

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

**PRINCIPAL BENCH, NEW DELHI**

**Original Application No. 73 of 2020 and connected matters viz. RA No. 19/2020; OA No. 76/2020 (Earlier OA No. 68/2020 (SZ)); OA No. 80/2020 (Earlier OA No. 73/2020 (SZ))**

In re: Gas Leak at LG Polymers Chemical Plant in RR Venkatapuram Village Visakhapatnam in Andhra Pradesh

**REPLY AFFIDAVIT ON BEHALF OF MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE**

**MOST RESPECTFULLY SHOWETH:**

I, Dr. Dharmendra Kumar Gupta, currently working as Scientist- F/ Director in the Hazardous Substances Management Division of the Ministry of Environment, Forest and Climate

Change (MoEF&CC), New Delhi, do hereby solemnly affirm and state as under: -

1. That I, in my official capacity of Scientist-F/ Director, Hazardous Substances Management Division, MoEF&CC, New Delhi (who is one of the Respondents in the above mentioned matter), am fully conversant with the facts and circumstances of the case on the basis of official records available, and as such authorized and competent to swear this affidavit on behalf of MoEF&CC.
2. That, I submit at the very outset that the instant respondent denies each averment and/ or submission made by other respondents, which are contrary to, and inconsistent with the averments made and facts stated in the present reply. It is submitted that only those facts, which have been expressly admitted by the instant Respondent in the present reply, be considered as an official position on behalf of the MoEF&CC.
3. That, the affidavit is being filed by the answering respondent highlighting the following aspects:

- i. Regulatory framework administered by it;
  - ii. Status of the actions undertaken in response to the directions of the Hon'ble NGT vide its order dated 01.06.2020 in consultation with other stakeholders; and
  - iii. Other associated actions taken/ under consideration of this Ministry related to the incident of Styrene gas leakage at M/s LG Polymers, Vishakhapatnam (hereafter referred as 'the industry').
4. That, the answering respondent craves leave and liberty to file additional as well as detailed Affidavit/ Counter Affidavit as may be required during the course of proceedings or as directed by the Hon'ble Tribunal in reference to the aforesaid application, as and when required.

### **Background**

5. That, in the instant matter Hon'ble Tribunal took *suo moto* cognizance of a chemical (industrial) accident that occurred at M/s LG Polymers India Pvt. Limited

Vishakhapatnam, Andhra Pradesh during early morning (around 3:45 AM) on 07.05.2020 due to leakage of Styrene gas from one of the storage tanks. The unit used styrene gas as a raw material for its industrial operations.

6. That, life of 12 persons were lost during the accident period (i.e. from the time in the intervening night of 6<sup>th</sup> & 7<sup>th</sup> May, 2020 when the leakage started, till such time when the leakage was brought under full control) and 585 persons were hospitalized, besides causing loss of livestock and damage to environment. The State Govt. of Andhra Pradesh, District Administration, Vishakhapatnam and National/ State Disaster Response Force facilitated in evacuation of inhabitants up to a distance of 3 km radius.

### **MoEF&CC's Regulatory Framework**

7. That, MoEF&CC is the nodal Ministry under Govt. of India mandated to take steps for pollution control and environmental conservation, among other things. To achieve its mandate, the MoEF&CC administers various acts including Environment (Protection) Act, 1986.

8. That, two sets of rules have been notified to put in place a regulatory mechanism aimed at avoiding chemical accidents in industrial units viz. 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]. Key responsibilities have been assigned to various State Government/ Central Government Departments under the provisions of MSIHC Rules, 1989 and CA(EPPR) Rules, 1996 with the objective to prevent major chemical accidents arising from industrial activities and limiting the effects of such accidents on human health and environment.

9. That, the MSIHC Rules, 1989 require the occupier to provide necessary information that is likely to cause major accidents and affect general public during a major accident at the site which include submission of information on usage/ storage/ manufacture of hazardous chemicals, seek approval of sites, prepare on-site emergency plan and safety reports, undertaking safety audits and mock-drills

etc. The occupier is required to comply with above mentioned rule provisions with concerned authorities designated under Schedule-5 of the rules.

10. That, to complement the provisions of MSIHC Rules, 1989, the CAEPPR Rules, 1996 provide statutory backup for setting up a Crisis Management framework and associated organizational support in the country. The Chemical Accidents (EPPR) Rules, 1996 envisage a Four-tier Crisis Management System in the country at the Central, State, District and Local levels. A Central Crisis Group has been constituted in compliance with Rule 3 under the chairmanship of Secretary (EF&CC). A Central Crisis Group Alert System i.e. Red Book has also been brought in compliance with Rule 4 to facilitate quick information exchange during chemical emergencies. The Red Book contains name, address and contact details of Central and State Nodal authorities, relevant national agencies/institutes pertaining to chemical (industrial) disaster management. The Red Book is hosted on the website of MoEFCC and being updated regularly. A virtual crisis control

room is also set-up in the MoEFCC to coordinate with State Authorities during chemical (industrial) accident emergencies.

11. That, Styrene is listed at S.No. 583 of Part-II of Schedule 1 signifying it as a hazardous chemical. Further as per Schedule 4, the Polymerization operation/ process is identified as a notified 'industrial activity'. Hence, the operations of the industry fall under listed 'industrial activity' and the accident of styrene gas leakage qualified as a 'major accident' under MSIHC Rules, 1989.

12. That, the Ministry previously filed affidavit 14.05.2020 before the Hon'ble Tribunal in the matter mentioning the MSIHC Rules, 1989 and the CAEPPR Rule, 1996 provisions including division of responsibilities among various Central/ State Authorities as per the Schedule 5 of MSIHC Rules, 1989. It was also submitted before the Hon'ble Tribunal that among all authorities, the State Chief Inspector of Factories (CIFs) (appointed under the Factories Act, 1948) are the nodal agencies that have been assigned

responsibilities in line with their mandatory obligations under the Factories Act, 1948 for addressing issues related to operational safety. The role of Petroleum and Explosives Safety Organization (PESO), established under the Explosives Act, 1884, was also brought to the knowledge of the Hon'ble Tribunal, as the nodal agency to approve the sites of industrial installation and isolated storages with regard to hazardous chemicals. A copy of the Affidavit is attached for reference. ***[Annexure-A]***

### **Action by MoEF&CC**

13. That, the Ministry, in its earlier affidavit, has mentioned the action undertaken by it which primarily comprised of follow-up and coordination with the concerned State Government Departments viz. Andhra Pradesh State Pollution Control Board, Directorate of Industrial Safety and Health (DISH)/ Chief Inspector of Factories as well as Central Pollution Control Board (CPCB). ***[Annexure-A]***

14. That, to contain the situation of gas leakage at the site of the industry, the MoEF&CC had convened the meeting of

Central Crisis Group (CCG), constituted under CA(EPPR) Rules, 1996 on 08.05.2020 under the Chairmanship of Secretary (EF&CC). During the meeting, suggestions were sought from all stakeholders, including chemical experts. The above fact has already been brought to the notice of Hon'ble Tribunal in previous affidavit. **[Annexure-A]**

15. That, the Central Government i.e. MoEF&CC and other stakeholders viz. Central Pollution Control Board (CPCB), Department of Chemical and Petro-chemicals) and National Disaster Management Authority (NDMA) had issued advisories to the State Governments, from time to time, to comply with the regulations/ statutes already notified to ensure chemical safety. It was further advised to undertake measures to deal with issues arising out of operational safety and chemical accidents. **[Annexure-B]**

**Cognizance of matter/ Order by Hon'ble Tribunal**

16. That, the Hon'ble NGT took *suo motu* cognizance of the styrene gas leakage incident on 08.05.2020 and

constituted a 6-member Committee comprising of the following members:

- a. Justice B. Seshasayana Reddy, Former Judge, A.P. High Court;
- b. Prof. Ch V Rama Chandra Murthy, Former Vice Chancellor, Andhra University, Vizag;
- c. Professor Pulipati King, Head of Chemical Engineering Department, Andhra University, Vizag;
- d. Member Secretary, Central Pollution Control Board;
- e. Director, CSIR-Indian Institute of Chemical Technology; and
- f. Head, National Environmental Engineering Research Institute, Vizag

17. That, the Committee was asked to report the following:

- i. The sequence of events;

- ii. Causes of failure and persons and authorities responsible therefor;
- iii. Extent of damage to life, human and non-human; public health; and environment – including, water, soil, air;
- iv. Steps to be taken for compensation of victims and restitution of the damaged property and environment, and the cost involved;
- v. Remedial measures to prevent recurrence;
- vi. Any other incidental or allied issues found relevant.

The Committee was asked to visit the site and submit report on the above-mentioned points and was given liberty to take assistance of experts, individuals and institutions as may be considered necessary.

18. That, the Committee submitted its report to the Hon'ble Tribunal on 28.05.2020, which was duly considered. Based on the report, the Hon'ble tribunal passed further directions

and asked various Central/ State authorities to comply with the directions. The following directions were passed by Hon'ble Tribunal:

- *The amount of Rs. 50 crores deposited by the Company with the District Magistrate, Vishakhapatnam will stand appropriated towards part liability and interim compensation to be spent for restoration of the environment and compensation for victims in accordance with the restoration plan to be prepared.*
- *Restoration plan may be prepared by a Committee comprising two representatives each of MoEF&CC, CPCB and three representatives of State Government to be named by the Chief Secretary, including the District Magistrate, Vishakhapatnam and such other concerned Departments within two months from today. MoEF&CC will be the nodal agency for the purpose.*

- *Final quantification of compensation may be assessed by a Committee comprising representatives of MoEF&CC, CPCB and NEERI. The said Committee will be at liberty to associate/co-opt any other expert institution or individual. The Secretary, MoEF&CC may ensure constitution of such Committee within two weeks from today. The Committee may give its report within two months thereafter. MoEF&CC will be the nodal agency for the purpose.*
- *The Chief Secretary, Andhra Pradesh may identify and take appropriate action against persons responsible for failure of law in permitting the Company to operate without statutory clearances within two months and give a report to this Tribunal.*
- *In view of the stand of the State PCB and the Company that it will not recommence its operation without requisite statutory clearances, we direct*

*that if any such statutory clearances are granted and the Company proposes to recommence, this aspect must be brought to the notice of this Tribunal so that compliance of law is ensured.*

- The MoEF&CC may also constitute an Expert Committee to suggest ways and means to revamp monitoring mechanism to check and prevent violation of environmental norms and preventing any such recurrence in future in any of the establishments dealing with hazardous chemicals. A special drive may be initiated in this regard. An action taken report may be furnished within three months from today.*

19. That, apart from the proceedings being heard in the matter of M/s LG Polymers, the Hon'ble tribunal has linked the following matters to be heard along with the matter of M/s LG Polymers being similar in nature i.e. cases related to chemical (industrial) accident:

The common issue requiring deliberations in all the mentioned cases was related to action taken by MoEFCC w.r.t. revamping of monitoring mechanism and action taken to ensure the safety of operations in industries dealing with hazardous chemicals.

### **Follow-up Action by MoEFCC**

20. That, to comply with the order/ directions passed by Hon'ble Tribunal, the Ministry examined the order in detail and based on the core competencies and technical expertise available with various stakeholders, a methodology was devised to execute the work directed vide order dated 01.06.2020. Further, it was also noted that the orders of the Hon'ble Tribunal were challenged in the Hon'ble Supreme Court by M/s LG Polymers, and the apex Court, upon hearing the matter, had stayed the operation of Para 40 of the order for a brief period of time. Thereafter, in consultation with the legal cell of the MoEFCC, follow-up action was initiated in the matter.

W.r.t. 'Preparation of Restoration Plan' and 'Finalization of Compensation'

21. That, In pursuance of the orders dated 01<sup>st</sup> June 2020 of Hon'ble Tribunal in OA No. 73/2020 (In re: Gas Leak at LG Polymers Chemical Plant in RR Venkatapuram Village, Visakhapatnam in Andhra Pradesh) & connected matters viz. Review Application No. 19/2020 of M/s LG Polymers India; OA No. 76/2020 (Earlier OA No. 68/2020 (SZ)) in the matter of EAS Sarma Vs Union of India & Ors.; OA No. 80/2020 (Earlier OA No. 73/2020 (SZ)) in the matter of Centre for Wildlife and Environmental Litigation Foundation Vs. Union of India & Ors., the Competent Authority in the MoEF&CC i.e. Secretary (EF&CC) had approved the constitution of two Committee(s) for the purpose of 'Preparation of Restoration Plan' and 'Final Quantification of Compensation'. Both the Committees were given specific 'Scope of Work', in terms of Hon'ble Tribunal's order dated 01.06.2020. A copy of the 'Committee constitution order' dated 21.07.2020 is placed for reference of Hon'ble Tribunal. **[Annexure-C]**

22. That, pursuant to the receipt of nominations from various agencies, the composition of the committees constituted by MoEF&CC was in line with the directions of the NGT, as follows:

Committee for 'Finalization of Restoration Plan'

- Dr. S. C. Garkoti, Adviser, MoEFCC - Chairman
  
- Shri A. K. Pateshwary, Director, IA (Industry-II),  
MoEFCC
  
- Dr. Prashant Gargava, Member Secretary, CPCB
  
- Shri Dinbandhu Gouda, Divisional Head (IPC-I) &  
Additional Director, CPCB
  
- Shri Bharat Sharma, Addl. Director and Incharge, CPCB  
Regional Directorate, Pune
  
- Shri A Ramchand, Chief Environmental Engineer, APPCB
  
- Shri D. Chandra Sekhara Varma, Director of Factories,  
Govt. of Andhra Pradesh

- Shri V. Vinay Chand, District Magistrate (DM),  
Vishakhapatnam
- Dr. Dharmendra K. Gupta, Director, HSM Division –  
Member Convenor

Committee for 'Finalization of Compensation'

- Dr. Prashant Gargava, Member Secretary, CPCB –  
Chairman
- Dr. Hemant Bherwani, Sr. Scientist, NEERI
- Shri Amardeep Raju, Addl. Director/ Scientist-E,  
MoEFCC (handling violation projects)
- Dr. Dharmendra K. Gupta, Director, HSM Division –  
Member Convenor

23. That, as per the order dated 21.07.2020, the work related to 'Preparation of Restoration plan' was sub-divided into two parts i.e. 'Plan for Restoration of environmental media viz. air, water and soil quality' and 'Plan for Restoration and Compensation plan for damage to property, health, crops,

livestock etc.’ The CPCB (*technical arm of the MoEF&CC*) was made nodal agency for preparation of ‘Plan for Restoration of environmental media viz. air, water and soil quality’ and the District Administration headed by District Collector was made nodal agency for ‘Plan for Restoration and Compensation plan for damage to property, health, crops, livestock etc.’.

24. That, the CPCB as well as District Administration, Vishakhapatnam was asked to submit respective ‘Restoration Plans’ to MoEFCC for compilation/ integration, review and examination, and based on the suggestions of the Committee constituted for ‘Finalization of Restoration Plan’ under the chairpersonship of Dr. Satish C. Garkoti, Adviser, MoEFCC, the plans shall be finalized.

25. That, after the preparation of a ‘Final Restoration Plan’, the Committee constituted for ‘Finalization of Compensation’ under the chair-personship of Dr. Prashant Gargava, Member Secretary, CPCB shall consider the consolidated Restoration-cum-Compensation Plan and finalize the

compensation on certain criteria (to be arrived), and make its recommendations to the MoEFCC, which shall be further submitted to Hon'ble Tribunal for its perusal.

26. That, the First (1<sup>st</sup>) meeting of the Committee constituted for 'Preparation of Restoration Plan' was convened under the chairmanship of Dr. Satish C. Garkoti, Adviser, MoEFCC on 17.08.2020 at 3 P.M. through video-conferencing. All the members of the Committee attended/ represented in the meeting. The Committee in its deliberations discussed the technical aspects with regard to the availability of technical/ scientific data available w.r.t. pollution of environmental media as well as need for further data collection. The Committee also deliberated on the extent of area to be covered for preparation of restoration plan as well as identify the compensation coverage. The Committee took cognizance of the fact that detail modelling/ technical studies have been carried out by the High Power Committee constituted by State Govt. of Andhra Pradesh, which has established that the impact zone is about 3kms of the unit, with majority of the impact in windward side. The

Committee also considered that in view of the expertise required for assessment of environmental damages and preparation of the restoration plan for air, water, soil components, CPCB may onboard CSIR-NEERI. The Minutes of the said meeting are annexed. **[Annexure-D]**

27. That, CPCB vide its letter dated October 09, 2020 had informed that it has initiated the process of on-boarding CSIR-NEERI and awarded a project to CSIR-NEERI with the following objectives:

- To collect and analyse the baseline and post impact data of air, water and soil pollution parameters
- To collect data related to population impact due to the leak
- To collate and finalize various economic methods which can be utilized for monetary damage assessment

- To collect data for primary assessments related to economic assessments and utilization of econometric tools for finalization normalized value
- To compute environmental damages in monetary terms
- To assess existing environmental quality data for air, water soil
- To monitor ambient air quality, surface water, ground water and soil within the industry and in surrounding villages within 3 km region for styrene
- To assess the microbiological diversity (bacteria and fungi) of soil within and surrounding villages (within 3 km) of industry
- To collect primary health and secondary health data from the primary health centers (PHCs)/ hospitals and personal questionnaire data on human health in the study area

- To assess the impacts on environmental media w.r.to air, water and soil due to the uncontrolled Styrene vapor release
- To prepare a Plan for Restoration of Environmental Media viz. air, water and soil quality. **[Annexure-E]**

28. That, the representative of APPCB, vide email dated 18.09.2019 had informed that the District Collector, Vizag has constituted a sub-committee for preparation of restoration and Compensation plan for damage to property, Health, Crops, Livestock etc. The sub-committee met on 14.09.2020 requested for 15 days more time for submitting the report. **[Annexure-F]**

29. That, vide letter dated 19.10.2020 (Received on 28.10.2020), the District Collector, Vizag submitted the Report on 'Restoration and Compensation Plan for damage to health, property, crops, livestock etc. (Sub Component-2) to the Ministry of Environment Forest and Climate Change. **[Annexure-G]**

30. That, the first (1<sup>st</sup>) meeting of the MoEFCC Nodal Committee constituted for 'Finalisation of Compensation' was convened under the chairmanship of Dr. Prashant Gargava, Member Secretary, CPCB on 10.09.2020 at 11 A.M. During the deliberation, the Committee noted that finalizing the compensation is a follow-up activity and can be undertaken once the 'Final Restoration Plan' is in place. The Committee also noted that for finalization of compensation specific skill, expertise would be required, and hence, independent experts can be on-boarded to support and guide the Committee. During the meeting, CPCB and CSIR-NEERI informed that the study would take at least five (5) months to complete. In view of the time required for completion of activities, the Committee further asked MoEF&CC to seek additional time from the Hon'ble Tribunal. **[Annexure-H]**

W.r.t. revamping of monitoring mechanism

31. That, requisite inputs were sought from IA (Monitoring) Division of MoEF&CC w.r.t. revamping of monitoring

mechanism and applicability of M/s LG Polymers. It was conveyed that the unit falls in Category 'A' under the EIA Notification, 2006. The unit had been operating without EC and the company has applied for EC in 2018 to the SEIAA under the 'Violation ' category. As per the Hon'ble Tribunal Order dated 01.06.2020, 'Failure of Monitoring mechanism' was one of the issue under consideration. It is further, submitted that this Ministry is handling the revamping of monitoring mechanism in OA No 837 of 2018 in the matter of Sandeep Mittal vs UoI and the same is under formulation.

W. r. t. consideration of EC of M/s LG polymers by MoEF&CC

32. That, requisite inputs were sought from IA (Violation) Division of MoEF&CC handling EC related case of LG Polymers. It was conveyed that, under the Environment (Protection) Act, 1986 read with Environment (Protection) Rules, 1986, Ministry of Environmental Forest and Climate Change has issued a Notification number S.O. 1533(E) dated 14.09.2006. **U**nder the provision of the EIA

Notification, 2006, *all new projects or activities listed in the Schedule to the EIA Notification 2006 or the expansion or modernization of existing projects or activities listed in the Schedule to the EIA Notification 2006 with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization or any change in product –mix in an existing manufacturing unit included in Schedule beyond the specified range*, shall be undertaken, only after receipt of the prior environment clearance from the Central Government (Ministry of Environment, Forest and Climate Change) or by the State Level Environment Impact Assessment Authority (“SEIAA”), as the case may be. It is submitted that, the Central Government under sub section (3) of section 3 of the Environment (Protection) Act, 1986, in accordance with the procedure specified in the EIA Notification, 2006, duly constitutes SEIAA in the States.

*Categorization of Projects and activities: -*

33. All projects and activities are broadly categorized into two categories- Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man-made resources.

All projects and activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) constituted by the Central Government for the purpose of this notification.

34. All projects or activities included as Category 'B' in the Schedule, including expansion and modernization of existing projects or activities, but excluding those which fulfil the General Conditions (GC) stipulated in the Schedule, will require prior environmental clearance from the State/Union Territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the

recommendations of a State or Union Territory Level Expert Appraisal Committee (SEAC). In the absence of a duly constituted SEIAA or SEAC, a Category 'B' project shall be considered at the Central Level.

35. That, under the provisions of the EIA Notification, 2006, Environment Clearance for Petrochemical based processing (process other than cracking reformation and not covered under the complexes) are covered under entry 5 (e) of the Schedule to the EIA Notification, 2006. The entry 5(e) of the Schedule of EIA Notification 2006 provides as follows;

	Project or Activity	Category with threshold limit		Conditions, if any
		A	B	
<b>5</b>	<b>Manufacturing/Fabrication</b>			
(1)	(2)	(3)	(4)	(5)
5 (e)	Petroleum products and	Located outside the	Located in a notified	General as well as

	<p>petrochemical based processing such as production of carbon black and electrode grade graphite (process other than cracking &amp; reformation and not covered under the complexes)</p>	<p>notified industrial area/estate</p>	<p>industrial area/ estate.</p>	<p>specific condition shall apply.</p> <p>Note:</p> <p>Manufacturing of products from polymer granules is exempt</p>
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36. It is submitted that the projects or activities or the expansion or modernization of existing projects or activities requiring prior environmental clearance under the Environment Impact Assessment Notification, 2006 entailing capacity addition with change in process or technology or both undertaken in any part of India without obtaining prior environmental clearance from the Central Government or by the State Level Environment Impact Assessment Authority, as the case may be, duly constituted by the Central Government under sub-section (3) of Section 3 of the said Act, shall be considered a case of violation of the Environment Impact Assessment Notification, 2006. The Ministry of Environment Forest and Climate Change (MOEF&CC) issued Notification S.O 804 (E) dated 14.03.2017 to bring such projects and activities (case of violation) in compliance with the environmental laws at the earliest point of time, rather than leaving them unregulated and unchecked, which will be more damaging to the environment.

37. It is further submitted that the MOEF&CC Vide Notification dated 14.03.2017 opened a window of 6 months (14.03.2017 to 13.09.2017) and further one-month window (14.03.2018 to 13.04.2018) in compliance to Hon'ble High Court of Madras order dated 14.03.2018 for the projects which failed to obtain prior environmental clearance in accordance with EIA Notification, 2006.

38. That, M/s. LG Polymers India Private Limited located at Sy. No.s 29 to 45, 83/1 and 83/3, Industrial Zone, RR Venkatapuram Village, Pendurti Mandal, Visakhapatnam District, Andhra Pradesh, had undergone expansion of the existing unit without obtaining prior Environmental Clearance. M/s. LG Polymers India Private Limited had filed the application to SEIAA, seeking Environmental Clearance under Ministry's Notification S.O. 804 (E) dated 14.03.2017. Application was submitted to SEIAA on 12.04.2018 as Category B project (Proposal No. SIA/AP/IND2/24594/1900) covered under item 5 (e) of the Schedule to the EIA Notification, 2006.

39. M/s. LG Polymers India Private Limited submitted the proposal to SEIAA for manufacturing of Polystyrene and Expandable polystyrene. Proposal was considered by the SEAC and SEIAA in the 128th and 120th meetings, respectively.

40. The project proponent (M/s. LG Polymers India Private Limited) in the said meetings informed that they have filed their application to the SEIAA, Andhra Pradesh instead of filling to the MoEF&CC as their project comes under Category 'A' and requested to transfer the file to MoEF&CC. The SEIAA recommended transferring this proposal to the MoEF&CC, Government of India, New Delhi for further processing. Accordingly, SEIAA vide letter dated 07.01.2020 transferred the proposal to the Ministry, which was received in the Ministry in March 2020. Proposal was considered on 19.05.2020 in 33rd meeting by the Expert Appraisal Committee (EAC), constituted for regularization of proposals submitted under violation of EIA Notification, in terms of the provisions of the Notification dated 14.03.2017.

41. EAC in the said meeting after detailed deliberations and thorough examination of the proposal, recommends the instant proposal to be deferred till the outcome of Hon'ble NGT, Hon'ble High Court of AP and reports of Committees constituted by NGT, MOEFCC, Govt. of AP, NDRF, CPCB, NDMA and NEERI is made available to the committee for facilitating proper appraisal of the project which will be restricted to existing production capacity (415 TPD ) being operated without prior Environmental Clearance

W.r.t. addressing safety related issues in industries handling hazardous chemicals

42. That, apart from the directions given by the Hon'ble Tribunal, the MoEF&CC has been examining the recommendations of the High Power Committee (HPC) constituted by State Govt. of Andhra Pradesh. A representative was also nominated in this regard to the HPC on behalf of MoEFCC/ CPCB. The HPC covered four aspects in its recommendations viz.

- i. About operation of M/s LG Polymers;

- ii. Technical suggestions regarding Styrene industries;
- iii. Technical suggestions regarding Hazardous Chemical Industries; and
- iv. Technical suggestions regarding Hazardous Chemical Industries located close to Residential areas/habitations, besides other suggestions. The summary of recommendations w.r.t. above four aspects is also attached. **[Annexure-I]**

43. That, it is submitted that while the stakeholders have been engaged in the coordinating the matters related to M/s LG Polymers, Vishakhapatnam and other accident issues, the ongoing pandemic situation coupled with restrictions on meetings/ movements/ work from home directions/ COVID infections in the work-space, has severely impacted the normal conduct of business. In such ongoing scenario, the pace of execution of activities is also hampered. However, sincere efforts are made to not only comply with the directions of the Hon'ble Courts/ Tribunals but also handle

increasing number of accident cases and issues arising out of it.

44. That, after the incident of chemical accident (styrene gas leakage) at M/s LG Polymers, Vishakhapatnam, there has been a series of major/ minor chemical accidents across the country which has immensely increased the official coordination issues (like court matters/ RTI/ grievances etc.) to be dealt by the same set of officials/ agencies at Central/ State level.

45. That, in light of the foregoing and considering that the studies to be convened for preparation of 'Restoration plan' are highly skilled and technical, it is prayed that Hon'ble Tribunal may take a lenient view and **condone the delay in favor of stakeholder agencies for not meeting the deadlines prescribed vide order dated 01.06.2020.** However, considering that, the work has been going on and CSIR-NEERI has been on-boarded and District Agencies have also sought additional time, **Hon'ble Tribunal may like to grant additional time for completion of the rest**

**of the activities and subsequent consideration of the 'Restoration Plan' by the committees constituted by MoEF&CC for finalizing the compensation.** In the meantime, the Ministry would also deliberate on the recommendations of the HPC to make technical recommendations on the 'operation of industries dealing in hazardous chemicals'. The Hon'ble Tribunal shall be apprised about the action status and apprise the about the same.

46. That, in view of the aforementioned facts, circumstances and action initiated by MoEF&CC in coordination with other stakeholders, this Hon'ble Tribunal may kindly be pleased to pass appropriate order(s).

**DEPONENT**

**VERIFICATION**

I, the above named deponent do hereby verify that the contents of the above affidavit are true and correct on the basis of official

record maintained by the Respondent No. 1 in daily course of its business, no part of it is false and nothing material has been concealed there from.

Verified at .....on this the .....day of October, 2020.

**DEPONENT**

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

**PRINCIPAL BENCH, NEW DELHI**

**Original Application No. 73 of 2020**

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Village Visakhapatnam in Andhra Pradesh

**REPLY AFFIDAVIT ON BEHALF OF MINISTRY OF ENVIRONMENT,  
FOREST AND CLIMATE CHANGE**

**MOST RESPECTFULLY SHOWETH:**

I, Dharmendra Kumar Gupta, currently working as Scientist- F/ Director in the Hazardous Substances Management Division of the Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi, do hereby solemnly affirm and state as under: -

1. That I, in my official capacity of as Scientist-F/ Director, Hazardous Substances Management Division, Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi one of the Respondents in the above mentioned matter, am conversant with the facts and circumstances of the case on the basis of official records available, and as such authorized and competent to swear this affidavit.
2. It is submitted at the very outset that the instant respondent denies each averment and/ or submission made by other respondents which are contrary to and inconsistent with the averments made and facts stated in the present reply. It is submitted that only those facts, which have been expressly admitted by the instant Respondent in the present reply, be considered as an official position on behalf of the MoEF&CC.
3. That a short affidavit is being filed by the answering respondent at this stage highlighting the regulatory framework and action taken by the Ministry so far. The respondent craves leave and liberty to file a detailed Counter Affidavit to the aforesaid application, as and when required.

4. That in the instant matter Hon'ble Tribunal has taken *suo moto* cognizance of a chemical (industrial) accident that occurred at M/s LG Polymers India Pvt. Limited, Vishakhapatnam, Andhra Pradesh during early morning (around 3:45 AM) on 07.05.2020 due to leakage of Styrene gas from one of the storage tanks. The styrene gas was used as a raw material in the industry. Till now, 12 deaths have been reported and an estimated 4000 persons are affected due to the accident. The Govt. of Andhra Pradesh has reportedly evacuated inhabitants up to a distance of 3 km radius. **[Refer Annexure-A]**
5. That MoEF&CC is the nodal Ministry under Govt. of India mandated to take steps for pollution control and environmental conservation, among other things. To achieve its mandate, the MoEF&CC administers various acts including Environment (Protection) Act, 1986.
6. That two sets of rules have been notified to put in place a regulatory mechanism aimed at avoiding chemical accidents in industrial units viz. 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]. Key responsibilities have been assigned to various State Government/ Central Government Departments under the provisions of MSIHC Rules, 1989 and CA(EPPR) Rules, 1996 with the objective to prevent major chemical accidents arising from industrial activities and limiting the effects of such accidents on human health and environment. **[Refer Annexure-B and Annexure-C]**
7. That the MSIHC Rules, 1989 require the occupier to provide necessary information that is likely to cause major accidents and affect general public during a major accident at the site which include submission of information on usage/ storage/ manufacture of hazardous chemicals, seek approval of sites, prepare on-site emergency plan and safety reports, undertaking safety audits and mock-drills etc. The occupier is required to comply with above mentioned rule provisions with concerned authorities designated under Schedule-5 of the rules.
8. That to complement the provisions of MSIHC Rules, 1989, the CAEPPR Rules, 1996 provide statutory backup for setting up a Crisis Management framework and associated organizational support in the

country. The Chemical Accidents (EPPR) Rules, 1996 envisage a Four-tier Crisis Management System in the country at the Central, State, District and Local levels. A Central Crisis Group has been constituted in compliance with Rule 3 under the chairmanship of Secretary (EF&CC). A Central Crisis Group Alert System i.e. Red Book has also been brought in compliance with Rule 4 to facilitate quick information exchange during chemical emergencies. The Red Book contains name, address and contact details of Central and State Nodal authorities, relevant national agencies/ institutes pertaining to chemical (industrial) disaster management. The Red Book is hosted on the website of MoEFCC and updated annually. The last update was done in November, 2019. A virtual crisis control room is also set-up in the MoEFCC to coordinate with State Authorities during chemical (industrial) accident emergencies.

9. That Styrene is listed at S.No. 583 of Part-II of Schedule 1 signifying it as a hazardous chemical. Further as per Schedule 4, the Polymerization operation/ process is identified as an 'industrial activity', which is carried out in the unit i.e. M/s LG Polymers India Pvt. Limited. Hence, the instant unit falls under listed 'industrial activity'.
10. That various provisions of the MSIHC Rules, 1989 are briefly described as follows:

<b>Rule</b>	<b>Heading</b>	<b>Description</b>
Rule 1	Short Title And Commencement	Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
Rule 2	Definitions	Various terms used in the rules like Hazardous Chemical, industrial activity, isolated storage, import, importer, export, exporter, isolated storage, major accident, major accident hazard etc. have been defined.
Rule 3	Duties of Authorities	Duties of authorities are specified in Schedule 5.
Rule 4	General Responsibility Of The Occupier During Industrial	Responsibility of MAH occupier defined such as: (a) identify the major accident hazards; and

<b>Rule</b>	<b>Heading</b>	<b>Description</b>
	Activity	(b) take adequate steps to - (i) prevent such major accidents and to limit their consequences to persons and the environment; (ii) Provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety.
Rule 5	Notification Of Major Accident	Occupier should notify about the major chemical accident to concerned authority and concerned authority shall undertake full analysis of accident report and sent to MoEF&CC as prescribed.
Rule 6	Industrial Activity To Which Rules 7 To 15 Apply	Defined industrial activity, isolated storage, new industrial activity, existing industrial activity are mentioned in rules for application of Rules 7 to 15
Rule 7	Approval and Notification Of Sites	Occupier should not undertake any industrial activity without approval of concerned authority (as per Schedule 5) and submit a written report as per the particulars specified in Schedule 7 at least 3 months before commencing the activity.
Rule 8	Updating of the site notification following changes in the threshold quantity	Any change in details submitted by occupier as per Schedule 7 is required to be updated by the way of submission of an updated report to the concerned authority.
Rule 9	Transitional Provisions	Modus of applicability of various rule provisions in respect of units operating prior to these rules as well as new industrial activity/ isolated storages
Rule 10	Safety Reports [And Safety Audit Reports]	Occupier to conduct safety audit for new and existing industrial activity and prepare a safety reports as per Schedule 8 and submit it to concerned

<b>Rule</b>	<b>Heading</b>	<b>Description</b>
		authority
Rule 11	Updating of reports under rule 10	Occupier required to make prior reporting of the proposed modifications in an industrial activity as prescribed
Rule 12	Requirement for further information to be sent to the authority	Concerned authority may ask from occupier for additional information in industrial activity.
Rule 13	Preparation to on-site emergency plan by the occupier	Occupier should prepare and keep up-to-date 'on-site emergency plan' as specified in schedule 11.  The occupier required to ensure that a mock drill of the 'on-site emergency plan' is conducted every six months and report submit to concerned authority as per Schedule 5
Rule 14	Preparation of off-site emergency plan by the authority	District collector/ District authority should prepare and keep up-to-date 'off site emergency plan' as per format specified in schedule 12.
Rule 15	Information to be given to persons liable to be affected by a major accident	Occupier should inform public of the adjoining areas about the nature of the major accident hazard; and the safety measures and the "Do's' and 'Don'ts'" which should be adopted in the event of a major accident as prescribed
Rule 16	Disclosures of Information	Provisions on disclosure of information by concerned authority
Rule 17	Collection, Development and Dissemination of Information	The occupier should prepare and develop a safety data sheet as specified in Schedule 9 in respect of a hazardous chemical handled by him and ensure that the information is recorded accurately and reflects the scientific evidence used in making the hazard determination.

Rule	Heading	Description
		Container of hazardous chemical should be clearly labelled as specified under rule.
Rule 18	Import of Hazardous Chemicals	Any person responsible for importing hazardous chemicals in India should provide prior-information specified under the rule to the concerned authorities prescribed under the rules. Any person importing hazardous chemicals should maintain the records of the hazardous chemicals imported as specified in Schedule 10 and the records can be checked by the concerned authority
Rule 19	Improvement Notices	Concerned authority may serve the improvement notice to occupier in case of violation of rules
Rule 20	Power of the Central Government to modify the schedules	The Central Government may, at any time, by notification in the Official Gazette, make suitable changes in the Schedules.

11. That various provisions of the CA(EPPR) Rules, 1996 are briefly described as follows:

Rule	Heading	Description
Rule 1	Short Title And Commencement	Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
Rule 2	Definitions	Various definition viz. Chemical accident, industrial pocket, major chemical accident, industrial activity, hazardous chemical etc. has been given in the mentioned rule.
Rule 3	Constitution Of Central Crisis	Provision of constitution of CCG for management of chemical accident and

	Group	functions.
Rule 4	Setting up of Crisis Alert System	Provision of setting up a functional crisis control room, information net working system with the State Governments under Crisis Alert System.
Rule 5	Functions of the Central Crisis Group	Defined responsibilities of CCG/provide expert guidance for handling chemical accidents.
Rule 6	Constitution Of State Crisis Group	Provisions enabling the State Government to constitute a State Crisis Group for management of chemical accidents
Rule 7	Functions of the State Crisis Group	Defined responsibilities of SCG/ to deal with chemical accidents and coordinate efforts in planning, preparedness and mitigation of a chemical accident
Rule 8	Constitution of the District And Local Crisis Group	The State Government constitute a District and Local Crisis Group for management of chemical accidents
Rule 9	Functions Of The District Crisis Group	Apex body in the district to deal with major chemical accidents and to provide expert guidance for handling chemical accidents
Rule 10	Functions Of The Local Crisis Group	To deal with chemical accidents and coordinate efforts in planning, preparedness and mitigation of a chemical accident
Rule 11	Powers of the members of the Central, State And District Crisis Groups	The Members of the Central Crisis Group, State Crisis Groups and District Crisis Groups shall be deemed to be persons empowered by the Central Government in this behalf under sub-section (1) of section 10 of the Environment (Protection) Act, 1986
Rule 12	Aid And assistance for the	Major Accident Hazard installations provide aid, assist and facilitate

	functioning of the District and Local Crisis Groups	functioning of the District Crisis Group and Local Crisis Group.
Rule 13	Information to the Public	CCG, SCG, LCG provide information on request regarding chemical accident prevention, preparedness and mitigation in the country, state and industrial pocket respectively.

12. That to prevent chemical (industrial) accidents in the country, the concerned Central/ State authorities have been delegated responsibilities as per Schedule 5 of the MSIHC Rules, 1989. Among all authorities, the State Chief Inspector of Factories (CIFs) (appointed under the Factories Act, 1948) are the nodal agencies that have been assigned responsibilities in line with their mandatory obligations under the Factories Act, 1948 as follows:

*Enforcement of directions and procedures in respect of industrial installations and isolated storages covered under the Factories Act, 1948, dealing with hazardous chemicals and pipelines including inter-state pipelines regarding-*

- i. *Notification of major accidents as per Rule 5(1) and 5 (2).*
- ii. *Notification of sites as per Rules, 7 to 9.*
- iii. *Safety reports as per Rules, 10 to 12.*
- iv. *Preparation of on-site emergency plans as per Rule 13.*
- v. *Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per S. No. 9 of this schedule.*

Similarly, the MSIHC Rules, 1989 mandates Petroleum and Explosives Safety Organization (PESO), as the nodal agency to approve the sites of industrial installation and isolated storages.

13. That the PESO and CIFs while giving site-specific approvals to industrial units and isolated storages are expected to ensure preparation of on-site emergency plans & safety reports by units, reviewing 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.

14. That pursuant to the reporting of the accident in national media, the Ministry followed up the matter with concerned State Government Departments viz. Andhra Pradesh State Pollution Control Board, Directorate of Industrial Safety and Health (DISH)/ Chief Inspector of Factories as well as Central Pollution Control Board (CPCB). The meeting of Central Crisis Group (CCG), constituted under CA(EPPR) Rules, 1996 was convened on 08.05.2020 under the Chairmanship of Secretary (EF&CC) wherein suggestions were invited from all stakeholders including chemical experts to contain the situation at M/s LG Polymers India Pvt. Limited, Vishakhapatnam. **[Refer Annexure-D]**
15. That the MoEFCC has asked the State Government of Andhra Pradesh and Chairman, State Pollution Control Board to submit a detailed report to it under the provisions of Rule 4(2) of MSIHC Rules, 1989 within a stipulated time period of 90 days. Further the MoEFCC, has also shared with all States/ UT administrations, the latest version of Crisis Alert System i.e. Red-Book along with the contact details of nodal officer dealing with Chemical (industrial) accidents. **[Refer Annexure-E]**
16. That in view of the aforementioned facts, circumstances and action initiated by MoEFCC, this Hon'ble Tribunal may kindly be pleased to pass appropriate order(s).

**DEPONENT**

**VERIFICATION**

I, the above named deponent do hereby verify that the contents of the above affidavit are true and correct on the basis of official record maintained by the Respondent No. 1 in daily course of its business, no part of it is false and nothing material has been concealed there from.

Verified at .....on this the .....day of May, 2020.

**DEPONENT**

## **Report on the Styrene gas leakage happened at M/s LG Polymers India Pvt. Limited, Vishakhapatnam (Andhra Pradesh)**

### About the accident

A chemical (industrial) accident occurred during the early morning (around 3:45 AM) on 07.05.2020 at M/s LG Polymers India Pvt. Limited, Vishakhapatnam, Andhra Pradesh due to leakage of Styrene gas from one of the storage tanks. The styrene gas was used as a raw material in the industry. As of now, 12 deaths have been reported and an estimated 4000 persons are affected due to the accident. The Govt. of Andhra Pradesh has reportedly evacuated inhabitants' up to a distance of 3 km radius.

### Follow-up by MoEFCC

2. Pursuant to the reporting of the accident in national media, the Ministry followed up the matter with concerned State Government Departments *viz.* State Pollution Control Boards, Directorate of Industrial Safety and Health (DISH)/ Chief Inspector of Factories as well as Central Pollution Control Board (CPCB) Head Office, CPCB Regional Office, Chennai and MoEFCC Regional Office Chennai. Two separate meetings through video conferencing were held on 08.05.2020 i.e. (i) between MoEFCC and State Government of Andhra Pradesh and (ii) meeting of Central Crisis Group (CCG), constituted under CA(EPPR) Rules, 1996.

### Responses by Agencies

3. Preliminary Responses were received from CPCB and MoEFCC RO Chennai. Subsequently, response was also received from APPCB. The CPCB R.O. Chennai has shared a detailed report on 08.05.2020 (*Refer Annexure-1*). Based on the inputs received and discussion with concerned officials at Central/ State Government level and CCG members, the information is compiled.

### About the Unit

4. M/s LG Polymers India Pvt. Ltd was established in 1961 as "Hindustan Polymers" for manufacturing Polystyrene and its Co-polymers at Visakhapatnam, India. The unit merged with McDowell & Co. Ltd. of UB Group in 1978. Subsequently, it was taken over by LG Chem (South Korea) and renamed as LG Polymers India Private Limited (LGPI) in

July, 1997. The industry is spread in an area 213 acres near RRV Puram, Naidu Thota, Visakhapatnam. Presently, LGPI is one of the leading manufacturers of Polystyrene and Expandable Polystyrene in India. The Styrene monomer (raw material) is completely imported by the unit. The unit was not in operation and shutdown from last 45 days and the leakage had happened during preparation of the plant for resuming operations.

#### Status of approvals and Compliance

5. The unit has been issued Consent to Operate by APPCB to manufacture 313 TPD of polystyrene and 102 TPD of expandable polystyrene, which is valid up to 31.12.2021.

6. The unit is connected with CPCB Online Continuous Emission Monitoring System (OCEMS) for transmitting real time emission & effluent data to CPCB servers. On 24.03.2020, the unit had sent a mail to CPCB stating the stoppage of plant operations. CPCB reported that as per the OCEMS data available with it, no values were recorded between 24.03.2020 (around 13:00 hrs) and 05.05.2020. Further, the OCEMS was reactivated around 9:45 AM on 06.05.2020.

7. The unit falls under the Environmental Impact Assessment Notification, 2006. It applied for EC in 2018 under Violation category to the State Environmental Impact Assessment Authority. Subsequently, it was established that it is a 'Category A' project and should be considered at the central level. The Ministry is yet to receive transfer proposal from SEIAA.

#### Details of leakage

8. The unit have two raw material (styrene monomer) storage tanks of 2500KL and 3500KL. Apart from the main storage tanks, three standby tanks of Styrene Monomer are also established in the unit. All the tanks were provided with internal cooling system type of refrigeration to maintain the temperature below 20°C. The styrene gas (styrene monomer) was reportedly leaked from 2500KL storage tanks in early morning. The quantity of leaked gas leak is not reported by any agency. It has been reported that the unit had high volume of raw material storage due to shutdown. It has also

been reported that the failure of refrigeration system is one of the major reason of accident.

#### Impact of Styrene gas leakage

9. CPCB has reported that APPCB has monitored the concentration of styrene gas at 9:30 AM (07.05.2020). The concentration was observed in the range of 1 to 2.5 ppm in adjoining areas of Venkatapuram, Padmanabhapuram, SC & BC Colony (1 ppm reported as 4.2mg/m<sup>3</sup>). As per air quality norms, styrene should not be present in atmospheric air. The presence of even low concentration of styrene gas in atmospheric air can cause respiratory discomfort/ illness and skin irritation.

#### Addressing accident situation

10. The leakage was reportedly arrested at 10:30 AM (07.05.2020) and situation is under close watch. It is reported that the styrene gas normally decomposes in 12-24 hours, in case there is no further leakage. Accordingly, the NDRF/ SDRF, Distt. Authorities etc. have rescued the inhabitants of the nearby areas up to a radius of 3kms. As per the latest reports, twelve (12) people and 22 animals have died and an estimated 4000 persons are affected.

11. CPCB reported that Tertiary Dodecyl Mercaptan (TDM) is used for emulsion polymerization of styrene monomer and the same chemical is used to neutralize the residual emissions. It has been reported that 300 litres of TDM was already injected and an additional 500 ltrs of TDM would be required to complete the neutralisation. It is understood that the same is being arranged from Gujarat.

#### Safety related regulations

12. To address the issues related to chemical safety, the Ministry of Environment, Forest and Climate Change has put in a regulatory mechanism of the 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] with the support of State Governments. The objective of these rules is to prevent major chemical accidents arising from industrial activities and limiting the effects of such accidents on human health and environment. The Rules

mentions indicative criteria for hazardous chemicals and an illustrative list of 684 hazardous chemicals. *Styrene is a listed hazardous chemical and as per the literature available i.e. Material Safety Data Sheets, it is identified as a carcinogen with IARC grouping of 2B i.e. possibly carcinogenic to humans, flammable and can cause eye, inhalation and skin irritation, if exposed.*

13. Among other things, the MSIHC Rules, 1989 mandate the following:

- The occupier is required to inform to the authority, in schedule 6, of any major accident caused due to hazardous chemicals occurring on a site or in a pipeline.
- The concerned authority i.e. Chief Inspector of Factories, shall undertake full analysis of the major accident and send the requisite information to the MoEF.
- The occupier is required to submit safety report as specified in schedule 8 to the CIFs.
- The occupier shall prepare and keep updated on-site emergency plan as per schedule 11, detailing how major accident will be dealt in the industry on the site.
- An off-site emergency plan shall be prepared by the concerned authority (District Administration/ Authorities), as in schedule 5, to deal with the emergencies.

14. Apart from the above, the Directorate of Industrial Safety and Health have put in place the Standard Operating Procedures (SOPs) for operation of industries under the Factories Act, 1948 which is the umbrella legislation governing operation of all industries with regard to safety and health.

#### Action by MoEFCC on 07.05.2020

15. The Joint Secretary (HSMD) has written a DO letter on 07.05.2020 to Special Chief Secretary (Environment), Andhra Pradesh and Chairman, Andhra Pradesh Pollution Control Board to take further actions in line with the provisions of MSIHC Rules, 1989 and CA(EPPR) Rules, 1996. It is requested to send a detailed accident report within 90 days, as per the provisions of the rules. The report shall be examined in the Ministry and placed before the Central Crisis Group constituted under the rules.

Action by MoEFCC on 08.05.2020

15. A meeting of the Central Crisis Group, constituted under Rule 3 of the CA(EPPR) Rules, 1996, was held under the chairmanship of Secretary (EF&CC) at 5:30PM on 08.05.2020 through video-conferencing. The Central Crisis Group comprises of members from the following Ministries/ Departments/Experts, apart from MoEFCC:

- Ministry of Labour and Employment
- Ministry of Health and Family Welfare
- Central Pollution Control Board
- Ministry of Home Affairs Member
- Petroleum and Explosives Safety Organization
- Department of Chemicals and Petrochemicals
- Department of Industrial Policy and Promotion
- Ministry of Agriculture and Farmers Welfare
- Department of Fertilizers
- Ministry of Communications and Information Technology
- Ministry of Road, Transport and Highways- Member
- Ministry of Shipping- Member
- Ministry of Railways (Railway Board)
- National Disaster Management Authority
- Central Scientific and Industrial Research - Member, ex-officio
- Expert, Industrial Safety and Health
- Industry Representatives
- Representative, Indian Chemical Council - Member

16. During the meeting, the Chair informed the Group about the actions taken so far by the Central as well as State Government to contain the situation as well as status of leakage at the site of accident i.e. M/s LG Polymers India Pvt. Limited. The Chair also informed the Group about the video conference meeting held with Chief Secretary and other senior officials of Govt. of Andhra Pradesh. It was apprised to the Group that due to failure of refrigeration system and high ambient temperatures, the authorities are continuously working to keep the existing storages of styrene monomer below 20°C through water sprinkling.

17. It was further informed that Mercaptan (inhibitor) available in the plant is used to stabilize another three tanks of Styrene Monomer in the plant and required stocks of Mercaptan are being arranged from Gujarat. The Group noted that a team from National Environmental Engineering Research Institute (CSIR-NEERI) is already at the site to aid, assist and advise the authorities to control the situation. After detailed deliberations, the Chair requested the members to submit their suggestions on the situations that could further help in keeping the storage of Styrene monomer under control in absence of refrigeration system. The Minutes of the Meeting are placed at Annexure-2 for reference.

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**Central Pollution Control Board**

**Regional Directorate, Chennai**

**Dated: 07.05.2020**

**Preliminary Report on M/s LG Polymers India Pvt Ltd, Vishakhapatnam**

M/s LG Polymers India Pvt Ltd was established in 1961 as "Hindustan Polymers" for manufacturing Polystyrene and its Co-polymers at Visakhapatnam, India. It Merged with Mc Dowell & Co. Ltd. of UB Group in 1978. It was taken over by LG Chem (South Korea), Hindustan Polymers was renamed as LG Polymers India Private Limited (LGPI) in July, 1997. The industry is spread in an area 213 acres near RRV Puram, Naidu Thota, Visakhapatnam. It is an old Category A industry and applied for EC under violation window, which is under consideration of MOEFCC. The unit is having Consent to Operate issued by APPCB to manufacture 313 TPD of polystyrene and 102 TPD of expandable polystyrene valid upto 31.12.2021. The chemical Styrene (which was leaked) used as raw material is completely imported.

