased x relevant factor<br>= Rs. 7500/- x 207.98[&]<br>= Rs. 15,59,850/- |

* A→ calculation is explained in table-3.

&→ As per EC Act, 1923 the Central Government has specified Rs.15,000/- as monthly wages with effect from 03.01.2020. The relevant factor as per EC Act, 1923 is (the completed years of age on the last birthday of the workman immediately preceding the date on which the compensation fell due).

**Table 3**: A→ Amount of compensation in INR as per Hon'ble Supreme Court Judgement in civil appeal No. 6339 of 2019 and civil appeal No.3483 of 2008

| Name | DOB & Age at the time of death | Qualification & Designation | Salary per month for permanent employee | Future prospects (40% of the income) | less tax if any as per the prevailing tax slabs | Salary after deducting tax | Deduction towards personal expenses | Loss of monthly income to the dependents | Annual income | loss of future income | Expenses for shifting mortal remains and Loss of estate & funeral expenses(app. cost) | Loss of Love and affection | Hon'ble Supreme Court Judgement in civil appeal No. 6339 of 2019 and civil appeal No.3483 of 2008Compensation | As per Employee compensation Act |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | D= A+B | E[T]=50 % of D | F=D-E | G=F*12 | H[#]=G*M | I | J[&] | L=(F*G*H)+I+J | |
| Thotakura Venkataramana | 37 | BSc-Chemistry | 22200 | 8880 | | 31080 | 15540 | 15540 | 186480 | 2610720 | 100000 | 200000 | 2910720 | 1441050 |
| Kakarla Subtamanyam | 31 | Bsc-Chemistry | 17650 | 7060 | | 24710 | 12355 | 12355 | 148260 | 2372160 | 100000 | 200000 | 2672160 | 1559850 |

[T] Deduction towards personal expenses varies @50% for age of the deceased 20yrs to 50yrs

[#] Depending on the age, the factor is fixed. 16 for age group 31-35 years and 17 for age group 26 to 30 years

Based on Hon'ble Supreme Court of India in civil appeal No. 6339 of 2019 & civil appeal No.3483 of 2008 and as per Employees Compensation Act, the compensation of Rs. 40,00,000/- paid by the unit to the dependents of each deceased **is adequate**. The unit has already paid the compensation. In addition Government of A.P has announced compensation of Rs.10.00 lacs each to the family of the deceased and Rs. 1.00 lac each to the injured employees. The payment of compensation by the Govt. of AP is under process.

**VII.a.iii** Sh. N. Simhadri Rao, Sh. K. Srinivasa Rao, Sh. R. Rajkumar and Sh. K. Saibaba

These four employees were injured during accident and sustained burns. By the time of committee inspection on 15.04.2021 all the four injured were discharged from hospital, three employees namely Sh. N. Simhadri Rao, Sh. K. Srinivasa Rao, Sh. R. Rajkumar had joined duty and committee personally interacted with these three and interacted with Sh. K. Saibaba over telephone. Sh. K Saibaba informed that he is psychologically affected and he is still recovering from the shock of the accident. Soon after the accident, the unit has shifted the injured to the nearby hospital and expenditure incurred towards their treatment and hospital stay is borne by the unit. All four injured informed to the committee that presently they have fully recovered and are not facing any health issues. Government of A.P has announced compensation of Rs. 1.00 lac each to the injured employees which is under process. The unit has paid the following compensation to the injured employees:

Table 4: Details of compensation to injured employees

| **Name of the injured** | **Type & nature of injury of injury** | **Date of admission to Hospital** | **Date of Discharge** | **Compensation amount paid by the unit** | **Compensation to be paid** | **Remarks** |
|---|---|---|---|---|---|---|
| N. Simhadri Rao | Abrasion, injury at left thigh, laceration of right ear | 11.03.2021 | 14.03.2021 | Rs.3.00 lacs | Rs.5.00 lacs | Unit shall pay remaining amount of Rs.2.00 lacs |

| | | | | | | |
|---|---|---|---|---|---|---|
| K. Srinivasa Rao | Small blister and rashes in the back | 11.03.2021 | 14.03.2021 | Rs.3.00 lacs | Rs.5.00 lacs | Unit shall pay remaining amount of Rs.2.00 lacs |
| R. Rajkumar | Abrasion at abdomen wall & swelling | 11.03.2021 | 14.03.2021 | Rs.3.00 lacs | Rs.5.00 lacs | Unit shall pay remaining amount of Rs.2.00 lacs |
| K. Saibaba | 35% total body surface area burns | 11.03.2021 | 14.04.2021 | Rs.4.00 lacs | Rs.10.00 lacs | Unit shall pay remaining amount of Rs.6.00 lacs |

Referring to Uphaar tragedy victims case, *MCD Vs. Uphaar Tragedy Victims Association* – (2011) 14 SCC, Rs.10 lakhs for persons who have burns from 25 to 50% and Rs.5 lakhs for persons who have injuries between 5 to 25%. Victims who were treated as outpatients and who had but minor degree of burns or other forms of simple injuries shall be paid Rs.2 lakhs. The amounts shall be directed to be paid within the time the Tribunal may set and direct a further liability of interest at 12% p.a. for default of payment.

**VII.b.** *Contribution of Emissions into the atmosphere*: 752 Kgs of RAP-2 reaction mixture was evaporated into the atmosphere and it comprised of 600Kgs of RAP-1 mixture, 150Kgs of $HNO_3$

and 2Kgs of $H_2SO_4$. Due to high temperature, the entire reaction mixture evaporated within 30mins after the accident. Due to high pressure, the portion of the civil structure where reactor-504 was housed had collapsed. From interaction with employees, it was understood that huge noise was heard when the reactor had exploded. The committee did not observe any other physical damages during the visit. The environmental prices for the material emitted is not available. To account for the damage cost due to the material evaporated the committee has assumed the market price of the material is equal to the opportunistic cost. The committee opines that presently restoration measures or clean-up or remediation is not required but unit may tie up with hospital and monitor the health status of the injured employees for a period of two years (once in six month health monitoring).

Damage cost = Market price+ opportunistic cost+ treatment cost

| | | | | | | |
|---|---|---|---|---|---|---|
| Damage Cost | = | Market price | + | Opportunistic cost | + | Treatment cost |
| | = | Actual cost of the material lost | + | The essential product which could be beneficially used in treatment of ailments is wasted. The committee has assumed the market price of the product is considered as opportunistic cost | + | Nil<br>The injured employees have recovered and joined duty and all four injured have informed that they are not facing any health issues. The cost of treatment is already borne by the unit. Hence presently no additional treatment cost is required for injured employees but unit shall carry out health monitoring of injured employees for two years.<br>Since the entire reaction mixture evaporated within 30 minutes, no cleanup is required. Hence treatment cost is taken as Nil. |
| | = | 600 Kgs of RAP-1 reaction | + | 600 Kgs of RAP-1 reaction mixture which | + | Nil |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | mixture which was under process+150 Kgs of Nitric acid +2 Kgs of Sulphuric acid | | was under process+150 Kgs of Nitric acid +2 Kgs of Sulphuric acid | | |
| | = | Rs. 3500/- per Kg+ Rs. 1600/- per Kg+ Rs. 1600/- per Kg | + | Rs. 3500/- per Kg+ Rs. 1600/- per Kg+ Rs. 1600/- per Kg | + | Nil |
| | = | Rs.21,00,000/-+ Rs.2,40,000/-+ Rs.3,200/- | + | Rs.21,00,000/-+ Rs.2,40,000/-+ Rs.3,200/- | + | Nil |
| | | Rs. 23,43,200/- | + | Rs. 23,43,200/- | | |
| **Total damage cost** | **=** | **Rs. 46,86,400/-**<br>**Rs. Forty Six lacs Eighty Six thousand Four Hundred only** | | | | |

**VII.c.** *Environmental Compensation on account of non-compliances:* From the available records it is found that the unit started the production of RAP-2 from January 15, 2021. Since the unit has not complied with safety requirements during the manufacture of RAP-5/RAP-2, it lead to a major accident. Hence the committee has calculated EC as per CPCB formula:

EC=PI x N x R x S x LF

Where,

EC = Environmental Compensation in INR

PI = Pollution Index of industrial sector (Red-80)

N = Number of days of violation took place (start of unit operation to date of accident)

R = A factor in Rupees for EC (Rs. 250/- may be assumed)

S = Factor for scale of operation (large -1.5)

LF = Location factor (the unit is located in Kakinada and population is less than 10 lakh=1)

**i.** Pollution Index of industrial sector (PI): Andhra Pradesh Pollution Control Board has categorized this industry into red category of industries and accordingly the Combined consent & Authorisation have been granted. For red category of industries, average pollution index is 80.

**ii.** Number of days of violation (N): The number of days for which violation took place is considered as the period between the day of violation observed and day of compliance verified by the CPCB/ APPCB. From the available records, it is observed that unit has resumed the production of RAP-5/ RAP-2 on January 15, 2021. Based on the criteria, 55 days (from 15-01-2021 to 11-03-2021) is considered for calculation of period of violation for estimating EC.

**iii.** Scale of operation (S): The industry is considered as Large. Thus, scale of operation (S) for EC estimation is considered as 1.5.

**iv.** Location factor (LF): The industry is located in Kakinada and the total population within municipal boundary and up to 10 km distance from the municipal boundary of the city is less than 1 million. Thus location factor (LF) is considered as 1 for EC estimation

**v.** Factor in Rupees (R) (Rs): As per the environmental compensation estimation guidelines, factor of rupees may be minimum of Rs 100/- and maximum of Rs 500/-. The factor of rupees is considered as Rs. 250/- for estimating environmental compensation for this industry, considering its pollution potential.

| S.N | Period of non-compliance | PI | S | LF | R (Rs) | N (days) | Environmental compensation (Rs) |
|---|---|---|---|---|---|---|---|
| 1 | 15.01.2021 to 11.03.2021 | 80 | 1.5 | 1 | 250/- | 55 | 16,50,000/- |
| | Total EC for violating | | | | | 55 | 16,50,000/- |
| Rupees Sixteen lacs fifty thousand Only | | | | | | | |

**VII.d.** *Total Compensation M/s Tyche Industries Ltd liable to Pay*

a. The unit has already paid Rs. 40.00 lacs to the family of each deceased. (Total Rs.80.00 lacs paid towards Compensation to the deceased persons).

b. Referring to Uphaar tragedy victims case, MCD Vs. Uphaar Tragedy Victims Association – (2011) 14 SCC and reports submitted to Hon'ble NGT in other accident matters Total compensation to be paid to the four injured employees is Rs.25.00 lacs @ of Rs.5.00 lacs to three employees and Rs.10.00 lacs to one employee out of which unit has already paid Rs.13.00 lacs and remaining 12.00 lacs to be paid to injured employees. The unit has paid Rs.3.00 lacs each to three injured employees and Rs. 4.00 lac to one injured employee which is not adequate. The unit shall pay additional compensation of Rs.2.00 lacs each to three injured employees namely Sh. N. Simhadri Rao, Sh. K. Srinivasa Rao and Sh. R. Rajkumar respectively and Rs 6.00 lacs to Sh. K. Saibaba.

c. The unit shall pay Environmental Compensation to CPCB on account of contribution of emissions into environment→Rs. 46,86,400/-.

