

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

Original Application No. 107/2020

(With report dated 28.10.2020)

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"

Date of hearing: 08.01.2021

**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**

Respondents(s): Mr. Raj Kumar, Advocate for CPCB
Mr. TVS Raghavendra Sreyas, Advocate for AP PCB
Mr. R. Venkataramani, Senior Advocate with Mr. GN Reddy
Advocate for S.P.Y. Agro Industry

ORDER

1. The issue for consideration is the remedial action on account of Ammonia gas leakage accident at Nandyal in Kurnool District, Andhra Pradesh in S.P.Y. Agro Industry on 26.06.2020 resulting in death of one person and injury to three workers followed by second such incident in the same establishment on 5.8.2020 resulting in one more death.

2. The Tribunal initiated proceedings based on media reports of the first incident. Vide order dated 06.07.2020, this matter (OA 107/2020) was dealt with alongwith another matter relating to Benzimidazole gas leakage accident at Sainor Life Sciences factory at Parawada in industrial area on the outskirts of Visakhapatnam on 30.6.2020 being 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..."*. The said other matter has since been finally disposed of

vide order dated 22.12.2020 in terms of Expert Committee report holding that the industrial unit failed to follow safety norms and was liable to pay compensation apart from other liability. The Committee comprised CPCB, State PCB, District Magistrate, Kurnool, Prof. Ch V. Rama Chandra Murthy, Andhra University, Vizag and Prof. Pulipati King, Head of Chemical Engineering Department, Andhra University, Vizag. The Tribunal also directed the Director of Industries, Andhra Pradesh to conduct safety audit of entire pharma city in Vishakhapatnam where such units are located and also at all other locations in the State at the earliest.

3. In the present case, in the first order dated 06.07.2020, the Tribunal noted that the incident was reportedly on account of leakage of ammonia gas from establishment in question – S.P.Y. Agro in Kurnool District in the course of storage of Liquefied CO₂ gas to the bottling plant in the unit for chilling purposes. The said gas is covered by the Schedule to the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (the 1989 Rules) (serial no. 31). The same Committee was required to ascertain facts and recommend remedial action.

4. Accordingly, the joint Committee has furnished its report dated 28.10.2020. The Committee held its first meeting by video conference on 08.08.2020. It visited the site on 21st and 22nd September, 2020, interacted with unit officials, who were present during the accident occurred around 9:30 am on 27.06.2020 near ammonia storage tank (CO₂ unit). The report finds that during the accident one person died and four were exposed to ammonia gas. APPCB issued stop production order. The Committee monitored the ammonia levels near ammonia storage tank and area surrounding CO₂ unit. After examining the production process and ascertaining the sequence of events, causes of failure, measures taken

after the incidents, the Committee has proceeded to make assessment of damage and the amount of compensation to be paid to the victims. The Committee also found the second incident on 5.8.2020 resulting in one death and has recorded reasons leading to the same. Committee has also suggested further remedial measures in the light of the two incidents. It will be appropriate to reproduce important extracts which are as follows:

“V. About M/s S.P.Y. Agro Industry Limited, Nandyal

V. (a) General information

M/s S.P.Y. Agro Industry is a grain-based distillery, established in 2008 for manufacture of total spirit-134 KLD OR 125 KLD Extra neutral alcohol with Cogeneration power plant of capacity 4MW. The industry is located at APIIC, New Industrial Estate, Udumulapuram (V), Nandyal(M), Kurnool District in about 43 acres, in which built-up area of 14.87 acres and green belt area of 14.30 acres.

V. (b) Environmental Clearance and CFE & CFO issued by MOEF&CC and APPCB

- a. APPCB issued Consent for Establishment (CFE) dt: 04.01.2006 to setup distillery for manufacture of Total Spirit-134 KLD (OR) Extra Neutral Alcohol (ENA)-125 KLD with Cogeneration Power Plant of capacity-4MW. First CFO was issued by APPCB to the unit vide order dt.07.07.2008.
- b. MoEF&CC issued Environmental Clearance (EC) dt: 28.06.2007 for 134 KLPD grain based distillery unit RS/ENA / Ethanol &4MW Co-generation power plant.
- c. APPCB issued CFE dt.07.07.2008 for establishment of CO₂ recovery plant and industry has established CO₂ recovery plant in the name of M/s Nandyala gases Pvt. Ltd during 2008. APPCB issued first CFO 28.03.2009 to operate CO₂ plant and the same was renewed vide order dated:29.08.2011 with a validity upto 30.09.2014. After the expiry of consent during 2014, M/s Nandyala gases Pvt. Ltd (CO₂ plant) did not apply for renewal of consent and APPCB, RO, Kurnool issued notice to the industry for not submitting the application for renewal of consent, vide notice No.171 / KNL / PCB / RO / KRNL / Notices / 2014, dt: 13.03.2015. Consequent to the notice, M/s Nandyala gases Pvt. Ltd informed vide their letter dated: 27.05.2015 that M/s Nandyala gases Pvt Ltd (CO₂ plant) has been merged with M/s S.P.Y. Agro Industries (distillery cum co-generation power plant) and copy of Hon'ble High Court Order dt: 09.07.2012 was submitted as proof of merger.

Since then APPCB has issued common consent to distillery, CO₂ plant and Co-generation power plant.