An accident is reported to have occurred in M/s. L.G Polymers India Pvt Ltd, Visakhapatnam at 03:45AM on 07.05.2020. The company has stored styrene monomer in vertical MS storage tanks of 2500 KL and 3500 KL capacity provided with internal cooling system through refrigeration. Styrene from one storage tank of 2500 KL got leaked and spread to surrounding villages of Venkatapuram, Padmanabhapuram, SC&BC Colony. APPCB has measured the concentrations of styrene in the ambient air at 9:30 AM. As per the monitoring values the styrene gas was present in the range of 1 to 2.5 PPM (1ppm ~ 4.2 mg/m<sup>3</sup>) in Venkatapuram, Padmanabhapuram, SC & BC Colony. Nine people and 22 animals suspected to have died and estimated 3000 persons are affected. Habitation at Venkatapuram village is near to the unit at a distance of 0.1km.

The unit is connected with Online Continuous Emission Monitoring System (OCEMS) for transmitting real time emission & effluent data to CPCB servers. The unit sent a mail to CPCB on 24.03.2020 stating that the plant operations have been stopped. As per the OCEMS

data available with CPCB, no values were recorded between 24.03.2020 (around 13:00 hrs) and 05.05.2020. It was reactivated around 9:45 AM on 06.05.2020.



The Govt. of AP is reported to have completed the evacuation of habitants up to 2 km radius. Release of Styrene gas (mist) is presently in controlled stage but not totally arrested. It is understood that Tertiary Dodecyl Mercaptan (TDM) used for emulsion polymerization of styrene monomer, which is being injected to neutralise the residual emissions. 300 litres of TDM was already injected. The unit may require additional 500 litres of TDM to complete such neutralisation. It is understood that the same is being arranged from Gujarat. As per the information from the management of M/s. L G Polymers, the reaction is not yet totally controlled, therefore the villagers should be kept away, till the total gas is decomposed/diluted in the ambient air. Normally the gas will decompose in 12-24 hrs if there is no further addition from the storage tanks.



#### Drum Containing TDM:

Release of styrene gas (mist) is controlled by emulsion polymerization of styrene monomer by injecting TDM ( Tertiary Dodecyl Mercaptan).

The unit is using hazardous chemicals mainly the styrene for production of polystyrene and expandable polystyrene and reported to have complied with MSIHC Rules for storage, transportation and handling of raw materials. It was reported by the unit that high volume storage of raw material (styrene) and failure of refrigeration system may be the cause for accident. Detailed investigation is underway. The unit has however failed to comply with the MSIHC Rules that has resulted in the accident.

As per records, the unit has proposed for expansion of its installed capacity. As per the form 1 submitted (dated 22-12-2017) by the industry seeking EC for expansion, under item 8 - regarding the risk of accidents during construction or operation, it was stated that the unit is equipped with all inbuilt safety precautions and there will not be any damage to environment or human health. However, the accident proves that the claim made by the industry is not true and even the unit has ruled out the risk of accidents from any other causes or due to natural disasters in their application for expansion. Further, at item 7: regarding the risk of contamination due to release of pollutant is also ruled out in their application. At item 5: regarding the release of hazardous substances to air was also ruled out in their application seeking clearance for expansion.

#### **Recommended Follow-up action**

- (i) APPCB to ensure that the unit collects residual waste chemicals including the residue of emulsion polymerization of styrene monomer generated due to treatment with TDM.
- (ii) The unit shall be directed closed down operations safely in stipulated time period by ensuring that the premises is free from all raw chemicals, waste-residues, hazardous

wastes, spill-material, intermediates, by-products and final product. While doing so, industry shall take all possible precautions to prevent any leakage from another storage tank and to prevent any further accidents.

- (iii) The unit must share the material safety data sheets of the hazardous chemicals handled by it to concerned departments.
- (iv) APPCB to carry out spot assessment of soil and groundwater to check for contamination levels, if required services of an expert agency involved in assessment of remediation of contaminated sites may be taken.
- (v) Condensation of styrene mist, spill of styrene near storage tanks, sprinkling water with styrene levels might have contaminated soil and sediments in and around the industry. APPCBs shall therefore direct the industry to demarcate the spill site and other affected areas so as to carry out preliminary environmental site assessment for soil and groundwater and take up remediation of soil and groundwater if required, as outlined in CPCB “Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty” as per the provisions under Hazardous and Other Waste Management Rules, 2016.
- (vi) APPCB shall monitor quality of wastewater in outfall drain of the industry and also the recipient water bodies. Discharge from industry should be contained to the extent possible to prevent any further contamination and joining of water bodies.
- (vii) APPCB shall carry out continuous monitoring of VOC levels including styrene in the and ambient air and also carry out ambient air quality monitoring for at least a week or till the levels are within the safe limits.
- (viii) As per CTO condition, the unit has to install VOC analyser, APPCB shall therefore verify the status of online analyser and furnish the VOC levels to all concerned departments.
- (ix) Accidental release of styrene may lead to high styrene levels in drains carrying wastewater. The unit should therefore segregate highly contaminated streams and store the same into holding tanks, for suitable treatment prior to discharge. APPCB shall ensure that untreated wastewater is not released from the unit.
- (x) APPCB may impose environmental liability and penalty as per the provisions under Rule 23 of Hazardous and Other Waste Management Rules, 2016.

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**Minutes of the Central Crisis Group under the Chairpersonship of Secretary MoEF&CC  
was held on 08.05.2020 at 5.30 PM through Video Conferencing.**

A Central Crisis Group meeting under the Chairpersonship of Secretary MoEF&CC was held on 08.05.2020 at 5.30 PM through Video Conferencing to consider and review the measures to be taken after the chemical accident, which occurred at M/s LG Polymers India Private Limited, Vishakhapatnam (Andhra Pradesh). A list of participants of the meeting is enclosed as **Annexure -I**.

2.0 After a brief introduction of all participants, the Secretary (MoEF&CC), briefed the crisis group about the updated status regarding the leakage of the gas from the premises of M/s LG Polymers India Private Limited, Vishakhapatnam (Andhra Pradesh). He also informed the committee about the evacuation efforts undertaken by the NDRF. The Ministry of Environment, Forest and Climate Change also informed the group about the functioning of the Control Room established under the Chemical Accidents (Emergency Planning, Preparedness and Response) rules, 1996.

3.0 Members of the group were then requested to provide specific suggestions regarding reduction of temperature of the stored styrene in order to avoid any further accidents.

A. Representative of the Reliance Industry suggested that prompt removal of insulation from the tanks and sprinkling of water was an essential requirement. He also suggested that maintenance of circulation in the tanks through operation of pumps was required to reduce temperature.

B. Representative from NEERI who had visited the site informed the group that water sprinkling was under way and more than 85% of the fumes were already under control.

C. Joint secretary, DCPC emphasized that sufficient quantities of the inhibitor –mercaptan (TDM) must be available at the site. Secretary, MoEF&CC informed the group that arrangements had been made to make available the necessary quantity of the inhibitor at the site.

D. Representative from PESO was of the view that as a precautionary measure, in future, a dual refrigerant system must be adopted for storage of monomers.

E. Representative from MoHFW placed on record that a medical team including psychologists must be present at site to deal with possible health impact of this incident on the local populace. Secretary, MoEF&CC advised MoHFW to take up the matter with DGHS and also said that MoEF&CC would also forward the comments to DGHS.

4.0 It was decided that comments/suggestions received from the members will be communicated to the NDRF team for further necessary action.

Meeting ended with vote of thanks to the Chair.

## **List of participants**

1. Shri. Ravi Shankar Prashad, Additional Secretary cum Chairman CPCB
2. Ms. Geeta Menon, Joint Secretary, HSM Division, MoEF&CC
3. Shri. K.N. Jha, Joint Secretary, Department of Petrochemicals
4. Shri. D.K. Saami, Civil Defense, Ministry of Home.
5. NCDC, MoHFW
6. Shri. Dimpy Garg, ED Safety, MoR
7. Dr. Smita Mohanty, CEPET
8. Shri. Atis Chandra,
9. Dr. Brajesh Tripathi, Ministry of Agriculture
10. Dr. Krishnamurthy, NEERI
11. Ms. Shruti,
12. Representative of PESO
13. Representative of Reliance Industry

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**THE MANUFACTURE, STORAGE  
AND IMPORT OF HAZARDOUS  
CHEMICAL RULES, 1989**

(As amended to date)

**THE MANUFACTURE, STORAGE AND IMPORT OF  
HAZARDOUS CHEMICAL RULES, 1989**

**MINISTRY OF ENVIRONMENT & FORESTS**

(Department of Environment, Forests and Wildlife)

**NOTIFICATION**

New Delhi, the 27<sup>th</sup> November 1989

**\*S.O.966(E)** - In exercise of the powers conferred by Section 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules, namely :

**1. SHORT TITLE AND COMMENCEMENT –**

(1) These rules may be called the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989.

(2) They shall come into force on the date of their publication in the Official Gazette.

**2. DEFINITIONS** - In these rules, unless the context otherwise requires, -

- (a) "Act" means the Environment (Protection) Act, 1986 (29 of 1986);
- (b) "Authority" means an authority mentioned in Column 2 of Schedule 5;
- (c) "export" with its grammatical variations and cognate expression, means taking out of India to a place outside India;
- (d) "exporter" means any person under the jurisdiction of the exporting country and includes the exporting country, who exports hazardous chemical;
- (e) "Hazardous Chemical " means -
  - (i) any chemical which satisfies any of the criteria laid down in Part I of <sup>1</sup>[Schedule 1 or] listed in Column 2 of Part II of this Schedule ;
  - (ii) any chemical listed in Column 2 of Schedule 2;
  - (iii) any chemical listed in Column 2 of Schedule 3;

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\* The principal rules were published in the Gazette of India vide number S.O. 966(E), dated 27.11.1989 and subsequently amended vide: S.O.115 (E), dated 05.02.1990; GSR 584, dated 09.09.1990; S.O.2882, dated 03.10.1994; and S.O. 57(E), dated 19.01.2000.

<sup>1</sup> Substituted by Rule 2(i) of the Manufacture, Storage and Import of Hazardous Chemical(Amendment) Rules, 2000 notified vide S.O. 57(E), dated 19.1.2000.

- (f) "import" with its grammatical variations and cognate expression, means bringing into India from a place outside India;
- (g) "importer" means an occupier or any person who imports hazardous chemicals;
- (h) "industrial activity" means-
  - i. an operation or process carried out in an industrial installation referred to in Schedule 4 involving or likely to involve one or more hazardous chemicals and includes on-site storage or on-site transport which is associated with that operation or process, as the case may be; or
  - ii. isolated storage; or
  - iii. pipeline ;
- (i) "isolated storage" means storage of a hazardous chemical, other than storage associated with an installation on the same site specified in Schedule 4 where that storage involves atleast the quantities of that chemical set out in Schedule 2;
- <sup>1</sup>[(j) "major accident" means -an incident involving loss of life inside or outside the installation, or ten or more injuries inside and/or one or more injuries outside or release of toxic chemicals or explosion or fire or spillage of hazardous chemicals resulting in on-site or off-site emergencies or damage to equipment leading to stoppage of process or adverse affects to the environment ;
- (ja) "major accident hazards (MAH) installations" means - isolated storage and industrial activity at a site handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities specified in, Column 3 of schedule 2 and 3 respectively; ]
- (k) "pipeline" means a pipe (together with any apparatus and works associated therewith) or system of pipes (together with any

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<sup>1</sup> Substituted by Rule 2(ii) of the Manufacture, Storage and Import of Hazardous Chemical (Amendment)Rules, 2000 notified vide S.O.57(E), dated 19<sup>th</sup> January, 2000.

apparatus and work associated therewith) for the conveyance of a hazardous chemical other than a flammable gas as set out in Column 2 of Part II of Schedule 3 at a pressure of less than 8 bars absolute; the pipeline also includes inter - state pipelines;

- (l) "Schedule" means Schedule appended to these rules;
- (m) "site" means any location where hazardous chemicals are manufactured or processed, stored, handled, used, disposed of and includes the whole of an area under the control of an occupier and includes pier, jetty or similar structure whether floating or not;
- (n) "Threshold quantity" means, -
  - (i) in the case of a hazardous chemical specified in Column 2 of Schedule 2, the quantity of that chemical specified in the corresponding entry in Columns 3 and 4 ;
  - (ii) in the case of a hazardous chemical specified in Column 2 of Part I of Schedule 3, the quantity of that chemical specified in the corresponding entry in Columns 3 & 4 of that part;
  - (iii) in the case of substances of a class specified in Column 2 of Part II of Schedule 3, the total quantity of all substances of that class specified in the corresponding entry in Columns 3 and 4 of that part.

### <sup>1</sup>[3. DUTIES OF AUTHORITIES –

The concerned authority shall, -

- (a) inspect the industrial activity at least once in a calendar year;
- (b) except where such authority is the Ministry of Environment and Forests, annually report on the compliance of the rules by the occupiers to the Ministry of Environment and Forests through appropriate channel ;

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<sup>1</sup> Substituted by Rule 2 of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

- (c) subject to the other provisions of these rules, perform the duties specified in column 3 of Schedule 5.]

#### **4. GENERAL RESPONSIBILITY OF THE OCCUPIER DURING INDUSTRIAL ACTIVITY -**

(1) these rules shall apply to, -

- (a) an industrial activity in which a hazardous chemical, which satisfies any of the criteria laid down in Part I of Schedule 1<sup>1</sup>[or listed] in Column 2 of Part II of this Schedule is, or may be, involved; and

<sup>2</sup>[(b) isolated storage of a hazardous chemical listed in Schedule 2 in a quantity equal to or more than the threshold quantity specified in Column 3, thereof.]

(2) An occupier who has control of an industrial activity in terms of sub-rule (1) shall provide evidence to show that he has, -

- (a) identified the major accident hazards; and
- (b) taken adequate steps to -
- (i) prevent such major accidents and to limit their consequences to persons and the environment;
- (ii) provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety.

#### **4. NOTIFICATION OF MAJOR ACCIDENT -**

(1) Where a major accident occurs on a site or in a pipe line, the occupier shall <sup>3</sup>[within 48 hours notify] the concerned authority as identified in Schedule 5 of that accident, and furnish thereafter to the concerned authority a report relating to the accidents in installments, if necessary, in Schedule 6.

(2) The concerned authority shall on receipt of the report in accordance with sub-rule 1 of this rule, shall undertake a full analysis of the major accident and sent the <sup>4</sup>[requisite information within 90 days to the Ministry] of Environment and Forests through appropriate channel.

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<sup>1</sup> Substituted by Rule 3(i) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>2</sup> Substituted by Rule 3(ii), *ibid.*

<sup>3</sup> Substituted by Rule 3(a) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>4</sup> Substituted by Rule 3(b) *ibid.*

<sup>1</sup>[(3) An occupier shall notify to the concerned Authority, steps taken to avoid any repetition of such occurrence on a site.]

<sup>2</sup>[(4) The concerned Authority shall compile information regarding major accidents and make available a copy of the same to the Ministry of Environment & Forests through appropriate channel.

(5) The concerned Authority shall in writing inform the occupier, of any lacunae which in its opinion needs to be rectified to avoid major accidents.]

## **6. INDUSTRIAL ACTIVITY TO WHICH RULES 7 TO 15 APPLY -**

(1) Rules 7 to 15 shall apply to, -

- (a) an industrial activity in which there is involved a quantity of hazardous chemical listed in Column 2 of Schedule 3 which is equal to or more than the quantity specified in the entry for that chemical in Column 3 & 4 (Rules 10-12 only for Column 4); and
- (b) isolated storage in which there is involved a quantity of a hazardous chemical listed in Column 2 of Schedule 2 which is equal to or more than the quantity specified in the entry for that chemical in Column <sup>3</sup>[3 & 4 (rules 10-12 only for column 4).]

(2) For the purpose of rules 7 to 15,

- (a) "new industrial activity" means an industrial activity which, –
  - (i) commences after the date of coming into operation of these rules; or
  - (ii) if commenced before that date, is an industrial activity in which a modification has been made which is likely to cover major accident hazards, and that activity shall be deemed to have commenced on the date on which the modification was made;

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<sup>1</sup> Substituted by Rule 3(c) of the Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 1994 notified vide S.O. No.2882, dated 3.10.1994.

<sup>2</sup> Inserted by Rule 3(d); *ibid.*

<sup>3</sup> Substituted by Rule 4; *ibid.*

- (b) an "existing industrial activity" means an industrial activity which is not a new industrial activity.

## **7. <sup>1</sup>[APPROVAL AND] NOTIFICATION OF SITES -**

(1) An occupier shall not undertake any industrial activity <sup>2</sup>[unless he has been granted an approval for undertaking such an activity and has submitted] a written report to the concerned authority containing the particulars specified in Schedule 7 at least 3 months before commencing that activity or before such shorter time as the concerned authority may agree and for the purpose of this paragraph, an activity in which subsequently there is or is liable to be a threshold quantity or more of an additional hazardous chemical shall be deemed to be a different activity and shall be notified accordingly.

<sup>3</sup>(2) The concerned Authority within 60 days from the date of receipt of the report shall approve the report submitted and on consideration of the report if it is of the opinion that contravention of the provisions of the Act or the rules made thereunder has taken place, it shall issue notice under rule 19].

## **8. UPDATING OF THE SITE NOTIFICATION FOLLOWING CHANGES IN THE THRESHOLD QUANTITY -**

Where an activity has been reported in accordance with rule 7(1) and the occupier makes a change in it (including an increase or decrease in the maximum threshold quantity of a hazardous chemical to which this rule applies which is or is liable to be at the site or in the pipeline or at the cessation of the activity) which affects the particulars specified in that report or any subsequent report made under this rule, the occupier shall forthwith furnish a further report to the concerned authority.

## **9. TRANSITIONAL PROVISIONS-**

**Where. –**

- (a) at the date of coming into operation of these rules, an occupier is in control of an existing industrial activity which is required to be reported under rule 7(1); or

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<sup>1</sup> Substituted by Rule 5 of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

<sup>2</sup> Substituted by Rule 4 (a) of MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>3</sup> Substituted by Rule 4(b), *ibid.*

- (b) within 6 months after that date, an occupier commence any such new industrial activity;

it shall be a sufficient compliance with that rule if he reports to the concerned authority as per the particulars in Schedule 7 within 3 months after the date of coming into operation of these rules or within such longer time as the concerned authority may agree in writing.

#### **10. SAFETY REPORTS <sup>1</sup>[AND SAFETY AUDIT REPORTS] -**

(1) Subjects to the following paragraphs of this rule, an occupier shall not undertake any industrial activity to which this rule applies, unless he has prepared a safety report on that industrial activity containing the information specified in Schedule 8 and has sent a copy of that report to the concerned authority at least ninety days before commencing that activity.

(2) In the case of a new industrial activity which an occupier commences, or by virtue of sub-rule (2) (a) (ii) of rule 6 is deemed to commence, within 6 months after coming into operation of these rules, it shall be a sufficient compliance with sub-rule (1) of this rule if the occupier sends to the concerned authority a copy of the report required in accordance with that sub-rule within ninety days after the date of coming into operation of these rules.

<sup>2</sup>[(3) In case of an existing industrial activity, the occupier shall prepare a safety report in consultation with the concerned authority and submit the same within one year from the date of commencement of the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994 to the concerned Authority.]

<sup>3</sup>[(4) After the commencement of the Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 1994, the occupier of both the new and the existing industrial activities shall carry out an independent safety audit of the respective industrial activities with the help of an expert, not associated with such industrial activities.

(5) The occupier shall forward a copy of the auditor's report along with his comments to the concerned Authority within 30 days after the completion of such Audit.]

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<sup>1</sup> Substituted by Rule 6 of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

<sup>2</sup> Substituted by Rule 5(a) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>3</sup> Inserted by Rule 5(b), *ibid.*

<sup>1</sup>[(6) The occupier shall update the safety audit report once a year by conducting a fresh safety audit and forward a copy of it with his comments thereon within 30 days to the concerned Authority.

(7) The concerned Authority may if it deems fit, issue improvement notice under rule 19 within 45 days of the submission of the said report.]

## **11. UPDATING OF REPORTS UNDER RULE 10-**

(1) Where an occupier has made a safety report in accordance with sub-rule (1) of rule 10 he shall not make any modification to the industrial activity to which that safety report relates which could materially affect the particulars in that report, unless he has made a further report to take account of those modifications and has sent a copy of that report to the concerned authority at least 90 days before making those modifications.

(2) Where an occupier has made a report in accordance with rule 10 and sub - rule (1) of this rule and that industrial activity is continuing the occupier shall within three years of the date of the last such report, make a further report which shall have regard in particular to new technical knowledge which has affected the particulars in the pervious report relating to safety and hazard assessment and shall within 30 days <sup>2</sup>[\*\*\*] send a copy of the report to the concerned authority.

## **<sup>3</sup>[12. REQUIREMENT FOR FURTHER INFORMATION TO BE SENT TO THE AUTHORITY -**

Where, in accordance with rule 10, an occupier has sent a safety report and the safety audit report relating to an industrial activity to the concerned Authority, the concerned Authority may, by a notice served on the occupier, require him to provide such additional information as may be specified in the notice and the occupier shall send that information to the concerned Authority within 90 days].

## **13. PREPARATION TO ON-SITE EMERGENCY PLAN BY THE OCCUPIER -**

(1) An occupier shall prepare and keep up-to-date <sup>4</sup>[an on-site emergency plan containing details specified in Schedule II and detailing] how major accidents will be dealt with on the site on which the industrial activity is carried

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<sup>1</sup> Inserted by Rule 5(b) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>2</sup> Omitted by Rule 6, *ibid.*

<sup>3</sup> Substituted by Rule 7, *ibid.*

<sup>4</sup> Substituted by Rule 8(a), *ibid.*

on and that plan shall include the name of the person who is responsible for safety on the site and the names of those who are authorized to take action in accordance with the plan in case of an emergency.

(2) The occupier shall ensure that the emergency plan prepared in accordance with sub-rule (1) takes into account any modification made in the industrial activity and that every person on the site who is affected by the plan is informed of its relevant provisions.

(3) The occupier shall prepare the emergency plan required under sub-rule (1),-

(a) in the case of a new industrial activity, before that activity is commenced;

(b) in the case of an existing industrial activity within 90 days of commencing into operation of these rules.

<sup>1</sup>[(4) The occupier shall ensure that a mock drill of the on-site emergency plan is conducted every six months;

(5) A detailed report of the mock drill conducted under sub-rule (4) shall be made immediately available to the concerned Authority.]

#### **14. PREPARATION OF OFF-SITE EMERGENCY PLAN BY THE AUTHORITY -**

(1) It shall be the duty of the concerned authority as identified in Column 2 of Schedule 5 to prepare and keep up-to-date <sup>2</sup>[an adequate off-site emergency plan containing particulars specified in Schedule 12 and detailing] how emergencies relating to a possible major accident on that site will be dealt with and in preparing that plan the concerned authority shall consult the occupier, and such other persons as it may deem necessary.

(2) For the purpose of enabling the concerned authority to prepare the emergency plan required under sub-rule (1), the occupier shall provide the concerned authority with such information relating to the industrial activity under his control as the concerned authority may require, including the nature, extent and likely effects off-site of possible major accidents and the authority shall

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<sup>1</sup> Inserted by Rule 8(b) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>2</sup> Substituted by Rule 9 (a), *ibid.*

provide the occupier with any information from the off-site emergency plan which relates to his duties under rule 13.

(3) The concerned authority shall prepare its emergency plan required under sub-rule (1),-

- (a) In the case of a new industrial activity, before that activity is commenced;
- (b) In the case of an existing industrial activity, within six months of coming into operation to these rules.

<sup>1</sup>[(4) The concerned authority shall ensure that a rehearsal of the off-site emergency plan is conducted at least once in a calendar year.]

#### **15. INFORMATION TO BE GIVEN TO PERSONS LIABLE TO BE AFFECTED BY A MAJOR ACCIDENT -**

(1) The occupier shall take appropriate steps to inform persons outside the site either directly or through District Emergency Authority who are likely to be in an area which may be affected by a major accident about, -

- (a) the nature of the major accident hazard; and
- (b) the safety measures and the "Do's" and "Don'ts" which should be adopted in the event of a major accident.

(2) The occupier shall take steps required under sub-rule (1) to inform persons about an industrial activity, before that activity is commenced, except, in the case of an existing industrial activity in which case the occupier shall comply with the requirements of sub-rule (1) within 90 days of coming into operation of these rules.

#### **16. DISCLOSURES OF INFORMATION -**

Where for the purpose of evaluating information notified under rule 5 or 7 to 15, the concerned authority discloses that information to some other person, that other person shall not use that information for any purpose except for the purpose of the concerned authority disclosing it, and before disclosing the information the concerned authority shall inform that other person of his obligations under this paragraph.

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<sup>1</sup> Inserted by Rule 9(b) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

## 17. COLLECTION, DEVELOPMENT AND DISSEMINATION OF INFORMATION -

(1) This rule shall apply to an industrial activity in which a hazardous chemical which satisfies any of the criteria laid down in part I of Schedule 1<sup>1</sup>[or listed] in Column 2 of Part II of this Schedule is or may be involved.

(2) An occupier, who has control of an industrial activity in term of sub-rule 1 of this rule, shall arrange to obtain or develop information in the form of safety data sheet as specified in Schedule 9. The information shall be accessible upon request for reference.

(3) The occupier while obtaining or developing a safety data sheet as specified in Schedule 9 in respect of a hazardous chemical handled by him shall ensure that the information is recorded accurately and reflects the scientific evidence used in making the hazard determination. In case, any significant information regarding hazard of a chemical is available, it shall be added to the material safety data sheet as specified in Schedule 9 as soon as practicable.

(4) Every container of a hazardous chemical shall be clearly labelled or marked to identify -

- (a) the contents of the container ;
- (b) the name and address of manufacturer or importer of the hazardous chemical ;
- (c) the physical, chemical and toxicological data as per the criteria given at Part I of Schedule 1.

(5) In terms of sub rule 4 of this rule where it is impracticable to label a chemical in view of the size of the container or the nature of the package, provision should be made for other effective means like tagging or accompanying documents.

## 18. IMPORT OF HAZARDOUS CHEMICALS -

(1) This rule shall apply to a chemical which satisfies any of the criteria laid down in Part I of Schedule 1<sup>2</sup>[or listed] in Column 2 of Part II of this Schedule.

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<sup>1</sup> Substituted by Rule 7 of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

<sup>2</sup> Substituted by Rule 8(a), *ibid.*

(2) Any person responsible for importing hazardous chemicals in India shall provide <sup>1</sup>[before 30 days or as reasonably possible but not later than] the date of import to the concerned authorities as identified in Column 2 of Schedule 5 the information pertaining to, -

- (i) the name and address of the person receiving the consignment in India;
- (ii) the port of entry in India;
- (iii) mode of transport from the exporting country to India;
- (iv) the quantity of chemical (s) being imported; and
- (v) complete product safety information.

<sup>2</sup>(3) If the Concerned Authority of the State is satisfied that the chemical being imported is likely to cause major accidents, it may direct the importer to take such safety measures as the concerned Authority of the State may deem appropriate.]

<sup>3</sup>[(3A) In case the concerned Authority of the State is of the opinion that the chemical should not be imported on safety or on environmental considerations, such Authority may direct stoppage of such import.]

(4) The concerned Authority at the State shall simultaneously inform the concerned Port Authority to take appropriate steps regarding safe handling and storage of hazardous chemicals while off-loading the consignment within the port premises.

(5) Any person importing hazardous chemicals shall maintain the records of the hazardous chemicals imported as specified in Schedule 10 and the records so maintained shall be open for inspection by the concerned authority at the State or the Ministry of Environment and Forests or any officer appointed by them in this behalf.

(6) The importer of the hazardous chemical or a person working on his behalf shall ensure that transport of hazardous chemicals from port of entry to the ultimate destination is in accordance with the Central Motor Vehicles Rules, 1989 framed under the provisions of the Motor Vehicles Act, 1988.

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<sup>1</sup> Substituted by Rule 10(a) of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>2</sup> Substituted by Rule 10(b), *ibid.*

<sup>3</sup> Inserted by Rule 10(c), *ibid.*

**19. IMPROVEMENT NOTICES -**

(1) if the concerned authority is of the opinion that a person has contravened the provisions of these rules, the concerned authority shall serve on him a notice ( in this para referred to as " an improvement notice") requiring that person to remedy the contravention or, as the case may be, <sup>1</sup>[the matters occasioning it within 45 days.]

(2) A notice served under sub-rule (1) shall clearly specify the measures to be taken by the occupier in remedying said contraventions.

**20. POWER OF THE CENTRAL GOVERNMENT TO MODIFY THE SCHEDULES -**

The Central Government may, at any time, by notification in the Official Gazette, make suitable changes in the Schedules.

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<sup>1</sup> Substituted by Rule 11 of MSIHC Rules, 1994 notified vide S.O.2882, dated 3.10.1994.

<sup>1</sup>[SCHEDULE 1]

[See rule 2e (i), 4 (1)(a), 4(2), 17 and 18]

**[Part -I]**

- (a) **Toxic Chemicals:** Chemicals having the following values of acute toxicity and which owing to their physical and chemical properties, are capable of producing major accident hazards:

S.No.	Toxicity	Oral toxicity LD <sub>50</sub> (mg/kg)	Dermal toxicity LD <sub>50</sub> (mg/kg)	Inhalation toxicity LC <sub>50</sub> (mg/l)
1.	Extremely toxic	>5	<40	<0.5
2.	Highly toxic	>5-50	>40-200	<0.5-2.0
3.	Toxic	>50-200	>200-1000	>2-10

(b) **Flammable Chemicals :**

- (i) flammable gases: Gases which at 20°C and at standard pressure of 101.3KPa are :-

- (a) ignitable when in a mixture of 13 percent or less by volume with air, or ;
- (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limits.

**Note :** The flammability shall be determined by tests or by calculation in accordance with methods adopted by International Standards Organization ISO Number 10156 of 1990 or by Bureau of Indian Standard ISI Number 1446 of 1985.

- (ii) **extremely flammable liquids :** chemicals which have flash point lower than or equal to 23°C and boiling point less than 35°C.
- (iii) **very highly flammable liquids :** chemicals which have a flash point lower than or equal to 23°C and initial boiling point higher than 35°C.

<sup>1</sup> Substituted by Rule 9 of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

- (iv) **highly flammable liquids** : chemicals which have a flash point lower than or equal to 60°C but higher than 23°C.
- (v) **flammable liquids** : chemicals which have a flash point higher than 60°C but lower than 90°C.
- (c) **Explosives** : explosives mean a solid or liquid or pyrotechnic substance (or a mixture of substances) or an article.
  - (a) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings ;
  - (b) which is designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonative self sustaining exothermic chemical reaction.

**PART II**  
**LIST OF HAZARDOUS AND TOXIC CHEMICALS**

S. No.	NAME OF HAZARDOUS CHEMICALS	S. No.	NAME OF HAZARDOUS CHEMICALS
1.	Acetaldehyde	41.	Antimycin A
2.	Acetic acid	42.	ANTU
3.	Acetic anhydride	43.	Arsenic pentoxide
4.	Acetone	44.	Arsenic trioxide
5.	Acetone cyanohydrin	45.	Arsenous trichloride
6.	Acetone thiosemicarbazide	46.	Arsine
7.	Acetonitrile	47.	Asphalt
8.	Acetylene	48.	Azinpho-ethyl
9.	Acetylene tetra chloride	49.	Azinphos methyl
10.	Acrolein	50.	Bacitracin
11.	Acrylamide	51.	Barium azide
12.	Acrylonitrile	52.	Barium nitrate
13.	Adiponitrile	53.	Barium nitride
14.	Aldicarb	54.	Benzal chloride
15.	Aldrin	55.	Benzenamine,3-Trifluoromethyl
16.	Allyl alcohol	56.	Benzene
17.	Allyl amine	57.	Benzene sulfonyl chloride
18.	Allyl chloride	58.	Benzene. 1- (chloromethyl)-4 Nitro
19.	Aluminium (powder)	59.	Benzene arsenic acid
20.	Aluminium azide	60.	Benzidine
21.	Aluminium borohydride	61.	Benzidine salts
22.	Aluminium chloride	62.	Benzimidazole. 4, 5-Dichloro-2 (Trifluoromethyl)
23.	Aluminium fluoride	63.	Benzoquinone-P
24.	Aluminium phosphide	64.	Benzotrichloride
25.	Amino diphenyl	65.	Benzoyl chloride
26.	Amino pyridine	66.	Benzoyl peroxide
27.	Aminophenol-2	67.	Benzyl chloride
28.	Aminopterin	68.	Beryllium (Powder)
29.	Amiton	69.	Bicyclo (2, 2, 1) Heptane -2- carbonitrile
30.	Amiton dialate	70.	Biphenyl
31.	Ammonia	71.	Bis (2-Chloroethyl) sulphide
32.	Ammonium chloro platinite	72.	Bis (Chloromethyl) Ketone
33.	Ammonium nitrate	73.	Bis (Tert-butyl peroxy) cyclohexane
34.	Ammonium nitrite	74.	Bis (Terbutylperoxy) butane
35.	Ammonium picrate	75.	Bis(2,4, 6-Trinitrophenylamine)
36.	Anabasine	76.	Bis (Chloromethyl) Ether
37.	Aniline	77.	Bismuth and compounds
38.	Aniline 2,4, 6-Trimethyl	78.	Bisphenol-A
39.	Anthraquinone	79.	Bitoscanate
40.	Antimony pentafluoride		

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|------|--|------|------------------------------------|
| 80.  | Boron Powder                                     | 124. | Chloroacetal chloride              |
| 81.  | Boron trichloride                                | 125. | Chloroacetaldehyde                 |
| 82.  | Boron trifluoride                                | 126. | Chloroaniline -2                   |
| 83.  | Boron trifluoride comp.<br>With methylether, 1:1 | 127. | Chloroaniline -4                   |
| 84.  | Bromine  | 128. | Chlorobenzene                      |
| 85.  | Bromine pentafluoride                            | 129. | Chloroethyl chloroformate          |
| 86.  | Bromo chloro methane                             | 130. | Chloroform                         |
| 87.  | Bromodialone                                     | 131. | Chloroformyl morpholine            |
| 88.  | Butadiene  | 132. | Chloromethane                      |
| 89.  | Butane   | 133. | Chloromethyl methyl ether          |
| 90.  | Butanone-2                                       | 134. | Chloronitrobenzene                 |
| 91.  | Butyl amine tert                                 | 135. | Chlorophacinone                    |
| 92.  | Butyl glycidal ether                             | 136. | Chlorosulphonic acid               |
| 93.  | Butyl isovalarate                                | 137. | Chlorothiophos                     |
| 94.  | Butyl peroxy maleate tert                        | 138. | Chloroxuron                        |
| 95.  | Butyl vinyl ether                                | 139. | Chromic acid                       |
| 96.  | Butyl-n-mercaptan                                | 140. | Chromic chloride                   |
| 97.  | C.I.Basic green                                  | 141. | Chromium powder                    |
| 98.  | Cadmium oxide                                    | 142. | Cobalt carbonyl                    |
| 99.  | Cadmium stearate                                 | 143. | Cobalt Nitrimethylidyne compound   |
| 100. | Calcium arsenate                                 | 144. | Cobalt (Powder)                    |
| 101. | Calcium carbide                                  | 145. | Colchicine                         |
| 102. | Calcium cyanide                                  | 146. | Copper and Compounds               |
| 103. | Camphchlor (Toxaphene)                           | 147. | Copperoxychloride                  |
| 104. | Cantharidin                                      | 148. | Coumafuryl                         |
| 105. | Captan   | 149. | Coumaphos                          |
| 106. | Carbachol chloride                               | 150. | Coumatetrayl                       |
| 107. | Carbaryl   | 151. | Crimidine                          |
| 108. | Carbofuran (Furadan)                             | 152. | Crotenaldehyde                     |
| 109. | Carbon tetrachloride                             | 153. | Crotonaldehyde                     |
| 110. | Carbon disulphide                                | 154. | Cumene                             |
| 111. | Carbon monoxide                                  | 155. | Cyanogen bromide                   |
| 112. | Carbonphenothion                                 | 156. | Cyanongen iodide                   |
| 113. | Carvone  | 157. | Cyanophos                          |
| 114. | Cellulose nitrate                                | 158. | Cyanothoate                        |
| 115. | Chloroacetic acid                                | 159. | Cyanuric fluoride                  |
| 116. | Chlordane  | 160. | Cyclo hexylamine                   |
| 117. | Chlorofenvinphos                                 | 161. | Cyclohexane                        |
| 118. | Chlorinated benzene                              | 162. | Cyclohexanone                      |
| 119. | Chlorine   | 163. | Cycloheximide                      |
| 120. | Chlorine oxide                                   | 164. | Cyclopentadiene                    |
| 121. | Chlorine trifluoride                             | 165. | Cyclopentane                       |
| 122. | Chlormephos                                      | 166. | Cyclotetramethyl enetetranitramine |
| 123. | Chlormequat chloride                             | 167. | Cyclotrimethylen<br>etrinnitranine |

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|------|--|------|--|
| 168. | Cypermethrin                               | 209. | Dimethyl nitrosoamine                        |
| 169. | DDT  | 210. | Dimethyl P phenylene diamine                 |
| 170. | Decaborane (1 :4)                          | 211. | Dimethyl phosphoramidi cyanidic acid (TABUM) |
| 171. | Demeton                                    | 212. | Dimethyl phosphorochloridothioate            |
| 172. | Demeton S-Methyl                           | 213. | Dimethyl sulfolane (DMS)                     |
| 173. | Di-n-propyl peroxydicarbonate (Conc = 80%) | 214. | Dimethyl sulphide                            |
| 174. | Dialifos                                   | 215. | Dimethylamine                                |
| 175. | Diazodinitrophenol                         | 216. | Dimethylaniline                              |
| 176. | Dibenzyl peroxydicarbonate (Conc>= 90%)    | 217. | Dimethylcarbonyl chloride                    |
| 177. | Diborane                                   | 218. | Dimetilan                                    |
| 178. | Dichloroacetylene                          | 219. | Dinitro O-cresol                             |
| 179. | Dichlorobenzalkonium chloride              | 220. | Dinitrophenol                                |
| 180. | Dichloroethyl ether                        | 221. | Dinitrotoluene                               |
| 181. | Dichloromethyl phenylsilane                | 222. | Dinoseb                                      |
| 182. | Dichlorophenol – 2, 6                      | 223. | Diniterb                                     |
| 183. | Dichlorophenol – 2, 4                      | 224. | Dioxane-p                                    |
| 184. | Dichlorophenoxy acetic acid                | 225. | Dioxathion                                   |
| 185. | Dichloropropane – 2, 2                     | 226. | Dioxine N                                    |
| 186. | Dichlorosalicylic acid-3, 5                | 227. | Diphacinone                                  |
| 187. | Dichlorvos (DDVP)                          | 228. | Diphosphoramidate octamethyl                 |
| 188. | Dicrotophos                                | 229. | Diphenyl methane di-isocyanate (MDI)         |
| 189. | Dieldrin                                   | 230. | Dipropylene Glycol Butyl ether               |
| 190. | Diepoxy butane                             | 231. | Dipropylene glycolmethyl ether               |
| 191. | Diethyl carbamazine citrate                | 232. | Disec-butyl peroxydicarbonate (Conc.>80%)    |
| 192. | Diethyl chlorophosphate                    | 233. | Disufoton                                    |
| 193. | Diethyl ethtanolamine                      | 234. | Dithiazamine iodide                          |
| 194. | Diethyl peroxydicarbonate (Conc=30%)       | 235. | Dithiobiurate                                |
| 195. | Diethyl phenylene diamine                  | 236. | Endosulfan                                   |
| 196. | Diethylamine                               | 237. | Endothion                                    |
| 197. | Diethylene glycol                          | 238. | Endrin                                       |
| 198. | Diethylene glycol dinitrate                | 239. | Epichlorohydrine                             |
| 199. | Diethylene triamine                        | 240. | EPN  |
| 200. | Diethleneglycol butyl ether                | 241. | Ergocalciferol                               |
| 201. | Diglycidyl ether                           | 242. | Ergotamine tartarate                         |
| 202. | Digitoxin                                  | 243. | Ethanesulfenyl chloride, 2 chloro            |
| 203. | Dihydroperoxypropane (Conc >=30%)          | 244. | Ethanol 1-2 dichloracetate                   |
| 204. | Diisobutyl peroxide                        | 245. | Ethion                                       |
| 205. | Dimefox                                    | 246. | Ethoprophos                                  |
| 206. | Dimethoate                                 | 247. | Ethyl acetate                                |
| 207. | Dimethyl dichlorosilane                    | 248. | Ethyl alcohol                                |
| 208. | Dimethyl hydrazine                         | 249. | Ethyl benzene                                |
|      |  | 250. | Ethyl bis amine                              |

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|------|--|------|---|
| 251. | Ethyl bromide                                | 292. | Furan                                       |
| 252. | Ethyl carbamate                              | 293. | Gallium Trichloride                         |
| 253. | Ethyl ether                                  | 294. | Glyconitrile (Hydroxyacetonitrile)          |
| 254. | Ethyl hexanol -2                             | 295. | Guanyl-4-nitrosaminoguynyl-1-tetrazene      |
| 255. | Ethyl mercaptan                              | 296. | Heptachlor                                  |
| 256. | Ethyl mercuric phosphate                     | 297. | Hexamethyl terta-oxyacyclononate (Conc 75%) |
| 257. | Ethyl methacrylate                           | 298. | Hexachlorobenzene                           |
| 258. | Ethyl nitrate                                | 299. | Hexachlorocyclohexan (Lindane)              |
| 259. | Ethyl thiocyanate                            | 300. | Hexachlorocyclopentadiene                   |
| 260. | Ethylamine                                   | 301. | Hexachlorodibenzo-p-dioxin                  |
| 261. | Ethylene                                     | 302. | Hexachloronaphthalene                       |
| 262. | Ethylene chlorohydrine                       | 303. | Hexafluoropropanone sesquihydrate           |
| 263. | Ethylene dibromide                           | 304. | Hexamethyl phosphoromide                    |
| 264. | Ethylene diamine                             | 305. | Hexamethylene diamine N N dibutyl           |
| 265. | Ethylene diamine hydrochloride               | 306. | Hexane                                      |
| 266. | Ethylene flourohydrine                       | 307. | Hexanitrostilbene 2, 2, 4, 4, 6, 6          |
| 267. | Ethylene glycol                              | 308. | Hexene                                      |
| 268. | Ethylene glycol dinitrate                    | 309. | Hydrogen selenide                           |
| 269. | Ethylene oxide                               | 310. | Hydrogen sulphide                           |
| 270. | Ethylenimine                                 | 311. | Hydrazine                                   |
| 271. | Ethylene di chloride                         | 312. | Hydrazine nitrate                           |
| 272. | Femamiphos                                   | 313. | Hydrochloric acid (Gas)                     |
| 273. | Femitrothion                                 | 314. | Hydrogen                                    |
| 274. | Fensulphothion                               | 315. | Hydrogen bromide                            |
| 275. | Fluemetil                                    | 316. | Hydrogen cyanide                            |
| 276. | Fluorine                                     | 317. | Hydrogen fluoride                           |
| 277. | Fluoro2-hyrdoxy butyric acid amid salt ester | 318. | Hydrogen peroxide                           |
| 278. | Fluoroacetamide                              | 319. | Hydroquinone                                |
| 279. | Fluoroacetic acid amide salts and esters     | 320. | Indene                                      |
| 280. | Fluoroacetylchloride                         | 321. | Indium powder                               |
| 281. | Fluorobutyric acid amide salt esters         | 322. | Indomethacin                                |
| 282. | Fluorocrotonic acid amides salts esters      | 323. | Iodine                                      |
| 283. | Fluorouracil                                 | 324. | Iridium tetrachloride                       |
| 284. | Fonofos                                      | 325. | Ironpentacarbonyl                           |
| 285. | Formaldehyde                                 | 326. | Iso benzan                                  |
| 286. | Formetanate hydrochloride                    | 327. | Isoamyl alcohol                             |
| 287. | Formic acid                                  | 328. | Isobutyl alcohol                            |
| 288. | Formoparanate                                | 329. | Isobutyro nitrile                           |
| 289. | Formothion                                   | 330. | Isocyanic acid 3, 4-dichlorophenyl ester    |
| 290. | Fosthiotan                                   | 331. | Isodrin                                     |
| 291. | Fuberidazole                                 |      |   |

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|------|---|------|---|
| 332. | Isofluorophosphate                            | 373. | Methoxy ethanol (2-methyl cellosolve)   |
| 333. | Isophorone diisocyanate                       | 374. | Methoxyethyl mercuric acetate           |
| 334. | Isopropyl alcohol                             | 375. | Methacryloyl chloride                   |
| 335. | Isopropyl chlorocarbonate                     | 376. | Methyl 2-chloroacrylate                 |
| 336. | Isopropyl formate                             | 377. | Methyl alcohol                          |
| 337. | Isopropyl methyl pyrazolyl dimethyl carbamate | 378. | Methyl amine                            |
| 338. | Juglone (5-Hydroxy Naphthalene-1,4 dione)     | 379. | Methyl bromide (Bromomethane)           |
| 339. | Ketene  | 380. | Methyl chloride                         |
| 340. | Lactonitrile                                  | 381. | Methyl chloroform                       |
| 341. | Lead arsenite                                 | 382. | Methyl chloroformate                    |
| 342. | Lead at high temp (molten)                    | 383. | Methyl cyclohexene                      |
| 343. | Lead azide                                    | 384. | Methyl disulphide                       |
| 344. | Lead styphanate                               | 385. | Methyl ethyl ketone peroxide (Conc.60%) |
| 345. | Leptophos                                     | 386. | Methyl formate                          |
| 346. | Lenisite                                      | 387. | Methyl hydrazine                        |
| 347. | Liquified petroleum gas                       | 388. | Methyl isobutyl ketone                  |
| 348. | Lithium hydride                               | 389. | Methyl isocyanate                       |
| 349. | N-Dinitrobenzene                              | 390. | Methyl isothiocyanate                   |
| 350. | Magnesium powder or ribbon                    | 391. | Methyl mercuric dicyanamide             |
| 351. | Malathion                                     | 392. | Methyl Mercaptan                        |
| 352. | Maleic anhydride                              | 393. | Methyl Methacrylate                     |
| 353. | Malononitrile                                 | 394. | Methyl phencapton                       |
| 354. | Manganese Tricarbonyl cyclopentadiene         | 395. | Methyl phosphonic dichloride            |
| 355. | Mechlor ethamine                              | 396. | Methyl thiocyanate                      |
| 356. | Mephospholan                                  | 397. | Methyl trichlorosilane                  |
| 357. | Mercuric chloride                             | 398. | Methyl vinyl ketone                     |
| 358. | Mercuric oxide                                | 399. | Methylene bis (2-chloroaniline)         |
| 359. | Mercury acetate                               | 400. | Methylene chloride                      |
| 360. | Mercury fulminate                             | 401. | Methylenebis-4,4(2-chloroaniline)       |
| 361. | Mercury methyl chloride                       | 402. | Metolcarb                               |
| 362. | Mesitylene                                    | 403. | Mevinphos                               |
| 363. | Methacrolein diacetate                        | 404. | Mezcarb                                 |
| 364. | Methacrylic anhydride                         | 405. | Mitomycin C                             |
| 365. | Methacrylonitrile                             | 406. | Molybdenum powder                       |
| 366. | Methacryloyl oxyethyl isocyanate              | 407. | Monocrotophos                           |
| 367. | Methanidophos                                 | 408. | Morpholine                              |
| 368. | Methane                                       | 409. | Muscinol                                |
| 369. | Methanesulphonyl fluoride                     | 410. | Mustard gas                             |
| 370. | Methidathion                                  | 411. | N-Butyl acetate                         |
| 371. | Methiocarb                                    | 412. | N-Butyl alcohol                         |
| 372. | Methonyl                                      | 413. | N-Hexane                                |
|      |   | 414. | N- Methyl-N, 2, 4, 6-Tetranitroaniline  |

415. Naphtha  
416. Nephtha solvent  
417. Naphthalene  
418. Naphthyl amine  
419. Nickel carbonyl/nickel tetracarbonyl  
420. Nickel powder  
421. Nicotine  
422. Nicotine sulphate  
423. Nitric acid  
424. Nitric oxide  
425. Nitrobenzene  
426. Nitrocellulose (dry)  
427. Nitrochlorobenzene  
428. Nitrocyclohexane  
429. Nitrogen  
430. Nitrogen dioxide  
431. Nitrogen oxide  
432. Nitrogen trifluouide  
433. Nitroglycerine  
434. Nitropropane-1  
435. Nitropropane-2  
436. Nitroso dimethyl amine  
437. Nonane  
438. Norbormide  
439. O-Cresol  
440. O-Nitro Toluene  
441. O-Toludine  
442. O-Xylene  
443. O/P Nitroaniline  
444. Oleum  
445. OO Diethyl S ethyl suph. methyl phos  
446. OO Diethyl S propythio methyl phosdithioate  
447. OO Diethyl s ethylsulphinyl methylphosphorothioate  
448. OO Diethyl s ethylsulphonyl methylphosphorothioate  
449. OO Diethyls ethylthiomethylphospho-rothioate  
450. Organo rhodium complex  
451. Orotic acid  
452. Osmium tetroxide  
453. Oxabain  
454. Oxamyl  
455. Oxetane, 3, 3-bis(chloromethyl)  
456. Oxidiphenoxarsine  
457. Oxy disulfoton  
458. Oxygen (liquid)  
459. Oxygen difluoride  
460. Ozone  
461. P-nitrophenol  
462. Paraffin  
463. Paraoxon (Diethyl 4 Nitrophenyl phosphate)  
464. Paraquat  
465. Paraquat methosulphate  
466. Parathion  
467. Parathion methyl  
468. Paris green  
469. Penta borane  
470. Penta chloro ethane  
471. Penta chlorophenol  
472. Pentabromophenol  
473. Pentachloro naphthalene  
474. Pentadecyl-amine  
475. Pentaerythaiotol tetranitrate  
476. Pentane  
477. Pentanone  
478. Perchloric acid  
479. Perchloroethylene  
480. Peroxyacetic acid  
481. Phenol  
482. Phenol, 2, 2-thiobis (4, 6-Dichloro)  
483. Phenol, 2, 2-thiobis (4 chloro 6-methyl phenol)  
484. Phenol, 3-(1-methyl ethyl) methylcarbamate  
485. Phenyl hydrazine hydrochloride  
486. Phenyl mercury acetate  
487. Phenyl silatrane  
488. Phenyl thiourea  
489. Phenylene P-diamine  
490. Phorate  
491. Phosazetin  
492. Phosfolan  
493. Phosgene  
494. Phosmet  
495. Phosphamidon