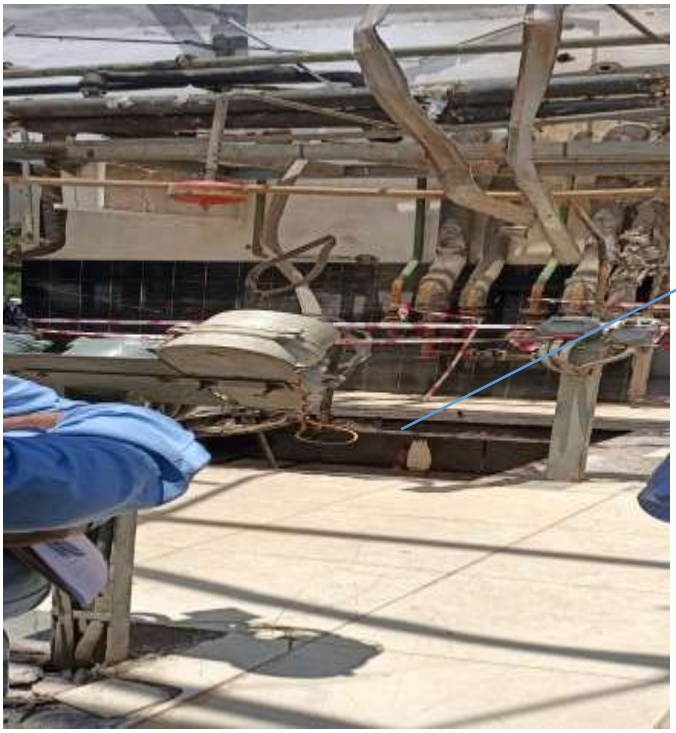
d. The unit shall pay Environmental Compensation to CPCB for operating the unit violating SOP's→ Rs 16,50,000/-. The unit shall pay total compensation of Rs.63,36,400/- (Rupees Sixty Three lacs Thirty Six Thousand and four hundred only) to CPCB.

**VII.e.** *Current Status of the Unit*: After the accident, Deputy Chief Inspector of Factories vide order dated 13.03.2021 issued "Prohibitory Orders" which states as "prohibiting the usage of all reactors and other reaction vessels in all production blocks in the factory which work at a pressure above the atmospheric pressure". Copy of the Prohibitory orders is placed as Annexure-V. When the accident occurred reactions were in progress in other reactors which were abruptly stopped. Hence, the unit was permitted to safely shutdown its operations. During the safe shutdown period from 26.03.2021 to 05.04.2021, the ongoing batches were either completed or brought into safe mode but no fresh batches were started. East Godavari district off site emergency plan was prepared in the year 2018 by DNV-GL Mumbai. Latest onsite emergency plan of Tyche Industry was prepared in 2019. The unit had conducted onsite emergency mock drills on 12.07.2019, 19.01.2020, 02.08.2020 and 21.02.2021.

| | | |
|---|---|---|
| The accident occurred on | → | 11.03.2021 |
| Deputy Chief Inspector of Factories, Kakinada issued Prohibitory orders to the unit on | → | 13.03.2021 |
| Deputy Chief Inspector of Factories, Kakinada issued Showcause to the unit on Copy enclosed as Annexure-VI | → | 22.03.2021 |

| | | |
|---|---|---|
| Deputy Chief Inspector of Factories, Kakinada issued Permission for safe shutdown of the unit on | → | 26.03.2021 |
| Unit safely shutdown on | → | 05.04.2021 |
| Committee inspected the unit on | → | 15.04.2021 |
| Unit addressed letter to Director of Factories to grant permission for manufacturing of three products | → | 17.04.2021 |
| Deputy Chief Inspector of Factories Kakinada granted permission to manufacture two products (Soliefinacin succinate and Tenofovir disoproxil fumarate) on (copy placed as Annexure-VII) | → | 22.04.2021 |

On the day of committee inspection, the unit was under shutdown and revamping and upgradation works were under progress. During safe shutdown period, few reactions were completed and reactors were cleaned but few reactions were brought to a safe mode and reaction mixture was still present in few reactors during committee visit. Deputy Chief Inspector of Factories Kakinada relaxed the prohibitory orders and granted permission to the to manufacture two essential drugs. As on date of committee inspection, reactor-504 which exploded was lying in the unit premises and is yet to be disposed off.



Portion of the production block-5 where reactor 504 was housed. The remaining portion of production block is intact. No damage to the structure.

Photo taken during inspection of Production block-5

exploded reactor 504 kept in unit premises

**VIII View Points of Stakeholders**

The committee interacted with industry personnel, injured employees and media persons.

**VIII.a.** *View point of the Management of the unit and as well as injured employees*

The unit management comprising of U.Satya Srinivas (Vice President Operations), M.Narayana Rao (Vice President R&D), K.Nagendra Varma (Vice President Techinal), M.Buchiraju (DGM Productions) and T. Madhusudhan Reddy (Manager – EHS) informed that the employees were experienced and working in production blocks since more than 5 years. On 11.03.2021 at around 14:15 hrs during shift change temperature readings were noted and it was found to be less than $29^0$C. Till that time the reaction was progressing normally. Suddenly within ten minutes after starting addition of Sulphuric acid the reactor exploded. The four injured employees were in state of shock & panic. It is not clearly known as who was adding Sulphuric acid into the reactor-504. When the committee interacted with injured employees, all four of them were fully aware about the production process of RAP-2 and as well as safety measures to be taken. Though the management admitted that there were safety lapses in reactor-504 and in the unit & but informed that the main cause of accident was manual error of not maintaining required flow conditions during addition of Sulphuric acid which led to explosion. Overall the unit was on a positive note and assured the committee to comply with all safety requirements and to impart more training to employees. The unit further added that it shall stop production of RAP-5/ RAP-2

The injured employees and the family of the deceased informed the committee that it was unfortunate that accident occurred and there is no fault of employees or the unit and suddenly an explosion happened.

Other employees present in the unit during accident only heard blasting sound and are not aware about how the accident occurred.

**VIII.b** *Representation made by media persons*

During the visit, media persons informed that the unit is discharging effluent outside the unit premises but during the committee visit the unit was not in operation. The ETP was under upgradation. Small portion of Effluent previously generated from the unit is re-circulated in the biological treatment systems to keep the bacteria (& other microorganisms) alive. No by-pass channels/ drains were found in the unit premises to discharge the effluents outside the unit. It was reported by the committee member from APPCB who is Regional Officer, Kakinada that previously no complaints were received against the unit regarding discharge of effluent. Reported that the effluent generated is reused within the unit premises for gardening. Housekeeping in ETP section has to be improved. Plastic bottles & carry bags were floating in the guard pond used for storing final treated effluent and there was no proper dedicated shed for storing hazardous waste. The existing ETP was very old and presently the unit is revamping the ETP. However, the APPCB may re-inspect the unit during full-fledged operation to verify whether effluent is discharged outside the unit premises.

**IX Suggested remedies to avert such accidents in future:**

The committee suggests following remedial measures

1. The units shall manufacture only those products specified in the EC and Consent. If the unit intends to manufacture any additional products or intermediates or restart manufacturing of a consented product after a long gap the unit shall impart adequate training to its employees.
2. To prepare comprehensive SOP for all consented products and to impart training to all employees on SOP's, product process, safety aspects. The employees shall be given hands on experience with the product process under the supervision of senior employees. The units only after ensuring that adequate training is imparted to its employees will engage the

employees for independent works. Overall the industries should be prepared for emergency response readiness & effectiveness in terms of major accidents.

3. The units shall carry Hazard Analysis and Risk Assessment (HARA) considering all products, bye-products, intermediates or any other manufactured in the unit.
4. The units shall carry out HAZOP study (Hazard and Operability) for all products, bye-products, intermediates and others manufactured etc in order to identify and evaluate risks by considering the possible deviations during the reaction, storage, handling, transfer etc.
5. The units shall carry out third party assessment through any certified agency or Compentent person on safety & suitability of the reactors.
6. The units shall provide interlocking facility for critical parameters with raw material feeding and with reaction terminators. For instance if temperaure or pressure increases, coolant may be flooded to reduce temperature or if a runaway reaction is taking place then reaction terminators can be added into reactor.
7. There should be auto alarm system or siren system to alert the employees in case of any deviations noticed in desired range of process parameters.
8. The units shall provide proper arrangement such as orifice, double valve, rotameter to regulate the flow of raw materials thereby preventing any runaway reactions which may lead to instantaneous temperature and pressure build-up.
9. All the reactors shall be provided with suitable rupture disc and safety valve of adequate capacity and size to prevent the pressure being built up in the reaction vessel beyond safe limit based on vent size calculations
10. The cooling system of all reactors shall be designed properly based on the evaluation of heat of reactions scientifically in order to withstand the possible deviations of parameters beyond operational limits.
11. The reactors shall be properly labelled indicating the crucial details such as status of reaction, product being manufactured etc. Since the unit is operating in different shifts, proper labelling and written communication will avoid confusion. During shift change, the shift in charge of closing shift shall record the essential details in a register or on reactor labels etc and upcoming shift in charge will read it and acknowledge it by signing to avoid confusion during shift change.

## X Concluding remarks

1. Major accident occurred on 11.03.2021 at M/s Tyche Industries Ltd due to explosion of reactor 504 during the production of RAP-2. The immediate trigger to the accident is ineffective cooling and deviation in the rate of addition of Sulphuric acid into reactor-504 which contained 600 Kgs of RAP-1 mixture and 150 Kgs of nitric acid. The unit had valid EC from MoEFCC and CFO from APPCB for manufacture of RAP-5 (the manufacture involves 5 stages and during second stage-RAP-2 accident occurred).

2. Lack of automation, Lack of comprehensive standard operating procedure on maintaining the desired reaction temperature & on rate of addition of chemicals, lack of training & experience of employees in manufacture of RAP-2, not checking the safety of the reactor, absence of alarm system in the reactor to alert the personnel on not maintaining desired temperature, absence of vent size calculations for reactor-504, use of rupture disc of inadequate capacity & size, no arrangement of orifice or double valve arrangement, lack of emergency preparedness are all the causes of accident. Immediate trigger is fast addition of Sulphuric acid and not maintaining the desired temperature of less than $29^0$C in the reactor.Both the unit M/s Tyche Industries Ltd and its employees are responsible for the accident

3. Six employees were present in the production block during accident out of which two employees died on spot and four were injured. The injured employees have recovered and have joined duty.

4. To ascertain the adequacy of compensation the committee has calculated compensation using two methods. As per Hon'ble Supreme Court Judgement in civil appeal No. 6339 of 2019 and civil appeal No.3483 of 2008 the Compensation to the deceased Late Sh. Thotakura Venkataramana and Late Sh. Subrahmanyam will be Rs. 29.10 lacs & Rs.26.72 lacs respectively. As per Employee Compensation Act the Compensation to the deceased Late Sh. Thotakura Venkataramana and Late Sh. Subrahmanyam will be will be Rs. 14.41 lacs and Rs.15.5 lacs. The unit has paid the compensation of Rs.40.00 lacs each to the dependents of the deceased (totally the unit has paid Rs. 80.00 lacs towards compensation to the family of the deceased). Based on Hon'ble Supreme Court of India in civil appeal

No. 6339 of 2019 & civil appeal No.3483 of 2008 and as per Employees Compensation Act, the compensation of Rs. 40,00,000/- paid by the unit to the dependents of each deceased **is adequate.**

5. Referring to Uphaar tragedy victims case, MCD Vs. Uphaar Tragedy Victims Association – (2011) 14 SCC and reports submitted to Hon'ble NGT in other accident matters Total compensation to be paid to the four injured employees is Rs.25.00 lacs @ of Rs.5.00 lacs to three employees and Rs.10.00 lacs to one employee out of which unit has already paid Rs.13.00 lacs and remaining 12.00 lacs to be paid to injured employees. The unit has paid Rs.3.00 lacs each to three injured employees and Rs. 4.00 lac to one injured employee which is not adequate. The unit shall pay additional compensation of Rs.2.00 lacs each to three injured employees namely Sh. N. Simhadri Rao, Sh. K. Srinivasa Rao and Sh. R. Rajkumar respectively and Rs 6.00 lacs to Sh. K. Saibaba. In addition, Govt. of AP has announced compensation of Rs. 10.00 lacs each to family of the deceased and Rs. 1.00 lac each to the injured employees and payment of the same is under process.

