

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

Original Application 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”

Date of hearing: 17.12.2020

Date of uploading of order: 22.12.2020

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

**ORDER**

1. Proceedings have been initiated in this matter based on media report that massive fire engulfed the chemical plant of **Visakha Solvents Ltd**, Vizag on 13.07.2020 at Ramky CETP Solvents building in Pharma City.<sup>1</sup>

2. The matter was earlier considered on 23.07.2020, after advance notice to the State PCB, CPCB, District Magistrate, Vishakhapatnam, Director Factories and Industrial Safety and Health and Ramky Pharma City (India) Ltd., Parawada Mandal, Vishakhapatnam.

3. Response of the State PCB was that one person died and one injured in the fire incident and there was damage to the structure/building/sheds, plant and machinery etc. **The cause of the incident was the reduction of the boiling point of the mixture on account of inefficient working and failure to observe requisite**

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<sup>1</sup> <https://www.indiatoday.in/india/story/massive-fire-vizag-chemical-plant-injured-latest-updates-1700252-2020-07-13>

**safeguards by the management.** The State PCB decided to close down the unit and to levy compensation for violation of environmental norms.

4. The Tribunal noted that several incidents had taken place recently, resulting in deaths and injuries to human beings and damage to the environment, on account of failure to observe safety norms and inadequate monitoring by the regulatory bodies. It was found necessary to constitute an independent Committee to ascertain the status of compliance of prescribed safety norms, assessment of compensation, to prepare restoration plan and to suggest precautions for future. The Committee was to comprise of CPCB, State PCB and Prof. P Jagannadha Rao, Dept. of Chemical Engineering, Andhra University, Vishakhapatnam. The Chief Secretary, Andhra Pradesh was required to identify the persons responsible for the failure and the MoEF&CC was to look into the effectiveness of the regulatory regime. Interim compensation was directed to be paid to the heirs of the deceased and to the injured. The action taken reports were required to be filed.

5. Accordingly, the joint Committee has filed its report dated 29.10.2020. The Committee held its first meeting on 07.08.2020, inspected the unit on 14.8.2020, interacted with the unit officials present and the officers of the neighboring industry. The Committee also examined the functioning of the unit, its process, sequence of events, causes of accident, status of compliance of Standard Operating Procedures (SOPs), persons responsible, damage assessment, restoration plan and remedies to avoid such accidents in future. It will suffice to reproduce the significant extracts from the report, as follows:

**“VII Causes of Accident**

**VII.a Immediate trigger to the accident**

*The reactor or distillation column has to be operated at vacuum pressure in the range of 680mm of Hg to 720mm of Hg. But the operators of both shift-II and shift-III have noted that vacuum pressure reading was 350mm Hg. This means more vacuum was created inside the reactor. As the pressure decreases the boiling point of solvent also decreases. Due to continuous steam supply, the solvents are heated up, vapour pressure has increased, reactor mixture have started to decompose & boil due to high temperature. This reaction can hold up to a certain level after which it reaches critical point.*

***At this point of time though steam supply is stopped, but the temperature and vapour pressure inside reactor 102 has built up to a critical level leading to static over pressure or internal blast load and when one of the operator has opened the sampling valve to collect samples, the solvents under very high static load (highly pressurised) have gushed out of the sampling vent (as soon as the solvents have come out of the nozzle have expanded appearing like a smoke) and may have reached auto ignition temperature causing fire outburst. The operators have seen the fire and then the fire has spread into the reactor leading to an explosion of reactor 102 and its rupture. The committee is of the opinion that after the outbreak of fire even if the operators had turned on the flame arrestors it would have been difficult to arrest the fire. Without opening the sampling valve the options that may have prevented the explosion are as follows:***

- a. To break the vacuum by passing an inert gas***
- b. To cool the reactor by flooding of coolant***

***The vacuum pump was not working properly and the required vacuum pressure for the reaction i.e. 680mm to 720mm of Hg was not maintained. The unit did not have interlocking facility for critical process parameters such as temperature, pressure and vacuum to auto cut-off steam supply when pressure was very low. Pressure releasing valves were not present in the reactor. In spite of such low pressure, there was no alarm system in the unit to alert the staff. There was no temperature sensors attached to the reactor to indicate the temperature build-up in the reactor. Even the fire alarm and flame arrestors had to be manually operated. Though firefighting measures like fire hydrant & froth system, sprinkler system was present but had to be manually operated. DMSO being heavier than air has moved at lower levels causing fire outbreak which spread into the reactor causing explosion. There was considerable difference in height between auto sprinkler and sampling valve where fire first occurred (the solvents coming out of nozzle auto-ignited). Hence, the only existing auto-safety measure also failed. The unit was functioning on manual intervention and even the critical safety points were not automised.***

*Only four persons including one security person were present during the shift. Persons present in the unit at the time of accident is given in table 3.*

**Table 3: Details of persons present at the time of accident**

Sl. NO	Name of the person present at the time of accident	Age	Designation	Qualification	Experience in the unit
1	Sh. T. Malleswara Rao	33	Shift Incharge-III & Senior Operator	ITI	2 years
2	Sh. K Srinivas Rao	44	Junior operator	10 <sup>th</sup>	8 years
3	Sh. Manoj Kumar	23	Chemist	M. Sc	6 months
4	Sh. B Chinna Rao	46	Security guard	10 <sup>th</sup>	Manpower supplied by security agency and persons keep changing

**The Shift incharge cum senior operator Sh. T. Malleswara Rao aged 33 years was an ITI graduate with 2 years experience and Junior operator Sh. K Srinivas aged 44 years was 10<sup>th</sup> standard qualified with 8 years experience. Sh. Manoj kumar aged 23 years was working as chemist in the unit for past six months. This indicates that qualified and experienced persons were not present in the unit at the time of accident.**

**In spite of both operators recording low vacuum pressure but immediate action is not taken like breaking of vacuum with inert gas and flooding of coolant into the jacket of reactor SSR 102 to cool the reactor. Collection of sample should have completely avoided at this point of time. This indicates lack of training and emergency preparedness of the staff.**

**Table 4: status of reactor at the time of accident**

Sl. NO	Reactor	Status
1	101	DMSO charged to reactor but operation not started. Reactor containing 5KL of spent DMSO. Operation was scheduled to start on the morning of 14.07.2020
2	102	Previous batch of DMSO completed at 5:00 PM. Reported that reactor was cleaned new batch of DMSO charged and batch started at 8:30 PM. 17 to 18 hrs batch. 5 KL of DMSO present
3	103	MDC and methanol (MDC-25% and Methanol-75%) under process. 5 KL of spent solvent present
4	104	MDC & methanol mixture (MDC-25% and Methanol-75%) charged but batch not started. Operation was scheduled to start on the morning of 14.07.2020. Reactor contains 5 KL of solvent
5	105	MDC& Methanol (MDC-25% and Methanol-75%) under process. 5 KL of solvent present

The total spent solvents present in reactors is 25 KL and 15 KL under process. Though in other two reactors, process was scheduled for operation on the morning of 14.07.2020 but the reactors were charged. DMSO charged in reactor 102 where accident occurred was procured from M/s Pratik industries, pashamailaram, Patancheru, Medak district in Telangana. M/s Pratik industry is having Consent for operation and hazardous waste authorization from Telangana SPCB valid till 31.12.2020.