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|------|--|------|--------------------------------------|
| 496. | Phosphine                                      | 535. | Propionitrile                        |
| 497. | Phosphoric acid                                | 536. | Propionitrile, 3-chloro              |
| 498. | Phosphoric acid dimethyl (4-methyl thio)phenyl | 537. | Propiophenone, 4-amino               |
| 499. | Phosphorothioic acid dimethyl S(2-Bis) Ester   | 538. | Propyl chloroformate                 |
| 500. | Phosphorothioic acid methyl (ester)            | 539. | Propylene dichloride                 |
| 501. | Phosphorothioic acid, OO Dimethyl S-(2-methyl) | 540. | Propylene glycol, allylether         |
| 502. | Phosphorothioic, methyl-ethyl ester            | 541. | Propylene imine                      |
| 503. | Phosphorous                                    | 542. | Propylene oxide                      |
| 504. | Phosphorous oxychloride                        | 543. | Prothoate                            |
| 505. | Phosphorous pentaoxide                         | 544. | Pseudosumene                         |
| 506. | Phosphorous trichloride                        | 545. | Pyrazoxon                            |
| 507. | Phosphorous penta chloride                     | 546. | Pyrene                               |
| 508. | Phthalic anhydride                             | 547. | Pyridine                             |
| 509. | Phylloquinone                                  | 548. | Pyridine, 2-methyl-3-vinyl           |
| 510. | Physostigmine                                  | 549. | Pyridine, 4-nitro-1-oxide            |
| 511. | Physostigmine salicylate (1:1)                 | 550. | Pyridine, 4-nitro-1-oxide            |
| 512. | Picric acid (2, 4, 6- trinitrophenol)          | 551. | Pyriminil                            |
| 513. | Picrotoxin                                     | 552. | Quinaliphos                          |
| 514. | Piperdine                                      | 553. | Quinone                              |
| 515. | Piprotal                                       | 554. | Rhodium trichloride                  |
| 516. | Pirinifos-ethyl                                | 555. | Salcomine                            |
| 517. | Platinous chloride                             | 556. | Sarin                                |
| 518. | Platinum tetrachloride                         | 557. | Selenious acid                       |
| 519. | Potassium arsenite                             | 558. | Selenium Hexafluoride                |
| 520. | Potassium chlorate                             | 559. | Selenium oxychloride                 |
| 521. | Potassium cyanide                              | 560. | Semicarbazide hydrochloride          |
| 522. | Potassium hydroxide                            | 561. | Silane (4-amino butyl) diethoxy-meth |
| 523. | Potassium nitride                              | 562. | Sodium                               |
| 524. | Potiassium nitrite                             | 563. | Sodium anthra-quinone-1-sulphonate   |
| 525. | Potassium peroxide                             | 564. | Sodium arsenate                      |
| 526. | Potassium silver cyanide                       | 565. | Sodium arsenite                      |
| 527. | Powdered metals and mixtures                   | 566. | Sodium azide                         |
| 528. | Promecarb                                      | 567. | Sodium cacodylate                    |
| 529. | Promurit                                       | 568. | Sodium chlorate                      |
| 530. | Propanesultone                                 | 569. | Sodium cyanide                       |
| 531. | Propargyl alcohol                              | 570. | Sodium fluoro-acetate                |
| 532. | Propargyl bromide                              | 571. | Sodium hydroxide                     |
| 533. | Propen-2-chloro-1 ,3-diou diacetate            | 572. | Sodium pentachloro-phenate           |
| 534. | Propiolactone beta                             | 573. | Sodium picramate                     |
|      |  | 574. | Sodium selenate                      |
|      |  | 575. | Sodium selenite                      |
|      |  | 576. | Sodium sulphide                      |
|      |  | 577. | Sodium tellorite                     |

578. Stannane acetoxy triphenyl  
579. Stibine (Antimony hydride)  
580. Strychnine  
581. Strychnine sulphate  
582. Styphinic acid (2, 4,6-trinitroresorcinol)  
583. Styrene  
584. Sulphotec  
585. Sulphoxide, 3-chloropropyl octyl  
586. Sulphur dichloride  
587. Sulphur dioxide  
588. Sulphur monochloride  
589. Sulphur tetrafluoride  
590. Sulphur trioxide  
591. Sulphuric acid  
592. Tellurim (powder)  
593. Tellurium hexafluoride  
594. TEPP (Tetraethyl pyrophosphate)  
595. Terbufos  
596. Tert-Butyl alcohol  
597. Tert-Butyl peroxy carbonate  
598. Tert-Butyl peroxy isopropyl  
599. Tert-Butyl peroxyacetate (Conc  $\geq 70\%$ )  
600. Tert-Butyl peroxy pivalate (Conc  $\geq 77\%$ )  
601. Tert-Butyl peroxyiso-butyrate  
602. Tetra hydrofuran  
603. Terta methyl lead  
604. Tetra nitromethane  
605. Tetra-chlorodibenzo-p-dioxin, 1, 2, 3, 7, 8(TCDD)  
606. Tetraethyl lead  
607. Tetrafluoriethyne  
608. Tetramethylene disulphotetramine  
609. Thallic oxide  
610. Thallium carbonate  
611. Thallium sulphate  
612. Thallous chloride  
613. Thallous malonate  
614. Thallous sulphate  
615. Thiocarbazide  
616. Thiocynamic acid, 2(Benzothiazolyethio) methyl  
617. Thiofamox  
618. Thiometon  
619. Thionazin  
620. Thionyl chloride  
621. Thiophenol  
622. Thiosemicarbazide  
623. Thiourea (2 chloro-phenyl)  
624. Thiourea (2-methyl phenyl)  
625. Tirpate (2,4-dimethyl-1,3-dithiolane)  
626. Titanium powder  
627. Titanium tetra-chloride  
628. Toluene  
629. Toluene -2,4-di-isocyanate  
630. Toluene 2,6-di-isocyanate  
631. Trans-1,4-di chloro-butene  
632. Tri nitro anisole  
633. Tri (Cyclohexyl) methylstannyl 1,2,4 triazole  
634. Tri (Cyclohexyl) stannyl-1H-1, 2, 3-triazole  
635. Triaminotrinitrobenzene  
636. Triamphos  
637. Triazophos  
638. Tribromophenol 2, 4, 6  
639. Trichloro naphthalene  
640. Trichloro chloromethyl silane  
641. Trichloroacetyl chloride  
642. Trichlorodichlorophenylsilane  
643. Trichloroethyl silane  
644. Trichloroethylene  
645. Trichloromethane sulphenyl chloride  
646. Trichloronate  
647. Trichlorophenol 2, 3, 6  
648. Trichlorophenol 2, 4, 5  
649. Trichlorophenyl silane  
650. Trichlorophon  
651. Triethoxy silane  
652. Triethylamine  
653. Triethylene melamine  
654. Trimethyl chlorosilane  
655. Trimethyl propane phosphite  
656. Trimethyl tin chloride  
657. Trinitro aniline  
658. Trinitro benzene

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|------|-----------------------------|------|---------------------------|
| 659. | Trinitro benzoic acid       | 673. | Vinyl cyclohexane dioxide |
| 660. | Trinitro phenetole          | 674. | Vinyl fluoride            |
| 661. | Trinitro-m-cresol           | 675. | Vinyl norbornene          |
| 662. | Trinitrotoluene             | 676. | Vinyl toluene             |
| 663. | Tri-ortho creosyl phosphate | 677. | Vinylidene chloride       |
| 664. | Triphenyl tin chloride      | 678. | Warfarin                  |
| 665. | Tris(2-chloroethyl)amine    | 679. | Warfarin Sodium           |
| 666. | Turpentine                  | 680. | Xylene dichloride         |
| 667. | Uranium and its compounds   | 681. | Xylidine                  |
| 668. | Valino mycin                | 682. | Zinc dichloropentanitrile |
| 669. | Vanadium pentaoxide         | 683. | Zinc phosphide            |
| 670. | Vinyl acetate monomer       | 684. | Zirconium & compounds     |
| 671. | Vinyl bromide               |      |                           |
| 672. | Vinyl chloride              |      |                           |

## **SCHEDULE 2**

[See rule 2(e)(ii),4(1)(b), 4(2) (1) and 6 (1) (b)]

### **ISOLATED STORAGE AT INSTALLATIONS OTHER THAN THOSE COVERED BY SCHEDULE 4**

(a) The threshold quantities set out below relate to each installation or group of installation belonging to the same occupier where the distance between installation is not sufficient to avoid, in foreseeable circumstances, any aggravation of major accident hazards. These threshold quantities apply in any case to each group of installations belonging to the same occupier where the distance between the installations is less than 500 metres.

(b) For the purpose of determining the threshold quantity of a hazardous chemical at an isolated storage, account shall also be taken of any hazardous chemical which is :-

- (i) in that part of any pipeline under the control of the occupier having control of the site, which is within 500 metres of that site and connected to it;
- (ii) at any other site under the control of the same occupier any part of the boundary of which is within 500 meters of the said site; and
- (iii) in any vehicle, vessel, aircraft or hovercraft, under the control of the same occupier which is used for storage purpose either at the site or within 500 metres of it;

but no account shall be taken of any hazardous chemical which is in a vehicle, vessel, aircraft or a hovercraft used for transporting it.

S.No	Chemicals	Threshold Quantities (tonnes)	
		<sup>1</sup> [For application of rules 4,5,7 to 9 and 13 to 15]	<sup>2</sup> [For application of rule 10 to 12]
1	2	3	4
1.	Acrylonitrile	350	5,000
2.	Ammonia	60	600
3.	Ammonium nitrate (a)	350	2,500
4.	Ammonium nitrate fertilizers (b)	1,250	10,000
5.	Chlorine	10	25
6.	Flammable gases as defined in Schedule 1, paragraph (b) (i)	50	300
<sup>3</sup> 7.	Extremely flammable liquids as defined in Schedule 1, paragraph (b) (ii)	5000	50,000]
8.	Liquid oxygen	200	2000
9.	Sodium chlorate	25	250
10.	Sulphur dioxide	20	500
11.	Sulphur trioxide	15	100
<sup>4</sup> 12.	Carbonyl chloride	0.750	0.750
13.	Hydrogen Sulphide	5	50
14.	Hydrogen Fluoride	5	50
15.	Hydrogen Cyanide	5	50
16.	Carbon disulphide	20	200
17.	Bromine	50	500
18.	Ethylene oxide	5	501
19.	Propylene oxide	5	50

<sup>1</sup> Substituted by Rule 10(i) (a) of the MSIHC (Amendment) Rules, 2000 notified by S.O.57(E), dated 19.1.2000 ;

<sup>2</sup> Substituted by Rule 10(i) (b), *ibid*;

<sup>3</sup> Substituted entry 7 by Rule 10(ii), *ibid* ;

<sup>4</sup> Inserted entries 12 to 27 by Rule 11 of the MSIHC (Amendment) Rules, 1994 notified vide S.O.2882,dated 3.10.1994.

S.No	Chemicals	Threshold Quantities (tonnes)	
		<sup>1</sup> [For application of rules 4,5,7 to 9 and 13 to 15]	<sup>2</sup> [For application of rule 10 to 12]
1	2	3	4
20.	2-Propenal (Acrolein)	20	200
21.	Bromomethane (Methyl bromide)	20	200
22.	Methyl isocyanate	0.150	0.150
23.	Tetraethyl lead or tetramethyl lead	5	50
24.	1,2 Dibromoethane (Ethylene dibromide)	5	50
25.	Hydrogen chloride (liquefied gas)	25	250
26.	Diphenyl methane di-isocyanate (MDI)	20	200
27.	Toluene di-isocyanate (TDI)	10	100]
<sup>1</sup> [28.	Very highly flammable liquids as defined in Schedule 1, paragraph (b) (iii)	7,000	7,000]
29.	Highly flammable liquids as defined in Schedule 1, paragraph (b) (iv)	10,000	10,000
30.	Flammable liquids as defined in Schedule - 1, paragraph (b) (v)	15,000	1,00,000]

- (a) This applies to ammonium nitrate and mixtures of ammonium nitrates where the nitrogen content derived from the ammonium nitrate is greater than 28 per cent by weight and to aqueous solutions of ammonium nitrate where the concentration of ammonium nitrate is greater than 90 per cent by weight.
- (b) This applies to straight ammonium nitrate fertilizers and to compound fertilizers where the nitrogen content derived from the ammonium nitrate is greater than 28 per cent by weight (a compound-fertilizer contains ammonium nitrate together with phosphate and/or potash).

<sup>1</sup> Inserted entries 28, 29 and 30 by 10(iii) of the HSIHC (Amendment) Rules, 2000 notified by S.O.57(E), dated 19.1.2000.

**SCHEDULE 3**

[See Rule 2(e)(iii), 5 and 6(1) (a)]

**LIST OF HAZARDOUS CHEMICALS FOR APPLICATION OF  
RULES 5 AND 7 TO 15**

- (a) The quantities set-out-below relate to each installation or group of installations belonging to the same occupier where the distance between the installations is not sufficient to avoid, in foreseeable circumstances, any aggravation of major-accident hazards. These quantities apply in any case to each group of installations belonging to the same occupier where the distance between the installations is less than 500 metres.
- (b) For the purpose of determining the threshold quantity of a hazardous chemical in an industrial installation, account shall also be taken of any hazardous chemicals which is :-
- (i) in that part of any pipeline under the control of the occupier have control of the site, which is within 500 metres off that site and connected to it;
  - (ii) at any other site under the control of the same occupier any part of the boundary of which is within 500 metres of the said site ; and
  - (iii) in any vehicle, vessel, aircraft or hovercraft under the control of the same occupier which is used for storage purpose either at the site or within 500 metres of it;

but no account shall be taken of any hazardous chemical which is in a vehicle, vessel, aircraft or hovercraft used for transporting it.

**PART - I**  
**NAMED CHEMICALS**

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
<b>GROUP 1-TOXIC SUBSTANCES</b>				
1.	Aldicarb	100kg		116-06-3
2.	4-Aminodiphenyl	1 kg		96-67-1
3.	Amiton	1 kg		78-53-5
4.	Anabasine	100 kg		494-52-0
5.	Arsenic pentoxide, Arsenic (V) acid & salts	500 kg		
6.	Arsenic trioxide, Arsenic (III) acid & salts	100 kg		
7.	Arsine (Arsenic hydride)	10kg		7784-42-1
8.	Azinphos-ethyl	100kg		2642-71-9
9.	Azinphos-methyl	100 kg		86-50-0
10.	Benzidine	1 kg		92-87-5
11.	Bezidine salts	1 kg		
12.	Beryllium (powders, compounds)	10 kg		
13.	Bis (2-chloroethyl) sulphide	1 kg		505-60-2
14.	Bis (chloromethyl) ether	1 kg		542-88-1
15.	Carbophuran	100 kg		1563-66-2
16.	Carbophenothion	100 kg		786-19-6
17.	Chlorefenvinphos	100 kg		470-90-6
18.	4-(Chloroformyl) morpholine	1 kg		15159-40-7
19.	Chloromethyl methyl ether	1 kg		107-30-2
20.	Cobalt (metal, oxide, carbonates, sulphides, as powders)	1 t		
21.	Crimidine	100 kg		535-89-7
22.	Cynthoate	100 kg		3734-95-0
23.	Cycloheximide	100 kg		66-81-9
24.	Demeton	100 kg		8065-48-3
25.	Dialifos	100 kg		10311-84-9
26.	OO-Diethyl S-ethylsulphinylmethyl phosphorothiate	100 kg		2588-05-8
27.	OO-Diethyl S-ethylsulphonylmethyl phosphorothiate	100 kg		2588-06-9
28.	OO-Diethyl S-ethylthiomethyl Phosphorothioate	100 kg		2600-69-3

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
29.	OO-Diethyl S-isoprophylthiomethyl phosphorothiate	100 kg		78-52-4
30.	OO-Diethyl S-isopropylthiomethyl phosphorodithioate	100 kg		3309-68-0
31.	Dimefox	100 kg		115-26-4
32.	Dimethylcarbamoyl chloride	1 kg		79-44-7
33.	Dimethylnitrosamine	1 kg		62-75-9
34.	Dimethyl phosphoromidocynicidic acid	1 t		63917-41-9
35.	Diphacinone	100 kg		82-66-6
36.	Disulfoton	100 kg		298-04-4
37.	EPN	100 kg		2104-64-5
38.	Ethion	100 kg		563-12-2
39.	Fensulfothion	100 kg		115-90-2
40.	Fluenetil	100 kg		4301-50-2
41.	Fluoroacetic acid	1 kg		144-49-0
42.	Fluoroacetic acid, salts	1 kg		
43.	Fluoroacetic acid, esters	1 kg		
44.	Fluoroacetic acid, amides	1 kg		
45.	4-Fluorobutyric acid	1 kg		462-23-7
46.	4-Fluorobutyric acid, salts	1 kg		
47.	4-Fluorobutyric acid, esters	1 kg		
48.	4-Fluorobutyric acid, amides	1 kg		
49.	4-Fluorobutyric acid	1 kg		37759-72-1
50.	4-Fluorocrotonic acid, salts	1 kg		
51.	4-Fluorocrotonic acid, esters	1 kg		
52.	4-Fluorocrotonic acid, amides	1 kg		
53.	4-Fluoro-2-hydroxybutyric acid, amides	1 kg		
54.	4-Fluoro-2-hydroxybutyric acid, salts	1 kg		
55.	4-Fluoro-2-hydroxybutyric acid, esters	1 kg		
56.	4-Fluoro-2-hydroxybutyric acid, amides	1 kg		
57.	Glycolonitrile (Hydroxyacetonitrile )	100 kg		107-16-4
58.	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	100 kg		194-8-74-3
59.	Hexmathylphosphoramide	1 kg		680-31-9
60.	Hydrogen selenide	10 kg		7783-07-5
61.	Isobenzan	100 kg		297-78-9
62.	Isodrin	100 kg		465-73-6
63.	Juglone (5-Hydroxynaphthalene 1,4 dione)	100 kg		481-39-0

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
64.	4,4-Methylenebis (2-chloroniline)	10 kg		101-14-4
65.	Mthyl isocynate	150 kg	150kg	624-83-9
66.	Mevinphos	100 kg		7786-34-7
67.	2-Naphthylamine	1 kg		91-59-8
68.	2-Nickel (metal, oxides, carbonates), sulphides, as powers)	1 t		
69.	Nickel tetracarbonyl	10 kg		13463-39-3
70.	Oxygendisulfoton	100 kg		2497-07-6
71.	Oxygen difluoride	10 kg		7783-41-7
72.	Paraxon (Diethyl 4-nitrophenyl phosphate)	100 kg		311-45-5
73.	Parathion	100 kg		56-38-2
74.	Parathion-methyl	100 kg		298-00-0
75.	Pentaborane	100 kg		19624-22-7
76.	Phorate	100 kg		298-02-2
77.	Phosacetim	100 kg		4104-14-7
78.	Phosgene (carbonyl chloride)	750 kg	750kg	75-44-5
79.	Phosphamidon	100 kg		13171-21-6
80.	Phosphine (Hydrogen phosphide)	100 kg		7803-51-2
81.	Promurit (1-(3,4 dichlorophenyl)-3-triazenthio-carboxamide)	100 kg		5836-73-7
82.	1,3-Propanesultone	1 kg		1120-71-4
83.	1-Propen-2-chloro-1,3diol diacetate	10 kg		10118-72-6
84.	Pyrazoxon	100 kg		108-34-9
85.	Selenium hexafluoride	10 kg		7783-79-1
86.	Sodium selenite	100 kg		10102-18-8
87.	Stibine (Antimony hydride)	100 kg		7803-52-3
88.	Sulfotep	100 kg		3689-24-5
89.	Sulphur dichloride	1 t		10545-99-0
90.	Tellurium hexafluoride	100 kg		7783-80-4
91.	TEPP	100 kg		107-49-3
92.	2,3,7,8,-Tetrachlorodibenzo-p-dioxin (TCDD)	1 kg		1746-01-6
93.	Tetramethylenedisulphotetramine	1 kg		80-12-6
94.	Thionazin	100 kg		297-97-2
95.	Tirpate (2,4-Dimethyl-1,3-dithiolane-2-carboxaldehyde O-methylcarbamoyloxime)	100 kg		26419-73-8

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
96.	Trichloromethanesulphonyl chloride	100 kg		594-42-3
97.	1-Tri (cyclohexyl) stannyl 1H-1,2,4-Triazole	100 kg		41083-11-8
98.	Triethylenemelamine	10 kg		51-18-3
99.	Warfarin	100 kg		81-81-2
<b>GROUP -2 TOXIC SUBSTANCES</b>				
100	Acetone cyanohydrin (2-Cyanopropan-2-ol)	200 t		75-86-5
101	Acrolein (2-Propenal)	20 t	<sup>1</sup> [200t]	107-02-8
102	Acrylonitrile	20 t	200t	107-13-1
103	Allyl alcohol (Propen-1-ol)	200 t		107-18-6
104	Alylamine	200 t		107-11-9
105	Ammonia	50 t	500t	7664-41-7
106	Bromine	40 t	<sup>1</sup> [500t]	7726-95-6
107	Carbon disulphide	20 t	200t	75-15-0
108	Chlorine	10 t	25t	7782-50-5
109	Diphneyl ethane di-isocynate (MDI)	20 t	<sup>1</sup> [200t]	101-68-8
110	Ethylene dibromide (1,2-Dibromoethane)	5 t	<sup>1</sup> [50t]	106-93-4
111	Ethyleneimine	5 t		151-56-4
112	Formaldehyde (concentration <90%)	5 t	<sup>1</sup> [50t]	50-00-0
113	Hydrogen chloride (liquified gas)	25 t	250t	7647-01-0
114	Hydrogen cyanide	5 t	20t	74-90-8
115	Hydrogen fluoride	5 t	50t	7664-39-3
116	Hydrogen sulphide	5 t	50t	7783-06-4
117	Methyl bromide (Bromomethane)	20 t	<sup>1</sup> [200 t]	74-83-9
118	Nitrogen oxides	50 t		11104-93-1
119	Propyleneimine	50 t		75-55-8
120	Sulphur dioxide	20 t	250t	7446-09-5
121	Sulphur trioxide	15 t	75t	7446-11-9
122	Tetraethyl lead	5 t	<sup>2</sup> [200t]	78-00-2
123	Tetra methyl lead	5 t	<sup>1</sup> [100t]	75-74-1
124	Toluene di-isocynate (TDI)	10 t		584-84-9

<sup>1</sup> Inserted by Rule14 (a to h) of MSIHC (Amendment) Rules, 1994 notified vide notification S.O.2882, dated 3.10.1994.

<sup>2</sup> Inserted by Rule14 (a to h) of MSIHC (Amendment) Rules, 1994 notified vide notification S.O.2882, dated 3.10.1994.

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
<b>GROUP 3-HIGHLY REACTIVE SUBSTANCES</b>				
125	Acetylene (ethyne)	5 t		74-86-2
126	a. Ammonium nitrate (1) b. Ammonium nitrate in form of fertilizer (2)	350t 1250 t	2500t	6484-52-2
127	2,2 Bis (tert-butylperoxy) butane) (concentration >70%)	5 t		2167-23-9
128	1, 1-Bis(tert-butylperoxy) cyclohexane (concentration > 80%)	5 t		3006-86-8
129	tert-Butyle peroxyacetate (concentration ≤70% )	5 t		107-71-1
130	tert-Butyle peroxy isobutyrate (concentration >80%)	5 t		109-13-7
131	Tert-Butyl peroxy isopropyl carbonate (concentration ≥80%)	5 t		2372-21-6
132	Tert-Butyl peroxyacetate (concentration ≥80%)	5 t		1931-62-0
133	Tert-Butyl peroxyisovalate (concentration ≥77%)	50 t		927-07-1
134	Dibenzyl peroxydicarbonate (concentration ≥90%)	5 t		2144-45-8
135	Di-sec-butyl peroxydicarbonate (concentration ≥80%)	5 t		19910-65-7
136	Diethyl peroxydicarbonate (concentration ≥30% )	50 t		14666-78-5
137	2,2-dihydroperoxypropane (concentration ≥30%)	5 t		2614-76-08
138	di-isobutyl peroxide (concentration ≥50%)	50 t		3437-84-1
139	Di-n-propyl peroxydicarbonate (concentration ≥80%)	5 t		16066-38-9
140	Ethylene oxide	5 t	50t	75-21-8
141	Ethyl nitrate	50 t		625-58-1
142	3,3,6,6,9,9 Hexamethyl - 1,2,4 5-tert oxacyclononane (concentration ≥75%)	50 t		22397-33-7
143	Hydrogen	2 t	50 t	1333-74-0

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
144	Liquid Oxygen	200 t	<sup>1</sup> [2000t]	7782-41-7
145	Methyl ethyl ketone peroxide (concentration ≥60%)	5 t		1338-23-4
146	Methyl isobutyl ketone peroxide (concentration ≥60%)	50 t		37206-20-5
147	Peracetic acid (concentration ≥60%)	50 t		79-21-0
148	Propylene oxide	5 t	<sup>1</sup> [50t]	75-56-9
149	Sodium chlorate	25 t		7775-09-9
<b>GROUP 4-EXPLOSIVE SUBSTANCES</b>				
150	Barium azide	<sup>1</sup> [100] kg		18810-58-7
151	Bis(2,4,6 -trinitrophenyl) amine	50 t		131-073-7
152	Chlorotrinitro benzene	50 t		28260-61-9
153	Cellulose nitrate (containing 12.6% Nitrogen)	50 t		9004-70-0
154	Cyclotetramethyleneteranitramine	50 t		2691-41-0
155	Cyclotrimethylenetiraniramine	50 t		121-82-1
156	Diazodinitrophenol	10 t		7008-81-3
157	Diethylene glycol dinitrate	10 t		693-21-0
158	Dinitrophenol, salts	50 t		
159	Enthylene glycol dinitrate	10 t		628-96-6
160	1-Gyanyl-4-nitrosaminoguanyl-1-tetrazene	<sup>1</sup> [100 kg]		109-27-3
161	2, 2, 4, 4, 6, 6, -Hexanitostibene	50 t		20062-22-0
162	Hydrazine nitrate	50 t		13464-97-6
163	Lead azide	<sup>1</sup> [100 kg]		13424-46-9
164	Lead Styphnate ( Lead 2,4,6-trinitroresorcinoxide)	50 t		15245-44-0
165	Mercury fulminate	10 t		20820-45-5 628-86-4
166	N-Methyl-N,2,4,6-tetranitroaniline	50 t		497-45-8
167	Nitroglycerine	10 t	10t	55-63-0
168	Pentacrythritol tetra nitrate	50 t		78-11-5

<sup>1</sup> Substituted by Rule 11(i) of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

S. No.	Chemicals	Threshold	Quantity	CAS Number
		for application of Rules 5, 7-9 and 13-15	for application of Rules 10-12	
(1)	(2)	(3)	(4)	(5)
169	Picric acid, (2,3,6-Trinitrophenol)	50 t		88-89-1
170	Sodium picramate	50 t		831-52-7
171	Styphnic acid (2,4,6-Trinitroresorcinol)	50 t		82-71-3
172	1,3,5-Triamino-2,4,6-Trinitrobenzene	50 t		3058-38-6
173	Trinitroaniline-	50 t		26952-42-1
174	2,4,6-Trinitroanisole	50 t		606-35-9
175	Trinitrobenze	50 t		25377-32-6
176	Trinitrobenzoic acid	50 t		35860-50-5 129-66-8
177	Trinitrocresol	50 t		28905-71-7
178	2,4,6-Trinitrophenitole	50 t		4732-4-3
179	2,4,6-Trinitrotoluene	50 t	50 t	118-96-7

<sup>1</sup>[PART II

**CLASSES OF SUBSTANCES AS DEFINED IN PART – I, SCHEDULE –1  
AND NOT SPECIFICALLY NAMED IN PART –I OF THIS SCHEDULE**

1	2	3	4
<b>GROUP 5 - Flammable substances</b>			
1.	Flammable Gases	15t	200t
2.	Extremely flammable liquids	1000t	5000t
3.	Very highly flammable liquids	1500t	10000t
4.	Highly Flammable liquids which remains liquid under pressure	25t	200t
5.	Highly Flammable liquids	2500t	20000t
6.	Flammable liquids	5000t	50000t]

- (1) This applies to ammonium nitrate and mixtures of ammonium nitrate where the nitrogen content derived from the ammonium nitrate is greater than 28% by weight and aqueous solutions of ammonium nitrate where the concentration of ammonium nitrate is greater than 90% by weight.
- (2) This applied to straight ammonium nitrate fertilizers and to compound fertilizers where the nitrogen content derived from the ammonium nitrate is greater than 28% by weight ( a compound fertilizer contains ammonium nitrate together with phosphate and/or potash).

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<sup>1</sup> Substituted by Rule 11(ii) of the MSIHC (Amendment) Rules, 2000 notified by S.O.57(E), dated 19.1.2000.

#### SCHEDULE -4

(See Rule 2(h) (i))

1. Installation for the production, processing or treatment of organic or inorganic chemicals using for this purpose, among others;
  - (a) alkylation
  - (b) Amination by ammonolysis
  - (c) carbonylation
  - (d) condensation
  - (e) dehydrogenation
  - (f) esterification
  - (g) halogenation and manufacture of halogens
  - (h) hydrogenation
  - (i) hydrolysis
  - (j) Oxidation
  - (k) Polymerization
  - (l) Sulphonation
  - (m) desulphurization, manufacture and transformation of sulphur containing compounds
  - (n) nitration and manufacture of nitrogen containing compounds
  - (o) manufacture of phosphorous-containing compounds
  - (p) formulation of pesticides and of pharmaceutical products
  - (q) distillation
  - (r) extraction
  - (s) solvation
  - (t) mixing
2. Installation for distillation, refining or other processing of petroleum or petroleum products.
3. Installations for the total or partial disposal of solid or liquid substances by incineration or chemical decomposition.
4. Installations for production, processing, <sup>1</sup>[use] or treatment of energy gases, for example, LPG, LNG, SNG.
5. Installation for the dry distillation of coal or lignite.
6. Installations for the production of metals or non-metals by a wet process or by means of electrical energy.

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<sup>1</sup> Inserted by Rule 12 of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

**SCHEDULE -5**  
**(See Rules, 2(b) and 3)**

<b>S. No.</b>	<b>Authority(ies) with legal backing</b>	<b>Duties and corresponding Rule</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
1.	Ministry of Environment and Forests under Environment (Production) Act, 1986.	1. Notification of hazardous chemicals as per Rules 2(e)(i), 2(e) (ii) & 2(e) (iii)
2.	Chief Controller Imports & Exports under Import & Exports (Control) Act, 1947.	Import of hazardous chemicals as per Rule 18
3.	Central Pollution Control Board or State Pollution Control Board <sup>1</sup> [or Committee] under Environment (Protection) Act, 1986 as the case may be.	(1) Enforcement of directions and procedures in respect of isolated storage of hazardous chemicals, regarding- (i) Notification of major accidents as per Rules 5(1) and 5(2) (ii) Notification of sites as per Rules 7 to 9. (iii) Safety reports in respect of isolated storages as per Rule 10 to 12. (iv) Preparation of on-site emergency plans as per Rule 13. (2) Import of hazardous Chemicals and enforcement of directions and procedures on import of hazardous chemicals as per Rule 18.
4.	Chief Inspector of Factories appointed under the Factories Act, 1948.	Enforcement of directions and procedures in respect of industrial installations and isolated storages covered under the Factories Act, 1948, dealing with hazardous chemicals and pipelines including inter-state pipelines regarding- (i) Notification of major accidents as per Rule 5(1) and 5 (2). (ii) Notification of sites as per Rules, 7 to 9. (iii) Safety reports as per Rules, 10 to 12. (iv) Preparation of on-site emergency plans as per Rule 13. Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per S. No. 9 of this schedule.

<sup>1</sup> Inserted by Rule 13(i) of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

<b>S. No.</b>	<b>Authority(ies) with legal backing</b>	<b>Duties and corresponding Rule</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
5.	Chief Inspector of Dock Safety appointed under the Dock Workers (Safety, Health and Welfare) Act, 1986.	Enforcement of directions and procedures in respect of industrial installations and isolated storages dealing with hazardous chemicals and pipelines <sup>1</sup> [inside a port covered under the Dock Workers (Safety, Health and Welfare) Act, 1986] regarding- (i) Notification of major accidents as per Rules 5(1) and 5(2). (ii) Notification of sites as per Rules 7 to 9. (iii) Safety reports as per Rules 10 to 12. (iv) Preparation of on-site emergency plans as per Rule 13. (v) Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per S. No.9 of this Schedule.
6.	Chief Inspector of Mines appointed under the Mines Act, 1952	Enforcement of directions and procedures in respect of industrial installations and isolated storages dealing with hazardous chemicals <sup>2</sup> [***] regarding - (i) Notification of major accidents as per Rules 5(1) and 5(2). (ii) Notification of sites as per Rules 7 to 9. (iii) Safety reports as per Rules 10 to 12. (iv) Preparation of on-site emergency plans as per Rule 13. (v) Preparation of off-site emergency plans in consultation with District Collector or District Emergency Authority as per S. No.9 of this Schedule.
7.	Atomic Energy Regulatory Board appointed under the Atomic Energy Act, 1972.	<sup>3</sup> [Enforcement of directions and procedures regarding :- (a) Notification of major accidents as per rule 5(1) and 5(2) (b) Approval and Notification of Sites as per rule 7; (c) Safety report and safety audit

<sup>1</sup> Substituted by Rule 13(ii) of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000;

<sup>2</sup> Omitted by Rule 13(iii), *ibid*;

<sup>3</sup> Substituted by Rule 13(iv), *ibid*.

S. No.	Authority(ies) with legal backing	Duties and corresponding Rule
(1)	(2)	(3)
		repots as per rule 10 to 12; (d) Acceptance of On-site Emergency plans as per rule 13; (e) Assisting the District Collector in the preparation of Off-Site emergency plans as per serial number 9 of this Schedule ]
8.	Chief Controller of Explosives appointed under the Indian Explosive Act and Rules, 1983	Enforcement of directions and procedures as per the provisions of <sup>1</sup> [(i) The Explosives Act, 1884(4 of 1884) and the rules made thereunder, namely:- (a) The Gas Cylinders Rules, 1981; (b) The Static and Mobile Pressure Vessel (Unified) Rules, 1981; (c) The Explosive Rules, 1984 (ii) The petroleum Act, 1934 (30 of 1934) and the Rules made thereunder, namely; (a) The Petroleum Rules, 1976; (b) The Calcium Carbide Rules, 1987]; <sup>2</sup> [and in respect of Industrial installation and isolated storages dealing with hazardous chemicals and pipelines including inter-state pipelines regarding. : -  (a) Notification of major accident as per rule 5; (b) Approval and notification of sites as per rule 7; (c) Safety report and safety audit reports as per rules 10 to 12; (d) Acceptance of On-site Emergency plans as per rule 13; (e) Assisting the District Collector in the preparation of Off-Site emergency plans as per serial number 9 of this Schedule.]

<sup>1</sup> Substituted by Rule 15 of the MSIHC (Amendment) Rules, 1994, notified vide S.O.2882, dated 3.10.1994.

<sup>2</sup> Inserted by Rule 13 (v) of the MSIHC (Amendment) Rules, 2000 notified vide S.O.57(E), dated 19.1.2000.

<b>S. No.</b>	<b>Authority(ies) with legal backing</b>	<b>Duties and corresponding Rule</b>
<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
9.	District Collector or District Emergency Authority designated by the State Government	Preparation of off-site emergency plans as per Rule 14
<sup>1</sup> [10.	<sup>2</sup> [CENTRE FOR ENVIRONMENT AND EXPLOSIVE SAFETY (CEES), Defense Research and Development of Organisation (DRDO). Department of defence Research & Development, Ministry of Defence	Enforcement of directions and procedures in respect of laboratories, industrial establishment and isolated storages dealing with hazardous chemicals in the Ministry of Defence]

<sup>1</sup> Substituted by Rule 13(vi), of the MSIHC (Amendment) Rules, 2000 notified vide S.O.No.57(E), dated 19.1.2000.

<sup>2</sup> Inserted by G.S.R.584(E), dated 9<sup>th</sup> June, 1990.

**SCHEDULE -6**

[See Rule 5(1)]

**INFORMATION TO BE FURNISHED REGARDING NOTIFICATION OF A MAJOR ACCIDENT**Report number .....  
of the particular accident.

## 1. General data

- (a) Name of the site
- (b) Name and address of the manufacturer  
(Also state telephone/telex number)
- (c) (i) Registration number
- (ii) Licence number  
(as may have been allotted under any status applicable to the site,  
e.g.the Factories Act)
- (d) (i) Nature of industrial activity (Mention what is actually manufactured,  
stored etc.)
- (ii) National Industrial Classification, 1987 at the four digit level.

## 2. Type of major accident

Explosion  Fire  Emission of dangerous substance 

Substance(s) emitted .....

## 3. Description of the major accident

- (a) Date, shift and hour of the accident
- (b) Department/Section and exact place where  
the accident took place
- (c) The process/operation undertaken in the  
Department/section where the accident took place.  
(attach a flow chart if necessary)
- (d) The circumstances of the accident and  
the dangerous substance involved

## 4. Emergency Measures taken and measures envisaged to be taken to alleviate short term effects of the accident.

## 5. Causes of the major accident.

Known (to be specified)

## 6. Not Known

Information will be supplied as soon as possible

7. Nature and extent of damage

- (a) Within the establishment - casualties .....Killed
- .....Injured
- .....Poisoned

Persons exposed to the major accident .....

- material damaged
- danger is still present
- danger no longer exists.

- (b) Outside the establishment casualties. ....Killed
- .....Injured
- .....Poisoned

Persons exposed to the major accident.....

- material damaged
- damage to environment
- the danger is still present
- the danger no longer exists

8. Data available for assessing the effects of the accident on persons and environment.

9. Steps already taken or envisaged

- (a) to alleviate medium or long term effects of the accident
- (b) to prevent recurrence of similar major accident
- (c) Any other relevant information.

**SCHEDULE -7**

[ See Rule 7(1)]

**INFORMATION TO BE FURNISHED FOR THE NOTIFICATION OF SITES****PART -I**

Particulars to be included in a notification of a site

1. The name and address of the employer making the notification.
2. The full postal address of the site where the notifiable industrial activity will be carried on.
3. The area of the site covered by the notification and of any adjacent site which is required to be taken into account by virtue of b(ii) of schedule 2 and 3.
4. The date on which it is anticipated that the notifiable industrial activity will commence, or if it has already commenced a statement to that effect.
5. The name and maximum quantity liable to be on the site of each dangerous substance for which notification is being made.
6. Organisation structure namely organisation diagram for the proposed industrial activity and set up for ensuring safety and health.
7. Information relating to the potential for major accidents, namely-
  - (a) identification of major accident hazards ;

- (b) the conditions or the events which could be significant in bringing one about;
- (c) a brief description of the measures taken.

8. Information relating to the site namely-

- (a) a map of the site and its surrounding area to a scale large enough to show any features that may be significant in the assessment of the hazard or risk associated with the site,-
  - (i) area likely to be affected by the major accident.
  - (ii) Population distribution in the vicinity.
- (b) a scale plan of the site showing the location and quantities of all significant inventories of the hazardous chemicals;
- (c) a description of the process or storage involving the hazardous chemicals and an indication of the conditions under which it is normally held;
- (d) the maximum number of persons likely to be present on site.

9. The arrangement for training of workers and equipment necessary to ensure safety of such workers.

**PART -II**

Particulars to be included regarding pipeline-

1. The names and address of the persons making the notification.
2. The full postal address of the place from which the pipeline activity is controlled, addresses of the places where the pipeline starts and finishes and a map showing the pipeline route drawn to a scale of not less than 1:400000.
3. The date on which it is anticipated that the notifiable activity will commence, or if it is already commenced a statement to that effect.
4. The total length of the pipeline, its diameter and normal operating pressure and the name and maximum quantity liable to be in the pipeline of each hazardous chemical for which notification is being made.

**SCHEDULE -8**  
**[See Rule 10(1)]**  
**INFORMATION TO BE FURNISHED IN A SAFETY REPORT**

1. The name and address of the person furnishing the information.
2. Description of the industrial activity, namely-
  - (a) site,
  - (b) construction design,
  - (c) protection zones explosion protection, separation distances,
  - (d) accessibility of plant,
  - (e) maximum number of persons working on the site and particularly of those persons exposed to be hazard.
3. Description of the processes, namely -
  - (a) technical purpose of the industrial activity,
  - (b) basic principles of the technological process,
  - (c) process and safety -related data for the individual process stages,
  - (d) process description,
  - (e) Safety-related types of utilities.
4. Description of the hazardous chemicals, namely -
  - (a) chemicals (quantities, substance data, safety-related data, toxicological data and threshold values),
  - (b) the form in which the chemical may occur on or into which they may be transformed in the event of abnormal conditions,
  - (c) the degree of purity of the hazardous chemical.

5. Information on the preliminary hazard analysis, namely-

- (a) types of accident
- (b) system elements or events that can lead to a major accident,
- (c) hazards,
- (d) safety-relevant components.

6. Description of safety -relevant units, among others;

- (a) special design criteria,
- (b) controls and alarms,
- (c) special relief systems,
- (d) quick-acting valves,
- (e) collecting tanks/dump tank,
- (f) sprinkler system,
- (g) fire fighting etc.

7. Information on the hazards assessment, namely-

- (a) identification of hazards ,
- (b) the cause of major accidents,
- (c) assessment of hazards according to their occurrence frequency,
- (d) assessment of accident consequences,
- (e) safety systems,
- (f) known accident history.

8. Description of information or organizational systems used to carry on the industrial activity safety, namely-

- (a) maintenance and inspection schedules,
- (b) guidelines for the training of personnel,
- (c) allocation and delegation of responsibility for plant safety,
- (d) implementation of safety procedure.

9. Information on assessment of the consequences of major accidents, namely-

- (a) assessment of the possible release of hazardous chemicals or of energy,
- (b) possible dispersion of released chemical,
- (c) assessment of the effects of the releases (size of the affected area, health effects, property damage)

10. Information on the mitigation of major accidents, namely -

- (a) fire brigade,
- (b) alarm systems,
- (c) emergency plan containing system of organisation used to fight the emergency, the alarm and the communication rules guidelines for fighting the emergency, information about hazardous chemicals, examples of possible accident sequences,
- (d) coordination with the District Emergency authority and its off-site emergency plan,
- (e) notification of the nature and scope of the hazard in the event of an accident,
- (f) antidotes in the event of a release of a hazardous chemical.

**SCHEDULE -9**

(See Rule 17)

**SAFETY DATA SHEET****1. CHEMICAL IDENTITY**

Chemical Name		Chemical Classification	
Synonyms		Trade Name	
Formula	C.A.S.No	U.N. No.:	
Regulated Identification	Shipping Name Codes/Lable	Hazchem No.:	
		Hazardous Waste I.D. No.:	
Hazardous Ingredients	C.A.S. No.	Hazardous Ingredients	C.A.S No.:
1.		3.	
2.		4.	

**2. PHYSICAL AND CHEMICAL DATA**

Boiling Range/Point °C	Physical State	Appearance
Melting/Freezing Point °C	Vapour Pressure @ 35 °C mm/Hg	Odour
Vapour Density (Air=1)	Solubility in Water at 30°C Others	
Specific Gravity Water =1	pH	

**3. FIRE AND EXPLOSION HAZARD DATA**

Flammability	Yes/No	<i>LEL</i>	%	Flash Point °C	Auto ignition Temperature °C
TDG Flammability		<i>UEL</i>	%	Flash Point °C	
Explosion Sensitivity to Impact				Explosion Sensitivity to Static Electricity	Hazardous Combustion Products
Hazardous Polymerisation Combustible Liquid		Explosive Material		Corrosive Material	
Flammable Material		Oxidiser		Others	
Pyrophoric Material		Organic Peroxide			

**4. REACTIVITY DATA**

Chemical Stability
Incompatibility With other Material
Reactivity
Hazardous Reaction Products

**5. HEALTH HAZARD DATA**

Routes of Entry					
Effects of Exposure/Symptoms					
Emergency Treatment					
TLV(ACGIH)	ppm	mg/m <sup>3</sup>	STEL	ppm	mg/m <sup>3</sup>

Permissible Exposure Limits LD <sub>50</sub>	ppm	mg/m <sup>3</sup>	Odour threshold LD <sub>50</sub>	ppm	mg/m <sup>3</sup>
NEPA Hazard Signals	Health	Flammability	Stability	Special	

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## 6. PREVENTIVE MEASURES

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Personnel  
Protective  
Equipment

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Handling and  
Storage  
Precautions

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## 7. EMERGENCY AND FIRST AID MEASURE

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Fire Extinguishing  
Media  
FIRE

---

Special Procedures

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Unusual Hazards  
EXPOSURE

---

First Aid Measures

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Antidotes/Dosages  
SPILLS

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Steps to be taken

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Waste Disposal Method

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## 8. ADDITIONAL INFORMATION / REFERENCES

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**9. MANUFACTURER / SUPPLIER DATA**


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Name of Firm	Contact Person in Emergency
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Mailing Address	Local Bodies Involved
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Telephone/Telex Nos.	Standard Packing
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Telegraphic Address	Tremcard Details/Ref Other.
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**10. DISCLAIMER**

Information contained in this material data sheet is believed to be reliable but no representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. It is upto the manufacturer/seller to ensure that the information contained in the material safety data sheet is relevant to the product manufactured/handled or sold by him as the case may be. The Government makes no warranties expressed or implied in respect of the adequacy of this document for any particular purpose.

**SCHEDULE -10**

[See Rule 18(5)]

**FORMAT FOR MAINTAINING RECORDS OF HAZARDOUS CHEMICALS IMPORTED**

1. Name and address of the Importer:
2. Date and reference number of issuance of permission to import hazardous chemicals:
3. Description of hazardous chemicals:
  - (a) Physical form:
  - (b) Chemical form:
  - (c) Total volume and weight (in kilogram's/  
Tones)
4. Description of purpose of Import:
5. Description of storage of hazardous chemicals:
  - (a) Date:
  - (b) Method of storage

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**Note:** Published in the Gazette No.787, dt.27.11.1989.

All correction made in the terms of corrigendum No.S.O.115(E), dt.5.2.1990 published in the Gazette No. 59 dt.5.2.1990.

**<sup>1</sup>[SCHEDULE –11]**

[See Rule 13(1)]

**DETAILS TO BE FURNISHED IN THE ON-SITE EMERGENCY PLAN**

1. Name and address of the person furnishing the information.
2. Key personnel of the organization and responsibilities assigned to them in case of an emergency
3. Outside organization if involved in assisting during on-site emergency:
  - (a) Type of accidents
  - (b) Responsibility assigned
4. Details of liaison arrangement between the organizations.
5. Information on the preliminary hazard analysis:
  - (a) Type of accidents
  - (b) System elements or events that can lead to a major accident
  - (c) Hazards
  - (d) Safety relevant components

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<sup>1</sup> Inserted by Rule 16 of the MSIHC (Amendment) Rules, 1994 notified by S.O.2882, dated 3.10.1994.

6. Details about the site:
  - (a) Location of dangerous substances
  - (b) Seat of key personnel
  - (c) Emergency control room
  
7. Description of hazardous chemicals at plant site:
  - (a) Chemicals (Quantities and toxicological data)
  - (b) Transformation if any, which could occur.
  - (c) Purity of hazardous chemicals.
  
8. Likely dangers to the plant.
  
9. Enumerate effects of:
  - (i) Stress and strain caused during normal operation:
  - (ii) Fire and explosion inside the plant and effect if any, of fire and explosion outside.
  
10. Details regarding:
  - (i) Warning, alarm and safety and security systems.

- (ii) alarm and hazard control plans in line with disaster control and hazard control planning, ensuring the necessary technical and organizational precautions;
  - (iii) Reliable measuring instruments, control units and servicing of such equipments.
  - (iv) Precautions in designing of the foundation and load bearing parts of the building.
  - (v) Continuous surveillance of operations.
  - (vi) maintenance and repair work according to the generally recognized rules of good engineering practices.
11. Details of communication facilities available during emergency and those required for an off-site emergency.

12. Details of fire fighting and other facilities available and those required for an off-site emergency.
13. Details of first aid and hospital services available and its adequacy.

<sup>1</sup>[**SCHEDULE 12**  
[See Rule 14(1)]]

**DETAILS TO BE FURNISHED IN THE OFF-SITE EMERGENCY PLAN**

1. The types of accidents and release to be taken into account.
2. Organisations involved including key personnel and responsibilities and liaison arrangements between them.
3. Information about the site including likely locations of dangerous substances, personnel and emergency control rooms.
4. Technical information such as chemical and physical characteristics and dangers of the substances and plant.
5. Identify the facilities and transport routes.
6. Contact for further advice e.g. meteorological information, transport, temporary food and accommodation, first aid and hospital services, water and agricultural authorities.
7. Communication links including telephones, radios and standby methods.

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<sup>1</sup> Inserted by Rule 16 of the MSIHC (Amendment) Rules, 1994 notified by S.O.2882, dated 3.10.1994.

8. Special equipment including fire fighting materials, damage control and repair items.
9. Details of emergency response procedures.
10. Notify the public.
11. Evacuation arrangements.
12. Arrangements for dealing with the press and other media interests.
13. Longer term clean up.]

**Note:** Principal rules were published in Gazette of India vide Notification S.O. 966(E), dated 27.11.1989. Amending rules were published vide GSR No.681, dated 9.6.1990, S.O.115 (E), dated 5.2.1990, S.O.2882, dated 3.10.1994 and S.O.57 (E), dated 19.1.2000.