6. The committee did not observe any damage to the surrounding environment and the accident and impacts were confined only to production block-5. The entire reaction mixture has evaporated within 30mins. Immediate restoration or remediation is not required in this incident case but however the health of the injured employees shall be monitored for a period of 2 years. The unit may tie up with hospitals for health monitoring. The unit started the production of RAP-5 on 15.01.2021 without taking adequate safety measures leading to a major accident. For violations and the damage caused (contribution of reaction mixture into atmosphere) the unit shall pay Environmental compensation of Rs. 63,36,400/- (Rupees Sixty Three lacs Thirty Six Thousand Four Hundred Only) to CPCB.

7. East Godavari district off site emergency plan was prepared in the year 2018 by DNV-GL Mumbai. Latest onsite emergency plan of Tyche Industry was prepared in 2019. The unit had conducted onsite emergency mock drills on 12.07.2019, 1 9.01.2020, 02.08.2020 and 21.02.2021.
8. Post accident the unit was safely shutdown during 26.03.2021 to 05.04.2021. During the committee visit on 15.04.2021 the unit was in shutdown and revamping works were in

progress. The biological effluent treatment systems was kept active by recirculating the effluent. Deputy Chief Inspector of Factories, Kakinada vide order dated 22.04.2021 has granted permission to the unit to manufacture two products.The committee suggests that APPCB and Chief Inspector of Factories shall verify the compliance of the unit and safety of installations

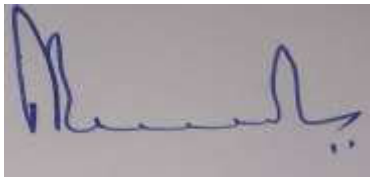
9. The committee humbly submits that the industries have to ensure self-compliance and the industry and its personnel are solely responsible for this negligent act which resulted in the accident. The committee humbly submits that the action taken against the industry and levying of EC from the unit will strengthen " Polluter Pay Principle" and all industries have to ensure self-monitoring, self-compliance and comply with statutory guidelines, safety measures, MOEFCC, CPCB, APPCB, Directorate of Factories etc.

Dr.Suresh Babu Pasupuleti, Scientist-C
Integrated Regional Office (IRO), Ministry of Environment, Forest and Climate Change, Green House Complex, Gopalreddy Road, Vijayawada

R. Trinadha Rao
Deputy Chief Inspector of Factories,
Eluru, 3rd road, Chanakyapuri, RR Pet,
Eluru

A. G. Chinni Krishna
Revenue Divisional Officer,
Kakinada-533001, East Godavari District

Mahima T, Scientist-D
Central Pollution Control Board,
second Floor, 77-A, South Avenue Road, Ambattur Industrial Estate,
Chennai-600058.



A. Ramarao Naidu, Environmental Engineer,
A.P.Pollution Control Board, Regional Office,
Kakinada, East Godavari District

Item No. 17 Court No. 1

**BEFORE THE NATIONAL GREEN TRIBUNAL**
**PRINCIPAL BENCH, NEW DELHI**

(By Video Conferencing)

Original Application No. 79/2021

In re: News item published in The Hindu dated 14.03.2021 titled ***"Safety lapses led to reactor blast at pharma unit"***

Date of hearing: 16.03.2021

**CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
**HON'BLE MR. JUSTICE SHEO KUMAR SINGH, JUDICIAL MEMBER**
**HON'BLE DR. NAGIN NANDA, EXPERT MEMBER**

**ORDER**

1. This matter has been put up in light of the media report titled '*Safety lapses led to reactor blast at pharma unit'*[1]. The report mentions the incident of **explosion of 3,000 kg reactor at the production wing of Tyche Industries Limited, on the outskirts of Kakinada, Andhra Pradesh (AP), on March 11, 2021, due to lack of safety mechanism and risk assessment failure. Two supervisors were killed and four workers severely injured** who are still battling for life at a private hospital. Deputy Inspector of Factories, Kakinada, Mr. V. Suresh said there were several safety lapses at the pharma unit. Inadequate calculation of the capacity of the reactor is also a prime reason behind its explosion, due to heavy pressure beyond its capacity. The size of the safety system installed in the unit is much lower than the actual requirement. Staff dealing with the reactor operations failed to calculate the scale of risk. The Tyche management has been directed to shut

[1] Dated 11.03.2021, The Hindu: https://www.thehindu.com/news/national/andhra-pradesh/safety-lapses-led-to-reactor-blast-at-pharma-unit/article34063916.ece

down the unit until further orders from the Directorate of Factories. The State Government is preparing to order a technical probe into the incident soon. A case has been registered against the Tyche Industries Limited management under Section 304 A on the grounds of causing death by negligence.

*2.* From the media reports, subject to further verification, there appears to be non-compliance of statutory safeguards under the provisions of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 ("the 1989 Rules"), the Hazardous and other Waste (Management and Transboundary Movement) Rules, 2016 and the Plastic Waste Management Rules, 2016 which give rise to substantial questions of environment, which need to be determined and directions issued for compensating the victims and restoration of environment, apart from measures to prevent such incidents in future.

3. As per law laid down in *M.C Mehta v. UoI & Ors.*[2], the owner/occupier of the hazardous activity is responsible for compensation to the victims and for restoration of the environment. Before proceeding further, it is necessary to **ascertain the cause of the incident, the extent of damage caused, the extent of compensation required to be paid for damage to the environment as well as for loss of lives, causing of injuries and steps required to be taken for preventing any such occurrence in future,** on the same pattern as the Tribunal has dealt with **such accidents in the recent past**[3].

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[2] (1987) 1 SCC 395

[3]

i. Order dated 01.06.2020, relating to incident of gas leak dated 07.05.2020 in **LG Polymers India Pvt. Limited** at Vishakhapatnam, resulting in death of 11 persons and injuries to more than 100, apart from other damage (OA No. 73/2020, In re: Gas Leak at LG Polymers Chemical Plant in RR Venkatapuram Village Visakhapatnam in Andhra Pradesh);

4. While directing **issuance of notice to the CPCB, AP State PCB, Directorate of Factories, AP, the District Magistrate, Kakinada, AP and Tyche Industries Limited, Kakinada, AP by e-mail**, we constitute

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ii. Order dated 03.02.2021, relating to incident dated 03.06.2020 in a chemical factory, **Yashyashvi Rasayan Pvt. Ltd**. at Dahej, District Bharuch, Gujarat resulting in deaths and injuries and other damage (OA No. 85/2020) (Earlier OA 22/2020) (WZ), Aryavart Foundation through its President vs. Yashyashvi Rasayan Pvt. Ltd. & Anr.);

iii. Order dated 06.08.2020, in relation to incident of **oil well blow out on 27.05.2020 at Baghjan in the Tinsukia District of Assam** resulting in deaths, injuries and damage to the environment (OA No. 43/2020(EZ), Bonani Kakkar vs. Oil India Limited & Ors.).

iv. Orders dated 06.07.2020 and 22.12.2020, relating to incident dated 30.06.2020 on account of gas leakage at **Sainor Life Sciences** factory at Parawada in industrial area on the outskirts of Vishakhapatnam (OA No. 106/2020, News item published in the local daily "Economic Times" dated 30.06.2020 titled "Another Gas Leakage at Vizag Factory kills two, critically injures four…");

v. Orders dated 08.07.2020 and 22.12.2020, dealing with the incident dated 01.07.2020 resulting in death of 6 person and injury to 17 due to blast of boiler in **M/s Neyveli Thermal Power Station** (NLCIL), Cuddalore (OA No. 108/2020, News item published in the "Indian Express" dated 01.07.2020 titled "Tamil Nadu Neyveli boiler blast: 6 dead, 17 injured") and;

vi. Orders dated 23.07.2020 and 22.12.2020, in relation to incident of **fire engulfed the chemical plant** of **Visakha Solvents Ltd**, Vizag on 13.07.2020 at Ramky CETP Solvents building in Pharma City resulting in injuries (OA No. 134/2020, News item published on 13.07.2020 in the local daily named "India Today" titled "Massive fire engulf Vizag chemical plant, explosions heard, injuries reported").

vii. Order **dated 18.12.2020**, in relation to incident of **explosion in a plastic recycling factory at Sujapur in Malda on 1.12.2020** resulting in death of six persons, including two minors and serious injuries to four persons (OA No. 272/2020, News item published in the "Times of India" dated 20.11.2020 entitled "Six killed as blast tears through Malda Plastic recycling factory").

viii. Order dated **18.12.2020**, in relation to incident of **methane gas leak in a sugar factory** called Lokenete Bapurao Patil Agro Industries Ltd. in Mohol Taluka of Solapur District, Maharashtra on 21.11.2020 resulting in deaths and injuries and other damage (OA No. 274/2020, News item published in the "Indian Express" dated 23.11.2020 entitled "Maharashtra: Two Killed, eight injured in methane gas leak in sugar factory").