**VII.b.** Compliance of the unit with Standard operating procedure for operating Solvent Recovery plant: CPCB issued Standard Operating Procedure and checklist of minimal requisite facilities for utilization of hazardous wastes and Other Wastes (Management and Transboundary movement) Rules, 2016 for “Utilization of Spent Solvent for recovery of solvent” in March, 2018 and again revised in August, 2019. (Revised version of the SOP prepared in June, 2016 and circulated vide letter dated 30.06.2016). The CFO issued by APPCB is enclosed as Annexure-III. The compliance status of the unit with SOP is given in table 5.

**Table 5: Compliance status of unit with SOP for operating SRP as per the inspection report of APPCB dated 01.04.2019**

SL. No.	Standard operating Procedure for Utilization	Compliance status
1	The spent solvents containing Toluene, Xylene, Cyclohexane, Acetone, Methyl isobutyl Ketone, Methanol, Iso propyl alcohol, Methylene Dichloride, Tetra hydro furan, Ethyl Acetate, Iso propyl ether, Dimethyl formamide, Butyl Acetate, Methylacetate, Butanol, Benzene, Ethanol and Methyl ethyl ketone shall be procured only in tankers/drums.	The industry procuring the solvents only in Tankers/drums
2	The spent solvents shall be transferred from tankers/drums to the raw material storage tank and to distillation column by solvent transfer pump.	Complied
3	Transportation of spent solvents shall be carried out by sender or receiver (utilizer) only after obtaining authorization from the concerned SPCB under the Hazardous and other wastes(Management & Transboundary movement) Rules,2016	Complied
4	It shall be ensured that the aforesaid hazardous waste is procured from the industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and other wastes (Management & Transboundary movement) Rules,2016	The industry was informed to submit the six months reports
5	During loading and unloading of spent solvents/ Recovered solvent from tanker to storage tank to Tanker, vent (of both storage tank to Tanker) shall be connected to each other so as to minimize VOC emissions.	Complied

6	Vent of storage tanks (i.e. Spent Solvent and Recovered Solvent) shall be connected through condenser.	Not provided
7	All the vehicles entering the utilization premises shall be fitted with the spark arrestor.	--
8	The vent of the condenser shall be at least 06 meters above the roof top or at height prescribed by SPCB/PCC, whichever is higher.	Complied
9	The vent of the condenser shall be passed through VOC absorption media like activated carbon and shall comply with the prescribed standards.	Not provided. Not complied
10	The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment such as hard hats, goggles, face shield, steel toed shoes, gloves, aprons, respirators etc.	As on date of inspection found complying.
11	The unit shall provide laboratory facility for analysis of solvent.	The facility is having lab for analysis of solvent
12	The unit shall provide suitable fire safety arrangements and spark/flame proof electrical installation/fittings.	Provided
13	The unit shall obtain license from Petroleum and Explosive Safety Organization of Govt. of India.	The license not obtained by the facility.
14	The spent solvents generated from Pesticides industry shall not be mixed with any other spent solvent and be distilled separately in separate batch. The Solvent recovered from spent solvent generated from Pesticides industry shall preferably be sent to the generator itself or other pesticides manufacturing units. However, such recovered solvent shall not be used in the process of production of pharma, food, and cattle feed.	The facility not using the spent solvents generated from Pesticides industry
15	The packing of products i.e., recovered solvent shall be labelled as " The product has been recovered from spent solvent generated from Pesticides /Dye and Dye intermediate industries/Drugs/etc. (as the case may be) manufacturing process".	--
16	Residue generated from the distillation unit shall be packaged and temporarily stored in a dedicated hazardous waste storage area within the unit. The same shall be disposed in common Hazardous Waste Treatment Storage Facility or sent to cementkilns for co-processing/ utilization at facility, as authorised by the concerned SPCB/PCC.	The facility disposing the hazardous waste to TSDF

17	The unit shall ensure that all the discarded/used drums/barrels are either sent back to the unit from the where the spent solvents is procured or to the facility who has authorisation for utilization of used drums/barrels or to the common Hazardous Waste Treatment storage and Disposal facility (CHWTSDf) for disposal, as authorized by the SPCB/PCC.	Sending drums to authorized parties.
18	The condensate water from distillation and effluent generated from cooling tower shall be managed as per the conditions stipulated by the concerned SPCB/PCC under the water (Prevention and control of pollution) Act, 1974.	The facility is sending effluents to CETP of Ramky
19	Transportation of the residue generated during the utilisation process shall be carried out by sender or receiver (TSDF operator ) as per the authorization issued by the concerned SPCB in accordance with provision under the Hazardous and other Waste (Management & Transboundary movement) Rules,2016	Complied
20	In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, ransportation and disposal, the unit shall be liable to implement immediate response measures, environmental site assessment and remediation of contaminated soil/ ground water/ sediment etc. as per the "Guidelines on implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Wastes and Penalty" publish by CPCB.	--
21	During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, Wherever applicable.	The facility is having valid PLI policy.

***No proper safety measures such as auto cut-off system with interlocking to temperature (steam supply) and pressure, no alarm system to alert the staff on critical operational parameters, lack of training to the staff, persons with limited experience and qualification working in the shop floor, improper handling of raw material, citing of the unit near to transmission tower, no separate shed for storing distillation residues, temporary arrangement such as use of hose pipe to transfer solvents, absence of pressure release valves are all the causes for the accident. Because these non-compliances one or the other day may lead to an accident. The immediate trigger to explosion was improper working of vacuum pumps-) decrease in vacuum pressure reading or increase in vacuum in the reactor-) increase in vapour pressure leading to static over pressure or internal blast load reaching critical points in the absence of pressure release valves in the reactor-) opening of nozzle for sample collection at the same time-) expansion reaction appearing like smoke-) auto ignition causing fire-) fire spreading to***

**reactor causing explosion & rupture of reactor 102-) fire spreading to entire unit and engulfing it.**

**VII.c. Who is responsible for accident: It is the primary responsibility of the unit to establish infrastructure facilities for its safe operations and to provide safe working conditions to its employers. It is the responsibility of the unit to comply with all statutory, regulatory, safety clearances stipulated by various concerned departments. Equal responsibility also lies with the operators to ensure safe operation, on recording such low pressure, the operators could have immediately stopped steam supply. The unit M/s Visakha Solvents and its employers are solely responsible for the accident. The main cause for the accident is failure to comply with safety guidelines.**

APPCB issued amendment for change of name vide order dated 18.09.2010 by stipulating condition that M/s Ramky Pharmacity shall have the overall responsibility for operation and maintenance of solvent recovery unit along with other infrastructural facilities. In any case, M/s Ramky Pharmacity Pvt Ltd., would stand to continue answerable for environmental impacts/ damage caused due to the operation of solvent recovery unit. Hence, the unit M/s Visakha Solvents and **M/s Ramky Pharmacity are liable to pay the compensation.**

#### **VIII Damage Assessment and Calculation of Compensation**

A major accident occurred at M/s Visakha Solvents and it was most unfortunate. But even in this unfortunate incident, the best thing was fire moved vertically upwards and had it spread horizontally, it would have been very devastating. The vegetation cover around the unit followed by open spaces, wind direction and wind speed prevented the fire from spreading to neighbouring industries and fire was confined only to the premises of M/s Visakha Solvents. The damages that occurred due to accident are as follows:

**VIII.a.** Loss of life and status of award of compensation: Only four persons were present in the unit at the time of accident out of which one person was found dead in the accident spot and other person succumbed to injury in the hospital. As per the report given by District administration, only two persons have died.