**THE CHEMICAL ACCIDENTS (EMERGENCY PLANNING, PREPAREDNESS,  
AND RESPONSE) RULES, 1996**

**MINISTRY OF ENVIRONMENT & FORESTS  
NOTIFICATION**

(New Delhi, the 1<sup>st</sup> August, 1996)

**RULES ON EMERGENCY PLANNING, PREPAREDNESS AND RESPONSE  
FOR CHEMICAL ACCIDENTS**

**\*G.S.R.347(E):-** In exercise of the power conferred by Section 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules, namely

**1. Short Title and Commencement-(1)** These rules may be called the Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996.

(2) They shall come into force on the date of their publication in the Official Gazette.

**2. Definitions** .- In these rules unless the context otherwise requires,-

- (a) "chemical accident" means an accident involving a fortuitous, or Sudden or unintended occurrence while handling any hazardous chemicals resulting in continuous, intermittent or repeated exposure to death, or injury to, any person or damage to any property but does not include an accident by reason only of war or radio-activity;
- (b) "hazardous chemical" means,-
  - (i) any chemical which satisfies any of the criteria laid down in Part I of Schedule 1 or is listed in Part 2 of the said schedule;
  - (ii) any chemical listed in Column 2 of Schedule 2;
  - (iii) any chemical listed in Column 2 of Schedule 3;
- (c) "industrial activity" includes an operation or process,-
  - i) carried out in an industrial installation referred to in Schedule -4 involving or likely to involve one or more hazardous chemicals;
  - (ii) on-site storage or on-site transport which is associated with that operation or process as the case may be;
  - (iii) isolated storage;
  - (iv) pipeline;

- (d) "industrial pocket" means any industrial zone ear-marked by the Industrial Development Corporation of the State Government or by the State Government;
- (e) "isolated storage" means,- storage of a hazardous chemical other than storage associated with an installation on the same site specified in **Schedule 4** where that storage involves at least the quantities of that chemical set out in **Schedule-2**;
- (f) "major chemical accident" means, - an occurrence including any particular major emission, fire or explosion involving one or more hazardous chemicals and resulting from uncontrolled developments in the course of industrial activity or transportation or due to natural events leading to serious effects both immediate or delayed, inside or outside the installation likely to cause substantial loss of life and property including adverse effects on the environment;
- (g) "Major Accident Hazards (MAH) Installations".- means, isolated storage and industrial activity at a site, handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities specified in column 3 of **Schedule 2 and 3** respectively;
- (h) "Manufacture, Storage and Import of Hazardous Chemical, Rules" means, - the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989, published in the notification of Government of India in the Ministry of Environment & Forests No. S.O.966 (E), dated 27 1h November, 1989;
- (i) "off-site emergency plan" means,- the off-site emergency plan prepared under rule 14 of the Manufacture, Storage and Import of Hazardous Chemicals Rules;
- (j) "pipeline" means,- a pipe (together with any apparatus and works associated therewith) or system of pipes (together with any apparatus and works associated therewith) for the conveyance of a hazardous chemical other than a flammable gas as set out in column 2 of Part 11 of Schedule 1, at a pressure of less than 8 bars absolute;
- (k) "site" means,- any location where hazardous chemicals are manufactured or processed, stored, handled, used, disposed of and includes the whole of an area under the control of an occupier and includes pier, jetty or similar structure whether floating or not;
- (l) "transport" means.- movement of hazardous chemicals by any means over land, water or air.

**3. Constitution of Central Crisis Group.-** (1) The Central Government shall constitute a Central Crisis Group for management of chemical accidents and set up a

Crisis Alert System in accordance with the provisions of Rule-4 within thirty days from the date of the commencement of these rules.

(2) The composition of the Central Crisis Group shall be as specified in Schedule 5.

(3) The Central Crisis Group shall meet at least once in six months and follow such procedure for transaction of business as it deems fit.

(4) Notwithstanding anything contained in sub-rule (2), the Central Crisis Group may co opt any person whose assistance or advice is considered useful in performing any of its functions to participate in the deliberations of any of its meetings.

**4. Constitution of Crisis Alert System:-** The Central Government shall,-

- (a) set up a functional control room at such place as it deems fit;
- (b) set up an information net working system with the State and district control rooms;
- (c) appoint adequate staff and experts to man the functional control room;
- (d) publish a list of Major Accident Hazard installations;
- (e) publish a list of major chemical accidents in chronological order;
- (f) publish a list of members of the Central, State and District Crisis Groups;
- (g) take measures to create awareness amongst the public with a view to preventing chemical accidents.

**5. Functions of the Central Crisis Group:** (1) The Central Crisis Group shall be the apex body to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents.

(2) Without prejudice to the functions specified under sub-rule (1), the Central Crisis Group shall,-

- (a) continuously monitor the post accident situation arising out of a major chemical accident and suggest measures for prevention and to check recurrence of such accidents;
- (c) conduct post-accident analysis of such major chemical accidents and evaluate responses;
- (d) review district off-site emergency plans with a view to examine its adequacy in accordance with the Manufacture, Storage and Import of Hazardous Chemicals, Rules, and suggest measures to reduce risks in the Industrial pockets;

- (d) review the progress reports submitted by the State Crisis Groups;
- (e) respond to queries addressed to it by the State Crisis Groups and the District Crisis Groups;
- (f) publish a State-wise list of experts and officials who are concerned with the handling of chemical accidents;
- (g) render, in the event of a chemical accident in a State, all financial and infra-structural help as may be necessary.

**6. Constitution of State Crisis Group.-** (1) The State Government shall constitute a State Crisis Group for management of chemical accidents within thirty days from the date of the commencement of these rules.

(2) The composition of the State Crisis Group shall be as specified in **Schedule 6**.

(3) The State Crisis Group shall meet at least once in three months and follow such procedure for transaction of business as it deems fit.

(4) Notwithstanding anything contained in sub-rule (2), the State Crisis Group may co-opt any person whose assistance or advice is considered useful in performing any of its functions, to participate in the deliberation of any of its meetings.

**7. Functions of the State Crisis Group.-** (1) The State Crisis Group shall be the apex body in the State to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents.

(2) Without prejudice to the functions specified under sub-rule (1), the State Crisis Group shall,-

- (a) review all district off-site emergency plans in the State with a view to examine its adequacy in accordance with the Manufacture, Storage and Import of Hazardous Chemicals, Rules and forward a report to the Central Crisis Group once in three months;
- (b) assist the State Government in managing chemical accidents at a site;
- (b) assist the State Government in the planning, preparedness and mitigation of major chemical accidents at a site in the State;
- (c) continuously monitor the post accident situation arising out of a major chemical accident in the State and forward a report to the Central Crisis group;
- (e) review the progress report submitted by the District Crisis groups;
- (f) respond to queries addressed to it by the District Crisis groups;

(h) publish a list of experts and officials in the State who are concerned with the management of chemical accidents.

**8. Constitution of the District and Local Crisis Group.-** (1) The State Government shall cause to be constituted within thirty days from the date of commencement of these rules,-

(a) District Crisis Groups;

(b) Local Crisis Groups;

(2) The composition of the District Crisis Groups and the Local Crisis Groups shall be as specified in **Schedule 7 and 8** respectively.

(3) The District Crisis Group shall meet every forty five days and send a report to the State Crisis Group;

(4) The Local Crisis Group shall meet every month and forward a copy of the proceedings to the District Crisis Group.

**9. Functions of the District Crisis Group.-**(1) The District Crisis Group shall be the apex body in the district to deal with major chemical accidents and to provide expert guidance for handling chemical accidents;

(2) Without prejudice to the functions specified under sub-rule (1). the District Crisis Group shall,-

(a) assist in the preparation of the district off-site emergency plan;

(c) review all the on-site emergency plans prepared by the occupier of Major Accident Hazards installation for the preparation of the district off-site emergency plan;

(c) assist the district administration in the management of chemical;

(d) continuously monitor every chemical accident;

(d) ensure continuous information flow from the district to the Central and State Crisis Group regarding accident situation and mitigation efforts;

(e) forward a report of the chemical accident within fifteen days to the State Crisis Group;

(f) conduct at least one full scale mock-drill of a chemical accident at a site each year and forward a report of the strength and the weakness of the plan to the State Crisis Group.

**10. Functions of the Local Crisis Group.-(1)** The Local Crisis Group shall be the body in the industrial pocket to deal with chemical accidents and coordinate efforts in planning, preparedness and mitigation of a chemical accident;

(2) Without prejudice to the functions specified under sub-rule (1), the Local Crisis Group shall,

- (a) prepare local emergency plan for the industrial pocket;
- (b) ensure dovetailing of the local emergency plan with the district off-site emergency plan;
- (c) train personnel involved in chemical accident management;
- (c) educate the population likely to be affected in a chemical accident about the remedies and existing preparedness in the area;
- (d) conduct at least one full scale mock-drill of a chemical accident at a site every six months forward a report to the District Crisis Group;
- (f) respond to all public inquiries on the subject.

**11. Powers of the Members of the Central, State and District Crisis Groups.-**

**(1)** the Members of the Central Crisis Group, State Crisis Groups and District Crisis Groups shall be deemed to be persons empowered by the Central Government in this behalf under sub-section (1) of section 10 of the Environment (Protection) Act, 1986.

**12. Aid and Assistance for the functioning of the District and Local Crisis Groups.-**

**(1)** The Major Accident Hazard installations in the industrial pockets in the district shall aid, assist and facilitate functioning of the District Crisis Group;

(2) The Major Accident Hazard installations in the industrial pockets shall also aid, assist and facilitate the functioning of the Local Crisis Group.

**13. Information to the Public.-** (1) the Central Crisis Groups shall provide information on request regarding chemical accident prevention, preparedness and mitigation in the country;

(2) The State Crisis Group shall provide information on request regarding chemical accident prevention, preparedness and mitigation to the public in the State;

(3) The Local Crisis Group shall provide information regarding possible chemical accident at a site in the industrial pocket and related information to the public on request;

(4) The Local Crisis Group shall assist the Major Accident Hazard installations in the industrial pocket in taking appropriate steps to inform persons likely to be affected by a chemical accident.

<b>Sr. No.</b>	<b>Schedules</b>	<b>Files</b>		
1	Schedule 1	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
A	Part I	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
B	Part II: List of Hazardous and Toxic Chemicals	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
2	Schedule 2	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
3	Schedule 3: Named Chemicals	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
4	Schedule 4	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
5	Schedule 5: Composition of the Central Crisis Group	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
6	Schedule 6: Composition of the State Crisis Group	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
7	Schedule 7: Composition of the District Crisis Group	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>
8	Schedule 8: Composition of the Local Crisis Group	<b>[html]</b>	<b>[pdf]</b>	<b>[word]</b>

## **A Minutes of the Central Crisis Group under the Chairpersonship of Secretary**

**MoEF&CC was held on 08.05.2020 at 5.30 PM through Video Conferencing.**

A Central Crisis Group meeting under the Chairpersonship of Secretary MoEF&CC was held on 08.05.2020 at 5.30 PM through Video Conferencing to consider and review the measures to be taken after the chemical accident, which occurred at M/s LG Polymers India Private Limited, Vishakhapatnam (Andhra Pradesh). A list of participants of the meeting is enclosed as **Annexure -I**.

2.0 After a brief introduction of all participants, the Secretary (MoEF&CC), briefed the crisis group about the updated status regarding the leakage of the gas from the premises of M/s LG Polymers India Private Limited, Vishakhapatnam (Andhra Pradesh). He also informed the committee about the evacuation efforts undertaken by the NDRF. The Ministry of Environment, Forest and Climate Change also informed the group about the functioning of the Control Room established under the Chemical Accidents (Emergency Planning, Preparedness and Response) rules, 1996.

3.0 Members of the group were then requested to provide specific suggestions regarding reduction of temperature of the stored styrene in order to avoid any further accidents.

A. Representative of the Reliance Industry suggested that prompt removal of insulation from the tanks and sprinkling of water was an essential requirement. He also suggested that maintenance of circulation in the tanks through operation of pumps was required to reduce temperature.

B. Representative from NEERI who had visited the site informed the group that water sprinkling was under way and more than 85% of the fumes were already under control.

C. Joint secretary, DCPC emphasized that sufficient quantities of the inhibitor –mercaptan (TDM) must be available at the site. Secretary, MoEF&CC informed the group that

arrangements had been made to make available the necessary quantity of the inhibitor at the site.

D. Representative from PESO was of the view that as a precautionary measure, in future, a dual refrigerant system must be adopted for storage of monomers.

E. Representative from MoHFW placed on record that a medical team including psychologists must be present at site to deal with possible health impact of this incident on the local populace. Secretary, MoEF&CC advised MoHFW to take up the matter with DGHS and also said that MoEF&CC would also forward the comments to DGHS.

4.0 It was decided that comments/suggestions received from the members will be communicated to the NDRF team for further necessary action.

Meeting ended with vote of thanks to the Chair.

**List of participants**

1. Shri. Ravi Shankar Prashad, Additional Secretary cum Chairman CPCB
2. Ms. Geeta Menon, Joint Secretary, HSM Division, MoEF&CC
3. Shri. K.N. Jha, Joint Secretary, Department of Petrochemicals
4. Shri. D.K. Saami, Civil Defense, Ministry of Home.
5. NCDC, MoHFW
6. Shri.Dimpy Garg, ED Safety, MoR
7. Dr. SmitaMohanty, CEPET
8. Shri.Atis Chandra,
9. Dr. BrajeshTripathi, Ministry of Agriculture
10. Dr. Krishnamurthy, NEERI
11. Ms. Shruti,
12. Representative of PESO
13. Representative of Reliance Industry

# CENTRAL CRISIS GROUP ALERT SYSTEM

(As on November, 2019)



MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE  
GOVERNMENT OF INDIA  
INDIRA PARYAVARAN BHAWAN  
JOR BAGH ROAD, NEW DELHI - 110003

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## 1.0 INTRODUCTION

With rapid industrialization, the Indian Chemical Industry is an important sector of economy and supplies a wide range of products which find their way into a massive spectrum of human activity. Hence, chemicals occupy an important position in our economy and are the source of several benefits to the society. Many of these chemicals are toxic, corrosive, highly reactive, poisonous, carcinogenic, explosive or flammable or have a combination of these characteristics. Due to these properties, they have the potential to cause harm to human beings, other living creatures, plant, property and the environment in general. Thus, extreme care is necessary while handling such chemicals at all stages of manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion or sale.

There are at present several agencies of the Government, both Central and State, such as the Inspectorates of Factories, Controller of Explosives, Pollution Control Boards, Port Authorities, Transport Authorities, Local Health Authorities and statutory rules & regulations for safe handling of hazardous chemicals. In spite of strict implementation of the rules & regulations, accidents do occur. Such accidents, lead to damage of life, property and environment. It is essential that the Central and State Governments and also the local authorities are fully prepared to meet such eventualities

Unlike the emergencies caused through natural disasters such as floods, earthquakes etc., which cannot be prevented, the occurrences of emergencies caused through chemical accidents can be minimized by proper planning and preparedness. The emergency planning is thus just one aspect of the

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total planning for safety. This planning has to be done by those who are responsible for handling hazardous chemicals, the local authority's In-charge of emergencies, the State Government and the Central Government. In view of the above, the Central Government has notified a set of rules entitled " Chemical Accident ( Emergency Planning, Preparedness and Response) Rules, 1996" for management of chemical accidents in the country.

The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 compliments the set of rules on accident prevention and preparedness notified under the Environment (Protection) Act, 1986 in 1989 entitled Manufacture, Storage and Import of Hazardous Chemicals Rules and envisages a 4-tier crisis management set up at the Local, District, State and Centre. The rules were gazetted on 2<sup>nd</sup> August, 1996 by the Ministry of Environment, Forest and Climate Change under the Environment (Protection) Act, 1986.

The rules provide a statutory back-up for setting up of Crisis Group in districts and states which have Major Accident Hazard (MAH) Installations. The rules define the major accident hazard installations to include industrial activity, transport and isolated storages at a site handling hazardous chemicals in quantities specified. As per the rules, the Government of India is to constitute a Central Crisis Group (CCG) for the management of chemical accidents and set up a Crisis Alert System (CAS) within 30 days of the notification.

Under this system, the Centre would set up a functional control room at appropriate places and an Information Networking System with the State and District control rooms will also be set up. Adequate

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staff and experts will be appointed to manage the control room. The CAS will also be responsible for publishing a list of major accident hazard installations, and a list of major chemical accident in chronological order. It would take measures to create awareness amongst the public with a view to prevent chemical accidents.

The Chief Secretaries of all the States are to constitute State Crisis Groups (SCG) to plan and respond to chemical accidents in the State and notify the same in gazette within 45 days. The District Collector shall not only constitute a District Crisis Group (DCG) but also constitute Local Crisis Groups (LCG's) for every industrial pocket in the district within 60 days.

The CCG shall be the apex body in the country to deal with and provide expert guidance for planning and handling of major chemical accidents in the country. The CCG shall continuously monitor the post-accident situation and suggest measures for prevention of reoccurrence of such accidents. It shall meet every six months and respond to enquiries from the SCG and DCG. The Ministry of Environment, Forest and Climate Change will publish a State-wise list of experts and concerned officials.

The SCG will be chaired by the State Chief Secretary and shall be the apex body in the State consisting of Government officials, technical experts and industry representatives and will deliberate on planning, preparedness and mitigation of chemical accidents with a view to reducing the extent of loss of life, property and ill health. The SCG will review all the District Off-site Emergency Plans for its adequacy.

The District Collector shall be the Chairman of the DCG and the Group will serve as the apex body at the

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district level and shall meet every 45 days. This group shall review all on- site Emergency Plans prepared by the occupiers of the Major Accident.

Hazard installations for preparation of a District Off-Site Emergency Plan, which shall also include hazards due to the transportation of hazardous chemicals both by road and by pipeline. The district Chairperson shall conduct at least one full scale mock-drill of the District Off-site Emergency Plan at a site each year. Powers under section 10 of the Environment Protection Act for entry and inspection have been made available to the Central, State and District Crisis Groups/members.

The Rules envisage that the Crisis Groups will provide information to the public regarding chemical accident prevention, preparedness and mitigation. The rules will enable preparation of an Off-site Emergency Plan, updation and conduct of mock drill. It will further enhance the implementation of the Public Liability Insurance Act 1991 for providing of speedy relief to the victims.

For the effective coordination and management of chemical disasters, the Red book is very important as it facilitates quick information exchange during chemical emergencies.

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## **INFRASTRUCTURE IN PLACE FOR CRISIS MANAGEMENT.**

The Ministry of Environment, Forest and Climate Change has set up a Control Room (CR) for fast flow of information and co ordination of activities during actual emergency. The control room is a part of the Crisis Alert System (CAS).

The Control Room is located in J-204, Second Floor, Jal Block, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi: 110003 (Phone No. +91-11-24695387). The following channels of communication are available:

**Mrs Geeta Menon, Joint Secretay, Ministry of Environment, Forest and Climate Change Indira Paryavaran Bhawan, Room no. 232, Second floor, Agni Wing, Jorbagh Road, Aliganj New Delhi-110003 011-24695281 (O), 24695283 (F) Email : menong@cag.gov.in**

or

**Dr. Dharmendra Kumar Gupta, Director, Hazardous Substances Management Division, Ministry of Environment, Forest and Climate Change, Room No. V-203, Level -II, Vayu Wing, Indira Paryavaran Bahwan Jor Bagh Road Aliganj New Delhi- 110003, +91 11 24695393 (O&F), Email: gupta.dharmendra@gov.in**

or

**Shri Dinesh Runiwal, Scientist-E, Hazardous Substances Management Division, Ministry of Environment, Forest and Climate Change, Level – II, Jal Wing, Indira Paryavaran Bahwan, Jor Bagh Road Aliganj New Delhi-110003, +91 11 24695245 (O), Email: d.runiwal@gov.in**

### **Operation of Control Room during Office Hours:**

The CR Operates during office hours (9.00 am to 5.30 pm) on workingdays.

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## Operation of Control Room before and after Office Hours including Holidays

Before & after office hours and on holidays, a night duty clerk will be available at Night Duty Room at the Ground Floor, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003 (Phone No. +91-11- 24695285, Extension 2012, 2014) to receive messages and pass them on to the Member – Secretary, Ms Geeta Menon, Joint Secretary, Hazardous Substances Management Division, (Telephone: +91 11 24695281 (Office) and +91 11 24695283 (Fax), Email: menong@cag.gov.in

In case, Member Secretary is not available, the messages will be passed to alternate Member Secretary,

Dr. Dharmendra Kumar Gupta, Director, Hazardous Substances Management Division, Ministry of Environment, Forest and Climate Change, Room No. V-203, Level –II, Vayu Wing, Indira Paryavaran Bahwan Jor Bagh Road Aliganj New Delhi- 110003, +91 11 24695393 (O&F), Email: gupta.dharmendra@gov.in **or** Shri Dinesh Runiwal, Scientist-E, +91- 11-24695245 (O), +91- 8604445993 (M); Email: d.runiwal@gov.in

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## CENTRAL CRISIS GROUP

The Central Crisis Group (CCG) has been setup by the Ministry of Environment, Forest and Climate Change. This is an apex body comprising senior officials of the Government and technical experts.

### The functions of the Group shall be as follows:

- i. To deal with major chemical accidents and provide expert guidance for handling major chemical accidents in the country.
- ii. Continuously monitor the post-accident situation arising out of a major chemical accident and suggest measures for prevention and to check recurrence of such accidents.
- iii. Conduct post-accident analysis of such major chemical accidents and evaluate responses.
- iv. Review District Off-Site Emergency Plans with a view to examining its adequacy in accordance with, the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and suggest measures to reduce risks in the industrial pockets.
- v. Review the progress reports submitted by the State Crisis Group.
- vi. Respond to queries addressed to it by the State Crisis Group and District Crisis Group.
- vii. Publish a State-wise list of experts and officials who are concerned with the handling of chemical accidents.
- viii. Render in the event of a chemical accident in a State, all financial and infrastructural help as may be necessary.

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The CCG shall meet once in every six months in the Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bagh, New Delhi. The Group may co-opt any person whose assistance or advice is considered useful in performing any of its functions.

The CCG deals only with major chemical accidents in the country where State Governments require marshalling of resources from other States as well as from the Central Government. The Chief Secretary, the District Magistrates of the concerned State/Districts should immediately inform the CCG about the accidents. It will meet as soon as possible after the accidents. It will meet as soon as possible after the receipt of information about the accident in carrying out its task, it shall consult experts, coordinate activities of the State Governments and the Central Ministries Departments/Agencies and keep the Cabinet Secretariat and appropriate authorities in the Government of India constantly informed about development.

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### **Duties of the Member Secretary, CCG**

In case of Chemical accident, the Member Secretary shall do the following:

- 1 Immediately contact the Chairman of the CCG and obtain instructions about convening of the meeting. He shall then contact any of the available duty officers and take his/her assistance in contacting other members of CCG/other duty officers. He will take necessary action to tackle the crisis as per his discretion, till guidance becomes available and will implement the direction of CCG as and when it becomes available.
- 2 Attempt within the time available before the CCG meeting, to obtain as much authentic information about the incident as possible particularly information on the location, time and nature, damage caused, immediate threats and the action taken so far.
- 3 Make administrative arrangements for convening of CCG.
- 4 Carry out all instructions of the CCG expeditiously.
- 5 Prepare hourly situations reports and place the latest, upto-the-minute report before the CCG.
- 6 Record minutes and decisions of the CCG, where necessary.
- 7 Ensure correct and timely documentation.
- 8 Maintain constant touch with State Capital/local authority.
- 9 Arrange for expert consultation in the shortest

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possible time.

- 10 Ensure that all communication facilities are installed and are in working order.
- 11 Ensure that, there are adequate arrangements for transportation of staff.
- 12 Ensure that, when necessary, confidentiality is maintained.
- 13 Arrange, when necessary, for press briefings, press release, information to AIR and Doordarshan.
- 14 Prepare a summary of news items which may appear each day and obtain orders from CCG about rejoinders, contradictions etc. to be issued to avoid general panic or rumour mongering.
- 15 Arrange for a permanent advance not exceeding Rs. 5,000/- for any requirement of contingent expenditure during activation of Control Room.

#### **Duties of the Duty Officers**

- 1 For speedy communication of information to the members of the CCG, the duty officer who is on duty, on instructions from the Member Secretary, shall contact the other two duty officers or any officer designated, if necessary, and the Members of the CCG. Duty Officer 1 shall contact Members (3) to (8). Duty Officer 2 shall contact Members (9) to (14) and Duty Officer 3 shall contact Members (15) to (22).
- 2 While informing members, the duty officers shall collect as much information about the accident as possible before the meeting of the CCG. The CCG members and Duty Officers shall be requested to

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come to the meeting by taxi, if necessary. The taxi fare shall be reimbursed. The duty officers after making telephone calls to the concerned members of the CCG shall proceed to the Control Room and initiate steps to make it operational in the quickest possible time. The three Duty Officers, after reaching the Control Room, shall immediately do the following:

#### **Duty Officer 1:**

- 1 Telephone the Secretary of the State Level Crisis Group, or the Secretary of the nodal department in the State Capital concerned, to inform him that the Control Room has been activated and request them for a constant flow of information. If the concerned local authority has been identified, it should also be similarly informed.
- 2 Make all the arrangements for the CCG meeting, including opening of the room, operating of lift, cooling/heating arrangement, stationery, etc. if possible, a resume of the information received so far should be made in an adequate number of copies.
- 3 He shall, if there are instructions from Chairman or Member Secretary of CCG, inform the Cabinet Secretary and other appropriate officer/Departments about these situations.

#### **Duty Officer 2:**

- 1 He shall take immediate steps to mobilize the staff indicated in Section 3.8 & 3.9. If the accident has occurred after office hours or on a holiday, the first move should be to locate and mobilize one or more vehicle(s) so that staff can be speedily brought from their residences. Normal location of the vehicles and

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addresses of drivers are enclosed as Section 3.9. The concerned Police Stations should also be requested to assist in informing the staff. If the accident occurs during working hours, Administration should be requested to ask (a) the designated staff to report for duty at once and (b) relieve the staff that would be required for the evening/night shift, so that they can come back on time.

- 2 Ensure that the telephones of the Control Room are in working order, and that requests are sent out to the Director General, Telecommunications to set up all other communication facilities where necessary.
- 3 Ensure that all necessary stationery and equipment are available in working order.

**Duty Officer 3:**

- 1 Locate the necessary data base required to deal with the particular emergency and if necessary, have copies prepared for the CCG.
- 2 From the list at Section 8.16, he shall attempt to identify the experts to be consulted. If they are Delhi-based, he shall inform them of the situation and with a request to be available either for consultation or for an immediate visit to the scene of accident.

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**Composition of Central Crisis Group**

**Chairman**

- 1 Shri C.K. Mishra +91 11 24695262 (O)  
Secretary +91 1124695265 (O)  
Ministry of Environment, Forest and Climate Change +91 11 24695270 (F)  
Indira Paryavaran Bhawan,  
Jor Bagh Road  
New Delhi-110003  
STD Code - 011

**Member Secretary**

- 2 Mrs Geeta Menon +91 11 24695281 (O)  
Joint Secretay +91 11 24695283 (F)  
Ministry of Environment, Forest and Climate Change  
Indira Paryavaran Bhawan,  
Room no. 232, Second floor,  
Agni Wing, Jorbagh Road,  
Aliganj New Delhi-110003  
Email: menong@cag.gov.in

**Members**

3. Dr. Biranchi Narayan Nanda +91 11 23731588 (O)  
Principal Labour and Employment  
Advisor (PLEA),  
Ministry of Labour and Employment  
Shram Shakti Bhawan Rafi Marg  
New Delhi-110001  
Email: bn.nanda@nic.in
- 4 Dr. N.S. Dharmshaktu +91 11 23062193 (O)  
Spl. Director General +91 11 23063030 (F)  
(Occupation Health) and Family,  
Directorate General of Health  
Services Welfare, Nirman Bhawan,  
Maulana Azad Road  
New Delhi- 110108  
Email: ns.dharmshaktu@nic.in

5	Shri Ravi Shankar Prasad, Chairman, IAS Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar New Delhi-110032 Email: ccb.cpcb@nic.in	+91 11 22307233 (O) +91 11 22304948(F)
6	Director General Civil Defence (Fire Adviser) East Block 7, Level 7 R.K Puram New Delhi - 110066	+91 11 26712951(O)
7	Chief Controller of Explosives Petroleum and Explosives and Safety Organisation A Block CGO Complex Fifth floor Seminary Hills Nagpur-(Maharashtra) -440006	+0712-2510248 (O)
8	The Joint Secretary (Chemicals) DCPC Shastri Bhawan New Delhi-110 001 Email: samir.biswas@gov.in	+91 11 23383428 (O) +91 11 23070104 (F)
9	Joint Secretary (chemical) Department of Industrial Policy and Promotion Ministry of Commerce and Industry Udyog Bhawan, New Delhi Email: singh.shailen@nic.in	+91 11 2306 1637 +91 11 2306 1642
10	The Joint Secretary (Plant Protection) Ministry of Agriculture and Farmers Welfare Krishi Bhawan Rajendra Prasad Road, New Delhi-110001	+91 11 23070306(O)

11	The Joint Secretary (Fertilizers) Ministry of Chemicals and Fertilizers A-Wing. Shastri Bhawan, Dr Rajendra Prasad Road, New Delhi- 110001	+91 11 23386800 (O) +91 11 23073820 (F)
12	The Joint Secretary (Telecommunications) Department of Telecommunications Ministry of Communication & Information Technology Sanchar Bhawan 20, Ashoka Road, New Delhi 110001	+91 11 23717411(O) +91 11 23372049(F)
13	The Joint Secretary (Transport) Ministry of Road, Transport and Highway, 5th Floor, Transport Bhawan, 1, Parliament Street, New Delhi- 110001	011-23719209(O) 011-23753804(F)
14	The Joint Secretary (Shipping) Transport Bhawan Ministry of Shipping New Delhi – 110001	011-23356112(O)
15	The Executive Director (Safety) Ministry of Railway (Railway Board) Federation of Railway Officer's Association Office, 256-A, Rail Bhavan, Raisina Road, New Delhi -110001	
16	The Joint Secretary (Mitigation) National Disaster Management Authority (NDMA) NDMA Bhawan, A-1, Safdarjung Enclave, New Delhi - 110029	011-26701718(O) 011-26701864(F)

- 
- 17 Director General 011 23710618(O)  
CSIR  
Council of Scientific and Industrial  
Research  
Anusandhan Bhawan,  
2 Rafi Marg,  
New Delhi-110001, India  
email: dgcsir@csir.res.in  
dg@csir.res.in
18. Two Experts, one each from the field of Industrial Safety and Health, to be nominated by the Central Government
19. Two persons to represent Industries, to be nominated by the Central Government
20. One representative from the Indian Chemical Council.

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#### Duty Officers/Supporting Staff

In performing his duties, the Member Secretary will be assisted by the following officers of the Ministry of Environment, Forest and Climate Change who would be assigned duties in the Control Room as 'Duty Officer'.

#### Directory: Duty Officers

Name & Office Address/ Tel. No	Residential Add./Tel.No.
1. Dr. Dharmendra Kumar Gupta Director, Hazardous Substances Management Division Ministry of Environment, Forest and Climate Change Room No. V203, Level -II, Vayu Wing, Indira Paryavaran Bahwan, Jor Bagh Road, Aliganj, New Delhi-110003	+91 11 24695393 (O&F) Email: gupta.dharmendra@gov.in WZ-99B, Gali No. 3A, Sadh Nagar, Palam Colony, New Delhi - 110045 Mob: +91 9415389825

- 
2. Shri Dinesh Runiwal +91 11 24695234 (O/F)  
Additional Director Email: d.runiwal@gov.in  
Hazardous Substances  
Management Division Q. No. 1112, Type-5, NH-4,  
Ministry of Environment, N.I.T., Faridabad, Haryana  
Forest and Climate Change Mob: +91 8604445993  
Indira Paryavaran Bhawan,  
Jal Wing, Level-II,  
Jor Bagh Road  
New Delhi-110003  
STD Code-011
3. Dr. Sonu Singh +91 11 24695418 (O/F)  
Additional Director Email: sonu.singh@nic.in  
Hazardous Substances  
Management Division C-77, United India  
Ministry of Environment, Apartment, Mayur Vihar,  
Forest and Climate Change Phase I Extension, Delhi –  
Indira Paryavaran Bhawan, 110091  
Jal Wing Level-III,  
Jor Bagh Road Mob: +918527758916  
New Delhi-110003  
STD Code-011
- 4 Shri Aditya Narayan Singh +91 11 24695325 (O/F)  
Additional Director +91 11 45078454 (R)  
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Management Division  
Ministry of Environment, D-304, Venus Apartment,  
Forest and Climate Change Rani Bagh, Delhi -110034  
Indira Paryavaran Bhawan,  
Jal Wing Level-II,  
Jor Bagh Road Mob: 9811447655  
New Delhi-110003  
STD Code-011

- 
- 5 Shri Amardeep Raju +91 11 24695296 (O&F)  
Additional Director Email: adraju@gmail.com  
Hazardous Substances  
Management Division A-21, Pragati Vihar Hostel  
Ministry of Environment, Lodhi Road, New Delhi –  
Forest and Climate Change 110003  
Indira Paryavaran Bhawan,  
Vayu Wing Level-III, Mob: 08800575487  
Jor Bagh Road  
New Delhi-110003  
STD Code-011
- 6 Smt. Arpita Gupta 61, Gulmohar Enclave  
Scientist 'D' New Delhi 110049  
Environment & Forest 9818644220 (M)  
Information Division Email: arpita@nic.in  
National Informatics Centre  
A-Block, C.G.O Complex +91 11 24305343 (D)  
Lodhi Road, +91 11 24346294 (F)  
New Delhi 110003

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## DIRECTORY -SUPPORT STAFF

### Names & Addresses of Duty Personnel

Name & Address	Residential Address /Tel No.
1. Shri Shantanu Swaroop Section Officer Ministry of Environment, Forest and Climate Change, (HSM) Division, Jal Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003	SC-227, Shastri Nagar, Ghaziabad, Uttar Pradesh  +91 8750843956 (M)
2. Shri Vivek Arora Personal Assistant Ministry of Environment, Forest and Climate Change (HSM) Division, J-223, Jal Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003	H- 54 B (FF), Kakkaji New Delhi - 110019
3. Shri Shrawan Kumar Research Investigor (Forestry) Ministry of Environment, Forest and Climate Change, (HSM) Division, J227, Jal Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003	P. No. 208 A/14-A, 2 <sup>nd</sup> floor, Savitri Nagar, Malviya Nagar, New Delhi-110017  +91 9983631718 (M)

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4. Mrs. Jyotsna Das Ghoshdastidar Assistant Section Officer Ministry of Environment, Forest and Climate Change, (HSM) Division, Jal Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi- 110003	112-D, Sector-IV, PushpVihar New Delhi-110017  +91 9868177646(M)
5. Shri. Dinesh Kumar Singh Assistant Section Officer Ministry of Environment, Forest and Climate Change, (HSM) Division, J-224, Jal Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi- 110003	House No, 246, Pocket B, Sector 16, Vasundhara, Ghaziabad, Uttar Pradesh- 201012  +91 9560604658 (M)
6. Shri Kunal Kumar Assistant Section Officer Ministry of Environment, Forest and Climate Change, (HSM) Division, J-226, Jal Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi- 110003	Rohini, Sector -15, New Delhi-110089  +91 7352757066 (M)
7. Shri Sri Ram Steno -D Ministry of Environment, Forest and Climate Change, (HSM) Division, V-211, Vayu Wing, Level-II Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi- 110003	627, Kalpana Nagar, Shibban Pura, Ghaziabad, Uttar Pradesh - 201001  +91 9953659393 (M)

**Directory Contacts for obtaining Staff Car Drivers and Vehicles of MoEF**

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1.	Shri Mela Ram Atal	9968094320	B-470, Jasola, Janta Flat, New Delhi-110025	Indira Paryavaran Bhawan
2.	Shri Niranjan Kumar	9810630809	H. No. 557, Village and Post Office, Daultabad, Dist. Gurugram, Haryana-122006	Indira Paryavaran Bhawan
3.	Shri C S. Sathi	8447793905	C-3/258, Lodhi Road, New Delhi-03	Indira Paryavaran Bhawan
4.	Shri S.K. Rathi	9871322303	H. No. 1282, Lodhi Road Complex, New Delhi-03	Indira Paryavaran Bhawan
5.	Shri Dinesh Muni	9958998049	H.No. 876, Type-2, Sector-2, Sadiq Nagar, New Delhi-110049	Indira Paryavaran Bhawan
6.	Shri Dharam Pal	9818564326	H. No. 96 C, Sector-IV, Pushp Vihar, New Delhi	Indira Paryavaran Bhawan

7.	Shri K S Bhandari	9968306347	52/F, Sector - 4, Bangala Sahib Road, New Delhi	Indira Paryavaran Bhawan
8.	Shri Jagdish Yadav	9868565309	H.No. 873, Type-2, Sector-2, Sadiq Nagar, New Delhi-110049	Indira Paryavaran Bhawan
9.	Shri Gianenender Singh	9013884926	1068, LR Complex, New Delhi -03	Indira Paryavaran Bhawan
10.	Shri. S. Danial	7065837570	H. No. 843, Sector – 3, R. K. Puram, New Delhi	Indira Paryavaran Bhawan

---

Ministry of Environment, Forest and Climate Change

List of Government Vehicle

	Vehicle No.	Make
1.	DL2-CAW 0166	INNOVA
2.	DL1-CV-6528	Maruti Ciaz
3.	DL2-CAQ-9530	Maruti Ciaz
4.	DL1-CM-7307 (CNG)	Maruti SX4
5.	DL1-CQ-9568 (CNG)	Maruti Ciaz
6.	DL1-CQ-2751	Maruti SX4
7.	DL1-CQ-6208	Maruti SX4
8.	DL1-CV-6507	Maruti Ciaz
9.	DL1-CV-6561	Maruti Ciaz
10.	DL9-CX-9334(CNG)	Maruti SX4
11.	DL3 CDF 3333	Maruti Ciaz
12.	DL2 CAX 8234	Maruti Ciaz
13.	DL2 CAX 8259	Maruti Ciaz

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**STATE CRISIS GROUP (SCG)**

**Constitution of State Crisis Group**

The State Government shall constitute a State Crisis Group for management of chemical accidents within thirty days from the date of the commencement of these rules.

The composition of the State Crisis Group shall be as specified in Schedule 6 of Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.

The State Crisis Group shall meet at least once in three months and follow such procedure for transaction of business as it deems fit.

Not with standing anything contained in sub-rule (2), the State Crisis Group may co-opt any person whose assistance or advice is considered useful in performing any of its functions, to participate in the deliberation of any of its meetings.

**Composition of the State Crisis Group**

1) Chief Secretary	Chairperson
2) Secretary (Labour)	Member Secretary
3) Secretary (Environment)	Member
4) Secretary (Health)	Member
5) Secretary (Industries)	Member
6) Secretary (Public Health Engg.)	Member
7) Chairman State Pollution Control Board	Member
8) 4 Experts Industrial Safety & Health (To be nominated by State Govt.)	Member
9) Secretary/Commissioner/Transport	Member
10) Chief Inspector of Factories	Member
11) Fire Chief	Member
12) Commission of Police	Member
13) One Representative for Industry (To be nominated by State Govt.)	Member

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## Functions of the State Crisis Group

The State Crisis Group shall be the apex body in the State to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents.

Without prejudice to the functions specified under sub-rule (1), the State Crisis Group shall -

- a) Review all district off-site emergency plans in the State with a view to examine its adequacy in accordance with the Manufacture, Storage and Import of Hazardous Chemicals, Rules and forward a report to the Central Crisis Group once in threemonths;
- b) Assist the State Government in managing chemical accidents at a site;
- c) Assist the State Government in the planning, preparedness and mitigation of major chemical accidents at a site in the State;
- d) Continuously monitor the post accident situation arising out of a major chemical accident in the State and forward a report to the Central Crisis Group;
- e) Review the progress report submitted by the District CrisisGroups;
- f) Respond to queries addressed to it by the District Crisis Groups;
- g) Publish a list of experts and officials in the State who are concerned with the management of chemical accidents.

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## DISTRICT CRISIS GROUP (DCG) CONSTITUTION AND FUNCTIONS OF DISTRICT CRISIS GROUP

The State Governments shall cause to be constituted within thirty days from the date of commencement of these rules,

District Crisis Groups;

Local Crisis Groups;

The composition of the District Crisis Group and the Local Crisis Groups shall be as specified in Schedule 7 and Schedule 8 respectively in Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996. The District Crisis Group shall meet every forty-five days and send a report to the State Crisis Group.

The Local Crisis Group shall meet every month and forward a copy of the proceedings to the District Crisis Group.

### Composition of the District Crisis Group

- |  |                  |
|--|------------------|
| 1) District Collector  | Chairperson      |
| 2) Inspector of Factories  | Member-Secretary |
| 3) District Energy Officer   | Member           |
| 4) Chief Fire Officer  | Member           |
| 5) District Information Officer  | Member           |
| 6) Controller of Explosives  | Member           |
| 7) Chief, Civil Defence  | Member           |
| 8) One Representative of Trade Unions to be nominated by the                       | Member           |
| District Collector   | Member           |
| 10) Deputy Superintendent of Police  | Member           |
| 11) District Health Officer/<br>Chief Medical Officer                              | Member           |
| 12) Commissioner, Municipal Corporations   | Member           |
| 13) Representative of the Department of Public Health Engineering                  | Member           |
| 14) Experts (Industrial Safety & Health) to be nominated by the District Collector | Member           |

- 
- 15) Commissioner (Transport) Member
  - 16) One Representative of Industry to be nominated by the District Collector
  - 17) Chair -person/Member-Secretary of' Member Local Crisis Groups

### Functions of the District Crisis Group

The District Crisis Group shall be the apex body in the district to deal with major chemical accidents and to provide expert guidance for handling chemical accidents;

Without prejudice to the functions specified under sub-rule (1), the District Crisis Group shall -

- a) Assist in the preparation of the district off-site emergency plan;
- b) Review all the on-site emergency plans prepared by the occupier of Major Accident Hazards installation for the preparation of the district off-site emergency plan;
- c) Assist the district administration in the management of chemical accidents at a site lying within the district;
- d) Continuously monitor every chemical accident;
- e) Ensure continuous information flow from the district to the Centre and State Crisis Group regarding accident situation and mitigation efforts;
- f) Forward a report of the chemical accident within fifteen days to the State Crisis Group;
- g) Conduct at least one full scale mock-drill of a chemical accident at a site each year and forward a report of the strength and the weakness of the plan to the State Crisis Group.

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### LOCAL CRISIS GROUP (LCG)

Constitution and Functions of the Local Crisis Group (LCG)

#### Composition of the LCG

- 1) Sub-Divisional Magistrate District Emergency Authority Chair Person
- 2) Inspector of Factories Member-secretary
- 3) Industries in the District/ Industrial area/industrial pocket Member
- 4) Transporters of Hazardous Chemicals (2 Numbers) Member
- 5) Fire Officer Member
- 6) Station House Officer (Police) Member
- 7) Block Development Officer Member
- 8) One Representative of Civil Defence Member
- 9) Primary Health Officer Member
- 10) Editor of local Newspaper Member
- 11) Community Leader/Sarpanch Village Pradhan nominated by Chair Person Member
- 12) One Representative of Non-Government Organization to be Nominated by the Chair-person Member
- 13) Two Doctors eminent in the Local area, to be nominated by the Chair-person Member
- 14) Two Social Workers to be nominated by the Chair Person Member

#### Functions of the Local Crisis Group

The Local Crisis Group shall be the body in the industrial pocket to deal with chemical accidents and coordinate efforts in planning preparedness and mitigation of a chemical accident;

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Without prejudice to the functions specified under sub-rule (1), the Local Crisis Group shall-

- a) Prepare local emergency plan for the industrial pocket;
- b) Ensure dovetailing of the local emergency plan with the district off-site emergency plan;
- c) Train personnel involved in chemical accident management;
- d) Educate the population likely to be affected in a chemical accident about the remedies and existing preparedness in the area;
- e) Conduct at least one full scale mock- drill of a chemical accident at a site every six months and forward a report to the District Crisis Group;
- f) Respond to all public inquiries on the subject.

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## **NATIONAL DISASTER MANAGEMENT AUTHORITY**

### **Introduction**

The National Authority shall consist of the Chairperson and such number of other members, not exceeding nine, as may be prescribed by the Central Government and unless the rules otherwise provide, the National Authority shall consist of the following:

- a) The Prime Minister of India, who shall be the Chairperson of the National Authority, ex officio;
- b) Other members, not exceeding nine, to be nominated by the Chairperson of the National Authority

The Chairperson of the National Authority may designate one of the members nominated under the clause (b) of sub-section (2) to be the Vice Chairperson of the National Authority.

The term of office and conditions of service of members of the National Authority shall be such as may be prescribed.

### **Powers and Functions of National Executive Committee**

- 1 The National Executive Committee shall assist the National Authority in the discharge of its functions and have the responsibility of implementing and policies and plans of the national Authority and ensure the compliance of directions issued by the Central Government for the purpose of disaster management in the country.
- 2 Without prejudice to the generality of the provision contained in sub-section (1), the National Executive Committee may-
  - (a) Act as the coordinating and monitoring body for disaster management;
  - (b) Prepare the National Plan to be approved by the National Authority;

- 
- (c) Coordinate and monitor the implementation of the Nation Policy;
  - (d) Lay down guidelines for preparing disaster management plans by different Ministers or Departments of the Government of India and the State Authorities;
  - (e) Provide necessary technical assistance to the State Governments and the State Authorities for preparing their disaster management plans in accordance with the guidelines laid down by the National Authority;
  - (f) Monitor the implementation of the National Plan and the plans prepared by the Ministers of Departments of the Government of India;
  - (g) Monitor the implementation of the guidelines laid down by the National Authority for integrating of measures for prevention of disasters and mitigation by the Ministries or Departments in their development plans and projects;
  - (h) Monitor, coordinate and give directions regarding the mitigation and preparedness measures to be taken by different Ministries or Departments and agencies of the Government;
  - (i) Evaluate the preparedness at all governmental levels for the purpose of responding to any threatening disaster situation or disaster and give directions, where necessary, for enhancing such preparedness;
  - (j) Plan and coordinate specialised training programme for disaster management for different levels of officers, employees and voluntary rescue workers;
  - (k) Coordinate response in the event of any threatening disaster situation or disaster;

- 
- (l) Lay down guidelines for, or give directions to, the concerned Ministers of Departments of the Government of India, the State Governments and the State Authorities regarding measures to be taken by them in response to any threatening disaster situation or disaster;
  - (m) Require any department or agency of the Government to make available to the National Authority or State Authorities such men or material resources as are available with it for the purpose of emergency response, rescue and relief;
  - (n) Advise, assist and coordinate the activities of the Ministries or Departments of the Government of India, State Authorities, statutory bodies, other governmental or non-governmental organisations and others engaged in disaster management;
  - (o) Provide necessary technical assistance or give advice to the State Authorities and District Authorities for carrying out their functions under Disaster Management Act. 2005;
  - (p) Promote general education and awareness in relation to disaster management; and Perform such other functions as the National Authority may require it to perform.

#### **Establishment of State Disaster Management Authority**

- 1 Every State Government shall, as soon as may be after the issue of the notification under sub-section (1) of section (3) by notification in the Official Gazette, establish a State Disaster management Authority for the State with such name as may be specified in the notification of the State Government.
- 2 A State Authority shall consist of the Chairperson and such number of other members, not exceeding nine, as may be prescribed by the State Government and, unless the rules otherwise provide, the State Authority shall consist of the following members, namely:-

- 
- (a) the Chief Minister of the State, who shall be Chairperson, ex-officio;
  - (b) other members, not exceeding eight, to be nominated by the Chairperson of the State Authority;
  - (c) the Chairperson of the State Executive Committee, ex-officio;
- 3 The Chairperson of the State Authority may designate one of the members nominated under clause (b) of sub-section (2) to be the Vice Chairperson of the State Authority.
- 4 The Chairperson of the State Executive Committee shall be the Chief Executive Officer of the State Authority, ex-officio;

### 7.3.1 Powers and Functions of State Authority

- 1 Subject to the provisions of this Act, a State Authority shall have the responsibility for laying down policies and plans for disaster management in the State.
2. Without prejudice to the generality of provisions contained in sub-section (1), the State Authority may-
- (a) lay down the State disaster management policy;
  - (b) approve the State Plan in accordance with the guidelines laid down by the National Authority;
  - (c) approve the disaster management plans prepared by the departments of the State Government;
  - (d) lay down guidelines to be followed by the departments of the Government of the State for the purpose of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefore;
  - (e) Coordinate the implementation of the State plan;
  - (f) Recommend provision of funds for mitigation and preparedness measures;

- 
- (g) Review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;
  - (h) Review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issues such guidelines as may be necessary.
- 3 The Chairperson of the State Authority shall, in the case of emergency, have power to exercise all or any of the powers of the State Authority but exercise of such powers shall be subject to ex post facto ratification of the State Authority.