ix. Order dated 08.01.2021, in relation **to Gas Leak in Agro Company** (O.A No. 107/2020, In RE: News item published in the local daily "Indian Express Sunday Express" dated 28.06.2020 titled "Gas Leak in Agro Company Claims life of one")

x. Order dated 18.01.2021, in relation to News item published in Navbharat Times dated 24.12.2020 titled "**Gas leaks in IFFCO Plant**, 2 Officers dead" (O.A No. 04/2020, In re : News item published in Navbharat Times dated 24.12.2020 titled "Gas leaks in IFFCO Plant, 2 Officers dead")

xi. Order dated **11.02.2021**, in relation to accident of **toxic gas leak in Rourkela Steel Plant in Orissa**" (O.A. No. 09/2021, In re: News item published in The Indian Express dated 07.01.2021 titled "Four workers dead due to toxic gas leak in Rourkela Steel Plant")

xii. Order dated **16.02.2021**, in relation to accident of **Virudhunagar firecracker factory blast** (O.A. No. 44/2021, In re: News item published in The News Indian Express dated 12.02.2021 titled "At least 19 dead in Virudhunagar firecracker factory blast, more than 30 injured")

xiii. Order dated **25.02.2021** in relation to accident of **quarry blast in Hirenagavalli, Chikkaballapu, Karnataka** (O.A. No. 59/2021, In re: News item published in Times Now News dated 23.02.2021 titled "Karnataka: Six killed in quarry blast in Hirenagavalli, Chikkaballapur")

xiv. Order dated **25.02.2021** in relation to accident of **fire at UPL plant,** Jhagadia, District Bharuch, Gujarat (O.A. No. 60/2021, In re: News item published in The Hindu dated 23.02.2021 titled "Two dead, 5 missing in fire at UPL Plant")

xv. Order dated **02.03.2021** in relation to accident of **massive fire broke out at an illegal factory at Pratap Nagar, North Delhi** (O.A. No. 65/2021, In re: News item published in The Times of India dated 28.02.2021 titled "Delhi: Man charred to death as illegal factory catches fire")

a five-member joint committee comprising MoEF&CC, CPCB, AP State PCB, Directorate of Factories, AP and the District Magistrate, Kakinada, AP. The nodal agency for coordination and compliance will be the CPCB and the State PCB. The joint Committee may visit to the site and give its report about the cause of the incident, the extent of damage caused, the extent of compensation required to be paid for damage to the environment as well as for loss of lives, injuries and steps required to be taken for preventing any such occurrence in future within one month. Except for visit to the site at least once, the Committee will be free to conduct its proceedings online. It will be free to take the assistance from any other expert/organization. The Committee may suitably interact with the stakeholders and, apart from considering the present incident, also consider remedial measures for preventing such incidents in the area or by other establishments, even beyond the said area. The Committee may compile information about existence and working of onsite and offsite plans in terms of 1989 Rules and conducting of mock drills and safety SOPs and compliance status of environment norms. Since in the recent past, the Tribunal has dealt with similar issues of industrial accidents resulting in deaths and injuries and Expert Committees in some of such accidents have given reports to this Tribunal, such reports may also be taken into account by the Committee to the extent relevant. The reports are available on the website of the CPCB. The report may be filed by email at judicial-ngt@gov.in preferably in the form of searchable PDF/OCR Support PDF and not in the form of Image PDF. Simultaneously, the report may also be uploaded on the website of the CPCB to enable the concerned stakeholders to access the same and file their response, if any.

A copy of this order be forwarded to the MoEF&CC, CPCB, AP State PCB, Directorate of Factories, AP and the District Magistrate, Kakinada, AP by e-mail for compliance.

List for further consideration on 30.04.2021.

Adarsh Kumar Goel, CP

S.K. Singh, JM

Dr. Nagin Nanda, EM

March 16, 2021
Original Application No. 79/2021
A

F. No. J-11011/302/2012- IA II (I)
**Government of India**
Ministry of Environment, Forests and Climate Change
(I.A. Division)

Indira Paryavaran Bhawan
Aliganj, Jorbagh Road,
New Delhi -110003

**E-mail : lk.bokolia@nic.in**
**Telefax : 011: 2436 0108**
Dated 27th August, 2014

To,

Shri G. Ganesh Kumar (Managing Director)
M/s Tyche Industries Ltd.
D.No 6/223, Sarpavaram, Kakinada (R)
East Godavari, District- 533005

**E-mail : tyche@tycheindusties.com ; Fax No. : 0884-2341510**

**Subject: Expansion of Bulk Drug Manufacturing Unit (from 57.51 TPM to 68.51 TPM) at Sy. No. 93/2, 94/1 to 94/6 of M/s TYCHE Industries Ltd Village Kakinada Mandal, East Godavari District, Andhra Pradesh.- Environmental Clearance reg.**
**Ref. : Your letter no. nil dated 16th November, 2013.**

Sir,

This has reference to your letter dated 16th November, 2013 along with project documents including Form I, Terms of References, Pre-feasibility Report and EIA/EMP Report on the above mentioned subject.

2.0 The Ministry of Environment and Forests has examined the application. It is noted that the proposal is for expansion of Bulk Drug Manufacturing Unit (from 57.51 TPM to 68.51 TPM) at Sy. No. 93/2, 94/1 to 94/6 of M/s TYCHE Industries Ltd Village Kakinada Mandal, East Godavari District, Andhra Pradesh. Total existing plant area is 22 acres and no additional land is required. Greenbelt will be developed in 8.65 acres land. Total cost of the expansion project is Rs. 3.5 Crore. No national parks and reserve forests are located within 10 km distance. Following products will be manufactured.

| S.N. | Product | Existing (TPM) | Proposed (TPM) | Total after proposed expansion (TPM) |
|---|---|---|---|---|
| 1 | Glucosamine hydrochloride | 30 | 15 (additional) | 45 |
| 2 | Di-Chloro Hydroxy Qulnoline | 10 | -- | 10 |
| 3 | Losartan potassium | 2.0 | -- | 2.0 |
| 4 | 2-chloro-n- (2-chloro 4-methyl)-3-pyridinyl)3-pyridine carboxamide (rap-5) | 7.0 | -- | 7.0 |
| 5 | Venlafaxine hydrochloride | 2.0 | 2.0 (dropping) | 0.0 |
| 6 | Tamsulosin hydrochloride | 0.01 | -- | 0.01 |
| 7 | Amoldipine besylate | 2.0 | 2.0(dropping) | 0.0 |
| 8 | 1-(2-chloroethyl) piperdine hydrochloride (CPH) | 2.50 | -- | 2.50 |
| 9 | Sertraline hydrochloride | 2.0 | -- | 2.0 |
| | Total | 57.51 | 11 | 68.51 |

Environment clearance of the existing unit was accorded by the MoEF vide letter no. J-11011/678/2007-IA II (I) dated 13th March, 2008.

3.0 Adequate scrubbing arrangement will be provided to process vents to control HCl and methanol. Total fresh water requirement from Samalkot Canal will be 109.5 $m^3$/day. Industrial wastewater generation will be 72.9 $m^3$/day and segregated into High TDS/COD and Low TDS/COD effluent streams. High TDS/COD effluent stream will be treated through steam stripper followed by multiple effect evaporator (MEE) and agitated thin film drier (ATFD). Low TDS effluent stream will be treated in effluent treatment plant (ETP) and then passed through reverse osmosis (RO) system. Condensate and recover water will be recycled/reused within factory premises. 'Zero' effluent discharge concept will be adopted and no effluent will be discharged outside the premises. Inorganic & evaporation salt and ETP sludge will be sent to Treatment Storage Disposal Facility (TSDF) for hazardous waste. Fly ash will be sold to brick manufacturers/cement industry. Waste oil and used batteries will be sold to authorized recyclers/re-processors.

4.0 Public hearing was exempted as per para 7 (ii) of EIA Notification, 2006 as there is no increase in air emissions, water pollution load, solid waste generation and plant area.

5.0 All Synthetic Organic Chemicals Industry located outside the notified industrial area/estate are listed at S.N. 5(f) under category 'A' and appraised at Central level.

6.0 The proposal was considered by the Expert Appraisal Committee (Industry) in its meetings held during 3rd-5th December, 2012 and 29th-30th January, 2014 respectively. Project Proponent and the EIA Consultant namely M/s Pioneer Enviro, have presented EIA / EMP report as per the TOR. EAC has found the EIA / EMP Report and additional information to be satisfactory and in full consonance with the presented TORs. The Committee recommended the proposal for environmental clearance.

7.0 Based on the information submitted by the project proponent, the Ministry of Environment and Forests hereby accords environmental clearance to above project under the provisions of EIA Notification dated 14th September 2006, subject to the compliance of the following Specific and General Conditions:

**A. SPECIFIC CONDITIONS:**

i) Compliance to all the environmental conditions stipulated in the environmental clearance letter nos. J-11011/678/2007-IA-(II) dated 13th March, 2008 shall be satisfactorily implemented.

ii) National Emission Standards for Organic Chemicals Manufacturing Industry issued by the Ministry vide G.S.R. 608(E) dated 21st July, 2010 and amended time to time shall be followed by the unit.

iii) Two stage chilled water/caustic scrubber shall be provided to process vents to control HCl. The scrubbing media shall be sent to effluent treatment plant (ETP) for treatment. Efficiency of scrubber shall be monitored regularly and maintained properly. At no time, the emission levels shall go beyond the prescribed standards.

iv) Ambient air quality data shall be collected as per NAAQES standards notified by the Ministry vide G.S.R. No. 826(E) dated 16th September, 2009. The levels of $PM_{2.5,}$ PM10, SO2, NOx, VOC and HCl shall be monitored in the ambient air and emissions from the stacks and displayed at a convenient location near the main gate of the company and at important public places. The company shall upload the results of monitored data on its website and shall update the same periodically. It shall simultaneously be sent to the Regional office of MOEF, the respective Zonal office of CPCB and the Andhra Pradesh Control Board (APPCB).

v) In plant control measures for checking fugitive emissions from all the vulnerable sources shall be provided. Fugitive emissions shall be controlled by providing closed storage, closed handling & conveyance of chemicals/materials, multi cyclone separator and water sprinkling system. Dust suppression system including water sprinkling system shall be provided at loading and unloading areas to control dust emissions. Fugitive emissions in

the work zone environment, product, raw materials storage area etc. shall be regularly monitored. The emissions shall conform to the limits stipulated by the APPCB.

vi) For further control of fugitive emissions, following steps shall be followed :

1. Closed handling system shall be provided for chemicals.
2. Reflux condenser shall be provided over reactor.
3. System of leak detection and repair of pump/pipeline based on preventive maintenance.
4. The acids shall be taken from storage tanks to reactors through closed pipeline. Storage tanks shall be vented through trap receiver and condenser operated on chilled water.
5. Cathodic protection shall be provided to the underground solvent storage tanks.

vii) The gaseous emissions from DG set shall be dispersed through adequate stack height as per CPCB standards. Acoustic enclosure shall be provided to the DG sets to mitigate the noise pollution.

viii) Solvent management shall be carried out as follows :

i. Reactor shall be connected to chilled brine condenser system
ii. Reactor and solvent handling pump shall have mechanical seals to prevent leakages.
iii. The condensers shall be provided with sufficient HTA and residence time so as to achieve more than 95% recovery.
iv. Solvents shall be stored in a separate space specified with all safety measures.
v. Proper earthing shall be provided in all the electrical equipment wherever solvent handling is done.
vi. Entire plant shall be flame proof. The solvent storage tanks shall be provided with breather valve to prevent losses.
vii. All the solvent storage tanks shall be connected with vent condensers with chilled brine circulation.

ix) Total fresh water requirement from Samalkot Canal shall not exceed 109.5 $m^3$/day and prior permission shall be obtained from the competent Authorities.

x) Industrial effluent generation shall no exceed 72.9 $m^3$/day. Industrial effluent shall be segregated into High COD/TDS and Low COD/TDS effluent streams. High TDS/COD shall be passed through stripper followed by MEE and ATFD (agitated thin film drier). Low TDS effluent stream shall be treated in ETP and then passed through RO system. Condensate and recover water will be recycled/reused within factory premises. 'Zero' effluent discharge shall be adopted and no effluent will be discharged outside the premises.

xi) 'Zero' effluent discharge shall be adopted and no effluent shall be discharged outside the premises.

xii) Process effluent/any wastewater shall not be allowed to mix with storm water. Storm water drain shall be passed through guard pond.

xiii) Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arresters shall be provided on tank farm. Solvent transfer shall be by pumps.

xiv) As proposed, process organic residue and spent carbon shall be sent to cement industries. ETP sludge, process inorganic & evaporation salt shall be disposed off to the TSDF. The ash from boiler shall be sold to brick manufacturers/cement industry.

xv) The company shall obtain Authorization for collection, storage and disposal of hazardous waste under the Hazardous Waste (Management, Handling and Trans-Boundary Movement) Rules, 2008 and amended as on date for management of Hazardous wastes

and prior permission from APPCB shall be obtained for disposal of solid / hazardous waste in the TSDF. Measures shall be taken for fire fighting facilities in case of emergency.