**VIII.a.i** K. Srinivasa Rao, Junior operator was found dead in the accident spot. Sh. K. Srinivasa Rao aged 44 was charred to death. As per the post-mortem examination, the body was found in pugilistic attitude which is caused by coagulation of muscle proteins when body is exposed to extremely high temperature. The whole body surface burns noted and reddish brown fluid purging out of nose and mouth on tilting of body. Based on the post mortem examination the committee recommends that Sh. Srinivas Rao died because of the accident and is liable to be compensated. **The State of A.P has declared the compensation of Rs. 50.00 lacs ( 35.00 lacs to be paid by unit and Rs.15.00 lacs by state of A.P) out of which the unit has already paid Rs.35.00 lacs to the dependent members of deceased.**



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 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.50.00 lacs is adequate or not.

As explained in table 6 and table 7, 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, 1923 the compensation amount of Rs.50.00 lacs fixed by the State of A.P is adequate.

**VIII.a.ii** Sh. Malleswara Rao (alias Maneswara Rao as per aadhar card), Senior Operator aged 33 years- Deceased Sh. Malleswara Rao senior operator suffered burnt injuries on 13.07.2020 during accident but managed to escape during the fire accident. He was taken to hospital for treatment but he succumbed to the injuries one week post-accident in the hospital. The committee recommends that Sh. Malleswara Rao died because of the accident due to burns & inhalation of solvent vapours and is liable to be compensated. The State of A.P has declared the compensation of Rs. 50.00 lacs( 35.00 lacs to be paid by unit and Rs.15.00 lacs by state of A.P) out of which the unit has already paid Rs.35.00 lacs to the dependent members of deceased.

As explained in table 6 and table 7, 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, 1923 the compensation amount of Rs.50.00 lacs fixed by the State of A.P is adequate. The unit has paid the employer share of Rs.35.00 lakhs to the dependents of the deceased.

**Table 6: Assessment of compensation**

Name of the deceased	A* Amount of compensation in INR as per Hon'ble Supreme Court	OR Whichever is more is considered by the committee to ascertain	B As per Employee Compensation Act, 1923
	Judgement in civil appeal No. 6339 of 2019 and civil appeal No.3483 of 2008	the adequacy of compensation	
Late Sh. K.	28,87,200/-		Compensation= fifty

<p><i>Srinivasa Rao, Junior operator</i></p>			<p><i>percent of the monthly wages of the deceased x relevant factor</i></p> <p><i>= Rs. 7500/- x 175.54 &amp;</i></p> <p><i>= Rs. 13,16,550-</i></p>
<p><i>Late Sh. Malleswara Rao, Senior Operator</i></p>	<p><i>39,28,800/-</i></p>		<p><i>Compensation= fifty percent of the monthly wages of the deceased x relevant factor</i></p> <p><i>= Rs. 7500/- x 203.85&amp;</i></p> <p><i>= Rs. 15,28,875/-</i></p>

*\* A-) calculation is explained in table-7.*

*&-) As per EC Act, 1923 the Central Government has specified 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 7: A- Amount of compensation in 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 Or Age at the time of death	Qualification & Designation	Salary per month for permanent employee	Future prospect s (40% of the income)	less tax	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	Compensation
			A	B	C	D	E <sup>T</sup> =50% of D	F=D- E	G	H <sup>#</sup>	I <sup>\$</sup>	J <sup>&amp;</sup>	L=(F*G*H) +I+J
K. Srinivas Rao	44	10th pass	22000	8800	-	30800	15400	15400	184800	2587200	100000	200000	2887200
Sh, Malleswara Rao	33	ITI	27000	10800	-	37800	18900	18900	226800	362880	100000	200000	3928800

T Deduction towards personal expenses varies @50% for age of the deceased 20yrs to 50yrs and @40% for age of the deceased more than 50yrs.

# Depending on the age, the factor is fixed. 14 for age group 41-45 years and 16 for age group 31-35 years

\$ Entire responsibility taken by unit for shifting mortal remains

& The committee fixed the amount as Rs.2,00,000/- for loss of love and affection

@ The committee fixed the amount as Rs.1,00,000/- for loss of estate, funeral expenses and for shifting mortal remains

**VIII.a.iii** Sh. Manoj Kumar, Chemist aged 23 years and Sh. Chinna Rao, Security Guard aged 46 years

These two persons reached the main gate unharmed. The committee is of the opinion that they are not liable for monetary compensation but during the accident, the employees have inhaled gases, solvent vapours, unburnt residues, ash etc emanated during accident which may have immediate and long term impact on their health. In view of the above, the health conditions of these two employees shall be ascertained by qualified medical practitioner and based on the recommendations of the medical practitioner, the District Magistrate may fix the amount of compensation as per Employee Compensation Act, 1923. If the employees desire to have further health monitoring, the unit shall tie-up with a hospital and the health profile of the two employees shall be monitored for a minimum period of two years (once in six months health monitoring). During the period of the monitoring, if the hospitals observe variations in the health profile and if the qualified medical practitioner are able to establish that it is due to accident or occupational exposure of solvents then the unit is liable to pay compensation to these two employees as per Employee Compensation Act, 1923. The expenditure incurred towards testing and monitoring shall be completely borne by the unit. The six-monthly health reports of these two employees shall be submitted to district administration. Further the health profile of the employees may be reviewed annually by a Government Doctor.

**VIII.b** Loss of Vegetation: From the satellite images, it is evident that the unit was surrounded by green belt followed by open spaces which prevented the spreading of fire. During the committee inspection, burnt trees were observed. The committee has considered loss in vegetation in two ways:

**VIIIb.i** Loss in vegetation due to industrial activity/ deforestation by the unit. The committee has considered the historical satellite image of 07-12-2019 and latest image of 12.04.2020.

The unit has cleared the vegetation on the backside of the unit (land belongs to pharmacy) to store the solvent drums. **The committee has attributed this loss in vegetation to industrial activity and is liable to pay environmental compensation. The deforested plot area is 50.51mx 52.09m (2631.066 sqm or 0.65 acres). The committee Consulted Forest Department and it was informed that about 2.0 lakhs per hectare is charged for compensatory afforestation. Since the unit was responsible for cutting fully grown-up trees, the committee fixes an Environmental compensation attributed on account of causing deforestation is Rs. 2,00,000/- . In addition, the unit shall take complete responsibility to develop green belt in the area where trees were cut.**

**VIII.b.ii** Loss in vegetation due to accident: The plantation in the entrance of the unit was burnt. The burnt plantation area is around 0.05 acres. The unit shall take complete responsibility to develop

green belt in the area where trees were burnt and also all along the periphery of the unit.