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### Directory - Chairman & Members of NDMA

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- i Department of Agriculture, Cooperation & Farmers Welfare**  
  
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- iii Department of Agriculture Research & Education /Indian Council of Education Research**  
  
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**15 Ministry of Heavy Industry & Public Enterprises**

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**i Department of Heavy Industries**

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**ii Department of Public Enterprises**

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**16 Ministry of Home Affairs**

North Block, Central Secretariat  
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STD Code - 011  
Website: www.mha.nic.in

**i Department of Home**

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**ii Department of Official Language**

Lok Nayak Bhawan (2nd Floor) Khan Market,  
New Delhi-110002  
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STD Code - 011

**Secretary**

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**iii Department of Inter State Council Secretariat**

Vigyan Bhavan Annexe  
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**Special Secretary**

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**17 Ministry of Information & Broadcasting**

Shastri Bhawan, New Delhi-110001  
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STD Code – 011

**Secretary**

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**i. Prasar Bharati (Broadcasting Corporation of India)**

Prasar Bharati Secretariat  
Prasar Bharati House, Copernicus Marg,  
New Delhi-110001  
STD Code – 011

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**ii Doordarshan**

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**iii Press Information Bureau**

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**Principal Director General**

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**iv Press Council of India**

Soochna Bhawan  
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**v Registrar, News Paper of India**

Office of Registrar of Newspapers for India,  
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9th Floor, Soochna Bhawan,  
CGO Complex, Lodhi Road,  
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Web: www.rni.nic.in

**Registrar**

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**18 Ministry of Labour & Employment**

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Web: www.labour.gov.in  
STD Code - 011

**Secretary**

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**19 Ministry of Law & Justice**

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Dr. Rajendra Prasad Road,  
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Web: www.lawmin.nic.in

**I. Department of Justice**

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**ii. Legislative Department**

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**iii Department of Legal Affairs**

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**20 Ministry of Micro, Small & Medium Enterprises**

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**21 Ministry of Mines**

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**22 Ministry of Petroleum & Natural Gas**

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**I. Petroleum Conservation Research Association**

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**i. Central Electricity Regulatory Commission**

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**24 Ministry of Railways**

Rail Bhawan, New Delhi-110001  
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**25 Ministry of Road Transport & Highways**

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STD Code - 011

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STD Code: 011

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STD Code: 011

**i. Department of Biotechnology**

CGO Complex, Block No. 2, (6th to 8th Floor),  
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**28 Ministry of Steel**

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STD Code: 011

Web: www.steel.nic.in

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**29 Ministry of Textiles**

Udyog Bhawan, Dr Maulana Azad Road,  
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Web: <http://www.ministryoftextiles.gov.in/>

STD Code: 011

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**30 Ministry of Water Resources, River Development  
and Ganga Rejuvenation**

Shram Shakti Bhawan, Rafi Marg, New Delhi-110001

STD Code: 011

Web: www.mowr@nic.in

**Secretary**

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Secretaries of States/UT****ANDAMAN & NICOBAR**

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|---|--------------------------------|--------------------|
| 1 | Shri Chetan B. Sanghi          | +91 3192 234087(O) |
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|   | Andaman & Nicobar              | +91 3192 232656(F) |
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**ANDHRA PRADESH**

- |   |                              |                     |
|---|------------------------------|---------------------|
| 2 | Shri L. V. Subrahmanyam, IAS | +91 863-2428914 (O) |
|   | Chief Secretary              | +91 863-2441024 (O) |
|   | 1st Block, 1st Floor,        | +91 863-2441029 (F) |
|   | A.P Secretariat Office,      |                     |
|   | Velagapudi, Guntur,          |                     |
|   | Andhra Pradesh – 522503      |                     |
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- 14 Jammu & Kashmir State Pollution Control Board  
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- Jammu & Kashmir State Pollution Control Board,  
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**EAST CIRCLE (KOLKATA)**

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O/o Dy. Chief Controller of +91 33 22480427(O)  
Explosives, East Circle  
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**Guwahati Sub Circle Office**

Petroleum and Explosives Safety  
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Ranchi-Sub Circle Office

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Bhubaneswar Sub Circle Office

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Patna Sub Office

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WEST CIRCLE (MUMBAI)

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SOUTH CIRCLE (CHENNAI)

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Ernakulam Sub Circle

Petroleum and Explosives Safety Organization  
O/o Dy. Chief Controller of Explosives  
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Mangaluru Sub Circle

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Vellore Sub Circle

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CENTRAL CIRCLE (AGRA. UP)

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STD Code – 0562

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NORTH CIRCLE  
(FARIDABAD, HARYANA)

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Chandigarh Sub Circle

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Jaipur Sub-Circle

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Names, Addresses & Telephone Nos. of Director  
General, Mines Safety

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**GUWAHATI REGION**

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**Bhubaneswar Region**

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Core Group of Experts to Review Hazard Analysis Reports

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30	Shri Ajay Rawat Plan Manager Hindustan Petroleum Corporation Ltd Mahul LPG filling Plant. L U Gadkari Marg. Chembur. Mumbai – 400074 STD Code - 022	+91 22 25544159(O) +91 9975255818(M) +91 22 25542280 +91 22 270157(O) +91 9420613873(M)
31	Shri Manjunath General Manager Viswaat Chemical Ltd. M.I.D.C , Anand Nagar Ambarnath (East) - 421506 STD Code - 0251 Email: mrai@viswaatchem.com	+91 251 2620046(O) +91 9870997794(M) +91 251 2621024(F)
32	Shri R.C. Verma General Manager Dhoopchem India Pvt. Ltd. T-123/124. MIDC. Tarapur - 401506 Thane STD Code - 02525	+91 2525 270157(O) +91 9637908121(M)
33	Dr.Prakash Wadgaonkar Chief Scientist (Safety) National Chemical Laboratory Dr. Homi Bhabha Road Pune -411008 STD Code - 020	+91 20 25902306 (O)

34	Shri V.G Tijare Safety Expert Plot No. 11, Avani Bunglow Behind Shreejay Nagar. Wadala Pathardi Road, Indira Nagar Nashik - 422006 STD Code - 0253 Email: vijay@tijare.in	+91 253 2321099(O) +91 253 2322099(O) +91 9822053890(M)
35	Shri Rajiv Kulkarni Chief Engineer Fire & Safety, AGM R.C.F. Thal Alibag Dist. Raigad - 402208 STD Code - 02141 Email: rnkulkarni@rrfltd.com	+91 2141 238067(O) +91 8007769833(M)
36	Shri Shripad Lele AVP Deepak Fertilizers and Petro Chemicals Corporation Plot No. K-1, M. I. D. C. Industrial Area, Taloja - 410208 STD Code - 022 Email: shripad.lele@dftcl.com	+91 22 67684221(O) +91 7875555951(M)
37	Shri Dinesh vidhya General Manager Reliance Industries Ltd. Nagothane Manufacturing Division P. O. Petrochemical Township Nagothane - 402125 STD Code - 02194	+91 22 222176(O)
38	Dr. Mona Sharma Managing Director & HSE Revenue Officer Odisha State Disaster Mitigation Authority Rajiv Bhawan, 2nd Floor Unit - 5, Bhubaneswar-751 001 STD Code - 0674	ODISHA +91 674 2595033(O) +91 674 2539023(O) +91 674 2391871(F)

---

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+91 522 2613357(O)  
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45 Shri A.P Gango Padhyay +91 3224 252151(O)  
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Purba Medinipur- 721606  
STD Code - 03224  
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46 Shri Tushar Mitsi +91 3224 221244(O)  
General Manager (HSE&F) +91 3224 222662(O)  
Haldia Petrochemicals Ltd. +91 3224 272755(F)  
Durga Chak, Haldia +91 9434300514(M)  
Purba Medinipore– 721602  
STD Code - 03224  
Email: tushar.mati@hpl.co.in

Names, Addresses & Telephone Nos. of Members of Experts and Organisations Dealing with Oil Slicks

S.No.	Name & Office Address	Telephone No.
<u>MINISTRY OF DEFENCE</u>		
1	Dr G. Satheesh Reddy Scientific Advisor to Defence Minister DRDO Headquarter DRDO Bhawan Raja Ji Marg, New Delhi-110011 STD Code - 011	+91 11 23011519(O) +91 11 23018216(F) +91 11 23013853(O)
2	Shri K Natrajan, PTM, TM Director General, Indian Coast Guard Ministry of Defence, Coast Guard Headquarter National Stadium Complex New Delhi - 110001 STD Code - 011	+91 11 23384934(O) +91 11 23383196(F)
<u>DEPARTMENT OF SPACE</u>		
3	Shri Kailasavadivoo Sivan Chairman, Indian Space Research Organization Department of Space, Government of India, Antariksh Bhawan, New BEL Road Bengaluru - 560094 STD Code - 080 Email; chairman@isro.gov.in	+91 80 23415241(O) +91 80 23415328(F) +91 07022602411(M)

DEPARTMENT OF SCIENCE  
& TECHNOLOGY

4	Prof. Ashutosh Sharma Secretary Department of Science & Technology, Technology Bhawan, New Mehrauli Road, New Delhi-110016 STD Code – 011 Email: dstsec@nic.in	+91 11 26510068(O) +91 11 26511439(O) +91 11 26863847(F)
5	Dr. Kanduri Jayaram Ramesh Director General Indian Meteorological Department Department of Science & Technology Room No. 606 MB, 6th Floor Mausam Bhawan, Lodhi Road, New Delhi-110003 Email: dgm.hq@imd.gov.in; kj.ramesh@imd.gov.in STD Code - 011	+91 11 24611842(O) +91 11 43824253(O) +91 11 43824225(O) +91 11 24699216(F) +91 11 24611792(F)

DEPARTMENT OF BIOTECHNOLOGY

6	Dr. Renu Swarup Secretary, Department of Biotechnology Ministry of Science & Technology Block No. 2, 6-8th Floor, CGO Complex, Lodhi Road, New Delhi-110003 STD Code – 011 Email: secy@dbt.nic.in	+91 11 24362950(O) +91 11 24362881(O) +91 11 24360747(F)
7	Shri C. P. Gopal Joint Secretary Department of Biotechnology Ministry of Science & Technology Block No. 2, 7th Floor CGO Complex, Lodhi Road New Delhi-110003 STD Code - 011	+91 11 24362982(O) +91 11 24360745(F)

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- 8 Shri Gopal Krishna +91 11 23714938(O)  
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Joint Secretary (Ports) +91 11 23753396 (F)  
Ministry of Shipping,  
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DEPARTMENT OF OCEAN DEVELOPMENT

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Ministry of Earth Sciences +91 11 24629777(F)  
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COUNCIL OF SCIENTIFIC & INDUSTRIAL  
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- 14 Shri Vijay Sharma +91 11 23073069 (O/F)  
Deputy Secretary (Gas Pipe lines)  
Ministry of Petroleum & Natural Gas  
Room No. 205-B, B Wing,  
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- 15 Shri Shashi Shanker +91 11 26129001 (O)  
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Oil & Natural Gas Corporation Ltd +91 11 26129021(F)  
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- 16 Shri Dayanand Kalundia +91 832 2677002 (D)  
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Health & Environment Management (IPSHEM)  
Head IPSHEM  
Oil & Natural Gas Commission  
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-

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CENTRAL POLLUTION CONTROL BOARD

- 18 Shri Ravi Shankar Prasad, IAS +91 11 22307233(O)  
Chairman +91 11 23304948(F)  
Central Pollution Control Board +91 8130676464(M)  
Parivesh Bhawan,  
CBO - Cum - Office Complex  
East Arjun Nagar, New Delhi-110032  
STD Code - 011

---

Names, Addresses & Telephones Nos. of International Organisations engaged in Disaster Management Activities

S. No. Address

- 1 United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UNISDR) 9-11. Rue De Varemby  
CH 1202  
Geneva 10  
Switzerland-83235  
Tel. : +41 22 917 8908 | 8907  
Fax: +41 227339531/227339855  
Email: isdr@un.org  
Website : www.unisdr.org
- 2 UNISDR Asia & Pacific  
C/o UNESCAP - UN Conference Centre Building,  
Rajdamnern Nok Avenue  
Bangkok, Thailand - 10200  
Tel. : +22 882100; Fax: +22 812129  
Email: isdr-bkk@un.org  
Website: www.unisdr.org/asiapacific
- 3 Asian Disaster Preparedness Centre (ADPC)  
S M Tower, 24th Floor  
979/69 Paholyothin Road, Samsen Nai  
Phayathai, Bangkok 10400, Thailand  
Tel. : +66-2 298 0681-92  
Fax: +66-22980012-13  
Email: adpc@adpc.net  
Website: www.adpc.net

- 
- 4 Disaster Reduction & Recovery Unit  
Bureau for Crisis Prevention & Recovery, UNDP  
Office -11 -13,Chemin OesAnemones  
Chatelaine, CH - 1219 Geneva,  
Switzerland - 83238  
Tel. : 41-22- 917-8536, +41-22-917-8001 (F)  
Email: bcpr.disaster@undp.org  
Website : www.undp.org/bcpr
- 5 Climate Change Secretariat (UNFCCC)  
Main Office: Haus Carstanjem  
Martin-Luther-King-Strasse 8  
53175 Bonn, Germany  
Mailing Address: P.O.Box 260124  
0-53153 Bonn, Germany  
Tel. : (49 - 228) 815 - 1000  
Fax: (49 - 228) 815 - 1999  
Email: press@unfccc.int  
Website : www.newsroom.unfccc.int
- 6 International Labour Organisation  
4, Route des Morillons  
CH - 1211, Geneva 22, Switzerland  
Tel. : +41(O) 22 799 6111  
Fax: +41 (O) 22 798 685  
Email: ilo@ilo.org  
Web: www.ilo.org
- 7 United Nations Environment Programme  
United Nations Avenue, Gigiri,  
PostBox. 30552,00100  
Nairobi, Kenya  
Tel. : (254 - 20) 7621234  
Fax: (254 - 20) 7624489 | 90  
Email: unepinfo@unep.org  
Web: www.unep.org

- 
- 8 UNEP Chemicals  
United Nations Environment Programme  
Chemicals Branch, DTIE  
Maison Internationale de l' Environment  
(2nd Floor, Sections C&D)  
11 - 13, Chemin des Anemones  
CH - 1219, Chatelaine, Geneva 10 Switzerland  
Tel. : +(41 22) 917 8192  
Fax: +(41 22) 797 3460  
Email: chemicals@unep.org  
Website : www.unep.org
- 9 UNECE  
UN Economic Commission for Europe  
Information Service, Palais des  
Nations" "CH -1211, Geneva -10  
Switzerland  
Tel. : +41 (O) 229171234  
Fax: +41 (O) 229170505  
Email: info.ece@unece.org  
Website : www.unece.org
- 10 U. S. Chemical Safety & Hazard Investigation Board  
1750 Pennsylvania Avenue, NW,  
Washington DC-20006  
Tel.: +1 (202) 261 - 7600  
Fax: +1 (202) 261 -7650  
Email: hillary.cohen@csb.gov  
Website: www.csb.gov
- 11 United Nations Development Programme  
One United Nations Plaza,  
New York 10017, USA  
Tel. : +1 (212) 905 5315  
Fax: +1 (212) 905 - 5364  
Website : www.undp.org

-: NOTES:-

Some important notable points in case of  
Chemical Emergency

Table 1 : Physical Impact of Heat Radiation  
(World Bank, 1985)

Radiation Level (kW/m <sup>2</sup> )	Observed Effect
37.5	Sufficient to cause damage to process equipment.
25	Minimum energy required to ignite wood at indefinitely long exposures (non-piloted).
12.5	Minimum energy required for piloted ignition of wood, melting of plastic tubing.
9.5	Pain threshold reached after 8s; second degree burns after 20s.
4	Sufficient to cause pain to personnel if unable to reach cover within 20s however blistering of the skin (second degree burns) is likely; 0 : lethality.
1.6	Will cause no discomfort for long exposure.

Table 2 : Physical Impact of Explosion  
Overpressure (Clancey, 1972)

Pressure (bar(g))	Damage Produced by Blast
0.02	Safe distance" ( probability 0.95 no serious damage beyond this value); projectile limit; some damage to house ceilings; 10% window glass broken
0.05	Minor damage to house structures
0.1	Repairable building damage
0.2	Heavy machines (3000 lb) in industrial building suffered little damage; steel frame building distorted and pulled away from foundations.
0.35	Wooden utility poles snapped; tall hydraulic press (40,000 lb) in building lightly damaged.
0.70	Probable total destruction of buildings; heavy machines tools (7000 lb) moved and badly damaged, very heavy machine tools (12,000 lb) survived
21	Limit of crater lip

**Table 3 : Physical Impact of Toxic Concentration**

Concentration Level	Observed Effect
Threshold Limit Value (TLV)	Average concentration of the substance in ambient air for a normal 8 hour workday or 40 hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effects.
Short-Term Exposure Limit (STEL)	Maximum concentration of the substance to which workers can be exposed for a period upto 15 minutes continuously without suffering from irritation, chronic tissue change, provided that no more than four execution per day are permitted, with at least 60 minutes between exposure and that the daily TLV is not exceeded.
Immediately Dangerous to Life and health (IDLH)	It represents the maximum airborne concentration to which a healthy male worker can be exposed for as long as 30 minutes and still be able to escape without loss of life or irreversible organ system damage.
Lethal Concentration at 50%	Lethal concentration levels that kill 50% Of exposed laboratory animals under controlled experiments.

Reference: Lees, F.P., 2000: Loss Prevention in Chemical Process Industries, Butterworth Publication.

**Table 4: Suggested Individual Fatality Risk Criteria for Various Land Uses**

Land Use	Suggested Criteria (risk in a million)
Hospitals, schools, child-care facilities, old age housing	0.5
Residential, hotels, motels, tourist resorts	1
Commercial developments including retails centers, Offices and entertainment centers	5
Sporting complexes and active open space	10
Industrial	50

F. No. 12-146/2019-HSMD  
Government of India  
Ministry of Environment, Forest and Climate Change  
(HSM Division)

\*\*\*

2<sup>nd</sup> Floor, Vayu Wing  
Indira Paryavaran Bhawan  
Date: 8<sup>th</sup> May, 2020

**Office Memorandum**

In compliance of the provisions contained in Rule 4 of the Chemical Accidents (Emergency Planning, Preparedness, and Response) Rules, 1996 and as the part of the crisis alert system, the undersigned is directed to inform that the Ministry of Environment, Forest and Climate Change has a Crisis Control Room for addressing issues emerging out of chemical (industrial) accidents. The detail of the crisis control room are available in the red book "CENTRAL CRISIS GROUP ALERT SYSTEM". A copy is enclosed for reference

For any further detail, the nodal officer to be contacted is Dr. Dharmendra Kumar Gupta. His details are as follows.:

Dr. Dharmendra Kumar Gupta  
Director (S)/Scientist-F  
Hazardous Substances Management Division,  
Ministry of Environment, Forest and Climate Change  
Phone No: [91-11-24695393](tel:91-11-24695393); [9415389825](tel:9415389825)  
E-mail: [gupta.dharmendra@gov.in](mailto:gupta.dharmendra@gov.in)

**Geeta Menon**  
**Joint Secretary**  
**Tel: 2469 5281**

भारत सरकार  
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय  
GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE  
इंदिरा पर्यावरण भवन, जोर बाग रोड,  
नई दिल्ली-110 003  
INDIRA PARYAVARAN BHAWAN, JOR BAGH ROAD,  
NEW DELHI-110 003  
Website : moef.nic.in

**D.O. No. 12/146/2019-HSM**

**Date: 7<sup>th</sup> May, 2020**

*Dear Sir,*

At the outset, I would like to express my deep concern at the damage caused to life due to the industrial chemical accident in the plant of M/s LG Polymers India Pvt. Limited, Vishakhapatnam, Andhra Pradesh on 07.05.2020. At present, the extent of damage caused due to the accident is being assessed and the rescue and relief operations are underway by NDRF and State Government.

2. In this regard, I would like to highlight here that this Ministry has already placed a regulatory framework to avoid chemical accidents in industrial units wherein key responsibilities have been assigned to various State Governments and Central Government Departments. The rules notified to create an enabling implementation mechanism are 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] with the support of State Governments. The objective of these rules is to prevent major chemical accidents arising from industrial activities and limiting the effects of such accidents on human health and environment.

3. The above-mentioned rules prescribe various enabling measures for addressing industrial chemical safety concerns, which include the following, among other things:

- Occupier is mandated to inform about any major accident (on a site or pipeline) caused due to hazardous chemicals to the concerned authority as per Schedule 6 and subsequent analysis of the major accident by such authority
- Occupiers are mandated to submit Safety Reports to the concerned authority as specified under Schedule 8;
- Preparation of updated on-site emergency plan as per schedule 11, by the occupier;
- Preparation of updated off-site emergency plan by the concerned authority i.e. District Administration as per Schedule 5, to deal with the emergencies;



Contd.. page...2.

4. In terms of the Rules 4(2) of the MSIHC Rules, 1989, it is requested that a detailed report on the accident may be submitted to this Ministry.

5. In view of the above, I urge you to utilize the above-referred existing mechanisms in managing the risks associated with operation of all chemical industries within your State and work closely with all agencies to avert possible chemical accidents in the future.

*Regards*

**Yours sincerely,**

*Geeta Menon*

**[Geeta Menon]**

Shri B.S.S.Prasad, IFS(Rtd)  
Chairman,  
AP Pollution Control Board  
D.No. 33-26-14 D/2,  
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Chalamalavari Street, Kasturibaipet,  
Vijayawada - 520 010

**Geeta Menon**  
**Joint Secretary**  
**Tel: 2469 5281**

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GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE  
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नई दिल्ली-110 003  
INDIRA PARYAVARAN BHAWAN, JOR BAGH ROAD,  
NEW DELHI-110 003  
Website : moef.nic.in

**D.O. No. 12/146/2019-HSM**

**Date: 7<sup>th</sup> May, 2020**

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- Occupiers are mandated to submit Safety Reports to the concerned authority as specified under Schedule 8;
- Preparation of updated on-site emergency plan as per schedule 11, by the occupier;
- Preparation of updated off-site emergency plan by the concerned authority i.e. District Administration as per Schedule 5, to deal with the emergencies;



Contd.. page...2.

:2:

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*Regards*

**Yours sincerely,**

*Geeta Menon*

**[Geeta Menon]**

**Shri Neerabh Kumar Prasad**  
Special Chief Secretary,  
Government of Andhra Pradaesh  
Environment, Forest, Science and Technology,  
Andhra Pradesh Secretariat,  
**Velagapudi -522238**

**O.A. No. 73/2020 (RE-GAS LEAK POLYMERS CHEMICALS PLANT IN RR VENKATAPURAM VILLAGE VISAKHAPATNAM IN ANDHRA PRADESH)**

---

**From :** Dharmendra Kumar Gupta  
<gupta.dharmendra@gov.in>

Thu, May 14, 2020 12:24 PM

 9 attachments

**Subject :** O.A. No. 73/2020 (RE-GAS LEAK  
POLYMERS CHEMICALS PLANT IN RR  
VENKATAPURAM VILLAGE  
VISAKHAPATNAM IN ANDHRA  
PRADESH

**To :** Consultant Judicial-NGT(P.B.)  
<judicial-ngt@gov.in>

**Cc :** Dinesh Runiwal <d.runiwal@gov.in>,  
Geeta Menon <menong@cag.gov.in>,  
Ravi S Prasad <ravis.prasad@nic.in>

Sir,

This is with regard to the **O.A. No. 73/2020 (RE-GAS LEAK POLYMERS CHEMICALS PLANT IN RR VENKATAPURAM VILLAGE VISAKHAPATNAM IN ANDHRA PRADESH).**

Wherein, Hon'ble NGT has directed the MoEF&CC to file it's response. Therefore, I am directed to forward you the approved affidavit along with Annexures on behalf of Ministry of Environment Forest and Climate Change.

With kind regards

Dr. Dharmendra K. Gupta  
Director (S)/Scientist "F",  
Hazardous Substances Management Division,  
Ministry of Environment, Forest and Climate Change,  
Government of India,  
Room No V-203, Indira Parayavaran Bhawan,  
Jor Bagh Road, Aliganj,  
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Phone: +91-11-24695393  
E. Mail: gupta.dharmendra@gov.in



- 
-  **Annex A\_Report\_Ver3\_Vizag Accident\_08May2020.pdf**  
994 KB
  
  -  **Annex B\_MSIHC Rules 1989.pdf**  
828 KB
  
  -  **Annex C\_CAEPPR Rules 1996.pdf**  
16 KB
  
  -  **Annex D\_Minutes of CCG.pdf**  
326 KB
  
  -  **Annex E\_Crisis Alert System\_Red Book\_Updated May-2020.pdf**  
1 MB
  
  -  **Annex E1\_Nodal Officer for Crisis Management\_Chemical Accident.pdf**  
359 KB
  
  -  **Annex E2\_DO Chairman APPCB.pdf**  
1 MB
  
  -  **Annex E3\_DO Spl CS.pdf**  
1 MB
  
  -  **NGT Affidavit.docx**  
28 KB
-

B-29014/IPC-I/ MSIHC/2020

May 08,2020

To

**The Chairman**

All State Pollution Control Board /Pollution Control Committee  
(As per enclosed list)

**Sub: Strict safety precautions to be taken before resuming operation of units – Reg.**

Sir,

Some serious cases of chemical leakages, industrial mishaps have been reported recently. In view of this, all State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) should ensure immediate compliance of the following:

- 1) A proper safety and hazard audit should be undertaken by all units before resuming operation. The SPCB/PCCs shall direct all the units that manufacture, store or import hazardous chemicals to resume their operations after COVID 19 lockdown, only after they have taken adequate and necessary steps to prevent the occurrence of any chemical leakage / accident.
- 2) The SPCBs/PCCs shall ensure that pollution control equipment, connectivity of OCEMS with CPCB/SPCB servers, effluent treatment plants including safety equipment and its machineries shall be kept in good operable conditions before resuming operation in present COVID-19 situation.
- 3) The SPCBs/PCCs shall ensure that all the units shall take utmost care in handling hazardous chemical by using trained manpower.
- 4) The SPCBs/PCCs shall closely monitor the situation and ensure that the environmental norms are not violated by any unit.
- 5) The SPCBs/PCCs will direct all such units to ensure safety of workers and residents in vicinity.
- 6) The SPCBs/PCCs shall ensure that any unit involved in the Manufacture, Storage and Import of Hazardous Chemicals shall comply with the stipulated provisions of The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 without fail.

Yours faithfully

(Ravi S Prasad)  
Chairman, CPCB

dc

ADDRESS LIST OF SPCBs/PCCs

S.N.	Address
1.	Andhra Pradesh State Pollution Control Board D.No. 33-26-14 D/2, Near Sunrise Hospital, Pushpa Hotel Centre, Chalmvari Street, Kasturibaipet, Vijayawada- 520010
2.	Arunachal Pradesh State Pollution Control Board 'ParyavaranBhavan', Yupla Road, PappuNallah, Naharlagun – 791110 Arunachal Pradesh
3.	Assam State Pollution Control Board Bamunimaidan, Guwahati – 781021 Assam
4.	Bihar State Pollution Control Board PariveshBhawan, Plot No.N-B/2, Patliputra Industrial Area Patna-800023
5.	Chhattisgarh Environment Conservation Board ParyavasBhawan, North Block Sector-19 NayaRaipur – 492 002 Chhattisgarh
6.	Goa State Pollution Control Board, Nr. Pilerne Industrial Estate, Opp. Saligao Seminary, Saligao - Bardez Goa - 403511
7.	Gujarat State Pollution Control Board Sector 10-A, Gandhi Nagar – 382043 Gujarat
8.	Haryana State Pollution Control Board C-11, Sector 6, Panchkula, Haryana 134109 Haryana
9.	Himachal Pradesh State Pollution Control Board ParyavaranBhavan, Phase III, New Shimla – 171009 Himachal Pradesh
10.	J&K State Pollution Control Board, Parivesh Bhawan, Shiekh-ul-Campus, behind Govt. Silk Factory, Raj Bagh, Srinagar(J&K)

ADDRESS LIST OF SPCBs/PCCs

11.	Jharkhand State Pollution Control Board T.A Building, HEC Campus, P.O. Dhurwa Ranchi – 834004 Jharkhand
12.	Karnataka State Pollution Control Board ParisaraBhavan, 4 <sup>th</sup> & 5 <sup>th</sup> floors Church Street, Bangalore – 560 001 Karnataka
13.	Kerala State Pollution Control Board Plamcodu Junction, Pattam Palace P.O. Thiruvananthapuram – 695004 Kerala
14.	Maharashtra State Pollution Control Board Kalpataru Point, 3 <sup>rd</sup> & 4 <sup>th</sup> floors Sion Matunga Scheme Road No. 6 Opp. Cine Planet, Sion Circle, Sion (E), Mumbai 400 022 Maharashtra
15.	Madhya Pradesh State Pollution Control Board ParyavaranParisar, E-5 Arera Colony Bhopal – 462016 Madhya Pradesh
16.	Manipur State Pollution Control Board Lamphepat, Imphal West D.C. Office Complex – 795004 Manipur
17.	Meghalaya State Pollution Control Board Arden, Lumpyngngad, Shillong – 793014 Meghalaya
18.	Mizoram State Pollution Control Board New Secretariat Complex, Khatla, Thlanmual Peng, Aizwal Mizoram- 796001
19.	Nagaland State Pollution Control Board Signal Point, Dimapur, Nagaland – 797112 Nagaland
20.	Odisha State Pollution Control Board ParibeshBhawan A-118, Nilakanta Nagar, Unit –VIII, Bhubaneshwar – 751012. Odisha

ADDRESS LIST OF SPCBs/PCCs

21.	Punjab State Pollution Control Board Nabha Road, ITI Rd, Adarsh Nagar, Prem Nagar, Patiala - 147001. Punjab
22.	Rajasthan State Pollution Control Board A-4 Institutional Area, JhalaneDungri Jaipur – 302004. Rajasthan
23.	Sikkim State Pollution Control Board State land Use & Environment Cell Govt. of Sikkim, Deorali, Gangtok, Sikkim
24.	Tamil Nadu State Pollution Control Board No. 76, Mount Salai, Guindy, Chennai - 600032. Tamil Nadu
25.	Telangana State Pollution Control Board ParyavaranBhavan A-3, Industrial Estate, Sanath Nagar, Hyderabad – 500 018. Telangana
26.	Tripura State Pollution Control Board PariveshBhawan Pt. Nehru Complex, Gorkhabasti P.O., Kunjaban, Agartala, West Tripura - 799 006. Tripura
27.	Uttarakhand Environment Protection & Pollution Control Board Gaura Devi Bhawan, 46 B IT Park Sahastradhara, Dehradun, Uttarakhand- 248001
28.	Uttar Pradesh State Pollution Control Board 3 <sup>rd</sup> floor, PICUP Bhavan, VibhutiKhand, Gomti Nagar, Lucknow– 226010. Uttar Pradesh
29.	West Bengal Pollution Control Board, Paribesh Bhavan, 10A, Block-L.A., Sector III, Bidhan Nagar, Kolkata - 700 106
30.	Andaman & Nicobar Islands Pollution Control Committee Department of Science & Technology Dollyganj Van Sadan, Haddo P.O., Port Blair-744102 Andaman & Nicobar

ADDRESS LIST OF SPCBs/PCCs

31.	Chandigarh Pollution Control Committee ParyavaranBhawan Madhya Marg, Sector - 19 B, Chandigarh - 160019.
32.	Daman, Diu & Dadra Nagar Haveli Pollution Control Committee Office of the Deputy Conservator of Forests Moti Daman, Daman - 396220. Daman & Diu
33.	Delhi Pollution Control Committee 4 <sup>th</sup> floor, ISBT Building, Kashmeri Gate, Delhi - 110006. Delhi
34.	Lakshadweep Pollution Control Committee Lakshadweep Administration Department of Science, Technology & Environment Kavarati - 682555. Lakshadweep
35.	Puducherry Pollution Control Committee Department of Science, Technology & Environment Housing Board Complex, 3 <sup>rd</sup> floor, Anna Nagar, Pondichery - 600 005



आर पी गुप्ता  
R P Gupta



सत्यमेव जयते

सचिव  
भारत सरकार  
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय  
SECRETARY  
GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

D.O. No. 12/146/2019-HSM

June 21, 2020

Dear Chief Secretary/Administrator,

At the outset, I would like to express my concern on the damage to public life and property due to several chemical industrial accidents in recent past in various parts of the country.

2. In this regard, I would like to reiterate that a regulatory framework to deal with such issues is in the place vide the 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]. The key objective of these rules is to prevent major chemical accidents arising from industrial activities and limiting the effects of such accidents on human health and environment.

3. The Department of Industrial Safety and Health/Office of Chief Inspector of Factories, of State Governments have been assigned the key responsibilities under the MSIHC Rules, 1989 including assisting the District Collector in preparation of an Off-site Emergency Plan.

4. In view of the present scenario wherein industries are now reopening after an extended period of lock-down, there is an urgent need to undertake preliminary assessment of the operations w.r.t. safety and maintenance aspects so that accident can be avoided. The NDMA has also brought 'Guidelines for restarting of manufacturing industries after an extended lockdown' for ensuring safe operation of industries.

5. I would request you to ensure regular and periodic inspections of industrial and chemical sites. Safety audit and sharing of information with local authorities, must also be ensured. Regular filing of reports and stringent action against violations may be take. The relevant government departments, agencies and district administration should be vigilant and take all required steps to prevent such incidents and follow protocols and standard procedure as per rules.

6. I, therefore, urge you to utilize the above-referred mechanisms in managing the risks associated with operation of chemical industries and ensure close working of various authorities to avert possible chemical accident situations in the future.

Yours sincerely,

(R P Gupta)

To

All the Chief Secretaries of States and UT Administrators

इंदिरा पर्यावरण भवन, जोर बाग रोड, नई दिल्ली-110 003, फोन : (011) 24695262, 24695265 फैक्स : (011) 24695270

INDIRA PARYAVARAN BHAVAN, JOR BAGH ROAD, NEW DELHI-110 003, TEL. : (011) 24695262, 24695265 Fax : (011) 24695270.  
E-mail : secy-mr-ef@nic.in, Website : moef.gov.in

F.No.11/20/2020-HSMD  
Government of India  
Ministry of Environment, Forest and Climate Change  
(HSM Division)

2<sup>nd</sup> Floor, Vayu Wing  
Indira Paryavaran Bhawan  
Jorbagh Road, New Delhi

Date: July 21, 2020

**Office Order**

**Sub: Hon'ble NGT matter OA 73/2020 & connected matters related to Gas Leak incident at M/s LG Polymers Limited, Visakhapatnam (Andhra Pradesh) - Constitution of Committee(s) in compliance with order dated 01.06.2020 for 'Preparation of Restoration Plan' and 'Final Quantification of Compensation' - reg.**

This refers to the chemical accident occurred at M/s LG Polymers India Pvt. Limited, Vishakhapatnam, Andhra Pradesh during early morning (around 2:45 AM) on intervening night of 06.05.2020 & 07.05.2020 due to leakage of Styrene gas. The Hon'ble National Green Tribunal had taken *suo moto* cognizance of the gas leakage incident on 08.05.2020 as per OA 73/2020 and other connected matters. The Hon'ble Tribunal, thereafter, constituted an Expert Committee and tasked it to look into various aspects of the incident including cause of failure, extent of damage, steps for compensation and remedial measures to prevent recurrence, and submit a report to it. The Expert Committee filed an interim report on 17.05.2020 and a detailed report was filed on 28.05.2020. The Hon'ble Tribunal, after considering the responses of various parties and report of Expert Committee, passed an order on 01.06.2020.

2. In pursuance of the orders dated 01<sup>st</sup> June 2020 of Hon'ble National Green Tribunal in OA No. 73/2020 (In re: Gas Leak at LG Polymers Chemical Plant in RR Venkatapuram Village, Visakhapatnam in Andhra Pradesh) & connected matters viz. Review Application No. 19/2020 of M/s LG Polymers India; OA No. 76/2020 (Earlier OA No. 68/2020 (SZ)) in the matter of EAS Sarma Vs Union of India & Ors.; OA No. 80/2020 (Earlier OA No. 73/2020 (SZ)) in the matter of Centre for Wildlife and Environmental Litigation Foundation Vs. Union of India & Ors., the Government of India, Ministry of Environment, Forest and Climate Change hereby constitutes the following Committee(s) (along with mentioned Scope of Work) for 'Preparation of Restoration Plan' and 'Final Quantification of Compensation', in terms of Hon'ble Tribunal's order dated 01.06.2020 and detailed report submitted to it by Expert Committee on 28.05.2020:

S. No.	Purpose	Committee and Scope of Work
1.	The Preparation of Restoration plan shall have two following two components: • Plan for Restoration of environmental media viz. air, water and soil quality	MoEF&CC Nodal Committee for Restoration Plan 1. Dr. S.C. Garkoti, Adviser, MoEF&CC, Chairman 2. Shri. A.K. Pateshwary, Director, IA (Industry-II), MoEFCC. 3. Dr. Prashant Gargava, Member Secretary, CPCB. 4. Additional Director, CPCB (handling matters related to chemical safety)...to be nominated by Chairman, CPCB. 5. Representative of APPCB... to be nominated by Chief Secretary, AP.

S. No.	Purpose	Committee and Scope of Work
	<ul style="list-style-type: none"> <li>Restoration and Compensation plan for damage to property, health, crops, livestock etc.</li> </ul>	<p>6. Representative of Chief Inspector of Factories, Govt. of Andhra Pradesh... <i>to be nominated by Chief Secretary, AP.</i></p> <p>7. District Magistrate (DM), Vishakhapatnam.</p> <p>8. Dr. Dharmendra Kumar Gupta, Scientist-F/Director, HSM Division – Member Convener.</p> <p><u>Sub-component 1 i.e. Plan for Restoration of Environmental Media viz. air water and soil</u></p> <ul style="list-style-type: none"> <li>CPCB, being the technical arm of MoEFCC advising on environmental pollution prevention as well as remediation related matters, is directed to submit a detailed 'Restoration Plan' to MoEF&amp;CC, within the stipulated time frame of 2 months.</li> <li>CPCB Expert Panel shall utilize the environmental compensation and damage assessment guidelines prepared by it along with the norms and methodology devised for considering damage for violation projects.</li> <li>CPCB Expert Panel shall be at liberty to choose experts, if need be, in preparation of Restoration Plan.</li> </ul> <p><u>Sub-component 2 i.e. Plan for Restoration and Compensation for damage to health, property, crops, livestock etc.</u></p> <ul style="list-style-type: none"> <li>A sub-committee, under the chairmanship of DM, Vishakhapatnam, is constituted comprising of representatives from APPCB/Environment/Factories/Health/ Agriculture Department etc.</li> <li>The Sub-Committee shall work out 'Compensation for Damage Assessment' in line with the suggestions/ recommendations made in report of the Expert Committee and submit a detailed 'Compensation Plan' to MoEFCC, within the stipulated time frame of 2 months.</li> <li>The DM, Vishakhapatnam shall be at liberty to constitute a committee or choose experts, if need be, in preparation of a Compensation Plan.</li> </ul> <p>The plans submitted by DM, Vishakhapatnam and CPCB shall be reviewed/examined by MoEF&amp;CC Nodal Committee for Restoration.</p>
2.	Final quantification of compensation	<p><u>MoEF&amp;CC Nodal Committee for Finalization of Compensation</u></p> <ol style="list-style-type: none"> <li>Dr. Prashant Gargava, Member Secretary, CPCB, Chairman.</li> <li>Shri. Raghu Kumar Kodali, Scientist-F/Director, IA Division (Violation Projects), MoEF&amp;CC.</li> <li>Representative, CSIR-NEERI (<i>to be nominated by Director, CSIR-NEERI</i>).</li> <li>Any other Co-opted Expert Member (<i>To be nominated</i>)</li> </ol>

S. No.	Purpose	Committee and Scope of Work
		<p>5. Dr. Dharmendra Kumar Gupta, Scientist-F/Director, HSM Division- Member Convener.</p> <p>The Committee shall consider the Consolidated Restoration-cum-Compensation Plan and finalize the plan including compensation. The Committee shall be at liberty to choose expert institutions or individual to finalize the quantification of compensation.</p>

3. The other 'Terms of Reference' for the above mentioned Committees would be as under:
- i. As far as possible, the Expert Panel/Committee(s) shall assess the compensation in line with the prevailing rules and guidelines of State Government/Central Government. However, it shall duly cover the suggestions/ recommendations made by NGT Expert Committee in its report w.r.t restoration plan and compensation, and address the same in the final plan prepared by it.
  - ii. The Expert Panel/Sub-Committee shall be free to take references from various Committee/ Expert reports, which were duly constituted by various Central/ State Government agencies in reference to the gas leakage incident. However, the CPCB guidelines of environmental compensation and damage assessment and methodology devised for assessing damage to violation projects shall form the basis of arriving at environmental damage and compensation.
  - iii. The Sub-Committee of DM, Vishakhapatnam and CPCB Expert Panel shall submit a detailed report, as per Scope of work, within two months of the issue of this order.
  - iv. The MoEF&CC Nodal Committee shall examine/ review the plan(s) submitted by CPCB Expert Panel and DM, Vishakhapatnam and communicate its observations for improvement, if any, within 15 days of receiving reports from CPCB Expert Panel and Sub-Committee of DM, Vishakhapatnam.
  - v. The MoEF&CC Nodal Committee(s)/CPCB Expert Panel/Sub-committee shall be free to undertake site visits, if need be.
4. The SPCBs shall make necessary arrangement for field visits/ inspections of various locations identified by the MoEF&CC Nodal Committee(s)/CPCB Expert Panel/Sub-committees.
5. The Expert Panel/Sub-Committee shall furnish its report within two (2) months of the issuance of this order or as per directions issued by the Hon'ble NGT from time to time, if any.
6. Joint Secretary (IA-Monitoring) is requested to provide a compliance report on the aspect of revamp of monitoring mechanism as the Hon'ble Tribunal in its judgment dated 01.06.2020 has directed as follows:

*.....The MoEF&CC may also constitute an Expert Committee to suggest ways and means to revamp monitoring mechanism to check and prevent violation of environmental norms and preventing any such recurrence in future in any of the establishments dealing with hazardous chemicals. A special drive may be initiated in this regard. An action taken report may be furnished within three months from today.....*

7. The expenses towards TA/DA, for independent expert members, shall be as per the Government norms. All payments to be made as per the OM of the Department of Expenditure dated 12.04.2017 (or amended thereafter). The official members may claim TA/DA, if applicable, from their respective organizations.

8. The Integrated Finance Division, MoEF&CC has also concurred the above proposal vide E-135407/ AS&FA dated 20.07.2020 with the following conditions:

- TA/DA to non-official members, as and when nominated, will be regulated as per SR.190;
- Entitlement may be restricted to actuals.
- Relaxation for Air journey, if any, will be as per instruction issued in the Ministry.
- Air Tickets may be purchased directly from Airlines website/booking counters/office or authorized travel agents viz. M/s Balmer Lawrie & Company Limited, M/s Ashok Travels & Tours and IRCTC.
- Declaration of 'No conflict of interest certificate' may be obtained in respect of Non-Official members for adoption in the Committee for ensuring accountability.
- The nomination of Non-Official member(s) in the Committee may be submitted to IFD for concurrence along with the Bio-data of the proposed Member.
- No duplication in payment, and.
- Payment be made through e-transfer only.

9. This issues with the approval of Secretary (EF&CC).

  
(Dr. Dharmendra Kumar Gupta)  
Scientist-F/Director(s)

To:

All Members (As per the list)

Copy for information to:

PS to MECC/ PPS to Secretary (EF&CC)/ PPS to AS (RSP)/ PS to JS (GM)/ IFD/ GC/ SO (HSMD)/  
Guard file

**‘Records of Discussion’ of the 1<sup>st</sup> meeting of the MoEFCC Nodal Committee constituted for Preparation of Restoration Plan in reference to the order passed by Hon’ble NGT in the matter of OA 73/2020 & connected matters related to Gas Leak incident at M/s LG Polymers Limited, Visakhapatnam (Andhra Pradesh)**

A meeting of the MoEFCC Nodal Committee constituted for Preparation of Restoration Plan was convened under the chairmanship of Dr. Satish C Garkoti, Scientist 'G', MoEFCC on 17.08.2020 at 3 P.M. through video-conferencing. All the members of the Committee attended the meeting in person, except Shri V Vinay Chand, District Magistrate, Vishakhapatnam, who was represented by the Joint Collector, Vishakhapatnam. The followings were present:

- Shri A. K. Pateshwary, Director, IA (Industry-II), MoEFCC
- Shri R Govinda Rao, Joint Collector (represented District Magistrate, Vishakhapatnam)
- Dr. Prashant Gargava, Member Secretary, CPCB
- Shri Dinbandhu Gouda, Divisional Head (IPC-I) & Additional Director, CPCB
- Shri Bharat Sharma, Addl. Director and In-charge, CPCB Regional Directorate, Pune
- Shri A Ramchand, Chief Environmental Engineer, APPCB
- Shri D. Chandra Sekhara Varma, Director of Factories, Govt. of Andhra Pradesh
- Dr. Dharmendra K. Gupta, Director, HSM Division – Member Convenor

2. At the outset, Chairman welcomed all the participants and meeting began with brief round of introduction. The Chairman also informed that this meeting is convened to get status update from the sub-committees constituted under the order dated 21.07.2020, wherein Central Pollution Control Board (CPCB) and State Government (District Magistrate, Vishakhapatnam) were directed to submit detailed plan to MoEFCC w.r.t. restoration of environmental media viz. air, water and soil and restoration and compensation plan with regard to the damages done to health, property, crops, livestock etc.

3. The Committee took note of the fact that after the incident of gas release many agencies like National Disaster Response Force (NDRF), National Environmental Engineering Research Institute (CSIR-NEERI), Andhra Pradesh Pollution Control Board (APPCB), Department of Industrial Safety and Health (DISH) etc. have undertaken separate studies with regard to the incident. In addition, the Govt. of Andhra Pradesh had constituted a High Power Committee (HPC), who had prepared/ submitted a comprehensive report to the State Govt. along with Annexures. The floor was thereafter opened for discussion.

4. The APPCB representative informed that extensive field monitoring/ sample analysis was done by APPCB since the accident took place. A detailed report (*running into more than 300 pages*) was submitted to the court as well as HPC, which could form the basis of preparing an environmental restoration plan. The Member Secretary, CPCB informed that apart from APPCB, the CSIR-NEERI had also undertaken sampling and analysis work

during the incident. It was informed that the APPCB Zonal Office, Vishakhapatnam and CSIR-NEERI Office, Hyderabad had played a pivotal role during the initial sampling and monitoring phase and are well versed with the situation emerged after the incidence. It was, therefore, suggested to involve NEERI in the preparation of the plan for restoration of environmental media.

5. With regard to impact zone due to incidence, Dr Bharat Sharma, CPCB (*who also happened to be a nominated member of HPC on behalf of MoEFCC/ CPCB*) informed that the Experts from Andhra University had assessed the styrene gas impact zone through modelling. The modelling data indicated the impact zone as approximately 3 kms, wherein majority of impact was found in the windward side. It was further informed that the impact of styrene leakage in air has now been degraded; however, the monitoring done during the accident phase would be helpful in indicating the extent of its concentration in the ambient environment during that period. Similarly, samples of ground water, surface water and soil were collected by APPCB and CSIR-NEERI also. The Joint Collector represented the office of DC, Vishakhapatnam during the meeting informed that they are in the process of undertaking the assigned task.

6. Dr. Dharmendra K. Gupta, Director and Member Convenor emphasized that Hon'ble NGT had given the task of preparation of restoration plan to a group of agencies considering the need/ requirement of expertise and adequate coordination among them. The Ministry, after careful examination of the task to be performed, had decided to assign roles to various agencies based on their core-expertise. However, to further support the identified agencies, provisions have been made to rope-in other experts, if needed, for preparation of restoration plan. The Committee noted that while the plan was to be prepared within two months; it is apparent that activities are yet to be started by agencies. With specific submission of CPCB regarding the need to on-board CSIR-NEERI (an expert agency) for the task, the Chair informed that CPCB can suitably look in to it, as provisions have already been made in the order dated 21.07.2020, issued by the Ministry with the approval of Secretary (EF&CC).

The meeting ended with vote of thanks to and from the Chair.

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केन्द्रीय प्रदूषण नियंत्रण बोर्ड  
CENTRAL POLLUTION CONTROL BOARD  
पर्यावरण, वन एवं जलवायु परिवर्तन विभाग भारत सरकार  
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

Email/Speed Post

B-29016/CPCB/IPC-I/

October 09, 2020

To

Dr Shaik Basha, Scientist & Head  
CSIR-NEERI Zonal Center  
CSIR-National Environmental Engineering Research Institute  
IIT Campus, Tamaka,  
Hyderabad-500007  
Telangana

**Sub:** Award of Work to NEERI "Assessment of Environmental Damages and Preparation of restoration plan for air, water and soil environment due to styrene gas leakage incident at Visakhapatnam" in the Hon'ble NGT matter OA 73/2020 – regarding

**Ref:** Email dated October 01, 2020

Sir,

The undersigned is pleased to inform you that the Competent Authority of the Central Pollution Control Board has accorded approval of project on "Assessment of Environmental Damages and Preparation of restoration plan for air, water and soil environment due to styrene gas leakage incident at Visakhapatnam" to NEERI, Hyderabad with a cost of ₹ 54,51,900/- (Fifty-four lakhs fifty-one thousand nine hundred) plus GST as **Grant in Aid (GIA)** basis.

You are, hereby requested to start the study/project work, immediately, in co-ordination with all the stakeholders and submit two signed copies of the "Memorandum of Understanding" along with "Integrity Pact", to the undersigned.

Yours faithfully

(Dinabandhu Gouda)

Additional Director & DH-IPC-I Division

Copy to

1. Dr Dharmendra Kumar Gupta, Director (Scientist-F)  
Hazardous Substances Management Division  
Ministry of Environment, Forest and Climate Change  
Indira Paryavaran Bhawan,  
Jorbagh Road, New Delhi - 110003
2. The Regional Director (Chennai),  
Central Pollution Control Board,  
77-A, Second Floor  
South Avenue Road,  
Ambattur Industrial Estate,  
Ambattur Taluk, Thiruvallur District,  
Chennai - 600 058
3. DH- F&A Division, CPCB

(Dinabandhu Gouda)

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***Assessment of Environmental Damages and  
Preparation of restoration plan for Air, Water  
and Soil Environment due to styrene gas  
leakage incident at Visakhapatnam***

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**For  
Central Pollution Control Board (CPCB)**



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**CSIR-National Environmental Engineering Research Institute (NEERI)  
(Council of Scientific and Industrial Research)  
Nagpur & Hyderabad Zonal Center (HZC)**

**September 17, 2020**

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# ***Assessment of Environmental Damages and Preparation of restoration plan for Air, Water and Soil Environment due to styrene gas leakage incident at Visakhapatnam***

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## **Part A: Technical Component**

### **1.0 Preamble**

M/s LG Polymers India Pvt Ltd manufactures Expandable Polystyrene using Styrene (C<sub>8</sub>H<sub>8</sub>), Pentane (C<sub>6</sub>H<sub>12</sub>) and HCl as main raw materials. It merged with M/s Mc Dowell & Co. Ltd. of UB Group in 1978. It was taken over by LG Chem (South Korea), Hindustan Polymers was renamed as LG Polymers India Private Limited (LGPI) in July, 1997.