xvi) The Company shall strictly comply with the rules and guidelines under Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 *as* amended time to time. All Transportation of Hazardous Chemicals shall be *as per* the Motor Vehicle Act (MVA), 1989.

xvii) Fly ash should be stored separately as per CPCB guidelines so that it should not adversely affect the air quality, becoming air borne by wind or water regime during rainy season by flowing alongwith the storm water. Direct exposure of workers to fly ash & dust should be avoided.

xviii) The company shall undertake following waste minimization measures :-

a. Metering and control of quantities of active ingredients to minimize waste.

b. Reuse of by-products from the process as raw materials or as raw material substitutes in other processes.

c. Use of automated filling to minimize spillage.

d. Use of Close Feed system into batch reactors.

e. Venting equipment through vapour recovery system.

f. Use of high pressure hoses for equipment clearing to reduce wastewater generation.

xix) The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Fire fighting system shall be as per the norms.

xx) Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.

xxi) As proposed, green belt over 33 % of the total project area should be developed within plant premises with at least 10 meter wide green belt on all sides along the periphery of the project area, in downward direction, and along road sides etc. Selection of plant species shall be as per the CPCB guidelines in consultation with the DFO.

xxii) At least 5 % of the total cost of the project shall be earmarked towards the Enterprise social responsibility based on Public Hearing issues and item-wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office at Bangalore Implementation of such program shall be ensured accordingly in a time bound manner.

xxiii) The Company shall submit within three months their policy towards Corporate Environment Responsibility which shall inter-alia address (i) Standard operating process/ procedure to being into focus any infringement/deviation/violation of environmental or forest norms/conditions, (ii) Hierarchical system or Administrative order of the Company to deal with environmental issues and ensuring compliance to the environmental clearance conditions and (iii) System of reporting of non compliance/violation environmental norms to the Board of Directors of the company and/or stakeholders or shareholders.

xxiv) Provision shall be made for the housing for the construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structure to be removed after the completion of the project. All the construction wastes shall be managed so that there is no impact on the surrounding environment.

**B. GENERAL CONDITIONS:**

i. The project authorities must strictly adhere to the stipulations made by the Andhra Pradesh Pollution Control Board (APPCB), State Government and any other statutory authority.

ii. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment and Forests. In *case* of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.

iii. The locations of ambient air quality monitoring stations shall be decided in consultation with the State Pollution Control Board (SPCB) and it shall be ensured that at least one stations is installed in the upwind and downwind direction as well as where maximum ground level concentrations are anticipated.

iv. The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

v. The Company shall harvest rainwater from the roof tops of the buildings and storm water drains to recharge the ground water and use the same water for the process activities of the project to conserve fresh water.

vi. Training shall be imparted to all employees on safety and health aspects of chemicals handling. Pre-employment and routine periodical medical examinations for all employees shall be undertaken on regular basis. Training to all employees on handling of chemicals shall be imparted.

vii. Usage of Personnel Protection Equipments (PPEs) by all employees/ workers shall be ensured.

viii. The company shall also comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, risk mitigation measures and public hearing relating to the project shall be implemented.

ix. The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. CSR activities shall be undertaken by involving local villages and administration.

x. The company shall undertake eco-developmental measures including community welfare measures in the project area for the overall improvement of the environment.

xi. A separate Environmental Management Cell equipped with full fledged laboratory facilities shall be set up to carry out the Environmental Management and Monitoring functions.

xii. As proposed, the company shall earmark sufficient funds towards capital cost and recurring cost/annum to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so earmarked for environment management/ pollution control measures shall not be diverted for any other purpose.

xiii. A copy of the clearance letter shall be sent by the project proponent to concerned Panchayat, Zila Parisad/Municipal Corporation, Urban local Body and the local NGO, if any, from who suggestions/ representations, if any, were received while processing the proposal.

xiv. The project proponent shall also submit six monthly reports on the status of compliance of the stipulated Environmental Clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF, the

respective Zonal Office of CPCB and the AP Pollution Control Board. A copy of Environmental Clearance and six monthly compliance status report shall be posted on the website of the company.

xv. The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental clearance conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.

xvi. The project proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB/Committee and may also be seen at Website of the Ministry at http://envfor.nic.in. This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same shall be forwarded to the concerned Regional Office of the Ministry.

xvii. The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project.

8.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

9.0 The Ministry reserves the right to stipulate additional conditions, if found necessary. The company in a time bound manner will implement these conditions.

**10.0** The above conditions will be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, Air (Prevention *&.* Control of Water Pollution) Act, 1981, the Environment (Protection) Act, 1986 Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008 and the Public Liability Insurance Act, 1991 along with their amendments and rules.

**(Lalit Bokolia)**
**Additional Director**

Copy to :-

1. The Principal Secretary, Department of Environment, Forest, Science & Technology, Government of Andhra Pradesh, Hyderabad, A.P.
2. The Chief Conservator of Forests, Regional Office (Southern Zone, Bangalore)KendriyaSadan, 4th Floor, E&F Wing, II Block Koramangala, Banglore-560034.
3. The Chairman, Central Pollution Control Board PariveshBhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
4. The Chairman, Andhra Pradesh Pollution Control Board, ParyavaranBhawan, A-III, Industrial Estate, Sanath Nagar, Hyderabad - A.P.
5. Joint Secretary, IA II(I), Ministry of Environment and Forests, ParyavaranBhavan, *CGO* Complex, New Delhi.
6. Monitoring Cell, Ministry of Environment and Forests, ParyavaranBhavan, *CGO* Complex, New Delhi.
7. Guard File/Monitoring File/Record File.

**(Lalit Bokolia)**
**Additional Director**

**ANDHRA PRADESH POLLUTION CONTROL BOARD**
**D.No.33-26-14D/2, Near Sunrise Hospital, Pushpa Hotel Centre,**
**Chalamalavari Street, Kasturibaipet, Vijayawada - 520 010**
**Phone. No.0866-2463200**, Website : https://pcb.ap.gov.in/

**RED CATEGORY**
**RENEWAL OF CONSENT & AUTHORIZATION ORDER**

**Consent Order No : APPCB/VSP/KKD/307/HO/CFO/2020** 13/11/2020

CONSENT is hereby granted for Operation under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act 1981 and amendments thereof and Authorisation under Rule 6 of the Hazardous & Other Wastes (Management and Transboundary, Movement) Rules, 2016 and the rules and orders made there under (hereinafter referred to as 'the Acts', `the Rules') to:

**M/s. Tyche Industries Ltd.,**
**D.No.6/223,Sarpavaram (V),**
**Kakinada (R),**
**East Godavari District - 533 005**
**E-mail: tyche@tycheindustries.com**

(Hereinafter referred to as 'the Applicant') authorizing to operate the industrial plant to discharge the effluents from the outlets and the quantity of emissions per hour from the chimneys as detailed below:

**i) Out lets for discharge of effluents:**

| Outlet No. | Outlet Description | Max Daily Discharge after CPM (KLD) | Point of Disposal |
|---|---|---|---|
| 1. | **High TDS effluent**<br>Process | 35.9 | • To Stripper followed by MEE & ATFD for evaporation.<br>• The first fore-run of the condensate to SRU.<br>• The secondary condensate to reuse for make-up of cooling tower. |
| 2. | **Low TDS effluent**<br>Wash Effluents - 30.0 KLD<br>Boiler blow down - 2.0 KLD<br>+ Cooling tower blow down<br>- 1.0 KLD + DM Plant regeneration<br>- 4.0 KLD after treatment | 37.0 | • To biological ETP followed by RO Plant.<br>• R.O permeates for reuse for cooling tower / boiler feed make up.<br>• R.O rejects to MEE. |
| 3. | Domestic effluents | 10 | • To biological ETP for further treatment. |

**ii) Emissions from chimneys:**

| Chimney No. | Description of Chimney |
|---|---|
| 1. | Attached to 3 TPH Husk fired Boiler |
| 2. | Attached to 5 TPH Husk fired Boiler (stand by) |
| 3. | Attached to 930 KVA DG Set |
| 4. | Attached to 380 KVA DG Set |

**iii)HAZARDOUS WASTE AUTHORISATION (FORM – II) [See Rule 6 (2)] :**
M/s. Tyche Industries Ltd., Sarpavaram (V), Kakinada (R), East Godavari District, is hereby granted an authorization to operate a facility for collection, reception, storage, treatment, transport and disposal of Hazardous Wastes namely:

- **HAZARDOUS WASTES WITH DISPOSAL OPTION:**

| S. No. | Name of the hazardous waste | Stream | Quantity | Disposal Option |
|---|---|---|---|---|
| 1 | ETP sludge | 35.3 of Schedule - I | 8 Kgs/day | Shall be routed through M/s. Andhra Pradesh Environment Corporation (APEMC) so as to dispose to TSDF Parawada. |
| 2 | MEE salts | 37.3 of Schedule - I | 3802 Kgs/day | |
| 3 | Process residues | 28.1 of Schedule - I | 1322 Kgs/day | Shall be routed through M/s. Andhra Pradesh Environment Corporation Limited (APEMC) so as to dispose to Authorised cement plants for co-processing / TSDF, Parawada, Visakhapatnam District. |
| 4 | Solvent bottom residues | 20.3 of Schedule - I | 450 Kgs/day | |
| 5. | Spent Carbon | 28.3 of Schedule - I | 215.78 Kgs/day | |

- **HAZARDOUS WASTES WITH RECYCLING OPTION:**

| Sl. No. | Name of the hazardous waste | Stream | Quantity | Disposal Option |
|---|---|---|---|---|
| 1. | Spent Solvents | 28.6 of Schedule - I | 2337 Kgs/day | Shall be recovered & Reuse within the premises |
| 2. | Spent catalyst | 28.2 of Schedule - I | 21 Kgs/day | Shall be routed through M/s APEMC so as to dispose to supplier / authorized agencies. |
| 3. | Empty barrels / containers / liners contaminated with hazardous chemicals / wastes | 33.1 of Schedule - I | 15 Nos/day | After complete detoxification, it shall be dispose of to outside agencies. |
| 4. | Used Lubricating Oil | 5.1 of Schedule - I | 300 LPA | Shall be routed through M/s.APEMC so as to dispose to Authorised re-processors / recyclers. |

**This consent order is valid to manufacture the following products along with**

**quantities indicated only:**

| S.No. | Name of the Product | Total capacity (TPM) |
|---|---|---|
| 1. | Glucosamine Hydrochloride | 30.0 |
| 2. | 2-Chloro-N (2-Chloro 4-Methyl) – 3- Pyridnyl)-3-Pyridine Carboxamide (RAP-5) | 2.0 |
| 3. | Tamsulosin Hydrochloride | 0.10 |
| 4. | 1-(2-Chloroethyl) Piperidine Hydrochloride (CPH) | 2.50 |
| 5. | Sertraline Hydrochloride | 2.0 |
| 6. | Silodosin | 0.6 |
| 7. | Racecadotril | 2.0 |
| 8. | Cinacalcet Hydrochloride | 0.05 |
| 9. | Reloxifene Hydrochloride | 0.1 |
| 10. | 1-Benzylpiperdine-4-Carboxadehyde | 0.1 |
| 11. | PMPA | 8.0 |
| 12. | 3-Qinqindole Hydrochloride | 0.1 |
| 13. | R-3 Qinqinadole Hydrochloride | 0.1 |
| 14. | Urapidil | 0.3 |
| 15. | Tetralon amine | 5.0 |
| 16. | Palonosetron Hydrochloride | 0.01 |
| 17. | Rupatadine Fumarate | 0.5 |
| 18. | Tenofovir Disoproxil Fumarate | 3.0 |
| 19. | Racemic Sertraline | 6.5 |
| 20. | Solfenacin Succinate | 0.5 |
| 21. | Azealic Acid | 5.0 |
| | Total: | **68.46** |

This order is subject to the provisions of `the Acts' and the Rules' and orders made thereunder and further subject to the terms and conditions incorporated in the schedule A, B & C enclosed to this order.