**VIII.c.** Contribution of Emissions into the atmosphere: Emissions or pollutants are released into atmosphere on account of burning of solvents. Since the data on precise quantity of solvents burnt on the day of accident is not available. The committee has used reverse calculation:

**Table 8: Assessment of quantity of solvents burnt**

Quantity of spent solvents burnt	=	161 KL of solvent burnt			
		Name of solvent	Quantity burnt in KL	Density	Quantity burnt in MT
		DMSO	10KL	1.1004 g·cm <sup>-3</sup>	11.004
		MDC	6 KL	1.3266 g/cm <sup>3</sup> (20 °C)	7.9596
		Methanol +Toluene (75% MEOH+25% Toluene)	50 KL	MEOH-0.792 g/cm <sup>3</sup> Tol-0.87 g/mL	29.7-MEOH 10.875-Tol
		Mixed solvents (Methanol-70%, Toluene C <sub>7</sub> H <sub>8</sub> -10%, acetone C <sub>3</sub> H <sub>6</sub> O-5%, other solvents-15%)	45 KL	0.792 g/cm <sup>3</sup> (density of methanol is considered since it is the major component)	35.64
		Acetone	24 KL	0.7845 g/cm <sup>3</sup> (25 °C)	18.828
		Iso Propyl alcohol (IPA)	26 KL	0.786 g/cm <sup>3</sup>	20.436
		<b>Total</b>	<b>161 KL</b>		<b>134.4426</b>
Distillation residue burnt	=	As per the records of CWMP, average 3 tonnes of distillation residue is generated. (8 to 8.5 tonnes of waste is sent to TSDF in once in two to three days). On 09.07.2020 waste is sent. Waste generated from 09.07.2020 to 13.07.2020 was lying in premises.  3tonnes per day x 5 days  15tonnes			

**Table 9: Gases likely to be released by the solvents**

<i>Chemical name</i>	<i>formula</i>	<i>Most emitted gases after explosion</i>	<i>Reference</i>
<i>DMSO – ) dimethyl sulfoxide</i>	<i>C<sub>2</sub>H<sub>6</sub>OS</i>	<i>Sulphur dioxide, carbon dioxide, methyl mercaptans &amp; formaldehyde which is combusted to release SO<sub>2</sub> &amp; CO<sub>2</sub></i>  <i>SO<sub>2</sub>, CO<sub>2</sub></i>	<a href="https://pubchem.ncbi.nlm.nih.gov/compound/Dimethyl-sulfoxide">https://pubchem.ncbi.nlm.nih.gov/compound/Dimethyl-sulfoxide</a>
<i>Methylene di-chloride</i>	<i>CH<sub>2</sub>Cl<sub>2</sub></i>	<i>Phosgene, hydrogen chloride and carbon monoxide</i>  <i>COCl<sub>2</sub>, HCl, CO</i>	<a href="https://pubchem.ncbi.nlm.nih.gov/compound/6344">https://pubchem.ncbi.nlm.nih.gov/compound/6344</a>
<i>Methanol</i>	<i>CH<sub>3</sub>OH</i>	<i>Carbon dioxide</i>	<a href="https://pubchem.ncbi.nlm.nih.gov/compound/887">https://pubchem.ncbi.nlm.nih.gov/compound/887</a>
<i>IPA</i>	<i>C<sub>3</sub>H<sub>8</sub>O</i>	<i>Carbon dioxide</i>	
<i>Acetone</i>	<i>(CH<sub>3</sub>)<sub>2</sub>CO</i>	<i>Carbon dioxide</i>	<a href="https://pubchem.ncbi.nlm.nih.gov/compound/180">https://pubchem.ncbi.nlm.nih.gov/compound/180</a>

The chemical reactions that may have taken place during explosion and gases that are likely released are as follows:

*Table 10: gases emitted during explosion and combustion of solvents*

<b>DMSO reaction</b>								
<i>C<sub>2</sub>H<sub>6</sub>OS + 4O<sub>2</sub> – ) SO<sub>2</sub> + 2CO<sub>2</sub> + 3H<sub>2</sub>O</i>								
<i>C<sub>2</sub>H<sub>6</sub>OS</i>	+	<i>4O<sub>2</sub></i>	=	<i>SO<sub>2</sub></i>	+	<i>2CO<sub>2</sub></i>	+	<i>3H<sub>2</sub>O</i>
78.13344	+	31.9988	=	64.0638	+	44.0095	+	18.01528
11.004 MT	+	18.02 MT	=	<b>9.02 MT</b>	+	<b>12.39 MT</b>	+	7.61 MT
<b>MDC combustion reaction</b>								
<i>CH<sub>2</sub>Cl<sub>2</sub> + O<sub>2</sub> – ) CO<sub>2</sub> + 2HCl</i>								
<i>CH<sub>2</sub>Cl<sub>2</sub></i>	+	<i>O<sub>2</sub></i>	=	<i>CO<sub>2</sub></i>	+	<i>2HCl</i>		
84.93258	+	31.9988	=	<u>44.0095</u>	+	<u>36.46094</u>		
7.9596 MT	+	2.99	=	<b>4.12</b>		<b>6.83</b>		

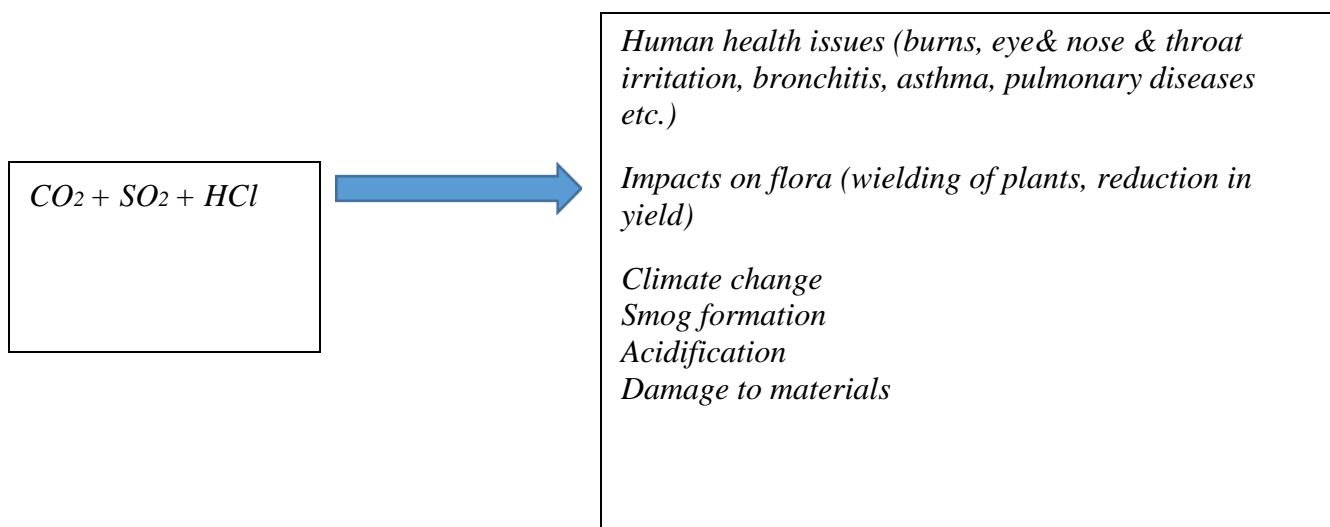
<b>Methanol+Toluene combustion reaction</b>						
$2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$						
$C_7H_8 + 9O_2 \rightarrow 7CO_2 + 4H_2O$						
$2CH_3OH$	+	$3O_2$	=	$2CO_2$	+	$4H_2O$
32.04186	+	31.9988		44.0095	+	18.01528
65.34 MT	+	97.87 MT	=	89.74 MT	+	73.47 MT
$C_7H_8 + 9O_2 \rightarrow 7CO_2 + 4H_2O$						
$C_7H_8$	+	$9O_2$	=	$7CO_2$	+	$4H_2O$
<u>92.13842</u>	+	<u>31.9988</u>	=	<u>44.0095</u>	+	<u>18.01528</u>
10.875	+	33.99	=	36.36	+	8.50
<b>Acetone combustion reaction</b>						
$(CH_3)_2CO + 4O_2 \rightarrow 3CO_2 + 3H_2O$						
$(CH_3)_2CO$	+	$4O_2$	=	$3CO_2$	+	$3H_2O$
<u>58.07914</u>	+	<u>31.9988</u>		<u>44.0095</u>	+	<u>18.01528</u>
18.828	+	41.49		42.80	+	17.52
<b>Iso Propyl Alcohol combustion reaction</b>						
$2C_3H_8O + 9O_2 \rightarrow 6CO_2 + 8H_2O$						
$2C_3H_8O$	+	$9O_2$	=	$6CO_2$	+	$8H_2O$
<u>60.09502</u>	+	<u>31.9988</u>	=	<u>44.0095</u>	+	<u>18.01528</u>
20.436	+	48.96	=	44.89	+	24.50