- d. MoEF&CC issued Environmental Clearance for expansion dt: 14.02.2015 for expansion of production capacity of Total Spirit from 134 KLD to 500 KLD (OR) ENA from 125 KLD to 475 KLD and Co-generation power plant from 4MW to 16.5MW.*
- e. APPCB issued CFE for expansion dt:27.04.2015 for expansion of production capacity of Total Spirit from 134 KLD to 500 KLD (OR) ENA from 125 KLD to 475 KLD and Co-generation power plant from 4MW to 16.5MW. The industry has not implemented this proposed expansion activity till now except increasing the capacity of co-generation power plant from 4MW to 6.5MW.*
- f. APPCB has renewed the CFO to M/s S.P.Y. Agro Industries Limited on 15.04.2010, 30.10.2013, 13.03.2015 with a validity period upto 31.03.2017. The Board vide auto renewal order dt:26.04.2018 has extended the validity of the CFO for the period upto 31.10.2019. The latest CFO was issued on 03.03.2020 (Annexure-III) with a validity upto 31.10.2021 for Total Spirit – 134 KLD (OR) Extra Neutral Alcohol (ENA) – 125 KLD and Cogeneration of Power Plant – 6.5 MW.*

V. (c) Location of the unit:

M/s S.P.Y Agro Industries Limited is located at latitudes 15°28'52.23" N; Longitudes 78°26'44.40" E at an elevation of 204 mts. The industry is surrounded by

North: *Proposed residential plots (presently no habitation) developed by Ganesh Nagar & Maruthi Nagar Development Society (about 100mts distance)*

South: *M/s Nandi Plasticizers and other industrial activities*

East: *Private vacant land followed by agricultural lands*

West: *Agricultural lands.*

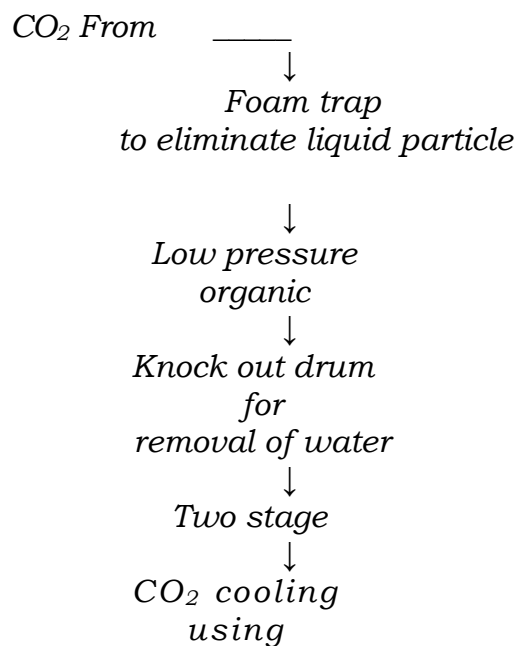
The aerial distance between the distillery and Venkateswarapuram, V.C colony, Moolasagaram and Krishna nagar is around 0.6KM, 2KM, 2.84 KM and 2.9KM respectively. The Nandyala town is located at about 2 Kms distance in eastern direction from the industry, Kundu river is the nearest water body at a distance of about 1.25Kms in North-Eastern direction from the industry.

V. (d) Workers:

431 persons are employed in the unit including 331 permanent employees and 100 contract workers.

V. (e) Production process:

Grain flour @ 60% starch content (Maize, Sorghum, Bajra & broken rice):339 TPD, Enzymes:0.5 TPD are the raw materials required in distillery. Rice husk:120 TPD & Coal:150TPD are used in co-generation power plant. The raw material is liquefied and then fermented to produce alcohol. Carbon-dioxide is produced during fermentation. The CO₂ gas so produced is collected and stored for further use. The gaseous CO₂ is converted into liquid CO₂ using ammonia as a refrigerant. During bio chemical reaction in fermentation section, the Carbon dioxide (CO₂) is generated as by-product along with Ethyl alcohol. This raw CO₂ gas having 99% v/v purity (dry basis) is taken for purification followed by liquefaction.



CO₂ is cooled and maintained -25⁰C hence liquid ammonia which is at a temperature of -30⁰C is used. Ammonia gas does not react with CO₂ and is used only as coolant, hence ammonia loss takes place due to evaporation etc. Purified liquid CO₂ of desired quality will be sent to liquid CO₂ storage tank. Liquid CO₂ and ammonia storage tank has to be equipped with all necessary accessories like pressure safety valves, insulation. After the scrubber, the pressurized CO₂ will be liquefied and stored in the storage container which will be disposed through tankers to the soft drink manufacturing units. Total CO₂ production will be 80 T/day.

VI. Accident occurred at S.P.Y Agro distillery, sequence of events and causes for accident

An accident occurred in the unit at around 9.30 AM on 27.06.2020 (Saturday).