An accident occurred in M/s. L.G Polymers India Pvt Ltd, Visakhapatnam at 03:02AM on 07.05.2020. The company has stored styrene monomer in vertical MS storage tanks of 2500 KL and 3500 KL capacity provided with internal cooling system through refrigeration. From one storage tank of 2500 KL, styrene vapor has leaked and spread to surrounding villages of Venkatapuram, Padmanabhapuram, SC & BC Colony. An accident occurred in M/s. L.G Polymers India Pvt Ltd, Visakhapatnam at 03:02AM on 07.05.2020. The company has stored styrene monomer in vertical MS storage tanks of 2500 KL and 3500 KL capacity provided with internal cooling system through refrigeration. From one storage tank of 2500 KL, styrene vapor has leaked and spread to surrounding villages of Venkatapuram, Padmanabhapuram, SC & BC Colony.

The Hon'ble National Green Tribunal had taken *suo moto* cognizance of the gas leakage incident and constituted an Expert Committee and tasked it to look in to various aspects of the incident including causes of failure, extent of damage, steps for compensation and remedial measures to prevent recurrence and submit a report. The Expert Committee filed a detailed report on 28.05.2020. The Hon'ble Tribunal after

consideration of the responses of various parties and report of Expert Committee, passes an order on 01.06.2020.

In pursuance of the orders of Hon'ble NGT dated 01.06.2020, the Ministry of Environment, Forest and Climate Change (MoEFCC) constituted various committees on July 21, 2020. The 1<sup>st</sup> meeting of the MoEFCC Nodal Committee (constituted for the preparation of restoration plan for the incident occurred at LG Polymers) was held on August 17<sup>th</sup>, 2020, while the first meeting on Environmental Damages and Compensation held on 9<sup>th</sup> September 2020. In both the meetings, it was proposed in the meeting to engage CSIR-NEERI for assessment of environmental damages and preparation of the restoration plan for air, water, soil components. In this regard, CPCB approached CSIR-NEERI, Nagpur and Hyderabad Zonal Centre to conduct environmental damages cost assessment and prepare a Plan for Restoration of Environmental Media viz. Air, Water and Soil. Accordingly, the following objectives and scope of work are proposed.

## **2.0 Objectives**

### **Assessment of Environmental Damages in Monetary Terms**

- To collect and analyse the baseline and post impact data of air, water and soil pollution parameters
  - To collect data related to population impact due to the leak
  - To collate and finalize various economic methods which can be utilized for monetary damage assessment
  - To collect data for primary assessments related to economic assessments and utilization of econometric tools for finalization normalized value
  - To compute environmental damages in monetary terms
- 
- To assess existing environmental quality data for air, water soil
  - To monitor ambient air quality, surface water, ground water and soil within the industry and in surrounding villages within 3 km region for styrene
  - To assess the microbiological diversity (bacteria and fungi) of soil within and surrounding villages (within 3 km) of industry
  - To collect primary health and secondary health data from the primary health centres (PHCs)/hospitals and personal questionnaire data on human health in the study area

- To assess the impacts on environmental media w.r.to air, water and soil due to the uncontrolled Styrene vapor release
- To prepare a Plan for Restoration of Environmental Media viz. air, water and soil quality.

### **3.0 Scope of Work & Methodology**

The study will be carried out in two parts:

**Part I: Assessment and prediction due to the LG Polymers incident as well as Assessment of Environmental Damages in Monetary Terms**

**Part III: Preparation of the restoration plan based on the assessment and prediction**

#### **Part – I:**

#### **Assessment and prediction due to the LG Polymers incident**

### **3.1 Assessment of Air, Water and Soil Quality**

Secondary data collection on ambient air, surface water, groundwater and soil quality within the study area will be made from available sources. The primary data on ambient air, surface water, groundwater and soil quality within the study area will be collected at identified locations.

#### **A. Ambient air quality**

- Collection of ambient levels of Volatile Organic Compounds (VOCs) and Styrene in the study area from the available resources like Report of the High Power Committee (HPC) constituted by Govt. of AP, Hon'ble National Green Tribunal (NGT) Report and primary data collected by different agencies like CSIR-NEERI and APPCB during the period immediately after the Styrene gas accident

#### **B. Ground water/surface water Quality**

- Collection of the existing groundwater data state groundwater board, CGWB and delineation of groundwater hydrology and geology based on secondary data will be carried out.

- Identification and establishment of available water bodies (surface as well as groundwater) existing in the study area around LG Polymers will be carried out.
- Groundwater/surface water and Sediment samples will be collected from the identified location for the physico-chemical parameters, DO, COD, BOD and heavy metals, oil & grease, styrene.
- Bioassay test of surface water samples to understand the level of toxicity
- Sediment remedial option will be addressed as most of the Styrene might have accumulated in the sediments of surrounding water bodies.

### **C. Soil quality**

- Collection of Site specific data & surrounding study area information through observations/consultation during Reconnaissance Survey
- Collection of secondary data w.r.t soil types Topography, Soil profile, soil Map & Land use pattern of the study area from various departments.
- Soil sampling from different depths in the study area by soil boring/ excavation including in areas where contamination is expected (hot spots).
- Soil samples will be collected in the study region and analyzed for Styrene and Physico- Chemical Parameters viz. pH, Conductivity, Porosity, available NPK, water holding capacity, soil texture, organic matter and trace elements (As, B, Ba, Cd, Co, Cr, Cu, F, Fe, Hg, Mn, Ni, Pb, Zn)
- Soil remedial option also will be delineated if Styrene or its metabolites still persists in the soil matrix

### **D. Soil microbial diversity**

- The structure of soil microbial composition will be studied and the diversity of beneficial (such as nitrogen fixers, phosphate solubilizers, etc) and harmful microbial flora (pathogens) will be analyzed.
- Styrene resistant or Styrene degrading strains if identified, will be mass cultivated for soil and sediment cleanup activities.

## **3.2 Predictive Assessment due to the accident**

- Impacts on ambient air quality due to the styrene accident over the study area will be assessed based on the results of modeling studies and impact zone in

terms of the threshold values given in the report of the High Power Committee (HPC) constituted by Govt. of AP

- Impacts on surface and ground water bodies in the study area
- Impact on soil environment and soil microbial diversity by soil characterization w.r.t physico chemical and Microbial properties.

### **3.3. Assessment of Environmental Damages in Monetary Terms**

Based on the baseline data generated in Part I, the assessment related to environmental impacts can be carried out. Following aspects shall be studied in terms of environment:

3.3.1 Air: The styrene gas leak would have created substantial disruption in terms of air quality. The same can be linked to various health impacts created in the region through survey and the reports which were generated during the time of accident. Impacts including but not limited to health, mortality, morbidity, aesthetics, infrastructure shall be assessed. Suitable economic methods such as contingent valuation method, value of statistical life and so on shall be used to arrive at the final economic damage. Suitable surveys may be designed to collect primary data related to morbidity, mortality, treatment and disability costs, if any.

3.3.2 Water Pollution: After establishing the baseline and post impact data, the assessment in terms pollution load discharged into the atmosphere can be valued using various methods such value transfer method, direct pricing method and/or contingent value method. The difference in terms of pollution parameters including BOD, COD, Nitrogen, Phosphorous and heavy metals can be valued using various economic methods.

3.3.3 Soil Pollution: Similar to water, assessment of monetary value of damages in soil can also be carried out,

3.3.4 Ecological Impact: In order to assess the damages in ecological environment, the impact on flora, fauna, microbial ecosystems is to be made evident for various tools to be used for economic valuation. National and international databases may be utilized to assess the services provided by the various affected ecological components and hence conduct the valuation.

Given above various approaches, it is important that detailed analysis in terms of impact measurement is done, as indicated in Part I, so that the actual load on environment can be established due to this accident. Once this is done, it becomes easier to calculate the attribution factors and apply economic methods for assessment of damages in monetary terms.

## **Part- II**

### **Preparation of the restoration plan based on the assessment and prediction**

#### **3.4 Preparation of Restoration Plan**

The restoration plan for air, water and soil will be prepared based on the assessment and prediction of the primary data. The restoration plan will be prepared based on the short term and long-term measures. The plan involved in the preparation of the restoration plan will be as follows:

- i. Assessment of impacts on air, water and soil quality in the study area and delineation of mitigation measures in comparison with respective Indian National standards.
- ii. Delineation of Plan for Restoration of Environmental Media viz. Air, Water and Soil Quality

#### **Air Environment:**

- Evaluation of adequacy of existing air pollution control equipment
- Implementation of WAYU/ambient air purification systems in and around the area for ambient air
- Suggestions on control of fugitive emissions at the source for styrene
- Risk mitigation and associated cost

#### **Water Environment:**

- Pump and treatment for deteriorated water quality
- Implementation of various treatment technologies like advanced oxidation processes etc for surface water

### **Soil/Ecological Environment:**

- Identification and introduction of local species of flora and fauna for adaptation and green belt development
- As a short-term measure top layer contaminated soil, shall be carefully excavated and shall be disposed off at an authorized TSDF, in accordance with the prevailing hazardous waste management rules and regulations.
- Styrene-degrading bacteria could potentially be used in bioremediation of styrene pollution as a long-term measure
- Impacts on health, animals, microbial flora and vegetation

### **4.0 Reporting**

**Draft Report:** Draft report will be submitted within 3 months after completion of field studies.

**Final Report:** Final report will be submitted within 1 month after receiving comments/ suggestions from CPCB, New Delhi on draft report.

### **5.0 Inputs by the Sponsor**

Following information and assistance is required to be provided by the Sponsor:

- All the permissions/assistance for CSIR-NEERI staff to enter in to LG Polymers Industry and surrounding area during sampling work.
- Assistance from local APPCB office at Visakhapatnam in logistics during field studies
- Details of storage tanks like capacity, height, diameter, storage conditions, type of chemical stored, MSDS of chemicals, etc
- Hourly meteorological data collected at the site for past one year
- Any other information available that is in interest of use for conducting studies

## 6. Activity Gantt Chart

Activity	Month 01	Month 02	Month 03	Month 04
Reconnaissance Survey, identification of study area and collection of primary data on air, water and soil environment at identified locations				
Secondary data collection on ambient air quality, groundwater, soil and geology, bio-diversity and health from available resources				
Analysis of air, water and soil samples and assessment				
Assessment of impacts due to styrene accident on air, water and soil environment in the study area and interpretation with human health, vegetation and animals				
Monetary Evaluation of Environmental Impacts				
Preparation of plan for restoration of air, water and soil quality				
Draft and final report preparation				

**Email****d.runiwal@gov.in**

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**APPCB - ZO - VSP - Hon'ble NGT matter O.A. 73/2020 - Restoration and Compensation plan for damage to property, Health, Crops, Live stock etc., - Extension of time for submission of report - Requested - Reg.**

---

**From :** T.Rajendra Reddy JCEE      Mon, Oct 19, 2020 07:27 PM  
<zovsp-jcee@appcb.gov.in>      1 attachment

**Subject :** APPCB - ZO - VSP -  
Hon'ble NGT matter O.A.  
73/2020 - Restoration  
and Compensation plan  
for damage to property,  
Health, Crops, Live stock  
etc., - Extension of time  
for submission of report -  
Requested - Reg.

**To :** Dinesh Runiwal  
<d.runiwal@gov.in>

**Cc :** commissioner gvmc  
<commissioner\_gvmc@yahoo.co.in>,  
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ee1@appcb.gov.in>,  
zovspappcb@gmail.com

Sir,

Please find the report of sub-committee constituted under the Chairmanship of the District Magistrate for preparation of 'Restoration and Compensation Plan for damage to health, property, crops, livestock etc.' (Sub Component-2) as per the Ministry of Environment, Forest and Climate Change(HSM Division), Government of India, office order dt: 21.07.2020 from the following link.

<https://we.tl/t-jDjJqKn8R6>

Submitted for favour of kind information and necessary action.

Regards,  
Joint Chief Environmental Engineer,  
A.P. Pollution Control Board,  
Zonal Office, Visakhapatnam.

---

**From:** "Dinesh Runiwal" <d.runiwal@gov.in>  
**To:** "T.Rajendra Reddy JCEE" <zovsp-jcee@appcb.gov.in>,  
jc1factoriesap@gmail.com  
**Cc:** "Dharmendra Kumar Gupta"  
<gupta.dharmendra@gov.in>,  
collectorpeshivizag@gmail.com, "Member Secretary APPCB"  
<membersecy@appcb.gov.in>  
**Sent:** Saturday, October 17, 2020 9:07:07 PM  
**Subject:** Re: APPCB - ZO - VSP - Hon'ble NGT matter O.A.  
73/2020 - Restoration and Compensation plan for damage to

property, Health, Crops, Live stock etc., - Extension of time for submission of report - Requested - Reg.

Sir,

Kindly refer trailing mails.

In this regard, it is requested to provide the copy of order issued by DM, Vizag, duly constituting the sub-committee; Minutes of the meeting held on 14.09.2020 and the status of work undertaken so far.

regards,  
Dinesh Runiwal  
Additional Director  
MoEFCC

**This may be treated on PRIORITY please.**

---

**From:** "Dharmendra Kumar Gupta" <gupta.dharmendra@gov.in>  
**To:** "Dinesh Runiwal" <d.runiwal@gov.in>  
**Sent:** Monday, September 21, 2020 1:37:42 PM  
**Subject:** Fwd: APPCB - ZO - VSP - Hon'ble NGT matter O.A. 73/2020 - Restoration and Compensation plan for damage to property, Health, Crops, Live stock etc., - Extension of time for submission of report - Requested - Reg.

This is the mail.....

---

**From:** "T.Rajendra Reddy JCEE" <zovsp-jcee@appcb.gov.in>  
**To:** "Dharmendra Kumar Gupta" <gupta.dharmendra@gov.in>  
**Sent:** Friday, September 18, 2020 1:25:47 PM  
**Subject:** APPCB - ZO - VSP - Hon'ble NGT matter O.A. 73/2020 - Restoration and Compensation plan for damage to property, Health, Crops, Live stock etc., - Extension of time for submission of report - Requested - Reg.

Sir,

Your attention is invited to the Office order dt. 21.07.2020 issued in pursuance of the orders dt. 01.06.2020 of Hon'ble NGT in O.A. No. 73/2020 (Gas Leak at L.G. Polymers). In compliance to the office order dt. 21.07.2020 of MoEF & CC, the District Magistrate, Visakhapatnam District constituted a sub committee for preparation of plan restoration and Compensation plan for damage to property, Health, Crops, Live stock etc.,. As per the office order, the sub committee shall submit the report within two months from the date of issue of order. The sub committee during its review meeting held on 14.09.2020 requested for 15 days more time for submitting the report.

Hence, it is requested to kindly consider the request of the sub committee for giving 15 days more time for submitting the report.

With regards,  
JCEE,  
ZO-VSP.



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 **District Collector Ltr 19.10.2020**

619 KB

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Report of the sub-committee constituted under the chairmanship of the District Magistrate, Visakhapatnam for preparation of **'Restoration and Compensation Plan for damage to health, property, crops, livestock etc.'** (Sub Component-2) as per the Ministry of Environment, Forest and Climate Change(HSM Division), Government of India, office order dt: 21.07.2020 issued in pursuance of the Order dated 01st June 2020 of Hon'ble National Green Tribunal in OA No. 73 of 2020 related to Gas leak incident at M/s.LG Polymers India Pvt. Ltd., R.R. Venkatapuram Village, Visakhapatnam, Andhra Pradesh.



*Submitted to*  
**Ministry of Environment, Forest and Climate Change  
(HSM Division), Government of India**

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## Preface

An accident of uncontrolled release of Styrene vapour occurred at M/s.LG Polymers India Pvt. Ltd, RR Venkatapuram Village, Pendurthi Mandal, Visakhapatnam District, Andhra Pradesh in the early hours of 7<sup>th</sup> May 2020 from one of the Styrene storage tanks. The hazardous Styrene vapours spread beyond the factory premises, affecting the populace of five villages / habitations leading to death of 12 persons and hospitalization of several citizens.

The Hon'ble National Green Tribunal had taken suo-moto cognizance of the gas leakage incident at M/s.LG Polymers India Pvt. Ltd in R.R. Venkatapuram Village, Visakhapatnam in Andhra Pradesh on 08.05.2020 as per O.A No.73/2020 and other connected matters. The Hon'ble National Green Tribunal, thereafter constituted an expert committee and tasked it to look into various aspects of the incident including cause of failure, extent of damage, steps for compensation and remedial measures to prevent recurrence, and submit a report to it. The Expert Committee filed an interim report on 17.05.2020 and a detailed report was filed on 28.05.2020. The Hon'ble National Green Tribunal, Principal Bench, New Delhi passed an order on 01.06.2020 in OA No. 73 of 2020.

In pursuance of the directions in the Hon'ble NGT Order dt: 01.06.2020 in O.A No. 73 of 2020, the Ministry of Environment, Forest and Climate Change(HSM Division), Government of India, vide office order dated 21.07.2020, constituted the sub -committee under the chairmanship of District Magistrate, Visakhapatnam comprising of representatives from APPCB / Environment / Factories / Health / Agriculture Department etc for preparation of Restoration and Compensation Plan for damage, to health, property, crops, livestock etc(Sub-component-2).

The MoEF&CC, GOI suggested to work out the Compensation for Damage Assessment in line with the suggestions / recommendations made in report of the Expert Committee and to submit a detailed 'Compensation Plan' to MoEF&CC within stipulated time frame of 2 months.

The District Magistrate constituted the Sub-Committee to work out Restoration and Compensation plan for damage to property, health, crops, livestock, etc. The Sub-Committee has taken up elaborate field study and assessed the damage caused due to release of styrene vapour and prepared long term requirements

for restoration under each component and submitted compensation plan as per terms of reference. The Restoration Plan prepared by the Sub-Committee envisages to bring back the normalcy in all the components taken up for study.

## 1.0. Introduction:

On 07<sup>th</sup> May 2020 an incident of uncontrolled styrene vapour release into the atmosphere occurred at M/s.L.G Polymers India Pvt. Ltd, R.R Venkatapuram, Pendurthy Mandal, Visakhapatnam from one of the styrene storage tank(M6 tank). The accident took the life of 12 persons in the immediate subsequent period and 585 people had to undergo treatment in hospitals, besides causing loss of livestock and vegetation.

### 1.1 Orders of the Hon'ble National Green Tribunal

The Hon'ble National Green Tribunal had taken suo-moto cognizance of the gas leakage incident at M/s.L.G Polymers India Pvt. Ltd on 08.05.2020 as per O.A No.73/2020 and other connected matters. The Hon'ble National Green Tribunal, thereafter constituted an expert committee and tasked it to look into various aspects of the incident including cause of failure, extent of damage, steps for compensation and remedial measures to prevent recurrence, and submit a report to it. The Expert Committee filed an interim report on 17.05.2020 and a detailed report was filed on 28.05.2020. The Hon'ble National Green Tribunal, Principal Bench, New Delhi passed an order on 01.06.2020 in OA No. 73 of 2020. The following directions with regard to preparation of restoration plan and compensation were issued by the Hon'ble Tribunal:

- i. The amount of Rs. 50 crores deposited by the Company with the District Magistrate, Vishakhapatnam will stand appropriated towards part liability and interim compensation to be spent for restoration of the environment and compensation for victims in accordance with the restoration plan to be prepared.
- ii. Restoration plan may be prepared by a Committee comprising two representatives each of MoEF&CC, CPCB and three representatives of State Government to be named by the Chief Secretary, including the District Magistrate, Vishakhapatnam and such other concerned Departments within two months from today. MoEF&CC will be the nodal agency for the purpose.
- iii. Final quantification of compensation may be assessed by a Committee comprising representatives of MoEF&CC, CPCB and NEERI. The said

Committee will be at liberty to associate/co-opt any other expert institution or individual. The Secretary, MoEF&CC may ensure constitution of such Committee within two weeks from today. The Committee may give its report within two months thereafter. MoEF&CC will be the nodal agency for the purpose".

## **1.2 Directions of the Ministry of Environment, Forest and Climate Change**

- a. As per the Hon'ble NGT Orders dt: 01.06.2020 in OA No. 73 of 2020, the Ministry of Environment, Forest and Climate Change(HSM Division), Government of India vide office order dt: 21.07.2020 constituted the committee(s) for the 'Preparation of Restoration Plan' and 'Final Quantification of Compensation'. The preparation of restoration plan was divided into the following two sub-components:
  - i. Plan for restoration of environmental media viz., air, water and soil quality.
  - ii. Restoration and Compensation Plan for damage to property, health, crops, livestock etc.
- b. The scope of work specified by MoEF&CC for sub component-2 i.e., plan for restoration and compensation for damage to health, property, crops, livestock etc is as follows:
  - i. A sub-committee, under the chairmanship of District Magistrate, Visakhapatnam is constituted comprising of representatives from APPCB / Environment / Factories / Health / Agriculture Department etc.
  - ii. The sub-committee shall work out 'Compensation for Damage Assessment' in line with the suggestions / recommendations made in report of the Expert Committee and submit a detailed 'Compensation Plan' to MoEF&CC within the stipulated time frame of 2 months.
  - iii. The DM, Visakhapatnam shall be at liberty to constitute a committee or choose experts, if need be, in preparation of a compensation plan.

### 1.3 Constitution of the Sub-Committee

- a. The District Magistrate, Visakhapatnam constituted the following Sub-committee to work out 'Compensation for Damage Assessment':
  - i. The Commissioner, GVMC, Visakhapatnam.
  - ii. The Joint Collector (Asara & Welfare), Visakhapatnam.
  - iii. The Joint Director of Agriculture Department, Visakhapatnam.
  - iv. The Joint Director of Animal Husbandry Department, Visakhapatnam.
  - v. The Principal, Andhra Medical College, Visakhapatnam.
  - vi. Experts from the Regional Agriculture Research Station, Anakapalli, Visakhapatnam.
  - vii. The Joint Chief Inspector of Factories, Visakhapatnam.
  - viii. The Revenue Divisional officer, Visakhapatnam.
  - ix. The Environmental Engineer, A.P.Pollution Control Board, Visakhapatnam.
  
- b. The following expert scientists are nominated by Associate Director of Research, Regional Agricultural Research Station, (RARS), Anakapalle:
  - i. Dr. K.V. Ramana Murthy, Principal Scientist (Agronomy), RARS, Anakapalle, Visakhapatnam District.
  - ii. Dr. Ch. Sitha Ramalakshmi, Senior Scientist (Soil Science), RARS, Anakapalle, Visakhapatnam District.
  - iii. Dr. Ch. Mukunda Rao, Principal Scientist (Crop Physiology), RARS, Anakapalle, Visakhapatnam District.
  - iv. Dr. G. Manasa, SMS (Home Science), Krishi Vigyan Kendra, Kondempudi, Visakhapatnam District.

## 2.0 Scope of work and working methodology of the Sub-Committee

- a. The Copies of the report of the Expert Committee constituted by the Hon'ble NGT, High Power Committee constituted by the Govt. of A.P along with the orders of the Hon'ble NGT dt: 01.06.2020 and the MoEF&CC Office Order dated:21.07.2020 were circulated to the members of the Sub-Committee.
- b. The Sub-Committee held its meeting on 15.09.2020 under the chairmanship of the District Magistrate, Visakhapatnam to finalize the working plan for 'Compensation for Damage Assessment' in line with the suggestions / recommendations made in report of the Expert Committee constituted by Hon'ble NGT and the High Power Committee constituted by Government of Andhra Pradesh.

### 2.1 Recommendations of the Expert Committee constituted by the Hon'ble NGT

The following suggestions / recommendations made in report of the Expert Committee are discussed in Sub-Committee meeting:

- a) Steps to be taken for compensation of victims under restitution of the damaged property and environment, and the cost involved.
- b) Compensation cost to be paid by industry shall be of two components (i) Compensation paid by government and (ii) Environmental Compensation and restitution of the damaged property.
- c) For Environmental Compensation and restitution of the damaged property an elaborate scientific study is required to calculate the actual cost for environmental damage and restoration. The services of National Environmental Engineering Research Institute (NEERI) may be utilised since they have conducted the preliminary studies and also have such expertise.
- d) Final quantification of compensation may be assessed by a committee comprising representatives of MoEF&CC, CPCB and NEERI.

## 2.2 Findings and suggestions of the High Power Committee constituted by the Government of A.P

The Government of A.P constituted a High Power Committee(G.O. RT.No.803, dt:08.05.2020) to probe into the causes behind the gas leak and suggest measures to improve the protocol for industrial safety of similar type of plants. The High Power Committee findings and suggestions are discussed in the Sub-Committee meeting:

- a) Nearly 20,000 people from 17,000 houses/residences of RRV Puram, Nandamuri Nagar, Kamparapalem, Padmanabha Nagar, SC/ BC Colony, Meghadripeta Colony evacuated, and arrangements were made at 23 rehabilitation centres maintained by GVMC as well as Simbachalam Devasthanam authorities.
- b) The GVMC reported disruption in the drinking water supply due to toxic contamination scare because of release of Styrene vapour. Accordingly, GVMC took immediate remedial measures to sanitise the 6318 houses (HH) in the affected areas with mobile water tankers on 11th May 2020, when the evacuated residents returned. On 12th May 2020, Godavari drinking water was made available from 2000 KL GLSR and was released to the public of 5 affected villages, after conducting disinfection and sanitization in all distribution main lines and reservoirs.
- c) As reported by the Animal Husbandry Department, a total of 34 animals died due to the effect of Styrene vapour between 7<sup>th</sup> May 2020 and 9<sup>th</sup> May 2020.
- d) The joint team of NEERI & CBRN, NDRF31 reported that all the trees near the M6 Tank have turned either fully or partially dry. The team observed that wherever the relatively heavy mixture of monomer and polymer Styrene flooded green plants, they got dried. All the trees were dried up to the level of Styrene vapour engulfing the affected area.
- e) As reported by the Agriculture Department, there were no crops in the agriculture fields except few vegetables and agro-forestry crops like casuarina and eucalyptus in the neighboring villages adjoining LG Polymers.

- f) In addition, the scientists from Rural Agriculture Research Station (RARS), Anakapalli conducted an assessment to study suitability of soil for cultivation after the accident. The team analysed soil quality pH ranges from 6.9 to 8.7 i.e., slightly Alkaline and the electrical conductivity ranges from 0.08 to 0.2 milli mhos, which is normal. It has been advised that Paddy, Vegetables and other crops should be cultivated by reclaiming the soil.
- g) The Horticulture Department has analysed the impact of Styrene vapour on the horticulture crop pattern around the company for 5 km radius area. It is reported that 50% of crop damage, i.e., charred and rotting symptoms were observed in vegetable crops, 90% in papaya and no damage in Banana, Drumstick, Sapota, Mango, Cashew, Tamarind and Coconut. The farmers were advised to destroy the crop and not to sell the produce as they were not safe for consumption.
- h) The District Collector constituted a group comprising of 10 Doctors under the Chairmanship of Principal, Andhra Medical College for conducting long term study on the health effects on the 585 people who got affected and had received treatment in the hospital and the others living in the vicinity of the factory.
- i) Indian Council for Medical Research (ICMR) may be entrusted with the task to study the long-term effects of Styrene monomer vapour on the health of the people. ICMR may also look into the various parameters of affected patients, a spectrum of symptoms reported by the exposed people, the impact of acute inhalation of Styrene during the period of the accident and its impact on the vulnerable group like pregnant women, new-born and children and senior citizens. The ICMR can also study impact on the reproductive system, Styrene-induced genetic disorders and also conduct epidemiological study.
- j) A study needs to be conducted by the Animal Husbandry experts to find out the long-term impact on the livestock and animals due to exposure to Styrene vapour.

### 2.3 Action points for the Sub-Committee

The following component wise action points were decided in the Sub-Committee meeting:

<b>S. No.</b>	<b>Scope of work</b>	<b>Action points</b>	<b>Responsible member of the Sub-Committee</b>
1.	Damage to the property	a. Assessment of physical damage to movable and immovable property. b. Identification of loss of movable property during the time of incident i.e., Theft of valuables and vehicles as per the FIRs registered, spoiled consumables like food grains, etc. c. Compensation plan for above items. a. Ex-gratia paid to the deceased persons and affected population by the Government of A.P to be enumerated and included in the compensation plan.	The Commissioner, GVMC and RDO, Visakhapatnam.
2.	Public Health	a. Identification of duration and no. of health camps required for affected population including pregnant women and assessment of cost involved. b. Establishment of a hospital of required bed strength and assessment of capital and recurring cost. c. Assessment of cost involved for conduct of long term health surveys & restoration of health.	Principal, Andhra Medical College, Visakhapatnam and DM&HO, Visakhapatnam.
3.	Agriculture	a. Assessment of crop damage during the gas leakage incident.	Joint Director,

		b. Long term research study of the impact of styrene gas accumulation on the agriculture and horticulture crops.	Agriculture Department and Regional Agriculture Research Station, (RARS), Anakapalle
4.	Live Stock	<p>a. Assessment of cost involved for conduct of long term veterinary health camps.</p> <p>d. Identification of loss of milk, replacement of live stock, feed and fodder support during the time of incident.</p> <p>b. Long term monitoring and surveillance of the health of animals.</p> <p>c. Compensation plan for above items.</p>	Joint Director, Animal Husbandry.

### 3.0 Findings of the Sub-Committee

The Sub-Committee members carried out individual field investigations as per the scope of the work and action points identified in the meeting held on 15.09.2020. The restoration and compensation plan for damage to the property was submitted by the Revenue Divisional Officer, Visakhapatnam. The restoration and compensation plan for damage to the health was submitted by the Principal, Andhra Medical College, Visakhapatnam and District Medical and Health Officer, Visakhapatnam. The restoration and compensation plan for damage to the crops was submitted by the Joint Director of Agriculture, Visakhapatnam. The restoration and compensation plan for damage to the livestock was submitted by the Joint Director, Animal Husbandry, Visakhapatnam.

#### 3.1 The restoration and compensation plan for damage to the property

The report submitted by the Revenue Divisional Officer (RDO), Visakhapatnam is annexed (Annexure-I). The RDO and GVMC Officials carried out damage assessment of the property in the affected area. The report of the damage assessment of the property and the compensation for restoration was prepared taking into consideration the compensation paid to the victims under various heads by Government of A.P, theft amounts as per FIRs, food grains spoiled and discarded by households and the damage to the goods stored in the petty shops. The Component wise assessment of damage and compensation for restoration is tabulated below:

S. No.	Component	Cost estimated in Rs.
i.	Compensation paid by the Government of Andhra Pradesh for Deceased Cases, Medical treatment to the Victims, Dead Animals and Individuals in affected Area	37,17,80,000/-
ii.	Theft amount assessed as per the cases filed in the police stations	2,03,500/-
iii.	The enumeration of the petty shop has been taken up and assessed the damage	5,12,585/-
iv.	Compensation for contamination of food grains / consumables losses Rs.2000/- per each family (Total no.of families-6503).	1,30,06,000/-
	<b>Total</b>	<b>38,55,02,085/-</b>

### 3.2 The restoration and compensation plan for damage to the health

The report submitted by the Principal, Andhra Medical College, Visakhapatnam and District Medical and Health Officer, Visakhapatnam is annexed (Annexure-II). The report of the damage assessment of the health and the compensation for restoration was prepared taking into consideration the establishment of 10 bedded hospital for monitoring the health of the affected public for five years, baseline investigations, research studies on accidental exposure, mental health assessment & restoration of health. The Component wise assessment of damage and compensation for restoration is tabulated below:

S. No.	Component	Cost estimated in Rs.
i.	Establishment of 10 bedded hospital	13,79,17,776/-
ii.	Baseline investigations suggested by general medicine, paediatrics, gastroenterology and pathology.	4,78,98,000/-
iii.	Three research projects were proposed to be carried out by the faculty of Andhra Medical College. a. Cytogenetic effects of accidental exposure to styrene monomer vapour - a population based cohort study b. To study the effect of accidental exposure to high concentration styrene gas on pregnancy and its outcomes. c. Mental health assessment and restoration of health in Styrene affected villages	99,49,250/- 30,24,000/- 89,16,000/-
iv.	Speciality treatment and unforeseen expenditure in hospital attached to Andhra Medical College	2,00,00,000/-
	<b>Total</b>	<b>22,77,05,026/-</b>

### 3.3 The restoration and compensation plan for damage to the Crops

The report submitted by the Joint Director of Agriculture, Visakhapatnam is annexed (Annexure-III). The Joint Director of Agriculture Department, Visakhapatnam and a team of scientists of Regional Agricultural Research Station, (RARS), Anakapalle along with officials from Horticulture

Department & Revenue Department carried out field inspection in the surrounding area on 17.09.2020. It was felt by the team of scientists that the data on yield at the time of harvest of the Kharif crop (Nov-Dec, 2020) along with the essential soil parameters can be taken for long term study of the impact of "styrene gas" accumulation, if any, on crop performance. Soil and underground water quality needs to be monitored at regular intervals for a period of 1-2 years to monitor the effect of styrene gas on soil and water quality. The report of the damage assessment of the crops and the compensation for restoration was prepared taking into consideration organic inputs and other expenses for restoration of crop in affected villages and analysis of soil and irrigation water. The Component wise assessment of damage and compensation for restoration is tabulated below:

S. No.	Component	Cost estimated in Rs.
i.	Estimated cost for inputs for adoption of Best Management practices(Organic + Inorganic)	5,98,840/-
ii.	Charges towards Testing parameters including visits of Scientists	59,500/-
iii.	Compensation Enumerated horticulture crop damages	1,98,938/-
	<b>Total</b>	<b>8,57,278/-</b>

### 3.4 The restoration and compensation plan for damage to the Livestock

The report submitted by the Joint Director, Animal Husbandry, Visakhapatnam is annexed (Annexure-IV). The report of the damage assessment of the livestock and the compensation for restoration was prepared taking into consideration the livestock profile in the affected villages, value of milk discarded during 30 days, amount for replacement of livestock, feed and fodder support and long term monitoring and surveillance. The Component wise assessment of damage and compensation for restoration is tabulated below:

S.No.	Component	Cost estimated in Rs.
i.	The estimated value of milk discarded during 30 days after incident Interim relief	17,42,400/-
ii.	Amount required for providing replacement of animals	9,00,000/-
iii.	Cost estimated for feed and fodder support for	62,33,472/-

	180 days	
iv.	For conducting veterinary Health camps	3,00,000/-
	<b>Total</b>	<b>91,75,872/-</b>

#### 4.0 Conclusions

The damage assessment and the compensation required for restoration of property, health, crops & livestock was taken up by the Sub-Committee consisting of the concerned departments who have taken up elaborate field study and assessed the long term requirements for restoration under each head and submitted compensation plan with the following cost estimate:

**The total Compensation for Damage Assessment is Rs. 62,32,40,261/-**

S. No.	Component	Cost estimated in Rs.
1.	The restoration and compensation estimate for property	38,55,02,085/-
2.	The restoration and compensation estimate for Health	22,77,05,026/-
3.	The restoration and compensation estimate for crops	8,57,278/-
4.	The restoration and compensation estimate for Livestock	91,75,872/-
	<b>Total</b>	<b>62,32,40,261/-</b>

\*\*\*\*

## Annexure-I

Rc.No.1252/2020/K dt. -09-2020.

Revenue Divisional Office,  
Visakhapatnam.

From

K.Penchala Kishore, B.Tech, MBA.,  
Revenue Divisional Officer,  
Visakhapatnam.

To

The District Collector,  
Visakhapatnam.

Sir,

Sub:- Industrial Accident – Visakhapatnam Dist. & Division – Gopalapatnam Mandal – Venkatapuram Village – Styrene Gas leakage incident occurred on early hours at about 3.00 PM on 07-05-2020 – Hon'ble National Green Tribunal order dt.9-6-2020 – Committee for "Final Quantification of Compensation" – Sub Committee Meeting held on 15-09-2020 – Enquiry conducted - Report submitted -Reg.

Ref:-1. Minutes of the meeting & Instructions of the District Collector, Visakhapatnam on submission of report of damages for Preparation of Restoration Plan held on 15-09-2020

\*\*\*

I invite kind attention to the reference cited.

I submit that on 07.05.2020 at about 3.00 AM, Styrene gas leakage occurred in LG Polymers Ltd., at R.R. Venkatapuram Village, Gopalapatnam mandal; resultantly the surrounding vilagers are affected.

I submit that in the above incident 12 persons were died and hundreds of the people suffered with ill-health due to consumption of styrene gas. The Govt. of Andhra Pradesh have paid compensation as detailed below:

Sl.No	Category	No	Amount released	Total Amount
1	Deceased Cases	12	Rs. 1.00 Crore	Rs.12,00,00,000/-
2	Hospitalized cases			
	a) Free Medical Care to all the Victims who are identified in all the Hospital under YSR Aarogyasri Scheme			
	b) Ventilator Treatment	1	Rs.10.00 Lakhs	Rs.10,00,000/-
	c) 2-3 Days Hospitalized	479	1 Lakh	Rs.4,79,00,000/-
	d) People Undergone Primary Treatment	72	Rs.25,000	Rs.18,00,000/-
3	Dead Animals	25 Animals ( 8 Owners)		Rs.8,75,000/-
4	Individuals in affected Area	19876	Rs.10,000/-	Rs.19,87,60,000/-
<b>Total Amount</b>				<b>Rs. 37,03,35,000/-</b>

I submit that the District Collector, Visakhapatnam has convened a meeting on 15-9-2020 and instructed to submit the report on physical damages occurred due to above incident at Venkatapuram Village for reparation of Restoration Plan to arrive at Final Quantification of Compensation. As per the instructions of the District Collector, Visakhapatnam myself along with the Tahsildar, Gopalapatnam, the Zonal Commissioner, Zone-V have visited the habitations to assess the physical damages occurred to the properties in connection with the incident.

During the enquiry it was brought to notice that, on while rescues operations are under progress few miscreants entered in to the houses and taken away few valuable belongings of the victims. Many of the houses kept unlocked as the villagers ran away to save their life's. It is submitted as ascertained that 6 theft cases were filed by the Police Department FIRs also registered and investigation is in progress. Among six cases one case found not genuine and reoffends false. The details of five theft cases are furnished here under:

1. Crime No.216/2020 U/s 457, 380 IPC occurred in between 26-3-2020 at 09 :00 hrs to 09-5-2020 at 21:00 hrs at D No 8-272- 6/1, Flat no 86, VUDA Colony, Gopalapatnam and reported on 10-5-2020 at 13:30 hrs where in the complainant Bokam Nagamani W/o Chinodu, age 25, Caste by K Velama, R/o D no 8- 272-6/1, Flat no 86, VUDA Colony, Gopalapatnam reported that she was living in above address with her family. On 26-03-2020 morning at 09:00 hrs she went to her mother's house at Kancharapalem. Again she came on 09.05.2020 at 21:00 hrs and noticed that some unknown person broke the lock entered into her house and committed theft of Sony TV, HP Gas Cylinder. Total worth 6000/-, She requested for necessary action. Hence the FIR. **Case is UI for want of clues**
2. Crime No. 217/2020 U/S 457,380 IPC occurred in between 08-05-2020 at 11:00 hrs to 10-5-2020 at 18:00 hrs at D no 2- 173/1, Venkatapuram, RRV Puram Gopalapatnam and reported on 10-5-2020 at 22:00 hrs where in the complainant Pindi Venkata Sathish S/o Someswarrao, age 33, Caste by Rajaka, R/o D no 2-173/1, Venkatapuram, RRV Puram Gopalapatnam reported that he was living in Venkatapuram with his family last 2 months. On 7-5-2020 morning at 04:00 hrs some Gas was leaked from L.G. Polymers Company, due to fear he along with his family members left the house and went to his relatives' house at Karasa. On 08.05.2020 morning at 11:00 hrs he came to his house and took his Gold and important items and cash in his room. Again he came on 10-5-2020 at 17:00 to his house and noticed that some unknown persons entered into his house and committed theft of ¼ Tulas Ear studs -2 Pairs, ¼ Tulas Gold Rings-3 and One Tula Gold Ring-1 and cash 13,000/-, Total worth 89,500/- which were kept in his mother's Iron Almarah. Therefore he presented a report for taking necessary action. **Case is UI for want of clues.**
3. Crime No. 218/2020 U/S 454,380 IPC occurred in between 07-05-2020 at 04:30 hrs to 14-5-2020 at 08:00 hrs at D no 1-36, Venkatapuram, Gopalapatnam and reported on 14-5-2020 at 17:30 hrs where in the complainant Seerapu Varaprasad Reddy S/o Apparao, age 27, Caste by Reddy, R/o D no 1-36, Venkatapuram, Gopalapatnam reported that he was living in Venkatapuram with his family. On 7-5-2020 morning at 0430 hrs some Gas was leaked from L.G. Polymers Company, due to fear he along with his family members left the house and went to his friend's house at Adavivaram, Again he came on 14.05.2020 morning at 0800 hrs and noticed that some unknown person entered into his house and committed theft of Two pairs ear studs-2 Tulas, Small Gold Piece -1, Fast Track watch-1, One pair Silver anklets -14 Tulas, One silver spoon, and Silver Harathi stand etc., which were kept in his Iron Almarah. Total worth 60,000 /-. Therefore he presented a report for taking necessary action. During the course of Investigation, Accused A1) Meesala Parameswara Rao @ Paramesh , S/o Late Appalanaidu , A2) Palavalasa Manikanta @ Mani S/o Lakshmanarao , A3) Neduri Sai Kumar @ Siva S/o Eswara Rao , A4) Badiyala Venkatarao @ Mahesh S/o Mangaraju , A5) Badiyala Anith Kumar @ Kumar S/o Mangaraju Was arrested and C.I.C.L. Nekkinti Vinay S/o late Kishore was apprehended on 18.05.2020 and sent for Remand. **This case u/s 457, 380 IPC(HB by Night) was altered to u/s 454 ,380 IPC(HB by Day). Case was Charged. CC NO.2142/2020.**
4. Crime No. 219/2020 U/S 454,380 IPC occurred in between 07-05-2020 at 04:00 hrs to 15-5-2020 at 11:00 hrs at D no 4-49, Gollaveedhi, venkatapuram, Gopalapatnam and reported on 15-5-2020 at 19:30 hrs where in the complainant Sarvasiddhi Lakshmi w/o sunnybabu, age 35, caste by yadava R/o D no 4-49, Gollaveedhi, venkatapuram, Gopalapatnam, Visakhapatnam City reported that she was living in venkatapuram with her family. On 7-5-2020 morning at 04:00 hrs some Gas was leaked from L.G. Polymers Company, due to fear she along with her family members left the house and went to KGH Hospital for medical treatment. After treatment she came to her house on 15.05.2020 morning at 11:00 hrs and noticed that some unknown person entered into his house and committed theft of an amount of Rs.40,000/- which were kept in his Iron Almarah.

Therefore she presented a report for taking necessary action. Hence the FIR. During the course of investigation Accused A1) Meesala Parameswara Rao @ Paramesh , S/o late Appalaraidu , A2) Palavalasa Manikanta @ Mani S/o Lakshmanarao , A3) Neduri Sai Kumar @ Siva S/o Eswara Rao , A4) Badiyala Venkatarao @ Mahesh S/o Mangaraju , A5) Badiyala Anith Kumar @ Kumar S/o Mangaraju Was arrested and C/CL Nekkinti Vinay S/o late Kishore was apprehended on 18.05.2020 and sent for Remand. This case u/s 457,380 IPC(HB by Night) was altered to u/s 454,380 IPC(HB by Day). Case was Charged. CC NO.2142/2020.

5. Crime No. 220/2020 U/S 454,380 IPC occurred in between 07-05-2020 at 03:30 hrs to 15-5-2020 at 15:00 hrs at D no 3-54/1, Venugopalswamy temple, venkatapuram, Gopalapatnam and reported on 15-5-2020 at 20:30 hrs where in the complainant Ellapu vasu S/o Kanakaraju, age 27, caste by kapu R/o at D no 3-54/1, Venugopalswamy temple, venkatapuram, Gopalapatnam reported that he was living in venkatapuram with his family. On 7-5-2020 morning at 03:30 hrs some Gas was leaked from L.G. Polymers Company, due to fear he along with his family members left the house and went to Relatives house at Narava. Again he came to his house on 15.05.2020 morning at 15:00 hrs and noticed that some unknown person entered into his house and committed theft of an amount of Rs. 28,000/- which were kept in his Iron Almarah. Therefore he presented a report for taking necessary action. Hence the FIR. During the course of investigation Accused A1) Meesala Parameswara Rao @ Paramesh , S/o late Appalaraidu , A2) Palavalasa Manikanta @ Mani S/o Lakshmanarao , A3) Neduri Sai Kumar @ Siva S/o Eswara Rao , A4) Badiyala Venkatarao @ Mahesh S/o Mangaraju , A5) Badiyala Anith Kumar @ Kumar S/o Mangaraju Was arrested and C/CL Nekkinti Vinay S/o late Kishore was apprehended on 18.05.2020 and sent for Remand. This case u/s 457, 380 IPC(HB by Night) was altered to u/s 454, 380 IPC(HB by Day). Case was Charged. CC NO.2142/2020.

**In all these above 5 cases the worth of damage is as follows:**

Sl.No.	Crime No. and details	Value of damage in Rs
1	216/2020	6000/-
2.	217/2020	69500/-
3.	218/2020	60000/-
4	219/2020	40000/-
5.	220/2020	28000/-
		2,03,500/-

**(Rupees two lakhs three thousand five hundred only)**

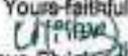
I further submit that due to the heavy ness of the styrene Gas vapors' settled down in the village especially in Venkatapuram habitations. Due to this the food grains and other food items were got effected. The villagers have thrown away these grains and food items into dust bins. In this way it can be assessed that at least 2,000/- of worth of food grains and other consumable were got damaged. So each family can be given Rs.2,000/- of compensation towards food grains / consumable losses. 6503 families exist in the effected zone.

I also submit that the petty vendors/Kirana shops are also affected due to this Styrene Gas leakage. The stocks which they have purchased and stored in their shops were also got damaged. These shop keepers have thrown away their damaged stocks into dust bins as they become hazardous. The enumeration of the petty shop has been taken up and assessed the damage. The details are furnished here under:

Sl. No.	Name of the Kirana Shop	Estimated Damage Amount in Rs.
	<b>Venkatapuram-1</b>	
1	Sri laxmi durga shop	16,163/-
2	Nooka raju kirana shop	30,000/-
3	Venkata padma kirana and general stores	12,630/-
	<b>TOTAL</b>	<b>58,793/-</b>

Venkatapuram -2		
4	Gandam siva general stores	38,885/-
5	pavan venkat teja kirana shop	3,800/-
6	venkat satya sai kirana and general stores	49,422/-
7	Sri rajesawri kirana and general stores	52,366/-
8	mahadhansaxmi kirana	19,290/-
9	Sri satyakirna and general stores	24,075/-
10	elapu appalanarsamma (small shop)	4,005/-
11	S.L.V bengalore bakery	1,10,300/-
12	Godla srinivasurao Sai pan shop	20,845/-
13	vimalakirana general stores	19,204/-
14	palavaralaxmi (tiffin shop)	3,910/-
15	satyanaryana chicken center	8,900/-
16	sridurga chips company	6,600/-
17	kotiyadaJyothi food centre	10,005/-
18	vamsi hot food centre	10,640/-
19	balajisatyavatikiran store	15,640/-
20	srilaxmiganapati manufacturing noodles	5,550/-
21	sivakotivaralaxmi (small shop)	2,760/-
22	pydimaba hot chat	4,750/-
24	chinntalabaddi	445/-
25	tegalachinnitali small shop	1,440/-
26	srivijayadurgabavani daily parlour	9,300/-
27	venkatarama and general stores	27,330/-
	<b>TOTAL</b>	<b>4,63,792/-</b>
	<b>Grand Total</b>	<b>Rs. 5,12,585/-</b>
	<b>(Rupees five lakhs twelve thousand five hundred and eighty five only)</b>	

The copies of FIRs and record of enquiry is submitted for kind perusal.

Yours faithfully  
  
 Revenue Divisional Officer,  
 Visakhapatnam



# ANDHRA MEDICAL COLLEGE Annexure-II

Affiliated to Dr.NTR University of Health Sciences, Vijayawada, Andhra Pradesh

Recognised by Medical Council of India, New Delhi

Maharanipeta, Visakhapatnam, Andhra Pradesh, INDIA 530002

Dr.P.V.Sudhakar,  
M.S., M.Ch, DNB,FAIS,FICS.  
Principal

Date:- 18.9.2020

To  
The Collector & District Magistrate  
Visakhapatnam

Sir,

Sub: Styrene gas leak at LG Polymers RR, Venkatapuram, Visakhapatnam – Plan for restoration and compensation for damage to health – submitted

Ref: Committee meeting on restoration and compensation for damage to health, Property, Crops, Livestock etc., dated: 15.9.2020.

As per the instructions received during the above meeting and as per the MoEF & CC office order subcomponent – 2, I am here with submitting the plan for restoration and compensation for damage to health. The plan for restoration of health as submitted by the DM&HO is incorporated in this report. The budget requirements for research activities under Andhra Medical College, Visakhapatnam for the long term benefits of the population in the affected villages is submitted for your kind perusal and necessary action.

Thanking You Sir,

Yours faithfully

  
18.9.2020  
PRINCIPAL  
Andhra Medical College  
Visakhapatnam

Phone: +91-891-256 1157  
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Email: amc\_vsp@nic.in  
Website: www.amc.edu.in

**Styrene Gas leak at LG polymers Chemical plant in RR Venkatapuram,  
Visakhapatnam**

**Plan for restoration and compensation for damage to health**

In the wee hours of 7<sup>th</sup> May, 2020 uncontrolled Styrene gas release took place from LG Polymers, RR Venkatapuram Village, Visakhapatnam.

This is the first incident of Styrene gas leakage from India. Victims were admitted to King George Hospital, Visakhapatnam, CHC, Pendurthi, CHC, Gopalapatnam & CHC Aganampudi and various private hospitals. There were 12 deaths before reaching the hospitals and 585 patients were admitted as shown below. All the patients admitted to the hospitals survived and discharged after treatment.

**Details of Admissions and Discharges**

Sl. No.	Type of Hospital	Admissions			Discharged
		On Ventilator	General	Total	
1	Government Hospital	0	418	418	418
2	Private Hospital	1	166	167	167
	<b>Total</b>	<b>1</b>	<b>584</b>	<b>585</b>	<b>585</b>

People in RR Venkatapuram and neighboring villages were evacuated to safer places. Once the patients were discharged they have returned home.

Medical camps were conducted daily in all the 6 villages by qualified doctors and Paramedics from 11.05.2020 to 06.07.2020. Approximately 5000 patients were examined and treated.