The total emissions contributed into the atmosphere by combustion of 161 KL of solvents is as follows:

SO<sub>2</sub>- 9.02 MT  
CO<sub>2</sub>- 230.3 MT  
HCl- 6.83 MT

**VIII.d Valuation of environmental damages due to ammonia release: SO<sub>2</sub>, CO<sub>2</sub> and HCl gases so released into the environment will impact on human well being either directly or by the formation of secondary pollutants. The damage caused and the level of impact due to emissions is expressed in monetary terms by the committee which is one of the ways by which the scale of impact can be communicated. In order to quantify the impacts in monetary terms, it is essential to understand the mechanism by which the impact happens. The impact pathway reveals, how emitted pollutants lead to different adverse outcomes on human wellbeing and other natural environment. The committee has used both market**

**price method and opportunist cost method to express the damage in monetary terms.**



UK-Defra values have been referred by the committee for assessing the damages. In the matter of OA 22/2020 (PB) in which CPCB was nodal agency, the committee has assessed environmental prices in INR for major environmental pollutants and report is submitted to Hon'ble NGT. The environmental prices in INR for the damage is taken from the report.

SO<sub>2</sub>- 9.02 - Rupees 2.1989 lacs per tonne of emission  
 CO<sub>2</sub>- 230.3 - Rupees 0.225 lacs per tonne of emission  
 HCl- 6.83 - Rupees 0.2189 lacs per tonne of emission

**Table 11: Valuation of damages**

Pollutant	SO <sub>2</sub>	HCl	CO <sub>2</sub>	Total
Pollutant load (a) in tonnes	9.02	6.83	230.3	246.15
Damage value per tonne in INR lacs (b)	2.1989	0.2189	0.0225	2.4403
Damage value in lacs (c= a*b)	19.83408	1.495087	5.18175	26.5109
15 tonnes of distillation residue is burnt. The treatment cost of residue is Rs. 10,000/- . Since it was directly let out into atmosphere and cost of treatment is to be compensated by unit. =15 tonnes x Rs 10,000/- per ton of distillation residue =1,50,000/- =1.5 lacs				
Total valuation of Environmental damages due to emissions				Rs. 28,01,092/-
Rupees Twenty Eight Lacs One Thousand Ninety Two only				

UK-Defra values published in October 2018 are adopted for considering nature of impact. Ref: Environmental Prices Handbook,



EU28 version.

<https://www.cedelft.eu/en/publications/2191/environmental-prices-handbook-eu28-version>.

From table 11, the committee estimates that total environmental damage of Rupees Twenty Eight Lacs One Thousand Ninety Two only due to air pollution caused by explosion and fire at M/s. Visakha Solvents, Visakhapatnam.

The committee interacted with two persons who survived the accident and also with surrounding industries. None of them complained about any smell or odour nuisance or any discomfort during the accident. Officials from APPCB, regional office Visakhapatnam worked in the accident site on 13.07.2020 at 11:45 till 14.07.2020 till 17:00 hrs. APPCB have monitored VOC's and other gases in the unit premises. The committee interacted with APPCB officials and they informed that the values of VOC's and CO was less, higher values of SO<sub>2</sub> was recorded. Explosion and massive fire has caused extremely high temperatures and at that high temperature, gases are completely burnt and chances of VOC emissions may be less.

**VIII.e.** Damage to property in terms of material loss: The explosion created massive noise and this caused the glasses in window pane to break in neighbouring industries. Huge sound and noise has occurred during the accident however during the committee inspection, the sound levels were low since no industrial activity is taking place in the premises. The committee could not assess EC for the impact caused due to noise pollution but the unit will take complete responsibility for installing the broken glass. Three reactors are completely damaged, one tanker, one car and two motor cycles are completely burnt out. If the car and motorcycles belonged to the employees, the cost of the same shall either reimburse to the employees or new ones shall be provided.

**VIII.f.** Damage to soil: **The soil is contaminated by burnt ashes, solvents and other chemicals. The unit and Ramky pharmacy shall make earthen bunds along the periphery of the unit and prevent run-off from the premises to join drains or other water sources.** Top soil upto a depth of 50cm to 1m shall be removed and sent to TSDF.

**VIII.g. Total Compensation M/s Ramky Pharmacy and M/s Visakha Solvents is liable to Pay**

- a. Compensation to the deceased persons-) Rs.70,00,000/-
- b. Environmental Compensation for loss of vegetation-) Rs.2,00,000/-
- c. Environmental Compensation on account of contribution of emissions into environment-) Rs. 28,01,092/-

**The unit has paid the compensation of Rs.35.00 lakhs each to the dependents of the deceased and disbursed through the District Commissioner or through the Officer identified by state of A.P. M/s Ramky Pharmacy and M/s Visakha Solvents**

**jointly shall pay the Environmental Compensation of Rs. 30,01,092/- (Rupees Thirty Lacs One Thousand Ninety Two only) to CPCB.**

**IX Restoration Plan**

**IX.a Restoration measures**

<i>Sl. No</i>	<i>Restoration Measure</i>	<i>Time limit</i>
1	<i>Construction of earthen bunds to arrest runoff</i>	<i>To be completed latest by December 01, 2020</i>
2	<i>The effluent stored in two effluent storage tanks (High TDS and low TDS tanks) shall be sent to Ramky CETP. After sending the effluent to CETP, the solids settled at the bottom of tanks shall be removed and sent to M/S Coastal Waste Management Project (TSDF) for incineration. APPCB &amp; Inspectorate of Factories shall monitor this activity and photos will be taken and report to Hon'ble NGT. Utmost precautions will be taken while removing the settled solids from the tank following all safety requirements. The workers involved will be provided with PPE's.</i>	<i>To be completed latest by December 15, 2020</i>
3	<i>During the visit the committee observed that solvents stored on storage tanks and in recovery tanks were intact. The leftover solvents from the tanks shall be either sent to TSDF for incineration or cement plant for co-processing. APPCB &amp; Inspectorate of Factories shall monitor this activity and photos will be taken and report to Hon'ble NGT.</i>	<i>To be completed latest by December 15, 2020</i>
4	<i>Demolition of existing structure and disposing the C &amp; D waste also to TSDF as it is likely to be contaminated. The reactors and equipment can be re-used</i>	<i>January 31, 2021</i>
5	<i>Plantation of sapling at all places where unit has carried out deforestation and in spaces where plants are burnt</i>	<i>To be completed by May 30, 2021</i>
6	<i>Excavation of minimum top 50cm soil from the entire premises and send to TSDF. The quantity of excavated earth removed by unit and received by TSDF shall be verified by APPCB and ensured that correct hazardous waste returns are filed. APPCB shall involve in the process of clean up. The photos and report of the same shall be furnished to District Magistrate. APPCB shall monitor the premises after the removal of top soil, if any dumps are found in the premises, the same can be removed and sent to TSDF.</i>	<i>To be completed by May 30, 2021</i>