VI. (a) The sequence of events are described as follows:

26.06.2020 03.00 P.M	<p>Workers noticed that there is a problem in Ammonia pipeline solenoid valve, which is passing from ammonia receiver tank to economizer. It is informed to the plant General Manager, Sri K. Srinivasa Rao. Upon instructions of the plant General Manager, the production of liquefied CO₂ has been stopped at 3.00 PM on 26/06/2020. After verification Sri K. Srinivasa Rao, General Manager has instructed to replace the solenoid valve to resume the production.</p> <p>Sri K. Srinivasa Rao, General Manager instructed the workers namely Sri P. Ravi Chandrudu, Fitter cum operator and Sri K. Madhusudhanachari, Fitter to replace the solenoid valve.</p>
26.06.2020 06.00 P.M	<p>The new solenoid valve was issued by the instrumentation team of S.P.Y. Agro Industries Limited for replacement of old one and started the work of replacement by Sri P. Ravi Chandrudu, Fitter cum Operator and Sri K. Madhusudhanachari, Fitter.</p>
27.06.2020 5:00 A.M	<p>Replacement of new solenoid valve was completed by the fitters around 5:00 a.m. on 27-06-2020. The valve was fitted to the pipelines by welding.</p>
27.06.2020 09.00 A.M	<p>Sri K.Srinivasa Rao, General Manager instructed to restart the CO₂ plant and requested restarted by Sri P. Ravi Chandrudu and Sri K. Madhusudhananchari. Sri K.Thippa Reddy, Manager-Instruments, Sri G.Tirumala, Supervisor, Sri Harin, Instrument Engineer from M/s S.P.Y Agro Industries Limited, came to the CO₂ plant. At this stage six members were present in the CO₂ plant.</p> <p>Sri K. Srinivasa Rao, General Manager of the plant and overall in charge of the operations and instrumentation division Sri K. Thippa Reddy, Manager-Instruments Sri Harin, Instrument Engineer Sri G. Tirumala, Supervisor Sri K. Madhusudhananchari, Fitter Sri P. Ravi Chandrudu, Fitter cum operator</p> <p>Sri K. Srinivasa Rao started the CO₂ compressor plant and adjusted the parameters of each equipment of Programmable Logic Control (P.L.C) and others were verifying the fields of each equipment in the plant. Sri K. Madhusudhanachari went out to check up the liquefied CO₂ storage tanker, which is located outside the machinery hall.</p>
27.06.2020 09.30 A.M	<p>Sri K. Srinivasa Rao instructed Sri P. Ravichandrudu to open the ammonia gas pipeline valve, which is at the ammonia receiver. Sri P. Ravichandrudu opened ammonia pipeline valve and came near the Programmable Logic Control unit (P.L.C) where Sri K. Srinivasa Rao was operating. The ammonia storage tank and PLC controller are present at the ground floor while solenoid valve and other associated machinery are present at an elevation.</p> <p>Sri K. Srinivasa Rao operated ammonia compressor at P.L.C. Immediately, the portion of the ammonia pipe connected by welding burst open and ammonia gas stored at -30C leaked and spilled from top on of Sri K. Srinivasa Rao standing below. Since ammonia was at -30C, soon after it spilled, he has freezed, burnt and he was unable to escape. The other employees though were exposed to gas but managed to escape safely without any major injuries.</p> <p>Sri K. Thippa Reddy informed the HR Department and HR Department in turn informed to fire department and other departments.</p>
27.06.2020 10.00 A.M	<p>Fire department persons arrived at the unit and started spraying of water into the machinery hall to dilute the Ammonia gas.</p> <p>$NH_3 + H_2O = NH_4OH$</p> <p>Ammonia dissolves with water to form ammonium hydroxide</p>
27.06.2020 12.40 P.M	<p>The Fire department persons went inside the machinery hall by wearing self-contained breathing apparatus and brought out Sri K. Srinivasa Rao and he was sent in ambulance to Government Hospital, Nandyal, where it was declared that he was brought dead.</p>

27.06.2020 02.00 P.M	Sri P. Ravi Chandrudu, Fitter/ Operator, Fire Department Team and Safety team of M/s Sree Rayalaseema Alkalies and Allied Chemicals Limited, Kurnool went inside the machinery hall by wearing self-contained breathing apparatus and closed the Ammonia gas main valve at 14:00 hrs and leakage of Ammonia gas was arrested. On 27.06.2020, from 9:30 AM till 14:00 hrs (4 1/2 hrs) ammonia gas has leaked into the atmosphere and water spraying was carried out to dilute it.
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VI. (b) Causes of failure:

The accident occurred mainly due to the following two reasons:

1. **The solenoid valve must be installed with the arrow on the valve body in the direction of flow through the valve. If the valve is backwards, the flow will not be stopped when the valve is electrically de-energized, reversal of pressure occurs in the system so the outlet pressure exceeds the inlet pressure by more than 0.07 bar (11 psi) reverse flow will occur. It was observed that valve was not fitted correctly which has resulted in reverse flow.**
2. **The committee observed that ammonia pipeline was connected to solenoid valve by both welding and threading of flanges. Just after the solenoid valve, there is a cut in the ammonia pipeline and it is joined by welding. The cut portion of the ammonia pipeline is not properly welded. After the solenoid valve was replaced and when ammonia was charged, pressure has increased due to flow reversal and the portion of the ammonia pipeline which is joined by welding burst and ammonia leaked into surrounding area.**
 - a. **It is essential that after replacing the valves, it has to be pressure tested prior to charging the system with ammonia. The pressure testing or functionality testing of solenoid valves is to be carried out as per the Manufacturers/ Operator manual or by instrumental air supply. After pressure testing of valve, before putting valves into service, all pipe connections, valve seats and seals should be tested for leaks at pressure levels using instrumental air. In this particular accident, when the valve was replaced the pressure testing was not done and ammonia was directly charged.**
 - b. **Standard procedure was not devised for replacing the solenoid valve by the unit or by Late Sri K. Srinivas Rao, Unit Manager who was overall incharge for safe operations of the entire unit.**
 - c. **It is observed that lot of machinery, ammonia storage tank, condensers are compactly housed**

in the gas cooling section. There is insufficient ventilation and difficult to escape during accidents.

- d. People doing any work on a refrigeration system must be qualified and completely familiar with the system which was lacking in the present case. For the protection of people and products, all refrigerant must be removed from the section to be worked on or it should be isolated before a valve, strainer, or other device is opened or removed.*
- e. Personal Protective Equipment (PPE), including SCBA (Self-Contained Breathing Apparatus), must be used for safety while handling ammonia. A risk assessment must be conducted to determine the level of personal protective equipment likely to be needed for various activities, including access. PPE's such as chemical safety goggles, face shield chemical protective clothing and boots to be worn by personnel while working. It was informed to the committee that the employees involved were not wearing PPEs other than mask due to covid-19 pandemic.*
- f. During the visit, it was informed to the committee that this was the third time the solenoid valve was replaced in the ammonia refrigeration section since establishment of CO₂ plant. The fitters who carried out the welding were not trained for welding operation of solenoid valve considering that the frequency of replacing the valve was only three times.*
- g. The cut portion of the pipeline is loosely joined by welding which could not withstand the pressure and joint portion opened.*
- h. Lack of training and poor emergency preparedness of the personnel.*
- i. Operational Negligence, Human error, Lack of Standard Operating Procedures(SOPs) for solenoid valve replacement, poor ventilation in the machinery room, Non-issuance of Personnel protective equipment by unit to employees are the causes for accident. The employees and Management of the unit, both are responsible for the accident. The immediate trigger to the accident was improper installation of solenoid valve (not in compliance with instrument manual) which lead to reverse flow and pressure increase, not conducting the pressure test and leak test in all pipe connections, valve seats and seals before charging ammonia and loosely joining the cut portion of the pipeline by welding which caused ammonia leakage.”*