To have continuous monitoring of the health status of people in RR venkatapuram and neighboring villages an expert committee was formed under the Chairmanship of Principal, Andhra Medical College as follows.

  
**PRINCIPAL**  
 Andhra Medical College  
 Visakhapatnam

Sno.	Committee Member	Designation	Role
01	Dr. P.V. Sudhakar	Principal, AMC	Chairman
02	Dr. K.V.V. Vijaya Kumar	Prof & HoD, Pulmonology	Member
03	Dr. P. Venu Gopal	Prof & HoD, Pediatrics	Members
04	*Dr. VVL Narasimha Rao	Suptd of REH	Member
05	Dr. G. Butchi Raju	Prof & HoD, Neurology	Member
06	Dr. L.R.S. Girinath	I/c Prof Gastroenterology	Member
07	Dr. B. Devi Madhavi	Prof & HoD, SPM	Member
08	**Dr. B. Purushotam Rao	Prof of Gen Med	Member
09	Dr. A. Bhagya Lakshmi	Prof & HoD Pathology	Member
10	Dr. K.V. Leela	Assoc Prof of Biochemistry	Member

\*Dr.V.Rajeswara Rao, Superintendent REH, is included in place of Dr. VVL Narasimha Rao who retired from service.

\*\*Dr.D.Radha Krishna, Professor of General Medicine is included in place of Dr.B.Purushotam Rao who expired due to COVID-19

The following recommendations were given by the expert committee.

1. Baseline study of the population and establishment of registry with different cohorts.
2. Data analysis of all the patients admitted in KGH and other hospitals.
3. Establishment of hospital at RR Venkatapuram.
4. Baseline investigations suggested by departments of General Medicine, Pediatrics, Gastroenterology and Pathology:
  - A. Haemogram
  - B. LFT
  - C. RFT
  - D. X-Ray

Specific advanced tests as and when required.

**a. Neurology:**

- i. To Study post trauma stress disorder ( Psychological Analysis)
- ii. Cognitive dysfunction – Psychometric Test for children
- iii. CNS – EEG, MRI Brain if required
- iv. PNS – NCV if required

  
**PRINCIPAL**  
 Andhra Medical College  
 Visakhapatnam

**b. Pulmonology :**

- i. Baseline respiratory status (COPD)
- ii. Symptomatic patients will be followed with X Ray and CT Thorax if required

**c. Ophthalmology :**

- i. Symptomatic patients to undergo slit lamp examination.
- ii. Neurological examination for visual defects.

5. Monitoring of pregnant women with outcome of pregnancy and 1 year follow up of newborns.

**Dr.Y.S.R. Clinic** : A dedicated facility with 10 beds was established on 07.07.2020 and patients being monitored with adhoc staff.

Health cards were distributed for 10,000 population of all the affected villages for continuous monitoring of health of affected people. (Annexure I)

The District Medical & Health Officer was requested for carryout the baseline investigations of all the card holders.

**Way Forward :**

1. Individual departments of Andhra Medical College will monitor the change in health status of individuals in affected villages and will compare with health status of public in unaffected villages. Weekly camps by two departments will be conducted at Dr YSR health Clinic located at RR Venkatapuram village.
  2. Patients requiring specialized treatment will be treated in various teaching hospitals attached to Andhra Medical College.
  3. Three research projects were proposed to be carried out by the faculty of Andhra Medical College. The details are given in Annexure II
- A. CYTOGENETIC EFFECTS OF ACCIDENTAL EXPOSURE TO STYRENE MONOMER VAPOUR – A POPULATION BASED COHORT STUDY.
  - B. To Study the Effect of Accidental Exposure to High Concentration Styrene Gas on Pregnancy and Its Outcomes.
  - C. Mental health assessment and restoration of health in Styrene affected villages of Visakhapatnam District, Andhra Pradesh.

**BUDGET REQUIREMENTS****YSR CLINIC – STYRENE GAS LEAK - VENKATAPURAM****PROPOSED EXPENDITURE FOR THE 10 BEDDED HOSPITAL FOR 5 YEARS**

S. No	POST	Number of Persons	Salary for Each Person	Total Salaries for one month	Total Salaries for 1 <sup>st</sup> year	Total Salaries for 2 <sup>nd</sup> year	Total Salaries for 3 <sup>rd</sup> year	Total Salaries for 4 <sup>th</sup> year	Total Salaries for 5 <sup>th</sup> year	TOTAL
1	Doctors	03	54,000	1,62,000	19,44,000	40,82,400	62,40,240	84,00,024	1,05,60,002	3,12,26,666
2	Staff Nurse	03	34,500	1,03,500	12,42,000	26,08,200	39,86,820	53,66,682	67,46,668	1,99,50,370
3	Pharmacists	02	28,000	56,000	6,72,000	14,11,200	21,57,120	29,03,712	36,50,371	1,07,94,403
4	Lab Tech	02	28,000	56,000	6,72,000	14,11,200	21,57,120	29,03,712	36,50,371	1,07,94,403
5	Attenders	04	15,000	60,000	7,20,000	15,12,000	23,11,200	31,11,120	39,11,112	1,15,65,432
6	Night Watchman	02	10,000	20,000	2,40,000	5,04,000	7,70,400	10,37,040	13,03,704	38,55,144
7	Sweeper	02	10,000	20,000	2,40,000	5,04,000	7,70,400	10,37,040	13,03,704	38,55,144
8	Thotiy	02	10,000	20,000	2,40,000	5,04,000	7,70,400	10,37,040	13,03,704	38,55,144
9	DEO	01	15,000	15,000	1,80,000	3,78,000	5,77,800	7,77,780	9,77,778	28,91,358

10	Clerk	01	18,000	18,000	2,16,000	4,53,600	6,93,360	9,33,336	11,73,334	34,69,630
11	Drugs & Disposables			50,000	6,00,000	12,60,000	19,26,000	25,92,600	32,59,260	96,37,860
12	Lab Consumables			15,000	1,80,000	3,78,000	5,77,800	7,77,780	9,77,778	28,91,358
	<b>Total</b>				<b>71,46,000</b>	<b>1,50,06,600</b>	<b>2,29,38,660</b>	<b>3,08,77,866</b>	<b>3,88,17,786</b>	<b>11,47,86,912</b>

(Contd)

  
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## YSR CLINIC – STYRENE GAS LEAK - VENKATAPURAM

## PROPOSED EXPENDITURE FOR THE 10 BEDDED HOSPITAL

S. No	POST	No. of Persons	Salary for Each Person	Total Salaries for one month	Total Salaries for 1 <sup>st</sup> year	Total Salaries for 2 <sup>nd</sup> year	Total Salaries for 3 <sup>rd</sup> year	Total Salaries for 4 <sup>th</sup> year	Total Salaries for 5 <sup>th</sup> year	TOTAL
	BF				71,46,000	1,50,06,600	2,29,38,660	3,08,77,866	3,88,17,786	11,47,86,912
13	Maintenance i.e. power, Internet and Telephone			15,000	1,80,000	3,78,000	5,77,800	7,77,780	9,77,778	28,91,358
14	Ambulance Maintenance									
	Drivers	02	20,000	40,000	4,80,000	10,08,000	15,40,800	20,74,080	26,07,408	77,10,288
	Helpers	02	15,000	30,000	3,60,000	7,56,000	11,55,600	15,55,560	19,55,556	57,82,716
15	Fuel			30,000	3,60,000	7,56,000	11,55,600	15,55,560	19,55,556	57,82,716
16	Vehicle Maintenance			5,000	60,000	1,26,000	1,92,600	2,59,260	3,25,926	9,63,786
	<b>Grand Total</b>				<b>85,86,000</b>	<b>1,80,30,600</b>	<b>2,75,61,060</b>	<b>3,71,00,106</b>	<b>4,66,40,010</b>	<b>13,79,17,776</b>

  
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**PROPOSED EXPENDITURE FOR INVESTIGATIONS**

S.No.	Test	No. of People to be covered	Rate (INR)	No. of times	Total
1	Routine tests	10,000	720	6	4,32,00,000
2	CT scan	1,000 (10% of population)	1200	1	12,00,000
3	USG abdomen	2,000 (20% of population)	699	1	13,98,000
4	MRI Brain	500 (5% of population)	1700	1	8,50,000
5	EEG	500 (5% of population)	1500	1	7,50,000
6	NCS	500 (5% of population)	1000	1	5,00,000
				Grand Total	4,78,98,000

  
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**PROPOSED EXPENDITURE FOR RESEARCH ACTIVITY**  
**(A) CYTOGENETIC EFFECTS OF ACCIDENTAL EXPOSURE TO STYRENE**  
**MONOMER VAPOUR – A**  
**(B) POPULATION BASED COHORT STUDY**

Budget Head	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> Year	Total
a. Staff	2 Lab technicians @ 25,000/-per month (6,00,000/ P.A)			18,00,000/-
b. Contingency	1,00,000/- (P.A)			3,00,000/-
e. Chemicals & Consumables				
<b>Cytogenetic Investigations</b> <b>MN &amp; SCE(700 samples)</b> <b>Chromosomal Aberrations (350 samples)</b>	700*1285/- = 8,99,500/-	350*1285/- = 4,49,750/-		13,49,250/-
<b>Molecular Investigations</b> <b>(700 samples)</b>			2000*700 =14,00,000	14,00,000/-
<b>Hematological &amp; Biochemical Investigations</b>	(700 samples * 4 times testing= 2800 samples) 2800*1500 = 42,00,000/-			42,00,000/-
d. LOGISTICS	Vehicle for carrying samples			9,00,000/-
<b>TOTAL</b>				<b>99,49,250/-</b>

  
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**B. To Study the effect of accidental exposure to high concentration Styrene Gas on Pregnancy and its Outcomes**

Budget Head	Split	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	Total
Staff salaries	4 health works	4 * 20000 = 80000	4 * 20000 = 80000	4 * 20000 = 80000	240000
Contingency	2 supervisors	2 * 30000 = 60000	2 * 30000 = 60000	2 * 30000 = 60000	180000
Stationery		50000	50000	50000	150000
		25000	25000	25000	75000
<b>Logistics</b>					
Transport for health care staff	500 per visit	500 * 10 = 5000	500 * 10 = 5000	500 * 10 = 5000	15000
Transport for mothers for TIFFA scan and other investigations	500 per person	500 * 120 = 60000	-	-	60000
TIFFA scan	3000 per person	3000 * 120 = 360000	-	-	360000
<b>Chemicals for Cytogenetics</b> RPMI Medium With L-Glutamine, FBS, PHA-M, Penicillin, Streptomycin and Sodium bicarbonate 1X Liquid Karyotyping Medium Colchicine Solution KCL Methanol and Glacial acetic acid (fixative) Giemsa Stain and Trypsin 5-Bromo-2'-deoxyuridine (BrDu) Cytochalasin B DPS mount	1000 per sample MN and SCE for both cases and controls Chromosomal aberrations analysis will be done only for	120 * 1000 = 120000	-	-	120000

  
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	cases				
<b>Chemicals for Biochemical &amp; Molecular Investigations</b> DNA isolation Kits Primers Ladders Agarose Gel	3214 per sample	120 * 3214 = 385680	-	-	<b>385680</b>
<b>Chemicals for Hematological Investigations</b>	857 per sample	857 * 360 * 2 = 617040	857 * 360 * 2 = 617040	857*120*2 =204240	<b>1438320</b>
<b>Total</b>					<b>30,24,000/- INR</b>

**(C) Mental health assessment and restoration of health in Styrene affected villages of Visakhapatnam District, Andhra Pradesh**

<b>BUDGET:</b>					
Sl No.	Particulars	1 <sup>st</sup> Year (In Rs.)	2 <sup>nd</sup> Year (In Rs.)	3 <sup>rd</sup> Year (In Rs.)	
<b>A</b>	<b><u>Non-Recurring</u></b>				
1	Office establishment	5,00,000	-	-	
2	Equipment's	5,00,000	-	-	
3	Furniture	5,00,000	-	-	
<b>B.</b>	<b><u>Recurring</u></b>				
<b>1.</b>	<b><u>Manpower</u></b>				
a	Project Manager No. 1 @ Rs. 54,000 p.m	2,48,000	2,48,000	2,48,000	
b	Field Investigators (6 months) No. 5 @ Rs. 20,000 p.m.	6,00,000	-	-	
c	Medico social Worker				

  
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	No. 1 @ Rs. 20,000 p.m.	2,40,000	2,40,000	2,40,000
d.	Counsellor No. 1 @ Rs. 20,000 p.m.	2,40,000	2,40,000	2,40,000
e.	Multitasking worker No. 1 @ Rs. 12,000 p.m	1,44,000	1,44,000	1,44,000
f.	Data Entry Operator No. 1 @ Rs. 20,000 p.m	2,40,000	2,40,000	2,40,000
<b>2.</b>	<b>Miscellaneous Expenses</b>			
	Hiring of Building	1,80,000	1,80,000	1,80,000
	Power and Internet	1,80,000	1,80,000	1,80,000
<b>3.</b>	Consumables	1,00,000	1,00,000	1,00,000
<b>4.</b>	Contingencies	2,00,000	2,00,000	2,00,000
<b>5.</b>	Transport	3,00,000	3,00,000	3,00,000
<b>6.</b>	Report Writing	2,00,000	2,00,000	2,00,000
	<b>Total</b>	<b>43,72,000</b>	<b>22,72,000</b>	<b>22,72,000</b>
	<b>Grant Total (1<sup>st</sup> Year + 2<sup>nd</sup> Year + 3<sup>rd</sup> Year)</b>		<b>89,16,000</b>	

  
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**PROPOSED BUDGET FOR SPECIALIST TREATMENT AND UNFORESEEN  
EXPENDITURE IN HOSPITALS ATTACHED TO ANDHRA MEDICAL COLLEGE : 2CR**

Abstract of budget requirements

<b>S.No.</b>	<b>HEAD</b>	<b>INR</b>
1	Expenditure for 10 bedded hospital for 5 years	13,79,17,776
2	Investigations	4,78,98,000
3	Research project 1	99,49,250
4	Research project 2	30,24,000
5	Research project 3	89,16,000
6	To Andhra Medical College	2,00,00,000
	<b>Total</b>	<b>22,77,05,026</b>

(RUPEES TWENTY TWO CRORES SEVENTY SEVEN LAKHS FIVE THOUSAND AND TWENTY SIX ONLY)

  
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**ANNEXURE I****Dr YSR HEALTH CLINIC****HEALTH CARD FOR STYRENE GAS AFFECTED POPULATION**

NAME :

AGE/ SEX :

ADDRESS :

ADHAR NUMBER :

CONTACT NUMBER :

IP NO OF DISCHARGE :

ANTENATAL STATUS : YES/NO

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**NEW BORN** : YES/NO

**COMORBID CONDITIONS:** DIABETES/HYPERTENSION/ CAD/  
THYROID – HYPO/HYPER/ COPD/  
BRONCHIAL ASTHMA

**PRESENTING COMPLAINTS:**

**PHYSICAL EXAMINATION:**

  
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## FIRST VISIT: 1<sup>ST</sup> WEEK

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

  
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 Anthea Medical College  
 Hyderabad

<b>COMPLAINTS</b>	
<b>EXAMINATION</b>	BP:            PALLOR:            ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
<b>CXR</b>	
<b>CT THORAX</b>	
<b>USG ABDOMEN</b>	
<b>SLIT LAMP EXAMINATION</b>	
<b>VISUAL FEILDS</b>	
<b>NEURO</b>	
<b>MRI BRAIN</b>	
<b>EEG</b>	
<b>NCS</b>	

## FIRST VISIT: 2<sup>ND</sup> WEEK

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

  
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 Visakhapatnam

<b>COMPLAINTS</b>	
<b>EXAMINATION</b>	BP:            PALLOR:            ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
<b>CXR</b>	
<b>CT THORAX</b>	
<b>USG ABDOMEN</b>	
<b>SLIT LAMP EXAMINATION</b>	
<b>VISUAL FEILDS</b>	
<b>NEURO</b>	
<b>MR/ BRAIN</b>	
<b>EEG</b>	
<b>NCS</b>	

  
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## SECOND VISIT: 1ST MONTH

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

  
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<b>COMPLAINTS</b>	
<b>EXAMINATION</b>	BP:            FALLOR:            ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
<b>CXR</b>	
<b>CT THORAX</b>	
<b>USG ABDOMEN</b>	
<b>SLIT LAMP EXAMINATION</b>	
<b>VISUAL FEILDS</b>	
<b>NEURO</b>	
<b>MRI BRAIN</b>	
<b>EEG</b>	
<b>NCS</b>	

  
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### THIRD VISIT: 3RD MONTH

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

  
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COMPLAINTS	
EXAMINATION	BP:            PALLOR:            ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
CXR	
CT THORAX	
USG ABDOMEN	
SLIT LAMP EXAMINATION	
VISUAL FEILDS	
NEURO	
MRI BRAIN	
EEG	
NCS	

  
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**FOURTH VISIT: 6<sup>TH</sup> MONTH**

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

  
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<b>COMPLAINTS</b>	
<b>EXAMINATION</b>	BP:            PALLOR:            ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
<b>CXR</b>	
<b>CT THORAX</b>	
<b>USG ABDOMEN</b>	
<b>SLIT LAMP EXAMINATION</b>	
<b>VISUAL FEILDS</b>	
<b>NEURO</b>	
<b>MRI BRAIN</b>	
<b>EEG</b>	
<b>NCS</b>	

  
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### FIFTH VISIT: 9<sup>TH</sup> MONTH

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

  
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COMPLAINTS	
EXAMINATION	BP:      PALLOR:      ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
CXR	
CT THORAX	
USG ABDOMEN	
SLIT LAMP EXAMINATION	
VISUAL FEILDS	
NEURO	
MRI BRAIN	
EEG	
NCS	

  
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### SIXTH VISIT: ONE YEAR

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RFT	
CREATININE	
BUN	
Na	
K	

<b>COMPLAINTS</b>	
<b>EXAMINATION</b>	BP:      PALLOR:      ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
<b>CKR</b>	
<b>CT THORAX</b>	
<b>USG ABDOMEN</b>	
<b>SLIT LAMP EXAMINATION</b>	
<b>VISUAL FEILDS</b>	
<b>NEURO</b>	
<b>MRI BRAIN</b>	
<b>EEG</b>	
<b>NCS</b>	

  
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**UNSCHEDULED VISIT**

HEMOGRAM	
HB	
WBC COUNT	
PLATELET COUNT	
PERIPHERAL SMEAR	
PCV	
MCV	
LFT	
TB	
DB	
SGOT	
SGPT	
ALP	
RET	
CREATININE	
BUN	
Na	
K	

  
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<b>COMPLAINTS</b>	
<b>EXAMINATION</b>	BP:            PALLOR:            ICTERUS:  SKIN: EYE: CVS: RS: CNS: P/A:
<b>CXR</b>	
<b>CT THORAX</b>	
<b>USG ABDOMEN</b>	
<b>SLIT LAMP EXAMINATION</b>	
<b>VISUAL FEILDS</b>	
<b>NEURO</b>	
<b>MRI BRAIN</b>	
<b>EEG</b>	
<b>NCS</b>	

  
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## ANNEXURE II : Research Projects

(A)

Title : **CYTOGENETIC EFFECTS OF ACCIDENTAL EXPOSURE TO STYRENE MONOMER VAPOUR – A POPULATION BASED COHORT STUDY.**

- |    |              |   |
|----|--------------|---|
| 1. | Investigator | Dr P.V. Sudhakar, M.S, M.Ch., DNB,FAIS,FICS,<br>Principal, AMC.   |
| 2. | CO-I's       | <p>Dr A. Bhagyalakshmi, MD<br/>Professor &amp; HoD,<br/>Department of Pathology, AMC</p> <p>Dr B. Devi Madhavi<br/>Professor &amp; HOD,<br/>Dept of Community Medicine,AMC</p> <p>Dr K.V. Leela<br/>Associate Professor,<br/>Department of Biochemistry, AMC</p> <p>Dr K. Satya Sri<br/>Associate Professor,<br/>Department of Pathology, AMC</p> <p>Dr A. Anuradha<br/>Research Scientist,<br/>Multidisciplinary Research Unit (MRU),AMC</p> |

**INTRODUCTION:** Exposure to styrene mainly occur via inhalation during the industrial accident. About 90% of inhaled styrene is absorbed by the lung and undergoes biotransformation to Styrene-7,8-Oxide (SO) via cytochrome P-450s. The product is then hydrolysed by microsomal epoxide hydrolase, followed by metabolism to the main final metabolites, mandelic acid (MA) and phenylglyoxylic acid (PGA). Styrene-7,8-Oxide (SO) can also be conjugated with glutathione giving rise to mercapturic acids. Styrene has been shown to induce single-strand breaks (SSBs) in human white blood cells as well as cytogenetic damage including chromosome breaks, aneuploidy, sister chromatid exchanges (SCEs) and micronuclei (MN) in several cell systems in

  
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vitro and in lymphocytes of exposed workers. International Agency for Research on Cancer classified styrene as possibly carcinogenic to humans and Styrene-7,8-Oxide (SO) as probably carcinogenic to humans. However, there is a little literature regarding the association between styrene and cancer.

These genotoxic biomarkers (MN and SCEs) provide information about normal and pathological states of population and also used for monitoring different aspects of a disease such as: prevention, diagnosis, treatment and progression of the disease. These also helps to assess the environmental and epidemiological risk measurement.

Since the induction of SCEs and MN represent sensitive cytogenetic endpoints for the detection of genotoxic activity of environmental mutagens and carcinogens (WHO, 2014), these two assays will be employed in the present study to monitor a group of subjects accidentally exposed to styrene at LG Polymers, Visakhapatnam.

**Primary Objectives:**

1. To compare the DNA damage assessed in the form of MicroNuclear(MN) assay and Sister Chromatid Exchanges (SCEs) in people exposed to styrene with that of unexposed people.
2. To compare the frequency of MN and Sister Chromatid Exchanges (SCEs) chromosomes in subjects and unexposed people with respect to their habits(smoking and alcohol).
3. To analyze correlation between age and MN.

**Secondary Objectives:**

1. To observe the chromosomal aberrations among the individuals with high scores of MN & SCE's.
2. To assess whether genetically determined individual variations in xenobiotic metabolizing capacity might modify individual susceptibility to potential genotoxic effects following styrene exposure. Individuals will be genotyped for several genes involved in the metabolic fate of styrene including GSTM1 and GSTT1 (gene deletions), GSTP1 (Ile105Val), EPHX1 (Tyr113His and His139Arg), and CYP2E1 (DraI polymorphism in intron 6 that identifies a Thr766Ala substitution).

  
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- **3.** To evaluate correlation between genetic polymorphisms and biomarkers of effect (MN and SCE).

### MATERIAL & METHODS

**Hypothesis:** It is assumed that the people exposed to styrene monomer vapour leak have genotoxic effects.

**Null hypothesis:** The people exposed to styrene monomer vapour leak will not have genotoxic effects.

**Alternative hypothesis:** The people exposed to styrene monomer vapour leak will have genotoxic effects.

**Study Design:** The study is a Cohort study.

**Study period :** The study will be carried out for a period of 3 years.

**Study population :** Exposed group & Unexposed group

The **Exposed group** are the villagers who are residents of place where the LG Polymers company is located and have been admitted to KGH on the day of industrial accident.

**Unexposed group** will be the residents residing in same geographic conditions with similar levels of air pollutants will be recruited for cytogenetic study.

**Sampling frame:-**

**Sample size:** The sample size consists of 350 individuals in exposed group or 350 individuals in unexposed group and the recruited random sample will be tested for Hematological parameters, MN and SCEs in the first year.

**Sample technique:** Stratified sampling in which the population is divided into strata/groups i.e.,

Group 1(5-18yrs)

Group 2(19-64yrs)

**Study tools:** The demographic data will be collected in the form of structured questionnaires.

**Place Of Work :** Andhra Medical College, King George Hospital, Visakhapatnam.

  
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**Exposed Group:****Inclusion criteria :**

1. Individuals of nearby villagers who are exposed to the industrial accident at LG Polymers on 7<sup>th</sup> May 2020 will be recruited.
2. Aged between 5 to 60 years.

**Exclusion criteria :**

1. Patients without informed consent and assent.
2. People under cancer, prolonged usage of immune suppressors and Chronic Kidney failure treatment are excluded.

**Unexposed Group:****Inclusion criteria :**

1. Age and sex matched Individuals residing in similar geographic conditions with similar levels of air pollutants will be recruited.
2. Aged between 5 to 60 years.

**Exclusion criteria :**

1. Patients without informed consent and assent.
2. People under cancer, prolonged usage of immune suppressors and Chronic Kidney failure treatment are excluded.

**Methodology:**

At enrollment, investigator collects information on demographic characteristics, current illness, and medical history.

After taking the written informed consent; clinical and medical history will be noted on a predesigned proforma along with three generation pedigree to assess any history of disease and consanguinity.

  
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### MicroNuclear(MN) assay

Aliquots of 2.5ml of heparinized whole blood are cultured in 4.5ml Hams F10 medium supplemented with 24% foetal calf serum (Sigma), penicillin (100IU/ml) (Sigma), streptomycin (100g/ml) (Sigma), 1% l-glutamine (Sigma) and 1% heparin (50IU/ml) (B. Braun). Lymphocytes are stimulated using 80µl of phytohaemagglutinin (Gibco BRL) and incubated at 37°C. **Cytochalasin B** (Sigma) is added after 44h at a final concentration of 6g/ml (Fenech and Morley, 1985). After a total of 72-h culture, cells are harvested by centrifugation, treated twice with 5ml of a mixture (pH 7.2) of RPMI, supplemented with 2% foetal calf serum, for 7min.

The cells are again centrifuged and submitted to a mild hypotonic treatment in a mixture (pH 7.2) of RPMI 1640:deionized water 1:4, supplemented with 2% foetal calf serum, for 5min. The centrifuged cells will be placed on dry slides and smears are performed. After air-drying, the slides are fixed with freshly prepared and cold methanol:acetic acid (3:1 v/v) for 20min. One day later the slides are stained with 4% Giemsa in phosphate buffer, pH 6.8 for 7min. For each subject, 1000 binucleated (BN) lymphocytes with well-preserved cytoplasm are scored blindly by the same reader. MN are identified according to the criteria of Caria et al. (1995) using a 500× magnification for detection and a 1250× magnification for confirmation.

### Sister Chromatid Exchanges (SCEs) assay

Aliquots of 2.5ml of heparinized whole blood are cultured as described above and 4.5l of 5-bromo-deoxyuridine (BrDu) solution at a final concentration of 10g/ml was added at 24hr. Lymphocytes were incubated at 37°C for 72h in the dark and colcemide (0.11g/ml) is added for the last hour; cells are prepared by standard procedures with hypotonic treatment followed by fixation with methanol:acetic acid (3:1 v/v). Slides are stained for SCE detection by the fluorescence-plus-Giemsa procedure (Perry and Wolff, 1974) for differential chromatid staining. A minimum of 25-s division metaphases will be scored for SCE per subject on coded slides by a single observer.

**Hematological Parameters:** 3 ml venous blood sample was collected in EDTA (Ethylenediaminetetraacetic acid) vacutainer tubes. The sample will be thoroughly, but gently mixed with the anticoagulant immediately after filling the tube. Blood samples will be tested within 4 hours on an automated 5 part differential cell counter for hemoglobin, WBC and platelet counts.

  
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**Genotyping :**

DNA will be isolated from lymphocytes using a commercially available kit according to the manufacturer's instructions (QIAamp DNA extraction kit; Qiagen, Hilden, Germany). CYP2E1, GSTT1, GSTP1, GSTM1, and EPHX1 polymorphisms will be determined as described by Teixeira et al. (2004).

**Biochemical Analysis:**

Urinary metabolites of styrene, namely, MA and PGA, will be measured in all subjects by using kits.

And lastly genetic counseling will be done to all families .

The study will be approved by ethical committee of the Andhra Medical College.

**Results & Data analysis:**

Project-specific case report forms will be used for data collection.

Prior to the study, a questionnaire will be supplied concerning health status, smoking habits, alcohol consumption, medication, and occupational history. The control group will be matched for gender, age, smoking, and lifestyle habits. The normality of variables will be evaluated by the Kolmogorov-Smirnov test. When no significant departure from normality found, Student's t-test will be applied for comparison between group means. Nonparametric tests will be applied when data distribution significantly deviated from normality, and are referred to when results are presented. When no test is specified, Student's t-test and parametric analysis will be applied. Spearman correlation analysis will be used for the estimation of correlations between parameters. A value of  $p < .05$  will be used as the criterion of significance. Multifactorial analysis was performed to evaluate the contribution of potential confounding factors (sex, age, smoking) to the response variables considered.

Microsoft Excel and SPSS will be used for validation and cleaning, for all analyses.

Microsoft Excel will be used for validation and cleaning, for all analyses.

**LIMITATIONS :** As the study is scheduled for a limited period of time, the results may vary when we change the no. of subjects and study period.

**ETHICAL CONSIDERATIONS:**

Prior permission will be taken from Institutional Ethics Committee, Andhra Medical College, Visakhapatnam.

Prior informed consent will be taken from each individual of the study.

  
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**Proposed Budget:**

<b>Budget Head</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> Year</b>	<b>Total</b>
b. Staff	2 Lab technicians @ 25,000/- per month (6,00,000/ P.A)			18,00,000/-
b. Contingency	1,00,000/- (P.A)			3,00,000/-
<b>e. Chemicals &amp; Consumables</b>				
<b>Cytogenetic Investigations MN &amp; SCE(700 samples) Chromosomal Aberrations (350 samples)</b>	700*1285/- = 8,99,500/-	350*1285/- = 4,49,750/-		13,49,250/-
<b>Molecular Investigations (700 samples)</b>			2000*700 =14,00,000	14,00,000/-
<b>Hematological &amp; Biochemical Investigations</b>	(700 samples * 4 times testing= 2800 samples) 2800*1500 = 42,00,000/-			42,00,000/-
<b>d. LOGISTICS</b>	Vehicle for carrying samples			9,00,000/-
<b>TOTAL</b>				<b>99,49,250/-</b>

  
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**(B)****PROJECT TITLE:**

**To Study the Effect of Accidental Exposure to High Concentration Styrene Gas on Pregnancy and Its Outcomes**

**Investigator** Dr P.V. Sudhakar, M.S, M.Ch., DNB,FAIS,FICS,  
Principal, AMC.

**CO-I's** Dr B. Devi Madhavi  
Professor & HOD,  
Dept of Community Medicine,AMC

**Dr A. Bhagyalakshmi, MD**  
Professor & HoD,  
Department of Pathology, AMC

**Dr.T.Nagamani**  
Prof. & HOD,  
OBG, AMC

**Dr.G.Ganga Bhavani**  
Associate Professor,  
Department of Community Medicine, AMC

**Dr.L.Siva Kumar**  
Assistant Professor,  
Department of Community Medicine, AMC

**Dr.G.Raja Lakshmi**  
Assistant Professor,  
OBG ,AMC

**AIM:**

To study the genotoxic effects among antenatal women who are accidentally exposed to high concentrations styrene gas and its impact on pregnancy outcome at the LG polymers styrene gas leak accident in Visakhapatnam in May 2020.

  
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**OBJECTIVE:**

1. To assess the impact of styrene gas exposure on pregnancy outcome in the form of miscarriage, still births, low birth rate, congenital anomalies in the new born both morphologic and genetic.
2. To assess the susceptibility to genotoxicity in antenatal mothers who were accidentally exposed to styrene.
3. To compare the pregnancy outcomes among the exposed antenatal women with and without exposure to styrene gas.
4. To follow the children born to mothers exposed to styrene up to a period of two years for growth and developmental assessment.

**DELIVERABLES:**

1. Early detection of genetic damage is crucial to implement the necessary measures to reduce or suppress the exposure to deleterious agent (styrene) when the damage is still reversible, thus reduce the risk to suffer diseases. Therefore, genotoxicity tests should be considered as essential tools for a complete medical surveillance of people potentially exposed to styrene and, in order to prevent the occurrence of diseases to styrene exposure. On the other hand, the application of these tests is useful to detect possible long-term effects of substances that are encountered by an industrial accident without knowing their capacity to affect human and environmental health.
2. This work provides new data about the ante natal exposure to styrene and helps to create a baseline data which can assist the physicians by increasing their awareness to determine the health risks that they may present as it is a unique incident.
3. Helps further in the search of information about ante-natal health for future interventions and genetic counselling.

**METHODOLOGY**

**Study design** - Cohort study

**Study setting** - within 3 km radius from LG polymers plant, the people who got accidentally exposed to styrene

**Study population** - All the pregnant mothers who got exposed to styrene gas within 3km radius from the LG polymers plant.

**Study duration** - August 2020 to August 2023. Which is 36 months.

**Sample size**- 60 pregnant women who were exposed to styrene gas on May 10 2020.

  
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**Data collection method:** Exposed pregnant women are recruited within three Kilometre radius of LG polymers where styrene gas leak has occurred. Pregnant women who are registered by the local ASHA /ANM by house to house survey are line listed and taken into the study after informed consent. Controls are taken from nearby PHC who are not exposed and willing to participate in the study in the ratio of 1:2. These are matched on the basis of age, trimester and nutrition.

Necessary investigations (lymphocyte micro nuclei frequency, CBMN ASSAY, Sister Chromatid)

One time new born investigations for assessing congenital anomalies(TIFFA Scan)

Growth follow up using Trivandrum development scale, length, weight up to 2 years.

congenital anomalies

Miscarriage, IUD, still birth

Preterm delivery

Testing for genotoxicity in both pregnant and new-born

**BUDGET:**

Budget Head	Split	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	Total
Staff salaries	4 health works	4 * 20000 = 80000	4 * 20000 =80000	4 * 20000 =80000	240000
Contingency	2 supervisors	2 * 30000 =60000	2 * 30000 =60000	2 * 30000 =60000	180000
Stationery		50000	50000	50000	150000
		25000	25000	25000	75000
<b>Logistics</b>					
Transport for health care staff	500 per visit	500 * 10 = 5000	500 * 10 = 5000	500 * 10 = 5000	15000
Transport for mothers for TIFFA scan and other Investigations	500 per person	500 * 120 = 60000	-	-	60000
TIFFA scan	3000 per person	3000 * 120 =360000	-	-	360000

  
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<b>Chemicals for Cytogenetics</b> RPMI Medium With L-Glutamine, FBS, PHA-M, Penicillin, Streptomycin and Sodium bicarbonate 1X Liquid Karyotyping Medium Colchicine Solution KCL Methanol and Glacial acetic acid(fixative) Giemsa Stain and Trypsin 5-Bromo-2'-deoxyuridine (BrDu) Cytochalasin B DPS mount	1000 per sample MN and SCE for both cases and controls Chromosomal aberrations analysis will be done only for cases	120 * 1000 = 120000	-	-	120000
<b>Chemicals for Biochemical &amp; Molecular Investigations</b> DNA isolation Kits Primers Ladders Agarose Gel	3214 per sample	120 * 3214 = 385680	-	-	385680
<b>Chemicals for Hematological Investigations</b>	857 per sample	857 * 360 * 2 = 617040	857 * 360 * 2 = 617040	857*120*2 =204240	1438320
<b>Total</b>					<b>30,24,000/- INR</b>

  
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(C)

**Mental health assessment and restoration of health in Styrene affected villages of  
Visakhapatnam District, Andhra Pradesh.**

<b>Investigator</b>	Dr P.V. Sudhakar, M.S, M.Ch., DNB,FAIS,FICS, Principal, AMC.
<b>CO-I's</b>	Dr. B. Devi Madhavi Professor & HOD, Dept of Community Medicine,AMC <b>Dr.S.Radha Rani</b> Professor of Psychiatry, Department of Psychiatry, AMC <b>Dr.T.S.N.Raju</b> Assistant Professor of Psychiatry, Department of Psychiatry, AMC <b>Dr.Kiran Kumar</b> Assistant Professor, Department of Community Medicine, AMC <b>Dr.L.Siva Kumar</b> Assistant Professor, Department of Community Medicine, AMC

**Introduction:**

Studies conducted in the aftermath of environmental disasters such as Chernobyl and Bhopal, as well as studies of less well-known contamination cases, have documented a variety of important psychosocial impacts (1-10). These psychosocial impacts range from increased levels of distress to severe social disruption and conflict. In addition, some studies have suggested that the psychosocial impacts of environmental accidents can be quite long lived (1). There is a growing body of literature and research focused on understanding these psychosocial impacts, much of it dealing with clinical issues and implications. Up to this point, however, far less attention has been focused on program and policy issues connected with efforts to plan and deliver psychosocial assistance to victims of chemical and nuclear accidents. Because environmental accidents are expected to be a continuing problem incoming decades (11), and because psychosocial services are certain to be a crucial part of the public health and human service response, there is a pressing need for these program and policy issues to be more fully considered.

  
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In view of above studies under taken after accidents, this current study is propose to assess the psychosocial wellbeing through a base line survey & to provide services for psychosocial wellbeing, also to access the prevalence of Post trauma stress disorder due to styrene gas release in the Visakhapatnam area.

**Objectives:**

1. To assess the psychosocial wellbeing through a base line survey.
2. To assess the prevalence of Post trauma stress disorder.
3. To provide services for psychosocial wellbeing
4. To establish a centre for counseling for assessment of psychological wellbeing will be done using a standardized questionnaire.

**Methodology:**

A base line survey will be taken over for 6 months by the field investigators for a population of 20,000 people. A centre will be established for the next 2 ½ years for counseling the population to access the prevalence of Post trauma stress disorder due to styrene gas release & provide necessary psychological wellbeing services to the population.

**Expected Deliverables:**

1. Prevalence of PTSD (Post trauma stress disorder) among the affected community.
2. Improvement in mental health

  
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<b>BUDGET:</b>				
Sl.No.	Particulars	1 <sup>st</sup> Year (In Rs.)	2 <sup>nd</sup> Year (In Rs.)	3 <sup>rd</sup> Year (In Rs.)
<b>A. Non-Recurring</b>				
1	Office establishment	5,00,000	-	-
2	Equipment's	5,00,000	-	-
3	Furniture	5,00,000	-	-
<b>B. Recurring</b>				
<b>I. Manpower</b>				
a	Project Manager No. 1 @ Rs. 54,000 p.m.	2,48,000	2,48,000	2,48,000
b	Field Investigators (6 months) No. 5 @ Rs. 20,000 p.m.	6,00,000	-	-
c	Medico social Worker No. 1 @ Rs. 20,000 p.m.	2,40,000	2,40,000	2,40,000
d	Counsellor No. 1 @ Rs. 20,000 p.m.	2,40,000	2,40,000	2,40,000
e	Multitasking worker No. 1 @ Rs. 12,000 p.m.	1,44,000	1,44,000	1,44,000
f	Data Entry Operator No. 1 @ Rs. 20,000 p.m.	2,40,000	2,40,000	2,40,000
<b>2. Miscellaneous Expenses</b>				
	Hiring of Building	1,80,000	1,80,000	1,80,000
	Power and Internet	1,80,000	1,80,000	1,80,000
3.	Consumables	1,00,000	1,00,000	1,00,000
4.	Contingencies	2,00,000	2,00,000	2,00,000
5.	Transport	3,00,000	3,00,000	3,00,000
6.	Report Writing	2,00,000	2,00,000	2,00,000
	<b>Total</b>	<b>43,72,000</b>	<b>22,72,000</b>	<b>22,72,000</b>
	<b>Grant Total (1<sup>st</sup> Year + 2<sup>nd</sup> Year + 3<sup>rd</sup> Year)</b>		<b>89,16,000</b>	

  
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 Andhra Medical College-  
 Visakhapatnam

From  
Dr.K.Vijaya Lakshmi  
District Medical and Health officer,  
Visakhapatnam.

Date: 18.9.2020.

To  
The Principal  
Andhra Medical College  
Visakhapatnam.

Sir,

Sub:- Styrene Gas leak –LG Polymers, RR Venkatapuram - Estimation of budget for running health centre- submitted

Ref:- Committee meeting on restoration and compensation plan for damage to health, property, crops live stock etc. dt.15.9.2020.

\*\*\*\*\*

With reference to above subject, I wish to submit the estimated budget requirement for running Health Center (Dr.YSR Health Clinic) established in RR Venkatapuram on 07.7.2020.

I request you to incorporate the estimate under Sub component – 2 as per the MoEF & CC orders.

Thanking you Sir,

Yours faithfully,

  
(Dr.K.Vijaya Lakshmi)  
District Medical & Health Officer  
Visakhapatnam

**BUDGET REQUIREMENTS****YSR CLINIC – STYRENE GAS LEAK - VENKATAPURAM****PROPOSED EXPENDITURE FOR THE 10 BEDDED HOSPITAL FOR 5 YEARS**

S. No	POST	Number of Persons	Salary for Each Person	Total Salaries for one month	Total Salaries for 1 <sup>st</sup> year	Total Salaries for 2 <sup>nd</sup> year	Total Salaries for 3 <sup>rd</sup> year	Total Salaries for 4 <sup>th</sup> year	Total Salaries for 5 <sup>th</sup> year	TOTAL
1	Doctors	03	54,000	1,62,000	19,44,000	40,82,400	62,40,240	84,00,024	1,05,60,002	3,12,26,666
2	Staff Nurse	03	34,500	1,03,500	12,42,000	26,08,200	39,86,820	53,66,682	67,46,668	1,99,50,370
3	Pharmacists	02	28,000	56,000	6,72,000	14,11,200	21,57,120	29,03,712	36,50,371	1,07,94,403
4	Lab Tech.,	02	28,000	56,000	6,72,000	14,11,200	21,57,120	29,03,712	36,50,371	1,07,94,403
5	Attenders	04	15,000	60,000	7,20,000	15,12,000	23,11,200	31,11,120	39,11,112	1,15,65,432
6	Night Watchman	02	10,000	20,000	2,40,000	5,04,000	7,70,400	10,37,040	13,03,704	38,55,144
7	Sweepers	02	10,000	20,000	2,40,000	5,04,000	7,70,400	10,37,040	13,03,704	38,55,144
8	Thoty	02	10,000	20,000	2,40,000	5,04,000	7,70,400	10,37,040	13,03,704	38,55,144
9	DEO	01	15,000	15,000	1,80,000	3,78,000	5,77,800	7,77,780	9,77,778	28,91,358
10	Clerk	01	18,000	18,000	2,16,000	4,53,600	6,93,360	9,33,336	11,73,334	34,69,630
11	Drugs & Disposables			50,000	6,00,000	12,60,000	19,26,000	25,92,600	32,59,260	96,37,860
12	Lab Consumables			15,000	1,80,000	3,78,000	5,77,800	7,77,780	9,77,778	28,91,358
	<b>Total</b>				<b>71,46,000</b>	<b>1,50,06,600</b>	<b>2,29,38,660</b>	<b>3,08,77,866</b>	<b>3,88,17,786</b>	<b>11,47,86,912</b>

District Medical & Health Officer  
Visakhapatnam

YSR CLINIC – STYRENE GAS LEAK - VENKATAPURAM

PROPOSED EXPENDITURE FOR THE 10 BEDDED HOSPITAL

S. No	POST	Number of Persons	Salary for Each Person	Total Salaries for one month	Total Salaries for 1 <sup>st</sup> year	Total Salaries for 2 <sup>nd</sup> year	Total Salaries for 3 <sup>rd</sup> year	Total Salaries for 4 <sup>th</sup> year	Total Salaries for 5 <sup>th</sup> year	TOTAL
	<b>BF</b>				<b>71,46,000</b>	<b>1,50,06,600</b>	<b>2,29,38,660</b>	<b>3,08,77,866</b>	<b>3,88,17,786</b>	<b>11,47,86,912</b>
13	Maintanance i.e. power,Internet and Telephone			15,000	1,80,000	3,78,000	5,77,800	7,77,780	9,77,778	28,91,358
14	<b>Ambulance Maintanance</b>									
	1) Drivers	02	20,000	40,000	4,80,000	10,08,000	15,40,800	20,74,080	26,07,408	77,10,288
	2) Helpers	02	15,000	30,000	3,60,000	7,56,000	11,55,600	15,55,560	19,55,556	57,82,716
15	Fuel			30,000	3,60,000	7,56,000	11,55,600	15,55,560	19,55,556	57,82,716
16	Vehicle Maintanance			5,000	60,000	1,26,000	1,92,600	2,59,260	3,25,926	9,63,786
	<b>Grand Total</b>				<b>85,86,000</b>	<b>1,80,30,600</b>	<b>2,75,61,060</b>	<b>3,71,00,106</b>	<b>4,66,40,010</b>	<b>13,79,17,776</b>

10.07  
18/9/2020  
District Medical & Health Officer  
Visakhapatnam

From  
Dr.K.Vijaya Lakshmi  
District Medical and Health officer,  
Visakhapatnam.

Date: 18.9.2020.

To  
The Principal  
Andhra Medical College  
Visakhapatnam.

Sir,

Sub:- Styrene Gas leak –LG Polymers, RR Venkatapuram - Budget requirement for Lab tests- submitted.

Ref:- Committee meeting on restoration and compensation plan for damage to health, property, crops live stock etc. dt.15.9.2020.

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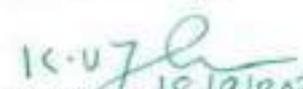
With reference to above subject, Laboratory tests are contemplated for needy 10000 populations in the affected villages. A detailed exercise of required tests was done and quotations were called from laboratories and finalized the rates.

In this connection, I am herewith submitting the detailed budget proposals for carrying out the tests.

Hence I request you to incorporate the proposal in the Sub component – 2 as per the MoEF & CC office order.

Thanking you Sir,

Yours faithfully,

  
(Dr.K.Vijaya Lakshmi)  
18/9/2020

District Medical & Health Officer  
Visakhapatnam

**PROPOSED EXPENDITURE FOR INVESTIGATIONS**

S.No.	Test	No. of People to be covered	Rate (INR)	No. of times	Total
1	Routine tests	10,000	720	6	4,32,00,000
2	CT scan	1,000 (10% of population)	1200	1	12,00,000
3	USG abdomen	2,000 (20% of population)	699	1	13,98,000
4	MRI Brain	500 (5% of population)	1700	1	8,50,000
5	EEG	500 (5% of population)	1500	1	7,50,000
6	NCS	500 (5% of population)	1000	1	5,00,000
				<b>Grand Total</b>	<b>4,78,98,000</b>

*10.07/18/19/2020*  
District Medical & Health Officer  
Visakhapatnam

## DEPARTMENT OF AGRICULTURE

From  
Smt. G.S.N.S. Leelavathi, M.Sc(Ag),  
Joint Director of Agriculture,  
Visakhapatnam.

To  
The Joint Chief Environmental Engineer  
A.P. Pollution control board  
Visakhapatnam

Sir,

File No. AGRI-CAL/ /2020-JA(T1)-AGRLVSKP, Dated 23.09.2020

Sub- Disaster Management - Gas leakage tragic incident- Visakhapatnam district- styrene vapours released from m6 storage tank of LG Polymers India Pvt. Ltd.- submission of input assessment report - Regarding.

Ref:- 1. AGRI-CAL/ 2020-SA(T1)-AGRLVSKP, Dated 19.09.2020, of this office  
2. Roc.No.A/2037/2020, Dt.21.09.2020, ADR, RARS, Anakapalli  
3. Rc. No. H(1) 16/2020, Dt. 23-09-2020, ADH, Visakhapatnam

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It is submitted that, in continuation to the restoration plan for damage to the crops village level a report submitted (as per ref. 1<sup>st</sup> cited), The Associate Director of Research has furnished the information on input requirement for adoption of best management practices in paddy crop and other expenses towards visit of the scientist has been submitted (ref.2<sup>nd</sup> cited), The Assistant Director of Horticulture has submitted the enumerated crop damages at the time of incident (ref 3<sup>rd</sup> cited) is herewith enclosed.

In this connection I submit the abstract of report towards supply of Inputs for adoption of Best Management practices both Organic and Inorganic, expenses towards visit of scientists and also compensation enumerated horticulture crop damages.

Estimated cost for inputs for adoption of Best Management practices (Organic + Inorganic) (Rupees)	598840
Charges towards Testing parameters including visits of Scientists	59500
Compensation Enumerated horticulture crop damages	198938
<b>Grand total</b>	<b>857278</b>

Hence submitted for necessary information.

Yours faithfully

*[Signature]* 23/9/2020  
Joint Director of Agriculture  
Visakhapatnam

Copy submitted to the District collector, Visakhapatnam for favour of kind information  
Copy submitted to the Commissioner of Agriculture, A.P., Guntur for favour of kind information  
Copy submitted to ADR, RARS, Anakapalli  
Copy submitted to ADH, Visakhapatnam

Cost of Inputs and other expenses for restoration of crop in L.G.Polymers affected villages-  
Agriculture Department

	Particulars	Qty per Ha	unit rate (Rs.)	Amount per Ha.
	<b>Organic Inputs</b>			
1	FYM	10 MTs	650	6500
2	Boifertilizers (3types per lit)	1.25 Lit	300	1125
3	Neem cake	500Kg	10	5000
4	Greenmanure	37.5 kg	50	2000
5	Trichocards (4releases)	10 cards	50	500
	<b>Inorganic inputs</b>			
1	Urea	263Kg	296/- (per 50kg bag)	1555
2	SSP	375 kg	500/- (per bag)	3750
3	MOP	100 kg	950/- (per bag)	1900
	<b>Plant protection chemicals (Need based)</b>			
1	Monocrotophos	1000ml	272/500ml	540
2	Tricyclazole	300gm	255/120gm	637.5
3	Hexaconazole	1000ml	245/400ml	612.5
4	Carbendizm	750gm	200/300gm	500
5	Cartaphydrochloride	20kg	650/5kg	2600
			<b>Total cost per ha</b>	<b>27220</b>

The villages affected in the L.G.Polymers incident are mostly living habitations, the only village with cropping area is R.Venkatapuram. As per the report given by MAO, there is an extent of 22Ha paddy in kharif grown in the endowment lands of the village, hence the estimated cost for inputs (Rupees)

1)

598840

	Additional Testing parameters	Rs. Per sample	As per recommendation samples	
1	soil sample	600	6000	
2	plant sample	1000	11000	
3	grain sample	1000	10000	
4	irrigation water	250	2500	
5	earthworm count	1000	10000	
6	Microbial Count			
7	soil sample collection charges per visit (5 visits)	1000	5000	
8	POL Charges (for scientist visits) per visit (5 visits)	3000	15000	
			2)	59500
	<b>Total estimation (Inputs + testing parameters)</b>		<b>(1+2)</b>	<b>658340</b>

<b>Total estimated enumerated Horticulture crop damages</b>	<b>3)</b>	<b>198938</b>
<b>GRAND TOTAL</b>	<b>(1+2+3)</b>	<b>857278</b>

*[Signature]*  
Joint Director of Agriculture  
Visakhapatnam  
Scanned with CamScanner

## DEPARTMENT OF AGRICULTURE

From  
Smt. G.S.N.S.Leelavathi, M.Sc{Ag},  
Joint Director of Agriculture,  
Visakhapatnam.