	<p><i>The TSDF after receiving the waste from the unit shall analyse and dispose the waste suitably either for landfilling/ incineration/ partly for both. After analysis the TSDF shall furnish a copy of the analysis results to APPCB and to the committee. APPCB may collect random samples from site and analyse in their laboratory to cross-verify the correctness of test report of TSDF.</i></p> <p><i>The entire clean-up work shall be carried out by unit and Ramky pharncity responsibly and shall be monitored by APPCB. The surrounding industries will also watch on the activity. The drains surrounding the unit shall be checked for any dumping of waste/ effluent. If the unit is found violating, then both the unit and Ramky pharmacy may be heavily penalised in addition to booking criminal cases against them.</i></p>	
7	<i>APPCB shall monitor noise and ambient air quality during demolition and shifting of waste to TSDF.</i>	-
8	<i>After the above actions, Ramky Pharmacy may rent out the plot to an industry with low fire hazard potential considering its proximity to transmission towers.</i>	-

**IX.b** *Alternate arrangement for disposal of spent solvent by member industries: The unit was a common spent solvent recovery plant taking spent solvents from different industries from Andhra Pradesh and Telangana recovering it and after recovery either returning back to mother industry or to other industries. The spent solvents so generated from the member industries of M/s Visakha Solvents has to be safely disposed. Hence immediately after accident, CPCB had informed APPCB to chalk out alternate arrangements for the member industries. APPCB regional office Visakhapatnam informed to the committee that there are 8 stand-alone solvent recovery units apart from more than 50 captive solvent recovery plants in Andhra Pradesh & the industries who were supplying spent solvents to M/s Visakha Solvents were informed to give to other solvent recovery unit.*

**X** *View Points of Stakeholders and neighbouring industries: The committee interacted with industry personnel and representatives from the surrounding industries who were present in their respective industry at the time of accident at M/s visakha Solvents*

**X.a.** *Sh. Sudhakara Reddy, Managing Director, M/s Visakha Solvents. The actual cause for the accident is still under investigation by the unit and by M/s Ramky pharncity. The unit has submitted that they were complying with all points of SOP's except two and CFO conditions stipulated by APPCB. The unit has collected all surface runoff and sent to CETP. It is informed that only surface discolouration in some areas is observed. The unit has already engaged MoEF & CC registered and NABET and NABL accredited third party to study the area and prepare remediation plan. The submissions made by the unit is placed as Annexure-IV.*

**X.b.** *Sh. Manoj Kumar, Chemist and Sh. Chinna Rao Security Guard present during the accident The committee interacted with Sh, Manoj Kumar through video call. He informed to the committee that the he work was going on as usual and suddenly he observed major fire*

and he started running towards main gate. 10 mins later an explosion happened. Presently he is fine and he is not having any health issues.

**X.c.** Sh. Kasi Viswanadha Rao and Sh. S. Mohana Rao, Mahidhara Chemicals Pvt. Ltd., Reported that the accident occurred on 13.07.2020 at night around 22:35 to 22:40 hrs. First the staff heard huge light, sound along with fire and again after few minutes they heard huge sound, light and fire. But they did not feel any smell or discomfort.

**X.d** Sh, U Lakshmana Rao, Sh.P. Kiran Kumar and Sh. L. Srinivasa Rao from M/s Vasudha pharma Chem Ltd located 200m North of Visakha solvents informed that accident happened on 13.07.2020 at 22:45 hrs and caused panic to neighbouring industries. There was no smell and 75 glasses were broken.

**X.e.** Sh. D. Bhaskara Raju (Production-Executive), Sh. I Nooka Raju (Production- Officer), Sh. L. Rama Murthy (Production- Sr Operator), Sh. V. Mahesh (Production- Workman) and Sh. G.

Sathyanarayana (Electrician) from M/s Mahi drugs Pvt ltd located west of Visakha solvents first heard big sound and light with fire at 22:40 hrs., immediately electrical person shutdown the main power and started DG set in Mahi Drugs. Glass of security room is broken. No personal property of employees is damaged. No smell or fumes observed.

Xf. Actions taken by APPCB

APPCB issued stop production order on 14.07.2020 by withdrew of CFO & HWA orders. The copy is enclosed Annexure- V. Show cause notice dated: 22.07.2020 was issued to M/s.Visakha Solvents for levy of interim environmental compensation of INR 1.0 Crore. However the unit has not paid the interim environmental compensation of INR 1.0 Crore to APPCB. Copy enclosed as Annexure-VI.

## **XI Suggested remedies to avert such accidents in future**

### **XI.a The committee suggests following remedial measures**

1. To conduct periodical mock drills to the employees in controlled environment on actions to be taken during failure of critical process parameters
2. To impart regular training to the staff and to make them aware about process details, process functionalities. The industry shall train its employees to deal with emergencies arising out of leakage, abnormal temperature & pressure readings, increased emissions, pump failures, failure of air pollution control devices, effluent treatment plant, shock loads or any other accidents likely to occur due to particular industrial activity. Overall the industries should be prepared for emergency response readiness & effectiveness in terms of major & minor accidents.
3. To recruit competent and qualified staff

4. *APPCB shall accord CFO and authorization to only those solvent recovery plants complying with Standard operating procedure stipulated by CPCB*
5. *The distillation units shall install double valve system for taking samples during the process to minimize air ingress.*
6. *To provide interlocking arrangement for critical process parameter and pollution control systems. For example: If temperature is increasing exorbitantly, the application of steam or heat should be automatically stopped and purging of coolant or other means to reduce the temperature to desired range should be automatically done.*
7. *There should be auto alarm system or siren system to alert the employees in case of any deviations noticed in process parameter.*
8. *Vacuum distillation units/ autoclaves should be provided with pressure relief valve, pressure gauge and safety valve or rupture disc in the reactors.*
9. *Fixed pipelines with metering pumps will be provided for solvent transfer up to Day tanks/reactors. Any reaction upsets will be confined to the reaction vessel itself as defined quantity of charges of raw materials is issued to the reaction vessel/Day tank by metering pumps.*
10. *Flame arrestors, water curtains and other fire safety arrangements shall be installed. Spark / flame proof electrical fittings shall be installed.*
11. *The spent solvents shall be procured from only those industries having hazardous waste authorization from respective SPCB's/ PCC's.*
12. *Utility like Chilling, cooling, vacuum, steaming and its alternative will be provided to control reaction parameters in a safe manner.*
13. *Free Fall of any flammable material in the vessel will be avoided*
14. *Static earthing provision will be made at design stage to all solvent handling equipment, reactors, vessels etc*
15. *Reactor vent line will be connected with reflux unit or condenser in case of VOC or with scrubber in case of toxic gas generation in reaction.*
16. *All emergency valves and switches and emergency handling facilities should be easily assessable.*
17. *All the vessels should be examined periodically by a recognized competent person under the Factory Act.*
18. *All the vessels and equipment should be well earthed appropriately and well protected against Static Electricity. Also for draining in drums proper earthing facilities should be provided.*
19. *All solvents and flammable material storage tanks will be away from the Process plant and required quantity of material should be charge in reactor by Pump or by applying N2 pressure.*
20. *Temperature indicators are provided near all reactor and distillation systems.*
21. *All the Plant Personnel shall be provided with Personal Protection Equipment to protect against any adverse health effect during operations, leakage, spillages or splash. PPE like*