This combined order of consent & Hazardous Waste Authorisation shall be valid for a period ending with the **31st day of August, 2025.**

DR. B.MADHUSUDHANA RAO, JCEE(MSRB), O/o JOINT CHIEF ENVIRONMENTAL ENGINEER4-APPCB

**To**
**M/s. Tyche Industries Ltd.,**
**D.No.6/223,**
**Sarpavaram (V), Kakinada (R),**
**East Godavari District – 533 005**

**Copy to :**

1. The Joint Chief Environmental Engineer**, Zonal Office**, **Visakhapatnam** for information and necessary action.
2. The Environmental Engineer, Regional Office, **Kakinada** for information and necessary action.

**SCHEDULE – A**

1. Any up-set condition in any industrial plant / activity of the industry, which result in, increased effluent / emission discharge and/ or violation of standards stipulated in this order shall be informed to this Board, under intimation to the Collector and District Magistrate and take immediate action to bring down the discharge / emission below the limits.
2. The industry should carryout analysis of waste water discharges or emissions through chimneys for the parameters mentioned in this order on quarterly basis and submit to the Board.
3. All the rules & regulations notified by Ministry of Law and Justice, Government of India regarding Public Liability Insurance Act, 1991 should be followed as applicable.
4. The industry should put up two sign boards (6x4 ft. each) at publicly visible places at the main gate indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO and exhibit the CFO order at a prominent place in the factory premises.
5. Notwithstanding anything contained in this consent order, the Board hereby reserves the right and powers to review / revoke any and/or all the conditions imposed herein above and to make such variations as deemed fit for the purpose of the Acts by the Board.
6. The applicant shall submit Environment statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1986 & amendments thereof.
7. The applicant should make applications through Online for renewal of Consent (under Water and Air Acts) and Authorization under HWM Rules at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts and detailed compliance of CFO conditions for obtaining Consent & HW Authorization of the Board. The industry should immediately submit the revised application for consent to this Board in the event of any change in the raw material used, processes employed, quantity of trade effluents & quantity of emissions. Any change in the management shall be informed to the Board. The person authorized should not let out the premises / lend / sell / transfer their industrial premises without obtaining prior permission of the State Pollution Control Board.
8. Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to Appellate authority constituted under Section 28 of the Water(Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air(Prevention and Control of Pollution) Act, 1981.
9. The industry may explore the possibility of tapping the solar energy for their energy requirements.

**SCHEDULE - B**

1. The industry shall comply with the following conditions within stipulated time, failing which the Bank guarantee of Rs. 5.0 Lakhs will be forfeited without any notice:

a. The industry shall provide container detoxification facility within one month i.e., by 13.12.2020.
b. The industry shall revamp the ZLD system within two months i.e., by 13.01.2021 and shall keep in operation.

**WATER POLLUTION:**

1. The source of water is Samalkot Canal. The following is the permitted water consumption:

| Sl. No. | Purpose | Quantity (KLD) |
|---|---|---|
| 1 | Process | **68.0** |
| 2 | Cooling tower and boiler feed | 26.0 |
| 3 | Domestic & Gardening purposes. | 12.0 |
| | **Total** | **106.0** |

Separate meters with necessary pipe-line shall be maintained for assessing the quantity of water used for each of the purposes mentioned above.

2. The industry shall maintain digital flow meters to measure the quantity of effluents.
3. The industry shall maintain daily records on characteristics of effluents and hydraulic load for each stream of cyanide & heavy metals bearing effluents and shall furnish soft copy of the consolidated records through mail to RO, Kakianda & ZO, Visakhapatnam every month.
4. The LTDS and HTDS effluents shall be stored in above ground level collection tanks separately.
5. The industry shall provide HDPE tanks in the effluent collection tank (both locations at block and common collection point). The effluent shall be connected to the HDPE tanks and from the HDPE tanks, effluent shall be pumped to the ETP. Free space shall be maintained around the HDPE tanks to observe leakages if any.
6. Effluents shall not be discharged onland or any water bodies or aquifers or outside under any circumstances. Floor washings shall be admitted into effluent collection system only and shall not be allowed to find their way into storm water drains or open areas.
7. The industry shall construct rainwater runoff tank for collection and storage of first flush storm water. The industry shall maintain dry condition outside drains in un-rainy season.
8. Container & Container liners shall be detoxified at the specified covered platform with dyke walls and the wash wastewater shall be routed to low TDS collection tank after characterization.

**AIR POLLUTION:**

9. The emissions shall not contain constituents in excess of the prescribed limits mentioned below.

| Chimney No | Parameter | Emission Standards |
|---|---|---|
| 1 & 2 | Particulate matter | 115 mg/Nm$^3$ |

10. The facility shall comply with emission limits for DG sets of capacity upto 800 KW as per the Notification G.S.R.520 (E), dated 01.07.2003 under the Environment (Protection) Amendment Rules, 2003 and G.S.R.448(E), dated 12.07.2004 under the Environment (Protection) Second Amendment Rules, 2004. In case of DG sets of capacity more than 800 KW shall comply with emission limits as per the Notification G.S.R.489 (E), dated 09.07.2002 at serial no.96, under the Environment (Protection) Act, 1986.
11. The industry shall comply with ambient air quality standards of PM10 (Particulate Matter size less than 10 micro grams) - 100 micro gram/ m3; PM2.5 (Particulate Matter size less than 2.5 micro grams) - 60 microgram/m3; SO2 - 80 micro gram/ m3; NOx - 80 micro gram/m3, Ammonia – 400 microgram/m3 outside the factory premises at the periphery of the industry.

Standards for other parameters as mentioned in the National Ambient Air Quality

Standards CPCB Notification No.B-29016/20/90/PCI-I, dated 18.11.2009.
Noise Levels: Day time (6 AM to 10 PM) - 75 dB (A)
Night time (10 PM to 6 AM) – 70 dB (A)

12. The industry shall maintain two stage scrubbers which are provided to control process emissions at production blocks and shall be provided pH meters with data logger facility to scrubbers. The scrubber solution shall be recycled as far as possible and finally sent to ETP for further treatment.
13. The industry shall maintain VOC monitoring system with auto recording facility.
14. The industry shall implement adequate measures to control all fugitive emissions from the plant.
15. The evaporation losses in solvents should be controlled by taking the following measures:

i. Chilled brine circulation to effectively reduce the solvent losses into the atmosphere.
ii. Transfer of solvents by using pumps and closed conveyance instead of manual handling.
iii. Closed centrifuges be used due to which solvent losses are reduced drastically.
iv. The reactor vents connected with primary & secondary condensers to catch the solvent vapours.
v. All the solvent storage tanks are connected with vent condensers to prevent solvent vapours.

16. The industry shall submit AAQ monitoring reports conducted by NABL/MoEF Authorized Agency every month.

**GENERAL:**

17. The industry shall not manufacture new products and not exceeding the consented quantity, other than those mentioned in this order.
18. The drums containing chemicals / solvents shall be stored under a roof on elevated platform with dyke wall and leachate collection pit.
19. The industry shall maintain dry condition outside drains in un-rainy season.
20. The industry shall maintain the following records and the same shall be made available to the inspecting officers of the Board:

a. Daily production details (ER-1 Central Excise Returns).
b. Quantity of Effluents generated, treated, recycled/reused and disposed to CETP.
c. Log Books for pollution control systems.
d. Characteristics of effluents and emissions.
e. Hazardous/non hazardous solid waste generated and disposed.
f. Inspection book.
g. Manifest copies of effluents / hazardous waste.

21. The industry shall provide HDP liner to HTDS effluent collection tank.
22. The industry shall provide hood on the effluent collection tanks and hood shall connect to the scrubber.
23. The industry shall provide separate energy meter for recirculation pumps installed at HTDS & LTDS collection tanks.
24. The industry shall comply with the Regulation of Persistent Organic Pollutants Rules,2018 notified by the MoEF&CC Notification vide G.S.R. 207 (E) dated 30.05.2018. As per the notification, the following 7 chemicals are prohibited to manufacturer, trade, use, import and export:

a. Chlordecone,
b. Hexabromobiphenyl,
c. Hexabromodiphenyl ether and heptabromodiphenyl ether (commercial octa-BDE),
d. Tetrabromodiphenyl ether and pentabromodiphenyl ether (commercial penta-

BDE),
e. Pentachlorobenzene,
f. Hexabromocyclododecane and
g. Hexachlorobutadine.

25. The following rules and regulations notified by the MoF &CC, GoI shall be implemented.
a. Hazardous Waste and Other Wastes (Management and Transboundary Movement) Rules, 2016.
b. Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989.
c. Fly ash notification, 2016.
d. Batteries (Management & Handling) Rules, 2010.
e. E-waste (Management) Rules, 2016.
f. Construction and Demolition waste Management Rules, 2016.
g. Bio-medical Waste Management Rules, 2016.
h. Plastic Waste Management Rules, 2016.
26. The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous Waste and manifest document prescribed Under Rule 18 and 19 of the HWM Rules, 2016.
27. The industry shall submit half-yearly compliance report for the schedule A, B & C conditions stipulated in CFO & HWA order audited through NABL / MoEF accredited laboratories.
28. The industry shall update the information in OCEMS - Industry Information Data Entry Software for Compliance Reporting Protocol in PART-II (Sections F & G) Every Quarter on 1st January, 1st April, 1st July and 1st October through this software system.
29. Any other directions / circulars / notices issued by CPCB, MoEF&CC and APPCB shall be followed from time to time.

**Specific conditions:**

30. VOC meters with real time data transmission facility through internet of things (IoT) shall be installed near the production blocks and near the chemical storage tanks and link to the servers of APPCB and CPCB, within 3 months.
31. The industry shall inventorize the storage quantities of hazardous chemicals (raw materials), products, as per the hazard nature of reactivity / toxicity / flammability / explosive stored/handling in the premises as defined in the Management of Storage, Import of Hazardous Chemicals (MSIHC) Rules, 1989 and the details shall be furnished to the Factories Department and to the Regional Office, APPCB on monthly basis duly certifying the same.
32. The industry shall inventorize the hazardous wastes and its quantities stored within the industry premises as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) and shall furnish the details to Regional Office, APPCB on monthly basis duly certifying the same by the industry.
33. The industry shall identify major accident hazard chemicals & list out the hazardous chemicals endangered to human health & environment and the details shall be furnished to the Factories Department and to the Regional Office, APPCB time to time duly certifying the same by the industry.
34. The industry shall transport the hazardous waste to cement industries through GPS vehicle.
35. The industry shall extend training to the working personnel while handling hazardous chemicals for prevention of accidents and necessary antidotes to ensure the safety, as per the MSIHC Rules, 1989.