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IX. (a) Directions issued by Inspector of Factories post-accident:

- a. A show cause notice RNo.47841/2020/Special, dt: 13.05.2020 has been issued to the Management Sri S. Sreedhar Reddy (Director) Occupier cum Manager of the said factory for contraventions of Section 7A-2 read with Section 41 and Rule 61-F(2), Rule 61-F(3) and Rule 61-E read with Section 87 and Rule 95 Schedule XV Part-II (11) and (15) under the Factories Act 1948.
- b. Prohibitionary order issued by Inspector of Factories: Deputy Chief Inspector of Factories, Kurnool issued Prohibitory Order No.R.101055/2020-1/Special, dt: 29.06.2020 (Annexure-VIII) to M/s Nandyala Gases Pvt Ltd, Nandyal(M), Kurnool District. Inspector of Factories has issued separate licenses for distillery and Nandyala Gases Pvt Ltd (CO₂ plant) and there is no restriction or prohibition direction from Inspector of Factories to operate the distillery unit.

IX. (b)Directions issued by APPCB pre-accident & post-accident

- a. APPCB, Zonal Office, Kurnool, vide letter No.APPCB/ZO-KNL/MAH/2020 Dt.02.06.2020, directed the industry to ensure the compliance of certain directions during operation of industry as circulated by CPCB and one of the directions is as follows:

“A proper safety and hazard audit should be undertaken by all the units before resuming operations. The industries shall follow the Rules stipulated that manufacture, store or import hazardous chemicals while resuming their operations after COVID-19 lockdown, only after they have taken adequate and necessary steps to prevent the occurrence of any chemical leakage / accident”

- a. On 12.06.2020, the Regional Office, Kurnool has issued a show cause notice to the industry with a direction to show cause as to why legal action shall not be initiated against your industry under section 33 (A), 44 of Water (Prevention and Control of Pollution) Act, 1974 and under section 31 (A), 37 of the Air (Prevention and Control of Pollution) Act, 1987 and Amendments thereof, for violation of CFO order conditions and thereby causing odour nuisance, clearly mentioning that failing which action will be initiated against the industry under above said acts.
- b. Further, the Regional Office, Kurnool, vide show cause notice NO:KNL 205/PCB/RO/KRNL/Notice-2020, Dt. 27.06.2020, informed the industry that they “have not carried out comprehensive safety audit and not taken any safety measures to meet the emergencies & not complied CFO conditions thereby causing lot of air pollution and occurrence of ammonia gas leakage due to

negligence attitude of the management towards safety measures”.

- c. *In continuation of the instructions issued on 02.06.2020 with regard to safety measures, the Zonal Office, Kurnool, directed the industry to carryout comprehensive safety audit through a reputed agency vide letter No.APPCB/ZO-KNL/MAH/2020 – 96 Dt.29.06.2020 and to furnish at the earliest. The industry was also directed to carry out the risk analysis and mock drills as per the protocol. Further, the industry was directed that*

“the date of mock drill shall be intimated to this office in advance. The time bound programme of carrying out comprehensive safety audit and other analysis as stated above shall be furnished to this office within 7 days from the date of receipt of this letter”.

As the industry has not responded to the notice even after 8 days, Zonal Office, Kurnool reminded the industry vide notice No. APPCB/ZOKNL/MAH/2020, Dt.09.07.2020 to submit a time bound programme with regard to carrying out comprehensive safety audit and other reports like risk analysis and intimation of conducting mock drill.

- d. *It is further submitted that the Zonal Office, Kurnool has conducted review meeting on 22.07.2020 regarding safety measures adopted by the industries covered under MS&IHC Rules, 1989. In the above meeting, M/s S.P.Y Agro industries Limited was also reviewed and the following directions were given in the meeting:*

- i. The mock drills shall be conducted as per the protocol and the dates shall be intimated to Zonal Office one week in advance without fail.*
- ii. The safety measure including valve regulated system shall be regularly checked and the concerned workers involved in the activity shall be properly trained. The compliance of the above shall be intimated to Zonal Office.*
- iii. The industries shall update the comprehensive safety audit, on-site and off-site emergency plans and risk analysis reports periodically as per the protocol and ensure that the reports are furnished to Zonal Office.*
- iv. The industries shall update the Public Liability Insurance (PLI) duly paying the premiums in time and shall submit the updated status of PLI.*

- e. *The A.P Pollution Control Board vide order dated: 13.07.2020 (Annexure -IX) issued stop production orders to M/s. S.P.Y. Agro Industries Ltd., under section 33 (A) of Water (Prevention & Control of Pollution) Act, 1988 and under Section 31 (A) of Air (Prevention & Control of Pollution) Act, 1987 for non-compliance of Board directions, Consent Conditions and also for causing the accident in the industry on 27.06.2020.*

IX. (c) Status of unit:

The unit informed that in compliance with the “Stop Production order” issued by APPCB on 13.07.2020, the unit immediately stopped its production activities on 14.07.2020.