- Helmets, Safety Shoes, Safety Glasses, Acid-Alkali Proof Gloves etc. will be provided to the employees. All employees will be given and updated in Safety aspects through periodic training in safety.*
22. *To make it mandatory to all employees working in the industry to wear PPE's especially persons working in shop floor should not be allowed inside without PPE's*
  23. *Material Safety Data Sheets of Raw Materials & Products will be readily available at the shop floor.*
  24. *PLC base process controls and operation of plant will be installed wherever possible.*
  25. *Solvents will be transferred by pump only in plant area and day tank will be provided. Overflow line will be return to the storage tank or Pump On-Off switch will be provided near day tank in plant.*
  26. *Materials will be stored as per compatibility and separate area for flammable, corrosive and toxic chemical drums in store shall be earmarked.*
  27. *Smoking and other spark, flame generating item will be banned from the Gate.*
  28. *Provision for separate water reservoir of adequate capacity for Fire Hydrant system and provision of separate DG set for emergency power as per TAC guidelines (Tariff advisory committee) sufficient quantity of Foam compound for firefighting during solvent Fire. Sufficient numbers of Fire extinguishers will be installed in plant and storage area as per IS 2190:2010 guidelines.*
  29. *Pipelines and Flexible pipeline (SS 316/MS) are appropriately earthed to avoid accumulation of Static Electricity. Periodic Checkups of the pipelines will be conducted to curb any chances of mishap due to leakages. Preventive Maintenance Schedules will be in practice.*
  30. *Transport Emergency planning and training to driver and cleaner will be provided.*
  31. *On way emergency telephone number list will be provided to transporter.*
  32. *Emergency siren and wind sock will be provided.*
  33. *Onsite emergency plan and off site emergency plan will be prepared by the industries.*
  34. *First Aid Boxes and First Aiders will be made available at site at easily accessible places.*
  35. *Solvents Handling, solvent storage area, distillation unit should be declared as Flame Proof areas having complete Flame Proof fittings to avoid any mishap.*
  36. *To prepare onsite and offsite emergency plans.*

***XI.b In case of fire in these type of units, following procedure may be followed:***

1. *Preferably Switch off the Electrical Supply*
2. *Isolate all the incoming/outgoing solvent lines valves and switch-off Solvent handling Pumps immediately. Cut off incoming and outgoing from Solvent Recovery to the Plant. Stop Steam Supply to distillation unit and run only Chilled Water for cooling purposes.*
3. *Call Fire Brigade from nearest Fire station immediately*

4. *Use chemical/mechanical foam, CO2 and Dry Powder Type Extinguishers to Extinguish the Fire.*
5. *Remove neighbouring Drums of Solvents away from the Fire incident. In case of fire in the Bulk Storage close the valves of the neighbouring Tanks and use Foam Type Fire Extinguisher.*
6. *Do not use Water jet directly on the Solvent Fire as Water being heavier goes below the Solvents and Solvent will spill more thereby enhancing the Fire Area.*
7. *If the Fire breaks out in Solvent Recoveries or Bulk Storage Area, i.e. an open area where a strong breeze may be there diluting the effect of the CO2 to quench the Fire. In such case, use dry Powder Type Extinguishers.*
8. *In case of any Indoor Fires, use carbon di-oxide with dry Powder and Foam Extinguishers.*
9. *Isolation of the area and removal of the excess material from the vicinity of the Fire will help to control the Fire at an early stage.*

**XII Concluding remarks: The committee humbly submits that it is most unfortunate that the accident occurred but the committee has carried out the post-mortem of the accident and has tried to establish the causes of the accident, failures and practically achievable measures to address & resolve these failures. The committee observed that unit is ready to remediate the area and to pay environmental compensation for the damages.**

1. **An electrical transmission tower or power tower carrying high voltage transmission lines is present adjoining to the unit. During the accident, the power lines were burnt and electricity to the pharmacy was stopped. On 14.07.2020, after the fire subsided the wires were replaced and electricity connection was restored. The transmission tower and lines carry high voltage and induce electric fields. Short circuit may lead to flames or fire. The solvents are inflammable and may catch fire. Ramky pharmacy will use this plot for establishing an industry with low fire hazard potential.**
2. **No proper safety measures such as auto cut-off system with interlocking to temperature (steam supply) and pressure, no alarm system to alert the staff on critical operational parameters, lack of training to the staff, persons with limited experience and qualification working in the shop floor, improper handling of raw material, citing of the unit near to transmission tower, no separate shed for storing distillation residues, temporary arrangement such as use of hose pipe to transfer solvents, absence of pressure release valves are all the causes for the accident. Because these non-compliances one or the other day will lead to an accident. The immediate trigger to explosion was improper working of vacuum pumps-\* decrease in vacuum pressure or increase in vacuum in the reactor-\* increase in vapour pressure leading to static over pressure or internal blast load reaching critical points in the absence of pressure release valves in the reactor-\***

- opening of nozzle for sample collection at the same time-\* expansion reaction appearing like smoke-\* auto ignition causing fire-\* fire spreading to reactor causing explosion & rupture of reactor 102-\* fire spreading to entire unit and engulfing it.*
3. *The unit is burnt, the concrete structure housing the production equipment has collapsed. The unit is not in a position to carry out any industrial process in the current situation. The entire unit and its structures has to be re-erected to start the industrial operations. Since this is the scenario, the unit will demolish the remaining portion of the structure, and C& D waste shall be sent to authorized C& D waste recycler. The reactors and other equipment may be reused. The reactors, solvent storage tanks which are intact shall be shifted jointly by Ramky pharmacy and unit to alternate location found suitable after feasibility study. If the unit intends to re-establish, feasibility study report of the site may be submitted to APPCB for verification.*
  4. *APPCB shall verify the compliance status of all Solvent recovery plant in the state and only those plants complying with standard operating procedure issued by CPCB for operating the SRP and having all necessary clearances shall be permitted to operate. APPCB while issuing CFO & Authorization shall clearly specify the list of solvents that the unit can recover.*
  5. *The unit shall clean-up and restore the area as per the restoration plan suggested by the committee. The restoration plan suggested by the committee such as construction of earthen bunds to prevent runoff from the site, disposal of remaining solvents to TSDF, effluents from tanks to CETP, excavation of 50cm-100cm topsoil from the unit premises and dispose to TSDF etc shall be complied within a period of May, 2021.*
  6. *If the unit intends to re-establish the solvent recovery plant at an alternate site, feasibility study report of the site may be submitted to APPCB for verification.*
  7. *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.*
  8. *The committee humbly submits that the action taken against the industry and levying of EC from the unit will strengthen “Polluter Pay Principle” and will also be a lesson to other industries that they have to ensure self-monitoring, self-compliance and comply with statutory guidelines, safety measures, MOEFCC, CPCB, APPCB, Directorate of Factories etc.*
  9. *The committee humbly submits that the regulatory authorities can not involve & check on the day to day activities of the industries. It shall be the primary responsibility of the industries to ensure compliance. Self-monitoring and Self Compliance shall be enforced*