36. The industry shall submit Risk analysis and risk assessment covering worst scenario clearly describing impact within the industry premises and outside the industry premises and emergency response system.
37. The industry shall submit the copy of the safety audit report and On-Site / Off Site Emergency Plans as applicable after being certified by the Factories Department to the APPCB, Regional Office from time to time, if the storage quantity of hazardous chemicals is equal to or, in excess of the threshold quantities specified in schedule 2 & 3 of MSIHC Rules, 1989.
38. The industry shall carryout calibration of safety equipment and leak detection systems at regular intervals and shall certify the same with the Factories Department. That certified copy shall be submitted to the APPCB, Regional Office.
39. The industry shall install fluorescent Wind Vane at the highest point in the industry premises.
40. The industry shall submit the self-certification on compliance of all the conditions stipulated in the CFO & HWA order.
41. The industry shall evaluate the performance of solvent recovery system for each stream-wise and shall furnish plan of action to maintain the efficiency of solvent recovery more than 95% for each stream wise.
42. The industry shall dispose the spent solvents / mixed spent solvents to APPCB authorized recyclers / recover within the premises.
43. The industry shall enter an agreement with the Cement industries for disposal of incinerable waste or shall dispose to Alternative Fuel Raw material facility (AFRF) OR to TSDF for co-incineration.
44. The drums containing chemicals / solvents shall be stored under a roof on elevated platform with a provision to collect leakages / spillages in the collection pit.
45. The industry shall dispose Hazardous waste to CWMP, Visakhapatnam regularly.
46. The industry shall comply with CPCB directions dated 05.02.2014 / 02.03.2015 and guidelines issued regarding online monitoring systems issued from time to time. The industry shall not start the operations till installation of flow meters and web camera and data connected to CPCB & APPCB.
47. Any other directions / circulars / notices issued by CPCB, MoEF&CC and APPCB shall be followed from time to time.

**SCHEDULE - C**

***[see rule 6(2)]***

**[ CONDITIONS OF AUTHORISATION FOR OCCUPIER OR OPERATOR HANDLING HAZARDOUS WASTES ]**

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
2. The authorisation shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.
3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.
4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.
5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on “Implementing Liabilities for Environmental

Damages due to Handling and Disposal of Hazardous Waste and Penalty".

7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.
8. An application for the renewal of an authorisation shall be made as laid down under these Rules.
9. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.

**Specific Conditions:**

10. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.
11. The industry shall enter an agreement with the Cement industries for disposal of incinerable waste or shall dispose to Alternative Fuel Raw material facility (AFRF) OR to TSDF for co-incineration.
12. The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous Waste and manifest document prescribed Under Rule 18 and 19 of the HWM Rules, 2016.
13. The industry shall not store hazardous waste for more than 90 days as per the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
14. The industry shall store Used / Waste Oil and Used Lead Acid Batteries in a secured way in their premises till its disposal to the manufacturers / dealers on buyback basis.
15. The industry shall transport the hazardous waste to cement industries only through vehicle fitted with GPS tracking system.
16. The industry shall maintain 7 copy manifest system for transportation of waste generated and a copy shall be submitted to concerned Regional Office of APPCB. The driver who transports Hazardous Waste should be well acquainted about the procedure to be followed in case of an emergency during transit. The transporter should carry a Transport Emergency (TREM) Card.
17. The industry shall maintain proper records for Hazardous and Other Wastes stated in Authorisation in Form-3 i.e., quantity of Incinerable waste, land disposal waste, recyclable waste etc., and file annual returns in Form-4 as per Rule 20 (2) of the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
18. The industry shall comply with the provisions of HWM Rules, 2016 in terms of interstate transport of Hazardous Waste and manifest document prescribed Under Rule 18 and 19 of the HWM Rules, 2016.

**The industry shall submit Half yearly compliance reports to all the stipulated conditions in Environmental Clearance (EC), Consent for Establishment (CFE) and Consent for Operation (CFO) through website i.e., https://pcb.ap.gov.in by 1st of January and 1st July of every year. The first half yearly compliance reports shall be furnished by the industry and second half yearly compliance reports shall be the audited through NABL accredited third party.**

DR. B.MADHUSUDHANA RAO,
JCEE(MSRB), O/o JOINT CHIEF ENVIRONMENTAL ENGINEER4-APPCB

**To**
**M/s. Tyche Industries Ltd.,**
**D.No.6/223,**
**Sarpavaram (V), Kakinada (R),**
**East Godavari District – 533 005.**

Signed by Dr.
B.madhusudhana Rao
Date: 13-11-2020 18:15:36
Reason: Approved

# TYCHE INDUSTRIES LIMITED

## PREVENTIVE MAINTENANCE RECORD OF REACTORS

(FORTNIGHTLY, MONTHLY, QUARTERLY, HALF YEARLY, ANNUAL)

Quality Assurance Issued by DL 30/04/20 Tyche Industries Limited

Doc. Ref. No.: SOP/EM/020

Form No.: EM/F/008-03
Effective Date: 22.01.2015
Page 1 of 2

Location: PB-5

Date: 28.05.20

| ID No. | | GLR 504 | SSR 510 | | | | |
|---|---|---|---|---|---|---|---|
| S.No. | Checks carried out | | | | | | |
| **Fortnightly maintenance** | | | | | | | |
| 1 | Check of the 'v' belt or star bush condition | NA | NA | | | | |
| 2 | Check of the gear box oil level | ✓ | ✓ | | | | |
| 3 | Check the coupling bolts and bush bolts | ✓ | ✓ | | | | |
| 4 | Check of the motor starter controls and connections | ✓ | ✓ | | | | |
| **Monthly maintenance** | | | | | | | |
| 1 | Check of the motor earthing | ✓ | ✓ | | | | |
| 2 | Check of the gland / seal condition | ✓ | ✓ | | | | |
| 3 | Check of reactor bearing grease | ✓ | ✓ | | | | |
| **Quarterly maintenance** | | | | | | | |
| 1 | Check of the motor bearing greasing | ✓ | ✓ | | | | |
| **Half-yearly maintenance** | | | | | | | |
| 1 | Check of anchor or turbine or propeller or baffle | ✓ | ✓ | | | | |
| 2 | Check of the glass lining for GLR | ✓ | NA | | | | |
| **Annual maintenance** | | | | | | | |
| 1 | Check the Jacket Hydraulic test | ✓ | ✓ | | | | |
| 2 | Check the shell pressure test | ✓ | ✓ | | | | |
| 3 | Check of the thickness test | NA | ✓ | | | | |

Put '√' mark inappropriate box when preventive maintenance carried out. Enter details in remarks column in the second page.

| | Prepared by | Reviewed by | Approved by |
|---|---|---|---|
| Name | K.V.V.K.Prasad | Ch.V.Satyanarayana | Approved by |
| Designation | Jr.Officer (Maintenance) | Dy.Manager (Maintenance) | K.Nageswararao |
| Sign & Date | 20/1/15 | 20/1/15 | 20/01/15 |

MASTER COPY

728/2021/LAW-HO

# TYCHE INDUSTRIES LIMITED

## PREVENTIVE MAINTENANCE RECORD OF REACTORS

(FORTNIGHTLY, MONTHLY, QUARTERLY, HALF YEARLY, ~~ANNUAL~~)

Doc. Ref. No.: SOP/EM/020

Form No.: EM/F/008-03
Effective Date: 22.01.2015


### DETAILS OF PREVENTIVE MAINTENANCE

| Equipment I.D No. | Remarks | Sign. |
|---|---|---|
| GLR-504 | 1. Jacket hydraulic test & Shell pressure test done ok. | 28/05/20 |
| SSR-510 | 1. Jacket hydraulic test & Shell pressure test done ok. | 28/05/20 |
| | 2. Thickness test done ok. | 28/05/20 |

Checked by 28/05/20

Verified by 28/05/20

| | Prepared by | Reviewed by | Approved by |
|---|---|---|---|
| Name | K.V.V.K.Prasad | Ch.V.Satyanarayana | Approved by |
| Designation | Jr.Officer (Maintenance) | Dy.Manager (Maintenance) | K.Nageswararao |
| Sign & Date | 20/1/15 | 20/1/15 | 20/01/15 |

MASTER COPY



Tyche Industries Limited

Quality Assurance * Tyche Industries Limited * Issued by DL 30/04/20

# TYCHE INDUSTRIES LIMITED

## HYDRAULIC PRESSURE TEST

Equipment ID No.: GLR-504

| S. No | Pressure applied Kg/cm$^2$ | Time | Observed Pressure Kg/cm$^2$ | Remarks | Done By | Checked By |
|---|---|---|---|---|---|---|
| 1 | 1.3 Kg/cm$^2$ | 10.50 | 1.3 Kg/cm$^2$ | NO DROP | 28/05/20 | 28/05/20 |
| 2 | 2.6 Kg/cm$^2$ | 11.00 | 2.6 Kg/cm$^2$ | NO DROP | 28/05/20 | 28/05/20 |
| 3 | 3.9 Kg/cm$^2$ | 11.10 | 3.9 Kg/cm$^2$ | NO DROP. | 28/05/20 | 28/05/20 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note : Record the pressure every 10 min

Tyche Industries Limited

# TYCHE INDUSTRIES LIMITED

## PRESSURE TEST TO SHELL

Equipment ID No.: GCR-504

| S. No | Pressure applied Kg/cm$^2$ | Time | Observed Pressure Kg/cm$^2$ | Remarks | Done By | Checked By |
|---|---|---|---|---|---|---|
| 1 | 1.0 kg/cm$^2$ | 11.50 | 1.0 kg/cm$^2$ | NO DROP | 28/05/20 | 28/05/20 |
| 2 | 2.0 kg/cm$^2$ | 12.01 | 2.0 kg/cm$^2$ | NO DROP | 28/05/20 | 28/05/20 |
| 3 | 3.0 kg/cm$^2$ | 12.11 | 2.9 kg/cm$^2$ | -0.1 kg/cm$^2$ | 28/05/20 | 28/05/20 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note : Record the pressure every 10 min

Ref SOP No.: SOP/EM/007, Annexure - 1, Effective date: 01.01.2016

File No.FDEG-AC0ACIF(FA)/2/2021-SA(A)-KKD1

GOVERNMENT OF ANDHRA PRADESH
FACTORIES DEPARTMENT

From:
Sri V.Suresh, B.E,MBA;
Deputy Chief Inspector of Factories(FAC),
Kakinada.

To
Sri G. Ganesh Kumar,
S/o. G. Rama Raju,
Occupier,
Sri M.Butchi Raju, 57 yrs,
S/O Suryanarayana, Manager.
Tyche Industries Limited,
Sarpavaram(P.O),
Kakinada-533005,
East Godavari District.

Sir,

Sub:- Factories Act,1948 and A.P.Factories Rules,1950 – Major Accident occurred at 02:30PM on 11.03 2021 in Tyche Industries Limited, Sarpavaram(P.O), Kakinada, East Godavari District – Prohibitory Orders – Issued – Regarding.

Consequent to the receipt of information of major accident occurred in Tyche Industries Limited, Sarpavaram(P.O), Kakinada, East Godavari District at 02:30PM on 11.03 2021, the Deputy Chief Inspector of Factories, Kakinada visited the said factory and conducted preliminary enquiry in to the said accident the same day.