The industry started production several times after issue of stop production order, violated the Board directions. The industry submitted letter dt. 20-10-2020(Annexure - X) for the reasons of the violation which is as follows:

The unit is using broken rice & grains for production of alcohol and due to sudden stoppage of production, the in-process wash (fermented grain solids etc.) started to putrefy and volatile acids build up was more than 1000ppm causing odour nuisance. 10lakh liters of the wash in fermenter required processing and also effluent re-circulation was required in bio digester. The unit further informed that it was essential to operate the aeration plant to keep the micro-organisms active. In view of the above, the unit operated from 19th July to 22nd July, 2020. The ETP was operated by recirculating effluent to keep microbes active. To sustain ETP operation, the unit continued to operate power plant with minimal load. The industry further replied as follows:

“On 29th of July, we once again faced issue with in process liquids in the fermenter and bio-digester culture. The 10 lakh liters of the wash in the fermenter needed to be processed and the bio- digester needed effluent circulation as the biomethanation time is 10 – 15 days (28th July-5th August). Similarly we needed to run the aeration plant to control the COD and BOD in the effluent. The company was also putting into operation the scrubber mandated by the PCB on the wet caking drying plant. The plant was running well below full installed capacity”.

The industry further operated the plant from 10th September, 2020 to 18th September, 2020 and explained the reason for the operation as follows:

“On 30th August, 2020, we have requested the Chief Inspector of Factories to issue a temporary revocation to process a further 40 lakh liters of wash. The department requested us to complete a safety audit and furnish details regarding the precautions taken to avoid a similar incident. We then submitted the same and started operation on 10th September upto 18th September, 2020”.

IX. (d) Second accident that occurred on 05.08.2020:

*The committee submits to Hon’ble NGT that, an accident occurred once again in M/s S.P.Y. Agro Industries at around 10.00 PM on 05.08.2020. **While conducting hydraulic test to the 50 TPH boiler of Co-Generation power plant, the water wall tube (steam raiser pipe line) burst. It is reported that one employee of M/s S.P.Y. Agro Industries***

Ltd., viz., Sri Lakshmanamoorthy, Sr. Fitter, 63 years was exposed to steam and died at about 6:00 AM on 06.08.2020 due to severe burns. The other two employees sustained with minor injuries and they were discharged after treatment.

As per the instructions of the Collector & District Magistrate, Kurnool on 06.08.2020, the GM DIC, Kurnool, Deputy Chief Inspector of Factories, Kurnool & the Environmental Engineer, R.O, Kurnool along with JSO, ZO, Kurnool have visited the unit at 11.15AM. It was informed to the committee that the 50TPH boiler connected to the Co-Generation power plant was taken for maintenance on 05.08.2020 at 6.00P.M.

After completion of maintenance work, while carrying out hydraulic test, the water wall tube (steam raiser pipe line) got burst as the pipe could not withstand for the pressure. As a result of this, Sri Lakshmanamurthy, Sr. Fitter, 63 years was exposed to steam. He was initially admitted at Govt. General Hospital, Nandyal. As the case was critical, he was shifted to Govt. General Hospital, Kurnool for better treatment and he died at 6.00 A.M on 06.08.2020 due to severe burns. It was informed to the committee that the unit has paid Rs.30,00,000/- as compensation to the family of the deceased person Late Sh. Lakshmanamurthy. The committee has assessed the adequacy of compensation as explained in table 6 and ascertained that the compensation paid to Sh. Lakshmanamoorthy is adequate. In this particular case the committee has considered the highest amount of the two for ascertaining the adequacy of compensation since the unit has violated APPCB directions and operated the unit. Among the two the highest amount is Rs.22,75,680/- and the unit has paid compensation of Rs. 30,00,000 lacs which is adequate. The expenditure towards treatment of the injured was borne by the unit. The health conditions of the injured shall be ascertained by qualified medical practitioner and as per the recommendation of the medical practitioner the District Magistrate may assess the compensation.

The unit has not complied with the instructions issued by APPCB vide letter dated 02.06.2020, Show-Cause Notice issued by APPCB dated 12.06.2020 and Stop Production Order dated 13.07.2020 and has operated the plant from 19/07/2020 to 22/07/2020, from 29/07/2020 to 31/07/2020, from 01/08/2020 to 04/08/2020 and from 10/09/2020 to 18/09/2020. The committee inspected the unit during September 21 & 22, 2020 and observed that the unit had not carried out safety audit and safety of installations was not ascertained. For the second accident, the committee has used the deterrent factor 2 for repeated violation since it was second time violation. The committee has assessed Environmental Compensation for the second accident using the formula $EC=PI \times N \times R \times S \times LF$

S. No.	Period of noncompliance	PI	S	LF	R (Rs)	N(days)	Environmental compensation (Rs)	Deterrent factor
1	28.06.2020 to 05.08.2020 And from 06.08.2020 to 21.09.2020 (deviations observed till the day of committee inspection)	80	1.5	1	250/-	85	25,50,000/-	(EC is increased on exponential basis i.e 2, 4, 6, 8...on each similar violation.)
	Total EC for 2 nd violation					85	25,50,000/- x 2	
							51,00,000/-	
Rupees Fifty One Lacs Only								

The committee interacted with Smt. P. Lakshmidevi, W/o Sri P. Lakshmana Murthy, Sr. Fitter and she has expressed her views to the committee as follows:

She has informed that her husband Late Sri P.Lakshmana Murthy, who worked as Sr. Fitter in M/s S.P.Y Agro Industries Limited, died due to exposure to steam at about 6:00 AM on 06.08.2020. She has informed that, she received Rs.30,00,000/- (Rupees Thirty Lakhs only) towards compensation from the industry on 06/08/2020. She has informed that she has received salary and she has not yet received the P.F amount and gratuity. The unit shall release P.F amount and gratuity to the family of the deceased within a period of one month.

IX. (e) Suggestions for restoration of Environment:

The committee did not observe any physical damage or damage to properties/ vegetation during the visit. Hence other than cleaning and proper maintenance of fermenters, distillation columns and proper operation of ETP, the committee does not suggest any restoration measure but however from safety point of view the committee recommends the unit to establish proper effluent conveyance system to transfer effluent from production block to ETP, to store coal in covered shed, to prevent odour nuisance by properly handling the dried fermented solids and to increase the vegetation cover in the unit, to place the online continuous emission and effluent monitoring systems as per CPCB guidelines. To improve ventilation in the CO₂ plant. The machineries are compactly housed in the CO₂ plant. The unit shall ensure that the machineries are so housed that adequate space is there for the personnel to operate and move to safe places during any mishap.