**by all the industries. The Regulatory Authorities shall exercise periodic check & review of the industries as per the mandate. The sole responsibility of recruiting competent staff, imparting Industrial, Environmental and Safety training to the staff lies, obtaining necessary clearances, NOC's from various departments lies with the industry. If the Regulatory Authorities learn about the non-compliances of the industries, shall immediately take action against the industry as per prevailing Rules.**

- 10. The committee humbly submits to Hon'ble NGT that it should uphold the principle of "Polluter Pay Principle". This will lay the foundation for the industries to exercise "Self-Compliance".**
- 11. The State of Andhra Pradesh shall direct the red category industries to carry out safety audit & risk management study and to prepare onsite and offsite emergency plans in compliance with MSIHC Rules, 1989 so that the possible risks from the industry are identified and appropriate risk mitigation measures and strategies are implemented. Detail management plan needs to be developed for safety measures.**
- 12. The district administration and urban development shall exercise caution and shall not accord permission for construction of residences in the vicinity of large red category industries/ industrial estates/ industrial areas.**
- 13. The compensation amount of Rs. 50.00 lacs per deceased person fixed by the State of Andhra Pradesh (Rs. 35.00 lacs by unit and Rs. 15.00 lacs by state of A.P) is adequate. The unit has paid compensation of Rs.35.00 lakhs each to the dependents of the deceased. M/s Ramky Pharmacy and M/s Visakha Solvents jointly shall pay Environmental Compensation of Rs. 30,01,092/- (Rupees Thirty Lacs One Thousand Ninety Two only) CPCB. Two employees exposed to emissions informed to the committee that they are fine and are not facing any health issues. However, the health conditions of two employees exposed to emissions & solvent vapours shall be assessed by qualified medical practioner and based on the assessment & recommendations of the medical practioner, District Magistrate may fix the compensation as per Employee Compensation Act, 1923.**
- 14. The measures suggested by the committee to avert such accidents shall be complied by the industries.**
- 15. The committee suggests that in-house comprehensive Environmental Audit should be conducted by the Management of the unit at regular intervals."**

6. The chemical unit in question has filed its response on 03.12.2020 giving the details of the processes. With regard to the report, it is stated

that the incident happened inspite of persons operating being experienced, having adopted safety measures. This plea is without any basis and is contradicted by the last para of the affidavit whereby finding of the Committee are accepted as follows:

“ xxx

xxx

xxx

***18. At this juncture, it bears mentioning herein that the present response does not object to the findings of the joint committee towards the payment of compensation to the families of deceased along with the environmental damage calculated by the joint committee and is merely restricted to the averments which portrays that VSL is solely attributable for the accident as there is failure to comply with safety guidelines. The same is causing prejudice to the reputation of VSL despite of them being committed towards reduction of pollution and preservation of natural resources. Without prejudice to the foregoing, it is submitted that while computing the environmental damages/ compensation, this Hon'ble Tribunal may take into cognizance the compensation amount already paid to the family of the deceased by VSL.”***

7. The report has also been filed by the Chief Secretary, Andhra Pradesh mentioning the steps taken after the incident and submitting of a report dated 06.07.2020 by the Committee constituted by the Government. The action taken report mentions a special drive for inspecting factories using hazardous chemicals, check list of safety protocols, constitution of State crises group, directions to the concerned departments to take safety measures, preparation of onsite and offsite emergency plans, holding of mock drills in some of the factories, holding of webinars and holding of a meeting by the Chief Secretary with concerned officials.

8. An affidavit has been filed on behalf of the MoEF&CC on 23.11.2020 covering eight matters of incidents arising out of the leakage of hazardous gases, relating to different such incidents in the last six

months<sup>2</sup>. The affidavit refers to the regulatory framework for enforcement of Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 [MSIHC Rules, 1989] and Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 [CAEPPR Rules, 1996]. Under MSIHC Rules, 1989, Petroleum and Explosives Safety Organization (PESO) is the nodal agency to approve the sites of industrial installation and isolated storage. The PESO and CIFs while giving site-specific approvals to industrial units and isolated storage are expected to ensure preparation of onsite emergency plans and safety reports by units, review the details of mock-drills conducted and implementation of Standard Operating Procedures (SOPs) of industrial operation by the unit from industrial safety point of view. The MoEF&CC is undertaking the following actions, in compliance with the Tribunal's directions on the

- 
- <sup>2</sup> i. Present matter and
- ii. 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);
  - iii. Order dated 08.06.2020, 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. 22/2020(WZ) (Earlier OA 22/2020)(WZ), Aryavart Foundation through its President vs. Yashyashvi Rasayan Pvt. Ltd. & Anr.);
  - iv. Order dated 02.07.2020, 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.);
  - v. Order dated 06.07.2020, 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...");
  - vi. Order dated 06.07.2020, relating to accident of Ammonia gas leakage at Nandyal in Kurnool District, Andhra Pradesh in Spy Agro Industry on 26.06.2020 resulting in death of one person and injury to three workers. (OA 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")
  - vii. Order dated 08.07.2020, 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;
  - 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").

matter in M/s LG Polymers case, OA 73/2020 and other connected matters:

- Committees have been constituted for 'Preparation of Restoration Plan' through CPCB and District Administration, and 'Finalization of Compensation'.
- Action is being taken for revamping of industrial monitoring mechanism, in line with the previous directions of Hon'ble NGT O.A. No. 73/2020, Gas Leak at LG Polymers Chemical Plant in RR Venkatapuram Village, Visakhapatnam in Andhra Pradesh.
- Consideration of the Technical and Administrative / Regulatory Framework Recommendations given by the High-Power Committee (HPC), which also include general recommendations on operation of hazardous industries/industries handling hazardous chemicals as well as industries operating in residential areas is under examination.

9. We have heard learned Counsel for the parties and perused the record available, particularly the report of the joint Committee.

10. There is no meaningful objection to the report by a Committee of experts, which includes statutory regulators and other experts. Accordingly, we accept the report of the Committee and dispose of these proceedings with a direction to comply with the recommendations which may be overseen by the statutory regulators, as per law. In particular, the implementation of restoration plan may be ensured, including recovery of compensation for damage to the environment, apart from other steps which remain to be taken.

11. We place on record our appreciation for the task executed by the Committee. This observation may be conveyed to the members of the Committee by the CPCB. The report of the Committee may be placed on the websites of the CPCB and the State PCB for purposes of reference, for atleast six months.

The application is disposed of.

A copy of this order be forwarded to the Chief Secretary, Andhra Pradesh, the CPCB and State PCB by e-mail.

Adarsh Kumar Goel, CP

S.K. Singh, JM

Dr. S.S. Garbyal, EM

Dr. Nagin Nanda, EM

December 22, 2020  
Original Application No. 134/2020  
DV