During the enquiry it has been found that the reactor No. GLR 504 in Production Block No. 5 has exploded while charging sulphuric acid and nitric acid into the said reactor for Nitration reaction with Stage –I compound (2 Hydroxypyridine) to manufacture the Stage II compound of Nevirapine with the following safety violations which are contraventions under Factories Act 1948 and A.P. Factories Rules 1950,

1. Vent size calculations were not done for the exothermic reaction and a Rupture disc of inadequate capacity and size has been provided to the Reactor. Due to this, the excess pressure built up in the reactor could not be discharged safely without affecting the reactor.
2. The studies related to ascertain the maximum heat generation potential in the nitration reaction were not got done based on which the reactor cooling system has to be designed. Due to this, the cooling system could not handle the excess heat due to deviation of parameters in the reactor like pressure, temperature beyond the safe limits which lead to reaction becoming runaway.
3. There is no arrangement of orifice or double valve arrangement, rotometer for flow measurement etc.. to the reactor thereby the rate of addition of Nitric acid is

prone for being faster than safe which could have rendered the reaction runaway leading to instantaneous pressure built up.

4. Nevirapine is being manufactured without getting HAZOP study done in order to identify and evaluate risks by considering the possible deviations during the process.
5. Hazard Analysis and Risk Assessment (HARA) report was prepared without considering the product of Nevirapine

It was found that the said accident and its consequences had taken place as a result of noncompliance of various legal obligations as mentioned above. Similar conditions are appeared to be prevailing with other reactors in other production blocks in the factory. With this Accident, there is a reason to believe that there is an imminent danger to the safety of the persons employed therein, if the reactors are allowed to operate for the manufacturing process without complying the above violations. Hence the following prohibitory orders are issued.

## PROHIBITORY ORDER

Section 40 (2) :-

**In view of the above, the usage of all the Reactors and other reaction vessels in all Production Blocks in the factory, which normally work at a pressure not above the atmospheric pressure but in which there is likelihood of pressure being created above the atmospheric pressure either due to reaction getting out of control or due to any other circumstances, is hereby prohibited until further orders based on the compliance of the following.**

1. All the reactors shall be provided with suitable Rupture disc and Safety valve of adequate capacity and size to prevent the pressure being built up in the reaction vessel beyond safe limit based on the vent size calculations.
2. The cooling system of all reactors shall be designed properly based on the evaluation of heat of reactions scientifically in order to withstand the possible deviations of parameters beyond the operational limits.
3. Hazard Operability (HAZOP) study shall be conducted for all the products being manufactured in the factory by considering the possible deviations during the process, and submitted along with compliance of its recommendations.
4. Hazard Analysis and Risk Assessment (HARA) report shall be prepared and submitted by considering all products.

File No.FDEG-AC0ACIF(FA)/2/2021-SA(A)-KKD1

5. Rotometers coupled with other flow restricting devices shall be provided for pipelines connected reactors for addition of reactants.

6. Audio visual alarm coupled with flooding of reaction terminators shall be provided for all exothermic reactions.

The prohibitory orders issued shall be in force until they are revoked.

Yours faithfully

V.SURESH
D eputy Chief Inspector of Factories(FAC),
Kakinada.

Copy submitted to the Director of Factories, A.P., Vijayawada.

Signed by Vadapalli Suresh
Date: 13-03-2021 10:15:12
Reason: Approved

**OFFICE OF THE DEPUTY CHIEF INSPECTOR OF FACTORIES, KAKINADA**

R.No 3192/2021 Dated: 22 .03.2021.

**INSPECTION ORDER OR NOTICE**

**FACTORIES ACT, 1948 AND A.P FACTORIES RULES, 1950
AND THE GOVERNMENT NOTIFICATION ISSUED THEREON**

Sir,

Upon a recent inspection of your factory on 11.03.2021,12.03.2021 and 13.03.2021 by me, It was found to the extent indicated below that certain provision of the Act, and Rules were not being carried out.

The orders below issued or repeated from previous orders without prejudice to any action that this office may take for non –compliance with the provisions of the Act and Rules there under.

V.Suresh
Deputy Chief Inspector of Factories(FAC),
Kakinada.

To
Sri G. Ganesh Kumar,
S/o. G. Rama Raju,
Occupier,
Sri M.Butchi Raju,
S/O Suryanarayana,
Manager.
Tyche Industries Limited,
Sarpavaram(P.O),
Kakinada-533005,
East Godavari District.

**1. Section 41 and Rule 61-I read with Section 87 Rule 95 ScheduleXV PART-II Para 5,12,15 read with Section 41-B:-**

1.Failed to provide vent of adequate size and capacity terminating into a dump tank of adequate size to the GLR 504 reactor(of 2 KL Capacity) in which nitration process is being carried out to discharge the product safely during reaction run away state.

2.Failed to ensure adequate cooling arrangement to the GLR 504 (of 2 KL Capacity) reactor by ascertaining the maximum heat generation potential in the nitration reaction.

3.Failed to provide proper arrangement such as orifice, double valve arrangement and rotameter for controlled addition of reactants like sulphuric acid and nitric acid due to which the rate of addition is prone for being faster than safe which could have rendered the reaction runaway leading to instantaneous pressure built up.

4. 2-CHLORO- N-(2-CHLORO -4- METHYL)-3- PYRIDYL)-3-PYRIDINE CARBOXAMIDE (RAP-5) is being manufactured without getting HAZOP study done in order to identify and evaluate risks by considering the possible deviations during the process.

5. Hazard Analysis and Risk Assessment (HARA) report was prepared without considering 2-CHLORO- N-(2-CHLORO -4- METHYL)-3- PYRIDYL)-3-PYRIDINE CARBOXAMIDE.

6.Failed to provide audio visual alarm coupled with flooding of reaction terminators.

7. Failed to test the reactor GLR 504 (of 2 KL Capacity) by a competent person to ascertain its suitabilityfor nitration reaction.

Consequently on 11-03-2021, At around 2.20 PM, while transferring sulphuric acid into the GLR 504 reactor which was already charged with reacted compound of Nitric acid and stage 1 compound of the batch process, the reaction had become run away, a heavy explosion took place and in which Sri T.Venkata Ramana (General Shift in charge) and Sri K.Subrahmanyam(B-Shift in charge) died on the spot due to the spillage of the chemical fumes and blood injuries and Sri K.Satya Saibabu (Block in charge), Sri N.Simhadri Rao (Asst Operator), Sri R.Raj Kumar (Operator), Sri K.Srinivasa Rao(Operator) were injured and hospitalized and caused heavy damage to the building, equipment and roof of the production block 5.

This is highly irregular.

***

Submitted to the Director of Factories, Andhra Pradesh, Vijayawada.
Copy to the Inspector of Factories, Kakinada1 circle.

Notes:
1. On 11.03.2020 at 04.00 PM and consequently on 12.03.2021 and 13.03.2021.
2. Working/ Mfg of Bulk Drug Intermediates.
3. “ 152 ” workers on 11.03.2021.
4. Show cause notice along with Inspection orders.
5. No claims

Signed by Vadapalli Suresh
Date: 22-03-2021 18:01:02
Reason: Approved

File No.FDEG-AC0ACIF(FA)/2/2021-SA(A)-KKD1

GOVERNMENT OF ANDHRA PRADESH
FACTORIES DEPARTMENT

From:
Sri V.Suresh, B.E,MBA;
Deputy Chief Inspector of Factories(FAC),
Kakinada.

To:
Sri G. Ganesh Kumar,
S/o. G. Rama Raju,
Occupier,
Sri M.Butchi Raju,
S/O Suryanarayana,
Manager.
Tyche Industries Limited,
Sarpavaram(P.O),
Kakinada-533005,
East Godavari District

Sir,

Sub:- Factories Act,1948 and A.P.Factories Rules,1950 – Major Accident occurred at 02:30PM on 11.03.2021 in Tyche Industries Limited, Sarpavaram(P.O), Kakinada, East Godavari District – Prohibitory Orders Issued –Partial relaxation for manufacturing of two products(Soliefinacin succinate and Tenofovir disoproxil fumarate ) subject to conditions– Regarding.

Ref:-(1)Prohibitory orders of this office vide File No.FDEG-AC0ACIF(FA)/2/2021-SA(A)-KKD1 of the Deputy Chief Inspector of Factories, Kakinada dt 13.03.2021.

(2) Lr no NIL dated 18.03.2021 of the management of Tyche Industries Limited, Sarpavaram (P.O), Kakinada to grant permission for safe shutdown of the plant.

(3)Lr addressed to the Director of Factories, Andhra Pradesh, Vijayawada requesting Instructions for safe shut down of the plant vide File No.FDEG- ACC0ACIF(FA) /2/2021-SA(A)-KKD1 of the Deputy Chief Inspector of Factories, Kakinada dt 19.03.2021.

(4)Oral Instructions of the Director of Factories on 25-03-2021.

(5) Lr no NIL dated 26.03.2021 of the management of Tyche Industries Limited, Sarpavaram (P.O), Kakinada to grant permission for safe shutdown of the plant along with details of operations and risk assessment report.

(6)This office File No.FDEG-AC0ACIF(FA)/2/2021-SA(A)-KKD1dt 26.03.2021 addressed to the management of Tyche Industries Limited, Kakinada.

(7)Lr No.nil dated 17.04.2021 of the management of Tyche Industries Limited, Sarpavaram (P.O), Kakinada to grant permission for manufacturing of three products along with reply to the prohibitory orders with enclosures.

(8) This office File No.FDEG-AC0ACIF(FA)/2/2021-SA(A)-KKD1 dt 19.04.2021.

(9)Oral instructions of the Director of Factories on 21-04-2021.

—

With reference to the above, this is to inform you that consequent to the major accident that took place on 11-03-2021, Prohibitory Orders were issued vide ref 1 st cited to avoid imminent danger to the workers and you requested permission for safe shut down of the plant by removing in process material in the reactors vide ref 2 nd cited and necessary instructions were requested from the Director of Factories, Andhra Pradesh, Vijayawada vide ref 3 rd cited and the under signed was instructed to issue necessary instructions to you in safe shut down of

the plant vide ref 4 th cited. Hence the Prohibitory orders vide ref 1 st cited are partially relaxed for safe shut down of the plant subject to the conditions vide ref 6 th cited.

Now vide ref 7 th cited,you have applied for permission to manufacture three products namely Setraline hydrochloride, Soliefinacin succinate and Tenofovir disoproxil fumarate and the same was submitted to the Director of Factories, Andhra Pradesh, Vijayawada vide ref 8 th cited and the under signed was instructed to relax the prohibitory orders vide ref 9 th cited with appropriate conditions.

Hence, In view of the above the prohibitory orders issued vide 1 st cited are partially relaxed for manufacturing of the following two products Soliefinacin succinate and Tenofovir disoproxil fumarate only (Through reactors in production blocks 1 and 2 only) subject to the following conditions.

1. No other products shall be manufactured except the approved two products (Soliefinacin succinate and Tenofovir disoproxil fumarate). Discrepancy in this regard leads to legal action apart from withdrawal of this partial relaxation order.

2. The manufacturing process operations (charging of materials, testing, removal etc..) shall be carried out under the supervision of suitable personnel by ensuring minimum number of workers engaged duly following standard operating procedures.

Yours faithfully
V.Suresh,
Deputy Chief Inspector of Factories(FAC),
Kakinada.

Copy submitted to the Director of Factories, Andhra Pradesh, Vijayawada.

Signed by Vadapalli Suresh
Date: 22-04-2021 07:03:43
Reason: Approved