The storage capacity of ammonia in the CO₂ recovery plant is 2000 Kgs. At the time of accident, there was 750Kgs of ammonia. Out of 750 Kgs, 500 Kgs was released into environment at the time of accident and the remaining 250 Kgs was treated in the ETP.

*The Ambient Air Quality monitoring was carried out by the officials of A.P. Pollution Control Board, Kurnool for the parameter ammonia in and around of M/s S.P.Y Agro Industries Limited from 27th day of June, 2020 to 28th day of June, 2020. The concentration of ammonia recorded was **610.61 µg/m³**(as against the standard of 400µg/m³) after the accident at about 2.00 p.m and the levels of ammonia has come down to the level below the standard of 400 µg/m³at 9.00 p.m on 27.06.2020. During the accident, the predominant wind direction was towards North-East direction, where there is no habitations upto 1.5 Kms. It was observed that there was only a localized impact very nearer to the CO₂ recovery plant and the restoration measures were taken by the industry by collecting and treating the left over ammonia in the storage tanks & used fire hydrant water in their Effluent Treatment Plant (ETP).*

IX. f. View Points of Stakeholders: *The unit has positive attitude and intends to implement corrective measures. The unit has submitted that temporary revocation order was issued by Inspector of Factories and prohibitory order by Inspector of Factories was issued only to M/s Nandyala Gases Pvt Ltd. To prevent putrefaction of in-process solids, it was essential to operate the plant. Hence the unit has requested not to treat this as violation of APPCB directions. The submissions made by the unit is enclosed as Annexure-X.*

X. Suggested remedies to avert such accidents in future:

- 1. Standard Operating Procedure shall be prepared for all industrial activities handling hazardous chemicals. To ensure that pressure test and leak test are conducted after replacement of valves, pipes, joints etc. as per the instrument manual or as per standard established procedure.*
- 2. The unit shall conduct comprehensive safety & hazard audit, identify the non-compliances and take corrective actions for the non-compliances identified. Emergency plans shall be established to deal with leaks. The risk assessment should identify the control measures necessary in an emergency. These are likely to include, for example instructions to identify the leak and close key valves. Such valves should be marked and identified on drawings. Regular checks of such valves should be undertaken to ensure correct operation. A clear documented emergency procedure should be drawn up which details the precise duties of all staff and*

arrangements for evacuation, rescue, first aid, resuscitation, plant isolation etc.

- 3. The CO₂ plant where the ammonia tanks are placed is very congested and during any unwarranted situations, it is difficult to escape. The unit shall re-design ammonia refrigeration unit to have more working space for the personnel. Adequate means of escape and rescue shall be provided.*
- 4. To install Emergency warm water showers and eyewash stations in locations where ammonia is handled for decontamination. They allow workers to flush away ammonia that can cause injury.*
- 5. To install automatic tripping system during pressure build-up, leaks etc.*
- 6. All pipework containing ammonia shall be identified by colour coding or labelling and positioned and protected to prevent damage. It is good practice to uniquely identify part of the system that contain gas or liquid and the direction of flow.*
- 7. The CO₂ plant was poorly ventilated. Machinery rooms should be provided with sufficient permanent ventilation during normal operations to prevent the build-up of toxic concentrations of ammonia from any small operational releases (for example from seals, glands etc.). The unit shall improve the mechanical ventilation to facilitate natural circulation. In addition, the unit shall provide emergency ventilation to prevent flammable ammonia and air mixtures accumulating in the event of reasonably foreseeable plant or operational failure, like valve failure etc. The unit may install ammonia sensor and emergency ventilation may be interlinked with ammonia sensor.*
- 8. To install check valves, relief valves at appropriate locations. Flow meters, sensors, measuring devices have to be regularly calibrated. Vents from relief valves shall be directed to a safe place.*
- 9. Seals, glands and gaskets shall be regularly inspected, without dismantling. Leak test should be conducted in all piping, valves, seals, flanges, and other pertinent equipment at least four times a year. Some methods that can be used for leak testing are sulphur sticks, litmus paper, or a portable meter equipped with a flexible probe.*
- 10. After the repair work is completed, it shall be verified by a strength pressure test followed by a tightness test and leak test.*
- 11. Anhydrous ammonia is very corrosive to copper, brass, and galvanized surfaces and materials. The unit shall not use copper, brass, zinc, and galvanized components in any*

part of an anhydrous ammonia refrigeration system. Support structure components should be readily visible such that they can be inspected for deterioration and replaced before a failure event can occur. All refrigeration piping should be periodically inspected for failed insulation/vapour barrier, rust, and corrosion. Ammonia piping underneath failed insulation should be carefully inspected for corrosion. Damaged and deteriorated ammonia piping should be replaced. All uninsulated piping should be cleaned, primed, and painted with an appropriate coating to protect the pipe from corrosion as well as being consistent with the colour coding scheme.

12. During the visit, the committee has observed the following:

- i. Stagnation of coloured effluents in drains and on roads*
- ii. Lot of stagnation of covered water in the storm water drains, on the roads and around the ETP units thereby causing ground water pollution.*
- iii. Leachete observed near drier*
- iv. Spillages near process area*
- v. ETP is in dilapidated condition*
- vi. Spillage of wet cake, entering into the storm water drains*

13. Photographs depicting the above violations are attached. Hence, the committee suggest that the industry has to maintain good housekeeping and to take-up preventive maintenance immediately to avoid all these problems and also to upgrade the ETP.

14. Only fully trained and qualified operators shall be permitted to operate ammonia systems. The operator is required to take refresher training at least every 3 years to ensure the employee understands and adheres to the current operating procedures related to the process. 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 & minor accidents.

15. To conduct mock drills to the employees in controlled environment on actions to be taken during failures, gas leakage etc.

16. To install suitable gas sensors and alarm system in the unit at appropriate locations where emission of gas is suspected so that any gas leaked is detected and the employees are immediately alerted. In sensitive areas of the unit where gas leakages are suspected, the unit shall

work out an emergency prepared plan to vent out the gases safely.

- 17. The unit shall provide essential Personnel protective equipment like nose mask, Helmets, Safety Shoes, Safety Glasses, chemical Proof Gloves, chemical proof body suit/ clothing, self-contained breathing apparatus to all its employees and make it mandatory that the employees have to wear PPE's during working hours.*
- 18. To develop 5mtrs thick green belt all along the boundary of the unit and also shall develop 33% of the total area as a green belt within the premises.*
- 19. To install appropriate firefighting equipment / fire hydrant system.*
- 20. The industry should conduct public awareness programmes in the surrounding villages about do's & don'ts during emergency.*

XI. Concluding remarks:

- 1. Operational Negligence, Human error, Lack of standard operating procedure for solenoid valve replacement, poor ventilation in the machinery room, Non-issuance of Personnel protective equipment by unit to employees working near hazardous areas, are the causes for accident. The employees and Management of the unit, both are responsible for the accident. The main cause for accident is failure to comply with safety practices. The immediate trigger to the accident was improper installation of solenoid valve (not in compliance with instrument manual) which lead to reverse flow and pressure increase, not conducting the pressure test and leak test in all pipe connections, valve seats and seals before charging ammonia and loose joining the cut portion of the pipeline by welding which caused ammonia leakage.*
- 2. The immediate measures taken by District Administration, APPCB, Fire Department and Inspectorate of Factories to dilute the emissions by water spraying was very helpful in containing the emissions within the unit itself. This timely decision prevented disastrous impact of ammonia leakage. As per the directions of the Collector and District Magistrate, the Superintendent of Police evacuated the people in the radius of 1.0 Km and 4 fire engines were brought to the unit. Till the situation came to control, the Collector and District Magistrate was there. Due to the presence of Collector and District Magistrate at the accident spot till the leakage was arrested, the people around the plant felt relieved. The committee appreciates the efforts of District administration and APPCB for containing the ammonium hydroxide so formed (by mixing*

of water and ammonia) immediately and to divert the same to ETP for further treatment.

3. To prevent any untoward incidence, APPCB and Inspector of Factories with the assistance of similar industry in the region drained the 250 Kgs of ammonia left over in the container using 1200 litres of water and then entire ammonia water mixture was treated in ETP.
4. The compensation amount and the status is as follows:

Sl. No.	Compensation	Status	Remarks of the Committee
First Accident → occurred on 27.06.2020 at 9:30 AM			
1	Compensation to the family of the deceased Sh. K. Srinivas Rao, GM- CO ₂ plant	Rs. 50.00 lacs paid to the family of the deceased by the unit	Adequate As per Employee Compensation Act, 1923, the compensation amount paid to the family of the deceased is adequate
2	500 Kgs of ammonia released Environmental Compensation on account of contribution of emissions into environment	Rs. 8,09,020/- Rupees Eight lacs Nine thousand and twenty only	The unit shall pay EC of Rs. 8,09,020/- with APPCB within a period of two months
3	The unit shall pay environmental compensation for not complying with the instructions issued by APPCB vide letter dated 02.06.2020	Rs. 7,20,000/- to APPCB	The unit shall pay EC of Rs. 7,20,000/- with APPCB within a period of two months.
Second accident → 05.08.2020			
4	Compensation to the family of the deceased Sh. Lakshamanamurthy, Sr. fitter	Rs.30.00 lacs paid to the family of the deceased by the unit	Adequate As per Hon'ble Supreme Court Judgement in civil appeal No. 6339 of 2019 and civil appeal No.3483 of 2008 and Employee Compensation Act, 1923, the compensation amount paid to the family of the deceased is adequate. The unit shall release the P.F amount, pending salary and other emoluments to the family of the deceased within a period of one month

5	<p>The unit shall pay environmental compensation for operating the unit in violation of APPCB "Stop Production Order" dated 13.07.2020 causing an accident in the unit.</p> <p>Period during which unit has operated in violation of directions:</p> <p>a. From 29/07/2020 to 31/07/2020</p> <p>b. From 01/08/2020 to 04/08/2020</p> <p>c. From 10/09/2020 to 18/09/2020</p>	<p>Rs. 51,00,000 Rupees Fifty One lacs</p>	<p>The unit shall pay EC of Rs. 51.00 lacs with APPCB within a period of two months.</p>
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5. *The committee suggests that APPCB and Chief Inspector of Factories shall verify the compliance of the unit, safety of installations and after ensuring compliance by the regulatory authorities, unit may be permitted for operation.*
6. *The committee did not observe any physical damage or damage to properties/ vegetation during the visit. Hence other than cleaning and proper maintenance of fermenters, distillation columns and proper operation of ETP the committee does not suggest any restoration measure but however from safety point of view the committee recommends the unit to establish proper effluent conveyance system to transfer effluent from production block to ETP, to store coal in covered shed, to prevent odour nuisance by properly handling the dried fermented solids, to increase the vegetation cover in the unit, to place the online continuous emission and effluent monitoring systems as per CPCB guidelines, to improve ventilation in the CO₂ plant and to improve housekeeping. The machineries are compactly housed in the CO₂ plant. The unit shall ensure that the machineries are so housed that adequate space is there for the personnel to operate and move to safe places during any mishap.*
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. 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, conducting safety audit, onsite and*

off site emergency preparedness, obtaining necessary clearances, NOC's from various departments lies with the industry. The Regulatory Authorities shall immediately take action against the industry as per prevailing Rules if any non-compliances are noticed.

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, MOEF&CC, CPCB, APPCB, Directorate of Factories etc.*
9. *The unit shall ensure that the CO₂ plant and ammonia refrigeration system are safe by taking into consideration all stages & aspects of a plant like design, risk assessment, material of construction, fabrication process, inspection (including material supplied by vendors), maintaining standard operating parameters during normal operation, adherence to the guidelines during operation as well as maintenance. Periodic inspection of equipment and machineries could prevent failures and shutdowns in the plant resulting in improved performance. Further, periodic training, motivation and feedback from operating personnel are most important and should be followed in right spirit to improve the performance of plant."*

5. The S.P.Y. Agro Industries Limited has filed written submissions dated 04.12.2020. The stand in the written submissions is that the incident in question is neither deliberate nor intentional and there is no substantial question of environment. The victims have been duly compensated. The report of the joint Committee does not have a sound basis for holding that there was failure to comply with the safety practices. The unit informed the PCB that it was in the process of preparing offsite plan and had paid 50% of the amount for safety hazard audit. It is further stated that the unit did not operate the plant four times after the stop orders as held by the Committee. Finally, it is stated that since there is no environmental damage/violation involved, appropriate direction may be given to the APPCB to revoke the Closure Order dated 29.10.2020 and stop production order dated 13.07.2020 in favour of the respondent company on which livelihood of almost 800 worker/employees depends.

6. From the report of the five-member credible Expert Committee, quoted above, it is clear that the Committee has thoroughly gone into the matter. It has found that the causes of accidents are: operational negligence, lack of Standard Operating Procedures (SOPs), poor ventilation in the machinery room and non-issuance of protective equipment to the employees. There is failure to comply with the safety practices. Immediate cause was improper installation of the valve leading to reverse flow and pressure. The State PCB issued stop production order. The report mentions the directions issued by the State PCB pre-accident and post-accident. Prior to the accident, vide letter dated 02.06.2020, direction was issued to undertake safety and hazard audit. The report finds that show cause notice dated 13.05.2020 was issued by the Inspector of Factories for violation of the Factory Rules. After the incident, prohibitory order dated 29.06.2020 was issued by the Inspector of Factories. On 12.06.2020, show cause notice was issued by the PCB as to why action be not taken for violation of the Water (Prevention and Control Pollution) Act, 1974 and the Air (Prevention and Control Pollution) Act, 1981 provisions. Show cause notice dated 27.06.2020 mentions that safety audit had not been carried out and it was found that the requisite safety measures had not been taken. On 29.06.2020, direction was issued to carry out risk analysis and mock drills, as per protocols. The State PCB issued order dated 13.07.2020 to stop production. On 22.07.2020, review meeting regarding safety measures was held. On 05.08.2020, another accident took place in the boiler of the unit resulting in death of one person due to severe burns and injuries to some workers. Compensation of Rs. 30 Lakhs was paid to the family of the deceased. Safety audit and safety installations have still not been complied with. The Committee has accordingly suggested establishment of proper effluent conveyance system to transfer effluent

from production block to ETP, to store coal in covered shed, to prevent odour nuisance by properly handling the dried fermented solids, to increase the vegetation cover in the unit, to have in place the online continuous emission and effluent monitoring systems, as per CPCB guidelines and to improve ventilation in the CO₂ plant. It has been found that the machineries are compactly housed in the CO₂ plant which requires that the unit ensures that the machineries are so housed that adequate space is there for the personnel to operate and move to safe places during any mishap. Further suggestions to avoid future accidents are to follow SOPs, conduct comprehensive safety and hazard audits, redesign ammonia refrigeration unit, install warm water showers, automatic tripping systems, colour coding of the pipe work containing ammonia, ventilation of the CO₂ plant and machinery rooms, installation of check valves, relief valves and other equipment at appropriate locations, regular inspections, avoid using galvanized components in ammonia refrigeration systems, employ trained staff, conduct mock drills, install gas sensors and alert systems, provide safety equipment to the staff, develop green belt, install firefighting equipments and conduct public awareness.

7. We find the report to be based on sound reasoning and material and objections of the establishment are merely self serving and without any sound basis. Accordingly, we accept the report and direct the establishment to take remedial steps in terms of the said recommendations to be overseen by the statutory regulators. The statutory regulators must maintain vigilance and carry out safety audits of the concerned establishments to avoid such accidents in future. We are unhappy to note frequent avoidable accidents resulting in loss of life and damage to the environment on account of failure to follow the prescribed safety norms and lack of adequate monitoring by the statutory regulators.

Apart from the present matter, we have recently dealt with atleast eight such cases.¹ We have found that by and large there is non-compliance to follow safety norms by the industries dealing with the hazardous chemicals, inspite of there being statutorily prescribed norms under the [MSIHC Rules, 1989] and Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 [CAEPPR Rules, 1996]

8. The Committee has assessed compensation for damage to the environment, apart from the compensation already paid to the victims. It has also recommended release of PF and other emoluments as per norms. We accept the report, rejecting the objections of M/s S.P.Y. Agro Industries. The recommendations of the Committee may be duly complied

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- ¹ 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);
- ii. 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.);
- iii. 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.).
- 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").

with which may be overseen by the statutory regulators in accordance with law.

9. 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. A copy of this report may be kept on the websites of CPCB as well as the State PCB for the purposes of reference for at least six months.

A copy of this order be forwarded to the MoEF&CC, the Chief Secretary Andhra Pradesh, the State PCB, the District Magistrate, Kurnool, by mail for compliance.

The application is disposed of.

Adarsh Kumar Goel, CP

S.K. Singh, JM

Dr. Nagin Nanda, EM

January 08, 2021
Original Application No. 107/2020
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