To  
The Joint Chief Environmental Engineer  
A.P. Pollution control board  
Visakhapatnam

Sir,

File No. AGRI-CAI/ /2020-JA(TI)-AGRI VSKP, Dated 22.09.2020

Sub:- Disaster Management - Gas leakage tragic incident- Visakhapatnam district- styrene vapours released from m6 storage tank of LG Polymers India Pvt. Ltd.- submission of input assessment report - Regarding.

Ref:- 1. AGRI-CAL/ 2020-SA(TI)-AGRI VSKP, Dated 19.09.2020, of this office  
2. Rec.No.A/2037/2020, Dt-21.09.2020, ADR, RARS, Anakapalli

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It is submitted that, in continuation to the restoration plan for damage to the crops village level a report submitted (as per ref. 5<sup>th</sup> cited), The Associate Director of Research has furnished the information on input requirement for adoption of best management practices in paddy crop and other expenses towards visit of the scientist has been submitted (ref.6<sup>th</sup> cited) is herewith enclosed.

Hence submitted for necessary information.

Yours faithfully

*AS* *22/9/2020*  
Joint Director of Agriculture  
Visakhapatnam

*24/9/2020*

Copy submitted to the District collector, Visakhapatnam for favour of kind information

Copy submitted to the Commissioner of Agriculture, A.P., Guntur

**Details of Inputs and other expenses for restoration of crop in L.G.Polymers affected villages-  
Agriculture Department**

S.No.	Particulars	Qty per Ha	unit rate (Rs.)	Amount per Ha.
<b>Organic Inputs</b>				
1	FYM	10 MTs	650	6500
2	Boifertilizers (3types per lit)	1.25 Lit	300	1125
3	Neem cake	500Kg	10	5000
4	Greenmanure	37.5 kg	50	2000
5	Trichocards (4releases)	10 cards	50	500
<b>Inorganic inputs</b>				
1	Urea	263Kg	296/- (per 50kg bag)	1555
2	SSP	375 kg	500/- (per bag)	3750
3	MOP	100 kg	950/- (per bag)	1900
<b>Plant protection chemicals (Need based)</b>				
1	Monocrotophos	1000ml	272/500ml	540
2	Tricyclazole	300gm	255/120gm	637.5
3	Hexaconazole	1000ml	245/400ml	612.5
4	Carbendizm	750gm	200/300gm	500
5	Cartaphydrochloride	20kg	650/5kg	2600
<b>Total cost per ha</b>				<b>27220</b>
The villages affected in the L.G.Polymers incident are mostly living habitations, the only village with cropping area is R.Venkatapuram. As per the report given by MAO, there is an extent of 22Ha paddy in kharif grown in the endowment lands of the village, hence the estimated cost for inputs (Rupees)				<b>598840</b>
<b>Additional Testing parameters</b>		<b>Rs. Per sample</b>	<b>As per recommendation samples</b>	
1	soil sample	600	6000	
2	plant sample	1000	11000	
3	grain sample	1000	10000	
4	irrigation water	250	2500	
5	earthworm count	1000	10000	
6	Microbial Count			
7	soil sample collection charges per visit (5 visits)	1000	5000	
8	POE Charges (for scientist visits) per visit (5 visits)	3000	15000	
			<b>59500</b>	
<b>Total estimation (Inputs + testing parameters)</b>				<b>658340</b>

BSS (22/3/2020)  
Joint Director of Agriculture  
Visakhapatnam

24/3/2020

**GOVERNMENT OF ANDHRA PRADESH  
DEPARTMENT OF HORTICULTURE**

From  
Smt.K.Sailaja  
Asst. Director of Horticulture  
Visakhapatnam

To  
The Joint Director of Agriculture  
Visakhapatnam

**Re. No. H(1) 16/2020, Dt. 23-09-2020**

Madam,

Sub:- M/s LG Polymers - Styrene Gas Leakage – Damage to Horticulture crops - -  
Compensation to farmers from M/s LG Polymers – Request-Regarding.

Ref:- 1. Rc.No. 360/2020/B/dt 4-6-2020/O/o Tahsildar, Gopalapatnam  
2. Rc.No. 190/2020/C/dt 6-6-2020/O/o Tahsildar, Pendurthi  
3. Study report of Dr. YSR, Horticulture University Scientists,  
Venkataramannagudem, West Godavari, district

\*\*\*\*

With references to 1<sup>st</sup> and 2<sup>nd</sup> cited above, it is submitted that Mandal level teams of Gopalapatnam and Pendurthi have enumerated Horticulture crop damages in R.Venkatapuram village of Gopalapatnam Mandal and Vepagunta village of Pendurthi Mandal due to Styrene gas leakage from M/s LG Polymers.

Further, submitted that, both the Tahsildars have certified that the lands belong to Sri SVLN Devasthanam and are unsettled villages. As the compensation cannot be released to farmers in unsettled inam villages by the Government, the compensation detailed below may be recommended from M/s LG Polymers.

The recommended compensation to affected farmers is as detailed below.

Sl.No	Crop	Extent damaged in Acres/No. Of trees	Estimated loss per acre/ fruit crops in (Rs)	Recommended compensation per acre @ 75 % (Rs)	Estimated Total amount (Rs)
1	Vegetables	4.25 ac	40000	30000	127500
2	Banana	0.30 ac	49000	36750	11025
3	Papaya	0.15 ac	200000	150000	22500
4	Mango	400 trees	22500	-	16875
5	Cashew	100 trees	9000	-	6750
6	Sapota	40 trees	18000	-	13500
7	Coconut	30 trees	1050	-	788
	<b>Grand Total</b>				<b>198938</b>

Vide ref 3<sup>rd</sup> cited, team of Horticulture Scientists from Dr.YSR Horticulture University, Venkataramannagudem, West Godavari, district have concluded that there is no adverse effect on soil, hence horticulture crops can be cultivated during succeeding seasons.

In this, connection, it is requested to recommend compensation of crop loss to affected farmers in Inam lands from M/s LG Polymers.

Submitted for favour of information.

Yours faithfully

*Smt. K. Sailaja*  
Asst. Director of Horticulture,  
Visakhapatnam

*Smt. K. Sailaja*  
23-09-2020

# ACHARYA N.G.RANGA AGRICULTURAL UNIVERSITY



**Dr. M. Bharathalakshmi,**  
M.Sc.(Ag.) Ph.D.  
Associate Director of Research

Regional Agricultural Research Station,  
Anakapalle – 531 001,  
Visakhapatnam Dist  
Ph : 08924-223370 (O), 9989625211  
e-mail : adrczone1983@gmail.com



Roc. No. A/ 2037 /2020, Dated.21-09-2020

To  
The Joint Director of Agriculture  
PM Palem  
Visakhapatnam

Respected Madam,

Sub : Regional Agricultural Research Station, Anakapalle-Information on input cost for best management of paddy crop per unit area and other expenses in R. Venkatapuram village, M/s LG polymers Gas leakage affected area – Submission – Reg.

Ref : Telephonic discussion with the Joint Director of Agriculture, Visakhapatnam on 20.09.2020

\*\*\*

In the light of above mentioned subject and as per the telephonic discussions held with the Joint Director of Agriculture, Visakhapatnam on 20.09.2020, I am herewith furnishing information on Input requirement for adoption of best management practices in paddy crop and other expenses towards visit of Scientist and chemicals pertaining to soil, plant and irrigation water sample analysis in R. Venkatapuram village, M/s LG polymers Gas leakage affected area for favour of information.

### Details of input cost per unit area and other expenses:

S.No.	Particulars	Qty. per ha	Unit rate (Rs.)	Amount per ha (Rs.)	Remarks
<b>Organic Inputs</b>					
01	Farm Yard Manure	10 T	650	6500	Any one of the organic source can be utilized
02	Vermi compostper Tonne	2 T	3000	6000	
03	Biofertilizers per Lt (3 types of biofer.)	1.25 Lt	300	1125	
04	Neem cake	500 kg	10	500	
05	Green manure (Diancha/Sunhemp seed)	37.5 kg	50	2000	
06	Trichocards (4 releases)	10 cards	50	500	
<b>Inorganic inputs</b>					
07	Urea	263 kg	296/bag	1555	Recommended dose of
08	Single Super Phosphate	375 kg	500/bag	3750	

09	Muriate of Potash	100 kg	950/bag	1900	fertilizers
10	Monocrotophos	1000 ml	272/500 ml	540	Need based plant protection chemicals
11	Tricyclozole	300 g	255/120 g	637.5	
12	Hexaconazol	1000 ml	245/400 ml	612.5	
13	Carbendazim	750 g	200/300 g	500	
14	Cartop Hydrochloride granules	20 kg	650 /5 kg	2600	
15	Seedling cost for Agroforestry (Seedlings from Department of Forestry)				
	<b>Testing charges (per sample)</b>	<b>Rs. Per sample</b>			
15	Soil sample analysis (per sample)	600			Analysis for soil and Irrigation water will be taken up before and after the crop season and plant sample will be taken up at maturity stage (For every 5 acres of land one sample is the optimum sample size). The heavy metal analysis has to be taken by the Pollution Control Board.
16	Plant sample analysis (per sample)	1000			
17	Grain sample analysis (per sample)	1000			
18	Irrigation water analysis (per sample)	250			
19	Earthworm count	1000			
20	Microbial count (will be done at ARS, Amaravathi)				
	<b>Other Miscellaneous charges</b>				
21	Sample collection charges per visit	1000			
22	POL charges (Conveyance to scientist visits) per visit	3000			

This is submitted for favour of kind information and further necessary action.

Yours faithfully

  
21/9/2020  
Associate Director of Research

DEPARTMENT OF AGRICULTURE

From  
Smt. G.S.N.S.Leelavathi, M.Sc(Ag),  
Joint Director of Agriculture (FAC),  
Visakhapatnam.

To  
The Joint Chief Environmental Engineer  
A.P. Pollution control board  
Visakhapatnam

Sir,

File No.AGRI-CAL/2020-SA(TI)-AGRLVSKP, Dated 19.09.2020

Sub:- Disaster Management - Gas leakage tragic incident- Visakhapatnam district- styrene vapours of LG Polymers India Pvt. Ltd.- preparation of the restoration plan and compensation for damage to the crops - Regarding.

- Ref:- 1. High Power Committee on Investigation Of Styrene Vapour Leak From LG Polymers India Pvt. Ltd., Visakhapatnam report Dt.15.06.2020  
2. NGT (Sesha Sainareddy) report Dt.,28.05.2020  
3. Lr.no.Gen/PCB/RO-VSP/NGT/2020- Dt.31.08.2020, APPCB, Visakhapatnam  
4.F.No.11/20/2020, Dt.21.07.2020, MoEF &CC office order  
5. File No.AGRI-CAL./2020-JA(TI)-AGRLVSKP, Dated 01.06.2020 of this office.  
6. Analysis reports from VIMTA labs Dt.07.06.2020  
7. Analysis reports of microbial population dynamics, ARS, Amaravathi, Dt.22.06.2020  
8. Roc. No.A/1587/2020, Dt.16.07.2020, RARS, Anakapalli  
9. File No.AGRI-CAL/2020-JA(TI)-AGRLVSKP, Dated 01.08.2020 of this office  
10. Lr.No.2937/Dr.YSRHU/Res.I/2020, Dt.14.09.2020, Dr.YSR Horticulture University, Venakatarammannagudem.  
11.Lr. from RARS, Anakapalli, Dt18.09.2020

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It is submitted that vide ref. 9<sup>th</sup> cited a report has been submitted stating that, At the time of gas leakage incident there were no field crops existing in the affected area except few vegetable crops and agroforestry. But to study the affect of styrene on the soil, 63 soil samples were collected on 13.05.2020 and analysed for various parameters like pH, E.C, O.C, N,P, K, Zn, Fe, Mn, Cu, S, B at the Soil testing laboratory, Department of Agriculture. According to the soil health reports, the pH ranges from 6.9 to 8.7 i.e., slightly Alkaline and the E.C ranges from 0.08 to 0.2 mms which are normal.

The Biological properties of soil i.e., Total bacterial population, total fungal population, Beneficial microorganisms were analysed at ARS, Amaravathi (ref. 7<sup>th</sup> cited) and also analysed for heavy metals at VIMTA, Labs Visakhapatnam (ref.6<sup>th</sup> cited). Based on these reports received from Research Scientist, ARS, Amaravathi and VIMTA- Laboratories, crop suitability assessment for cultivation has been given by Associate Director of Research, RARS Anakapalli, that it is satisfactory and the soil is suitable for cultivation of crops. (Ref. 8<sup>th</sup> cited).

It is further submitted that a team of Scientists from Dr.YSR Horticulture University, Venakatarammannagudem, has also submitted a report (Ref.10<sup>th</sup> cited) on soil quality, micro fauna, Water quality stating that there was no affect of styrene vapour on soil physiochemical and biological properties after 40days of the said incident and hence suggested that all crops can be grown by adopting good agricultural practices.

It is further submitted that, as per the instructions received in ref. 3<sup>rd</sup> and 4<sup>th</sup> cited for preparation of the restoration plan and compensation for damage to the crops a team constituting of Scientists from RARS, Anakapalli (Principal Scientist-Crop physiology, Principal Scientist-Agronomy, Senior Soil Scientist), Officers from Department of Agriculture ie., Joint Director of Agriculture, ADA@ Visakhapatnam along with MAO,

Chinagadili, Assistant Director of Horticulture, and MRO, Gopalapatnam has visited the village on 17.09.2020.

The team visited the Agricultural fields of R. Venkatapuram village and made the following observations (ref.11<sup>th</sup> cited)

1. The paddy crop is being irrigated with seepage water of Meghadrigedda reservoir mixed with municipal drainage water which was of poor quality for crop cultivation, dumped with plastic and other wastages, it may be a threat to the soil health in near future.
2. Paddy variety of BPT 5204 (Sambamahsuri) was planted with over aged seedlings of 50-60 days nursery and the crop is at active tillering stage (25-30 days after transplanting)
3. The cultivators, in general, have not adopted the timely management practices. The crop was planted with aged nursery, basal dose of fertilizers were not applied. The crop has symptoms of leaf blast and leaf folder incidence for which the plant protection chemicals were not sprayed.
4. On visual observation, Paddy crop looked healthy and symptoms of any adverse effect on growth due to styrene gas leak were not visible as the plant height and tillering were normal with 25-40 tillers per hill and 40-45 cm plant height coupled with chlorophyll content of leaf at 37.4 SPAD/SCMR value, which is a good sign of crop geometry at tillering stage for reaping good yields.
5. It was informed by the cultivators, that they are taking two crops in a year with the crop sequence of Paddy-Paddy and Paddy-Vegetables with available municipal drainage water.
6. The surrounding vegetation viz., *Casuarina*, Banana, Eucalyptus and other miscellaneous tree vegetation were also observed to be normal.
7. It is observed that, at present there is No abnormalities in crop condition situated in R.Venkatapuram village and further inference can be realized after receipt of the harvesting data of paddy (Nov/Dec, 2020).

Based on the above visual observations and the soil data obtained from the Department of Agriculture/Horticulture, the team is of the opinion that reclamation of soils can be done to ward off the any possible ill effects due to styrene gas leakage on the performance of crops and for avoiding the ill effects of drainage water which is being utilized for cultivation of crops.

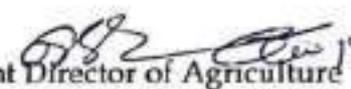
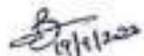
- a. It is suggested that green manure crops like Diancha, sunhemp etc., should be invariably grown as preceding kharif crop to sustain the soil and crop productivity.
- b. Application of organic manures like Farm Yard Manure, Pressmud cake, vermicompost, neem cake and other edible cakes can also be advocated for enrichment of soil organic matter content and soil health management.
- c. Use of different types of biofertilizers (*Azotobacter*, *Azospirillum*, Phosphate solubilizers and Potash solubilizers) can also be suggested for improvement of crop yields through enrichment of soil beneficial microflora.
- d. Irrigation with municipal drainage water for cultivation of crops can also be discouraged to curtail the soil health hazards in future.
- e. Incorporation of crop residues after every cropping cycle may be made mandatory for improvement of soil health.
- f. Supply of orchard/forest seedlings keeping in view of maintaining green vegetation for healthy livelihood as many people are residing in the vicinity of M/s LG Polymers.

Use of biocontrol tools like trichocards can also be promoted for pest control in crops to discourage chemical plant protection keeping in view of environmental safety and protection.

*It was felt by the team of scientists that data on yield at the time of harvest of the kharif crop (Nov-Dec, 2020) along with the essential soil parameters can be taken for long term study of the impact of "styrene gas" accumulation, if any, on crop performance. Similar observations at periodical intervals for at least two years may help in drawing valid conclusions on the impact of Styrene gas leakage on crop performance in the subsequent years.*

This is submitted for favour of information.

Yours faithfully

  
Joint Director of Agriculture  
Visakhapatnam  


Copy submitted to the District collector, Visakhapatnam for favour of kind information

Copy submitted to the Commissioner of Agriculture, A.P., Guntur

Copy submitted to the Associate Director of Research, RARS, Anakapalli

## DEPARTMENT OF AGRICULTURE

From  
Smt. G.S.N.S.Leelavathi, M.Sc(Ag),  
Joint Director of Agriculture,  
Visakhapatnam.

To  
The Commissioner of Agriculture  
A.P., Guntur.

Sir,

File No.AGRI-CAL/ /2020-JA(T1)-AGRLVSKP, Dated 01.06.2020

Sub:- Disaster Management - Gas leakage tragic incident- report on News article "Ryots hit as gas leak damages, halts cultivation - Regarding.

- Ref:- 1. News article - Ryots hit as gas leak damages, halts cultivation"- Indian express.  
2. R.C.No.679/2020/D3, Dt.10.05.2020, District Collector Visakhapatnam  
3. Lr. No.7063/PCB/ZO-VSP/Tech./2020- A.P Pollution Control board-zonal office -Visakhapatnam  
4. AGRI. CAL JA(T1)- AGRIL.VSKPdt14.05.2020 & 23.05.2020 of this office  
5. RC. No. H(1)16/2020, Dt01.06.2020 Department of Horticulture, Visakhapatnam  
6. Reports received from the Mandal Agricultural Officers of Chinagadili and Pendurthi  
7. Mail sent to RARs Anakapalli, dt 01.06.2020 from this office.  
8. Report from APPCB, Zonal lab Visakhapatnam dt:01.06.2020

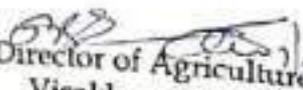
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It is submitted that, in response to the News article "Ryots hit as gas leak damages, halts cultivation" the facts analysed are here with reported

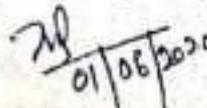
- As per the orders from the District Collector received in the reference 2<sup>nd</sup> cited above to Collect the vegetables, fruits and grass etc., in the farms and handed over safely to GVMC for safe disposal in biomedical waste method for avoiding consumption and feeding of cattle around.
- In view of the letter vide ref. 3<sup>rd</sup> cited from A.P Pollution Control board-zonal office - Visakhapatnam, the crop damage report and contamination assessment report has been submitted through ref. 4<sup>th</sup> cited. Soil samples were collected in random manner and assessed for nutrient status parameters (PH, E.C, O.C, N,P, K, Zn, Fe, Mn, Cu, S, B).
- In response to the ref. 1<sup>st</sup> cited, Department of horticulture has submitted the assessment report stating the cropping around the affected villages, concluding that crops exposed, charred and rotten due to styrene gas affect are being destroyed through disposal in biomedical waste method. And soil samples were collected from around the 5km radius immediately after the incident,63 soil samples have been collected from Agri and Horticulture fields and analysed by Mobile testing Laboratory Visakhapatnam.
- According to soil health reports the PH ranges from 6.9 to 8.7 i.e., slightly Alkaline and the E.C ranges from 0.08 to 0.2 mms which is normal. It is advised Paddy, Vegetables and other Plantation crops can be taken by reclaiming the soil with Gypsum @ 200 kgs per acre where the PH is beyond 8.5. The report received from APPCB, Zonal lab Visakhapatnam in ref. 8<sup>th</sup> cited, has also indicated the similar results, stating that Styrene concentrations couldn't be analysed as the Styrene standard is not readily available with them and the same will be procured and the samples will be analysed in due course.

- e) As per the reference 6<sup>th</sup> cited, report submitted by Mandal Agricultural Officers China Gadili and Pendurthi, stated that Venkatapuram and Kothapalem villages comes under Venkatapuram Revenue village having 55 Acres of wet land and approximately 92 farmers are cultivating the crops which are unsettled endowment lands. The main crops are Paddy during Kharif, and Vegetables during Rabi seasons. These fields are being benefitted by the seepage water of Megadhri Gedda reservoir. At the time of incident there were no field crops existing.
- f) In the Kamparapalem village 100 acres of wet land is there, with 175 farmers usually take up Paddy in Kharif, it is totally rainfed area and there is no other crop for the rest of the season. Laxmipuram village is having 30 acres of wet land with Paddy in Kharif followed by Vegetables in Rabi in an extent of 5-7 acres being cultivated by 75 farmers. There were no Agricultural crops existing in the field except Vegetables and Agro forestry crops like Casuarina and Eucalyptus at the time of incidence.
- g) Meanwhile the scientists from RARS, Anakapalli have been contacted for the Parameters to be analyzed for assessment of the styrene gas affect along with the suitability of soil for cultivation and have been suggested for analyzing soil quality parameters -Chemical and physical properties like pH, E.C, Available nutrients (macro and micro nutrients), Heavy metals, Bulk Density, Hydraulic Conductivity, Infiltration rate etc. and also suggested for assessment of Biological properties of soil Total bacterial population, total fungal population, Beneficial microorganisms (Nitrogen fixers and phosphate solubilizers), Enzyme activity (Dehydrogenase, urease, acid and alkaline phosphatase). For guidance on analysis of biological properties, a letter has been addressed to Directorate of Research, microbiology, Amaravathi.
- h) As the real time effect of Styrene has not reflected in the above parameters analysis and also APPCB, Visakhapatnam has informed that Styrene concentrations couldn't be analysed, A.U. Environmental Engineering Department, College of Engineering, Andhra university, Visakhapatnam are also consulted for further clarification on suitability of soil for cultivation in these areas along with analysis of soil for other parameters if any required, but due to the non-availability of required facilities with them the VIMTA, Laboratories have been contacted for analysis of heavy metals on payment basis and each sample analysis costing Rs.3500/- approximately. We have collected composite samples of 4 numbers from the affected villages which are being submitted for analysis. As informed by the laboratory the analysis report on heavy metals will be received in 5days, soon after the receipt of the same will be submitted for further necessary action.

Yours Faithfully

  
Joint Director of Agriculture  
Visakhapatnam

Copy submitted to the District Collector for favour of information.

  
20/01/06/2020



## ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

From:  
Dr. D.V.Ramana Reddy,  
Principal Scientist (SS&AC) & Head,  
Agril. Research Station,  
AMARAVATHI – 522 020.  
Guntur (Dist.), A.P.,

To  
The Joint Director of Agriculture,  
Visakhapatnam-

**Lr. No. ARS, AMT/Microbial analysis of soil samples/2020, dt.21.06.2020.**

Sir,

Sub: Agril. Research Station, Amaravathi – Microbial analysis of soil samples-Report-Submitted-Reg.

Ref: 1. File No. AGRI-CAL/2020-JA(T1)-AGRL VSKP, Dt.01.06.2020  
Joint Director of Agriculture, Visakhapatnam

###

As per the reference cited above, the report of microbial analysis of the soil samples is herewith enclosed / attached.

Yours faithfully,

*Dr. D.V. Ramana Reddy*  
22/6/2020

Principal Scientist & Head  
Agril. Research Station  
AMARAVATHI - 522 020  
Guntur Dist. A.P.

Your Ref : File No. AGRI-CAL/2020-JA(T1)-AGRL VSKP, Dt.01.06.2020

**Joint Director of Agriculture, Visakhapatnam**

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**Microbial population dynamics in soil samples of the villages of Vishakhapatnam**

Sample Name	Total Bacteria	Total fungi	Beneficial Population					
			KRB	PSB	<i>Rhizobium</i>	<i>Actinomycetes</i>	<i>Azospirillum</i>	<i>Azotobacter</i>
Kothapalem	$30 \times 10^7$	$10 \times 10^4$	$40.6 \times 10^5$	$30.0 \times 10^3$	$10.0 \times 10^3$	$93.0 \times 10^6$	$5 \times 10^5$	$33 \times 10^6$
Laxmipuram	$10 \times 10^7$	$90 \times 10^2$	$38.0 \times 10^3$	$38.0 \times 10^3$	$40.0 \times 10^4$	$108.0 \times 10^6$	$12 \times 10^3$	$62 \times 10^6$
Venkatapuram	$30 \times 10^7$	$20 \times 10^4$	$47.0 \times 10^5$	$10.2 \times 10^5$	$12.0 \times 10^3$	$74.0 \times 10^3$	$28 \times 10^3$	$36 \times 10^3$
Kampara palem	$10 \times 10^7$	$10 \times 10^4$	$15.0 \times 10^5$	$12.0 \times 10^4$	$25.0 \times 10^4$	$57.5 \times 10^3$	$36 \times 10^4$	$96 \times 10^6$

# Vimta

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## Test Report

ISSUED TO :-	REPORT NUMBER :VLL/VSKP/20/00426/001
Customer Name : Joint Director of Agriculture	ISSUE DATE : 2020-06-07
Customer Address: Joint Director of Agriculture, P M Palcon, Vizag ,AP,India	CUSTOMER REFERENCE : TRF
	CUSTOMER REFERENCE DATE : 2020-06-02

Customer Provided Details :			
Sample Name :	Soil (Kancharapalem village)		
Brand Name :	NA	Batch/Lot Number :	NA
Mfg. Date :	NA	Exp .Date	NA
Test Required :	Heavy metals		
Others Details if Any :	NA		
Lab provided Details :			
Sample Received Date :	2020-06-02	Sample Registration Date :	2020-06-02
Analysis Starting Date :	2020-06-05	Analysis Completion Date :	2020-06-05
Quantity Received :	500grms X.1No		
Sampling Details :	NA		

### TEST RESULTS

Sl. No.	Test Parameters	Method of Testing	UOM	Results
1	Heavy Metals			
1.a	Arsenic as As	In house	ppm (mg/kg)	0.22
1.b	Cadmium as Cd	In house	ppm (mg/kg)	<0.1
1.c	Mercury as Hg	In house	ppm (mg/kg)	<0.1
1.d	Lead as Pb	In house	ppm (mg/kg)	7.68

Results relate only to the sample tested.

Remark: Nil

\*END OF THE TEST REPORT\*

For Vimta Labs Limited

*Chandana*

Yesudasu.Ch  
Sr.Analyst

PAGE | 1 of 1

Sample tested at and report issued by: VIMTA LABS LTD, # 9-13-45/2-9-3, 3<sup>rd</sup> floor Above Tanishq, 'N' Circle, VIP Road, Visakhapatnam-530003, Andhra Pradesh, India  
Tel No: 043 67404040 Fax: 6071, 6074

# Vimta

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TEST REPORT

ISSUED TO :-	REPORT NUMBER :VLL/VSKP/20/00426/002
Customer Name : Joint Director of Agriculture	ISSUE DATE : 2020-06-07
Customer Address: Joint Director of Agriculture, P M Palem, Vizag ,AP,India	CUSTOMER REFERENCE : TRF
	CUSTOMER REFERENCE DATE : 2020-06-02

**Customer Provided Details :**

Sample Name :	Soil (Laxmipuram village)		
Brand Name :	NA	Batch/Lot Number :	NA
Mfg. Date :	NA	Exp. Date :	NA
Test Required :	Heavy metals		
Other Details if Any	NA		

**Lab provided Details :**

Sample Received Date :	2020-06-02	Sample Registration Date :	2020-06-02
Analysis Starting Date :	2020-06-05	Analysis Completion Date :	2020-06-05
Quantity Received :	500gms X 1No		
Sampling Details :	NA		

**TEST RESULTS**

Sl. No.	Test Parameters	Method of Testing	LOM	Results
1	Heavy Metals			
1.a	Arsenic as As	In house	ppm (mg/kg)	0.25
1.b	Cadmium as Cd	In house	ppm (mg/kg)	<0.1
1.c	Mercury as Hg	In house	ppm (mg/kg)	<0.1
1.d	Lead as Pb	In house	ppm (mg/kg)	4.30

Results relate only to the sample tested.

Remarks: Nil

**\*END OF THE TEST REPORT\***

For Vimta Labs Limited

*Chrup Sar*  
Yesudasa Ch  
Sr. Analyst

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Sample tested at and report issued by: VIMTA LABS LTD, # 9-13-45/2-9-3, 3<sup>rd</sup> floor Above Tarinbu, 'N' Circle, VIP Road, Visakhapatnam-530013, Andhra Pradesh, India  
Tel No: 043 07408040 Fax: 6071, 6074



Fast Report

ISSUED TO :-	REPORT NUMBER : VLL/VSKP/20/00426/003
Customer Name : Joint Director of Agriculture	ISSUE DATE : 2020-06-07
Customer Address: Joint Director of Agriculture, P M Palam, Vizag ,AP,India	CUSTOMER REFERENCE : TRF
	CUSTOMER REFERENCE DATE : 2020-06-07

## Customer Provided Details :

Sample Name :	Soil (Kothapalem village)		
Brand Name :	NA	Batch/Lot Number :	NA
Mfg. Date :	NA	Exp .Date	NA
Test Required :	Heavy metals		
Others Details if Any	NA		
Lab provided Details :			
Sample Received Date :	2020-06-02	Sample Registration Date :	2020-06-02
Analysis Starting Date :	2020-06-05	Analysis Completion Date :	2020-06-05
Quantity Received :	500gms X 1No		
Sampling Details :	NA		

## TEST RESULTS

Sl. No.	Test Parameters	Method of Testing	UOM	Results
1.	Heavy Metals			
1.a	Arsenic as As	In house	ppm (mg/kg)	0.28
1.b	Cadmium as Cd	In house	ppm (mg/kg)	<0.1
1.c	Mercury as Hg	In house	ppm (mg/kg)	<0.1
1.d	Lead as Pb	In house	ppm (mg/kg)	8.87

Results relate only to the sample tested.

Remark: Nil

\*END OF THE TEST REPORT\*

For Vimta Labs Limited

Yesudasu.Ch  
Sr. Analyst

Page | 1 of 1

Sample tested at and report issued by: VIMTA LABS LTD, # 9-13-45/2-9-3, 3<sup>rd</sup> floor Above Tansig, 'N' Circle, VIP Road, Visakhapatnam-530003, Andhra Pradesh, India  
Tel No: 048 67404040 Ext: 6071, 6074

# ACHARYA N.G.RANGA AGRICULTURAL UNIVERSITY



Dr. M. Bharathalakshmi  
M.Sc (Ag), Ph.D.  
Associate Director of Research &  
Principal Scientist (Sugarcane) I & II

Regional Agricultural Research Station,  
Anakapalle - 531 001, Visakhapatnam Dist.  
Ph - 08924-223370 (3), 224164 (15)  
Fax-08924-224024  
e-mail - aghr@rsr1.19032@gmail.com



Rec.No.A/1587/2020, Dt:16.07.2020

To  
The Joint Director of Agriculture,  
Visakhapatnam District.

Sr.

Sub: RARS, Anakapalle - Department of Soil Science & Agricultural Chemistry -  
Soil analytical report from Gas leakage affected villages of Visakhapatnam  
District - Crop suitability for cultivation on affected villages - Remarks -  
Submitted - Reg.

Ref: 1. File No. AGRI-CAL/2020-JA (TI) - AGRI VSKP, Date. 02.07.2020 of Joint  
Director of Agriculture, Visakhapatnam District.  
2. Note from the Principal Scientist (Soil Science & Agril. Chemistry).  
Date. 13.07.2020

\*\*\*

With reference to the above, I am to inform that, as per the testing reports regarding the  
quality of soils suitability to different crops it is found that the heavy metals (Pb, Cd, AS, Hg) are  
in safer limits and soil beneficial microbial counts, total bacteria and total fungi are also found at  
satisfactory levels.

Therefore the crops which were grown hitherto can be suggested for cultivation in the  
specified gas leakage affected village soils.

Yours faithfully,

*Bharathalakshmi*  
16/7/2020

Associate Director of Research

*Mud*  
14/7/2020  
*ALB*  
16/7/2020  
*S*  
16/7/2020



**Dr.Y.S.R. HORTICULTURAL UNIVERSITY**  
**Administrative Office, Venkataramannagudem – 534 101,**  
**West Godavari District, Andhra Pradesh**

Ph. No. 08818 219522  
 Fax No. 08818 264313

From  
 Dr.R.V.S.K.Reddy, -  
 Director of Research.

To  
 The Commissioner of Horticulture,  
 Department of Horticulture,  
 TTPC Building, 1<sup>st</sup> Floor,  
 Old Market Yard,  
 Near Rythu Bazar,  
 Chuttugunta, Guntur – 522007.

**Lr.No.2937/Dr.YSRHU/Res.1/2020, Dated:14.09.2020**

Sir,

Sub: Dr.YSRHU - Research - Horticulture Department - Leakage of styrene gas vapours from M/s.L.G.Polymers India Pvt. Ltd., Visakhapatnam on 07.05.2020 - Compliance report - Enclosed - Regarding.

- Ref: 1. N.F.No.P&M(1) 44/2015, dtd:02.06.2020 of the Commissioner of Horticulture, A.P., Guntur.  
 2. Lr.No.2937/Res./2020, dtd:12.06.2020 of this office.  
 3. Lr.No.HRS-ABJ/147/LG Poly/Styrene/20, dt:31.08.2020 of the Prl.Sci.(Hort.) & Head, HRS, Ambajipeta.  
 4. Note orders of the Hon'ble Vice-Chancellor, Dr.YSRHU; dtd:11.09.2020.

\*\*\*\*\*

In accordance with the reference 1<sup>st</sup> cited, I am herewith enclosing the compliance report of "Adverse affects of styrene vapour on the soil, horticulture crops/other adverse impact existing with in 5 km vicinity of the M/s LG Polymers India Pvt. Ltd., Visakhapatnam".

This is for favour of kind information & necessary action.

Yours faithfully,

Encl: Compliance Report

  
 14/9/2020  
 DIRECTOR OF RESEARCH  
 For  
 rufat/2020

Cc: to PS to Hon'ble Vice-Chancellor, Dr.YSRHU, V.R.Gudem,  
 Copy to SF/SC.

**REPORT ON ADVERSE AFFECTS OF  
STYRENE VAPOUR ON THE SOIL  
PROPERTIES, HORTICULTURE  
CROPS/OTHER ADVERSE IMPACT  
EXISTING WITHIN 5 KM VICINITY OF  
THE M/S LG POLYMERS INDIA PVT. LTD.,  
VISA KHAPATNAM**



**Dr. Y.S.R. HORTICULTURAL UNIVERSITY  
VENKATARAMANNAGUDEM  
WEST GODAVARI DISTRICT  
ANDHRA PRADESH**

**Report on adverse affects of styrene vapour on the soil, horticulture crops/other adverse impact existing within 5 km vicinity of the M/s LG Polymers India Pvt. Ltd.,  
Visakhapatnam.**

**Background:**

M/s LG Polymers India Pvt. Ltd. was established in 1961 as "Hindusthan Polymers" for manufacturing polystyrene and its co-polymers at Visakhapatnam, India. The industry is located at R.R.Venkatapuram, Visakhapatnam district, Andhra Pradesh. The company has stored styrene monomer in vertical MS storage of 2500 KL and 3500 KL capacity provided with internal cooling system through refrigeration to maintain below 200°C. An accident occurred at 03:02 am on 7<sup>th</sup> May 2020 where the stored styrene monomer in vertical MS storage tank of 2500 KL capacity has spread in the form of gas to the surrounding villages of Venkatapuram, Padhmanabhapuram, SC & BC Colony. The concentration of styrene was high at the time of leakage in Venkatapuram village among other surrounding villages.

With regard to the above issue, a group of scientists from Dr. YSRHU, V.R.Gudem were deputed by the Director of Research, Dr. YSR Horticultural University, Venkataramanagudem vide Lr. No. 2937/Res./2020, Dated: 12.06.2020 as per the instructions given by Hon'ble Vice-Chancellor and Commissioner of Horticulture, Dr. YSRHU, A.P with an objective to study the adverse effects of styrene vapour on different existing horticultural crops and soil properties within 5 km vicinity of LG Polymers India Pvt. Ltd., Visakhapatnam.

The following team members visited Venkatapuram village on 18.06.2020 which bore the burnt of styrene gas release.

1. Dr.B.V.K.Bhagavan, Principal Scientist (Hort.) and Head & Zonal Research Head (CZ-1), HRS, Ambajipeta
2. Dr.N.B.V.Chalapathi Rao, Principal Scientist (Ento.), HRS, Ambajipeta
3. Dr.K.Ravindra Kumar, Scientist (Hort.), HRS, Kovvuru
4. Sri. P. Raja Sekhar, Scientist (SS&AC), KVK, Pandirimamidi

During the visit, the team has observed existing crop condition of vegetables crops like Brinjal, Chilli, Okra and gourds, fruits crops like Sapota, banana and mango. Scientists have also collected the soil samples at different depths in styrene affected gardens as per standard methods for analysis of soil physio-chemical properties and also to examine the population of soil micro fauna under laboratory conditions.

### Styrene Gas Leak Accident:

- An accident occurred at 03:02 am on 07.05.2020 from 2500 KL tank. The company has stored styrene monomer in vertical MS storage tanks of 2500 KL and 3500 KL capacity provided with internal cooling system through refrigeration to maintain 200 °C. Due to accident the styrene gas has spread to the surrounding villages of Venkatapuram, Padmanabhapuram, SC&BC colony.
- The concentration of styrene was high at the time of accident in the villages. The concentrations could not be measured at that time as there were lethal and villages were inaccessible.
- Subsequently the concentrations of styrene were measured in the ambient air by Andhra Pradesh Pollution Control Board (APPCB) on 07.05.2020. As per the monitoring values the styrene gas is present at low concentrations in the range of 1 to 2.5 ppm in the affected area as on 07.05.2020 at 09.30 AM.

### About styrene:

Styrene is a colourless, clear liquid. It has a sweet smell and can be found in nature as well as manufactured. It can also be found in common foods and beverages, such as strawberries, coffee, cinnamon, peanuts and tobacco. Manufactured styrene has wide range of uses and is a component of many goods including polystyrene, fibreglass, packaging materials, electrical insulation, home insulation, drinking cups, food packaging, rubber and carpet backing.

Styrene is a volatile and highly flammable compound. Styrene vapour is heavier than air and 3.25 times higher than oxygen molecular weight (32 g/mol). At concentrations normally encountered in the workplace, the air and styrene mixer is not significantly heavier than clean air. Styrene evaporates more rapidly at high temperatures (eg. the evaporation rate at 30°C is twice to that at 20°C).

### Physical and Chemical Properties of Styrene (C<sub>8</sub>H<sub>8</sub>):

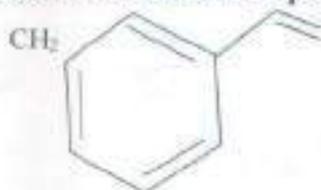


Fig. Structural formula of styrene

Parameter	Unit	Value	Remark
Molecular weight	[g.mol <sup>-1</sup> ]	104.15	-
Water solubility	[g.L <sup>-1</sup> ]	0.3	20°C
Vapour pressure	[pa]	667	20°C
Melting point	[°C]	-30.6	-
Boiling point	[°C]	145-146	-
Hydrolysis half-life	DT50 [d]	-	Styrene contains no hydrolysable groups
Photolysis half-life	DT50 [h]	< 16 hrs	Hydroxyl radicals and tropospheric ozone rapidly degraded styrene
Degradability	-	-	Readily bio-degradable

(Source: Letter report 601782017 on Environmental risk limits for styrene from National Institute for Public Health and the Environment, 2009)

#### Sampling and Analysis:

During the visit to study site a total 22 no. of soil samples were collected randomly from 6 locations at two depths i.e. 0-15 cm and 15-30 cm in both conventionally tilled land and zero tilled land at about 0.25 km, 0.5 km, 1 km, 1.5 km, 2 km and >5 km distance towards north-east direction where the actual flow and spread of styrene gas leak was recorded. Also 3 no. of water samples were collected at 40 days after gas leak incident within the vicinity of 5 km from the LG Polymers at Venkatapuram village. The details of sampling locations where soil and water samples have been collected are given in Table 1 & 2 and the methods employed for soil and water analysis were mentioned in Table 3. Analysis of soil and water samples was carried out at Central Tobacco Research Institute, Rajahmundry and Horticultural Research Station, Ambajipeta, Dr. YSR Horticultural University.

Table 1: Details of soil sampling at Venkatapuram village under study.

S.No	Location/ Distance	Crop/ Particulars	ZT/CT*	Depth of soil sampling	Sampling Code	GPS
1	0.25 km	Cashuarina plantation	ZT	0-15 cm	1-A	N 17°45.819'
				15-30 cm	1-B	E 083°12.318'
		Fallow	CT	0-15 cm	1-C	N 17°45.327'
				15-30 cm	1-D	E 083°12.304'
2	0.5 km	Brinjal	ZT	0-15 cm	2-A	N 17°45.487'
				15-30 cm	2-B	E 083°12.296'
		Brinjal	CT	0-15 cm	2-C	N 17°45.485'
				15-30 cm	2-D	E 083°12.293'
3	1 km	Bhendi	ZT	0-15 cm	3-A	N 17°45.670'
				15-30 cm	3-B	E 083°12.584'
		Fallow	CT	0-15 cm	3-C	N 17°45.512'
				15-30 cm	3-D	E 083°12.442'
4	1.5 km	Chilli	ZT	0-15 cm	4-A	N 17°45.478'
				15-30 cm	4-B	E 083°12.298'
		Fallow	CT	0-15 cm	4-C	N 17°45.462'
				15-30 cm	4-D	E 083°12.302'
5	2 km	Fallow	ZT	0-15 cm	5-A	N 17°45.074'
				15-30 cm	5-B	E 083°12.066'
		Fallow	CT	0-15 cm	5-C	N 17°45.098'
				15-30 cm	5-D	E 083°12.023'
6	>5 km	Fallow	ZT	0-15 cm	6-A	N 17°44.211'
				15-30 cm	6-B	E 083°17.371'

(Note: \* ZT- Zero tilled soil after styrene gas leak, CT- Conventionally tilled soil after gas leak)

Table 2: Details of water sampling at Venkatapuram village under study.

S.No	Location/Distance	Source of irrigation water	Sampling Code	GPS
1	1.5 km	Dug well	W1	N 17°45.478' E 083°12.298'
2	2 km	Bore well	W2	N 17°45.074' E 083°12.066'
3	>5 km	Bore well	W3	N 17°44.211' E 083°17.371'

Table 3. Methods employed for the analysis of soil and water samples.

## a) Soil sampling and analysis

S.No	Parameter	Method	Reference
<b>Physico-Chemical Properties</b>			
1	Texture	Feel method	USDA
2	pH (1:2)	Glass electrode pH meter	Jackson (1967)
3	Electrical Conductivity (dSm <sup>-1</sup> )	Conductometric method	Jackson (1967)
4	Organic Carbon (g kg <sup>-1</sup> )	Walkey and Black's wet oxidation method	Piper (1966)
5	Total Nitrogen (kg ha <sup>-1</sup> )	Kjeldhal's method	Jackson (1967)
6	Available P <sub>2</sub> O <sub>5</sub> (kg ha <sup>-1</sup> )	Olsen's method	Watanabe and Olsen (1965)
7	Available K <sub>2</sub> O (kg ha <sup>-1</sup> )	Flame photometric method	Jackson (1967)
8	Sulphur (ppm)	Turbidity method	Piper (1966)
<b>Soil Biological Properties</b>			
9	Bacteria (x10 <sup>5</sup> )	Serial dilution plate count method	Waksman (1922)
10	Fungi (x10 <sup>4</sup> )		
11	Actinomycetes (x10 <sup>3</sup> )		

## b) Water analysis

S.No	Parameter	Method	Reference
1	pH (at 25°C)	Glass electrode pH meter	Jackson (1967)
2	Electrical Conductivity (dSm <sup>-1</sup> )	Conductometric method	Jackson (1967)
3	Chlorides (meq/l)	Mhor's method	Piper (1966)

**Observations of the committee:**

The observations of the above investigation are presented under the following heads.

- A) Soil quality
- B) Soil micro fauna
- C) Water quality
- A) **Soil quality:**

As per the summarised results given in table 4 & 5 pertaining to soil physico-chemical properties, the surface and sub-surface soils of study area are characterised with sandy loam (SL) and sandy clay loam (SCL) in texture respectively within 0.25 km, 2 km and > 5 km distance and sandy clay loam (SCL) and clay loam (CL) in texture respectively at about 0.5 km, 1 km and 1.5 km distance where the cultivated lands are being located. The analysis indicated that, soils are neutral (pH 6.79) to moderately alkaline (pH 8.66) in reaction having mean electrical conductivity of 0.38 dSm<sup>-1</sup> and medium in organic carbon content (0.56 %).

With regard to soil fertility status, the soils are very low in available nitrogen (138.95 kg ha<sup>-1</sup>) in surface and sub-surface soils and increased with increase in depth of soil. It may be due to more leaching of soluble nitrogen from sandy loam surface to sandy clay loam sub-surface soil and further to deeper layers resulted in retention of low nitrogen in surface soils.

Available phosphorus was recorded with low to high in content (varied from 13 to 170 kg ha<sup>-1</sup>). But, maximum available phosphorus was observed in surface soils than sub-surface soils in both zero tilled (ZT) and conventionally tilled (CT) soils. This wide range of fertility status may be due to site-specific inheritance of soil and differential practices of soil fertilization and manuring in different crops being cultivated in these fields.

However, medium in available potassium (156 to 259 kg ha<sup>-1</sup>) was recorded within the vicinity of 0.25 km from LG Polymers, Pvt. Ltd, Venkatapuram. But, high to very high in available potassium (ranges from 356 to 2388 kg ha<sup>-1</sup>) was recorded after 0.5 km distance onwards where most of field crops and vegetables grown in the styrene affected area. Very

high potassium content was observed at about 0.5 km under zero tilled (ZT) soil, 1 km under zero tilled (ZT) & conventionally tilled (CT) soil and 1.5 km under conventionally tilled (CT) soil where the actual surface and sub-surface soils are characterised with sandy clay loam (SCL) and clay loam (CL) texture respectively than the surface and sub-surface soils of other locations with sandy loam (SL) and sandy clay loam (SCL) texture respectively. This may be due to high clay content of soils that holds the potassium effectively in interlayer spaces of clay and due to site-specific deposits of potash minerals i.e feldspars and micas in clay loam textural soils and also due to addition of potassic fertilizers in different crops grown in these fields.

It can be concluded that more potassium content was observed in affected area than unaffected area which was 5 km away from the styrene gas tank but cannot be comparable with the content of soil potassium in unaffected area as it may vary in native soil fertility status. But, the release of styrene or deposit of styrene in soil has no scientific evidence in changing any of the physicochemical properties of soil. So, this may be concluded that no effect of styrene on soil fertility status but, it is of purely inherent capacity of parent soil material that determines the distribution and availability of various macro and micro nutrients at variable concentrations in the soil profile.

**Table 4. Physico-chemical properties of soil of study area.**

S.No	Location/ Distance	ZT/CT*	Texture		pH (1:2)		EC (dSm <sup>-1</sup> )		OC (%)	
			0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30
1	0.25 km	ZT	SL	SCL	8.16	8.03	0.170	0.297	0.32	0.18
		CT	SL	SCL	6.79	7.52	0.270	0.166	0.26	0.01
2	0.5 km	ZT	SCL	CL	7.95	8.44	0.209	0.665	0.41	0.47
		CT	SL	SCL	7.89	8.05	0.236	0.213	0.44	0.41
3	1 km	ZT	SCL	CL	8.47	8.54	0.626	0.659	0.92	0.99
		CT	SCL	CL	8.46	8.66	0.758	0.573	0.82	0.37
4	1.5 km	ZT	SL	SCL	8.06	8.17	0.355	0.266	0.85	0.38
		CT	SCL	CL	7.67	8.54	0.543	0.718	1.41	0.91
5	2 km	ZT	SL	SCL	7.83	7.95	0.299	0.288	0.53	0.40
		CT	SL	SCL	8.16	7.99	0.282	0.285	0.63	0.73
6	>5 km	ZT	SL	SCL	7.36	7.83	0.146	0.260	0.45	0.41
<b>Mean</b>					<b>7.89</b>	<b>8.16</b>	<b>0.35</b>	<b>0.40</b>	<b>0.64</b>	<b>0.48</b>

(Note: \* ZT- Zero tilled soil after styrene gas leak, CT- Conventionally tilled soil after styrene gas leak)

**Table 5. Chemical properties of soil in study area.**

S.No	Location/ Distance	ZT/CT*	Available N (kg/ha)		Available P (kg/ha)		Available K (kg/ha)	
			0-15	15-30	0-15	15-30	0-15	15-30
1	0.25 km	ZT	113	115	43	27	156	189
		CT	141	156	68	38	281	259
2	0.5 km	ZT	133	138	74	18	450	1721
		CT	116	166	67	69	356	356
3	1 km	ZT	167	173	45	43	2066	2197
		CT	116	141	31	27	2161	1540
4	1.5 km	ZT	121	131	67	13	1111	234
		CT	166	163	168	49	1294	2388
5	2 km	ZT	133	138	16	56	385	310
		CT	138	123	43	52	702	785
6	>5 km	ZT	133	136	170	152	657	666
<b>Mean</b>			<b>134.27</b>	<b>143.64</b>	<b>81.09</b>	<b>49.45</b>	<b>874.45</b>	<b>967.73</b>

(Note: \* ZT- Zero tilled soil after styrene gas leak, CT- Conventionally tilled soil after gas leak)

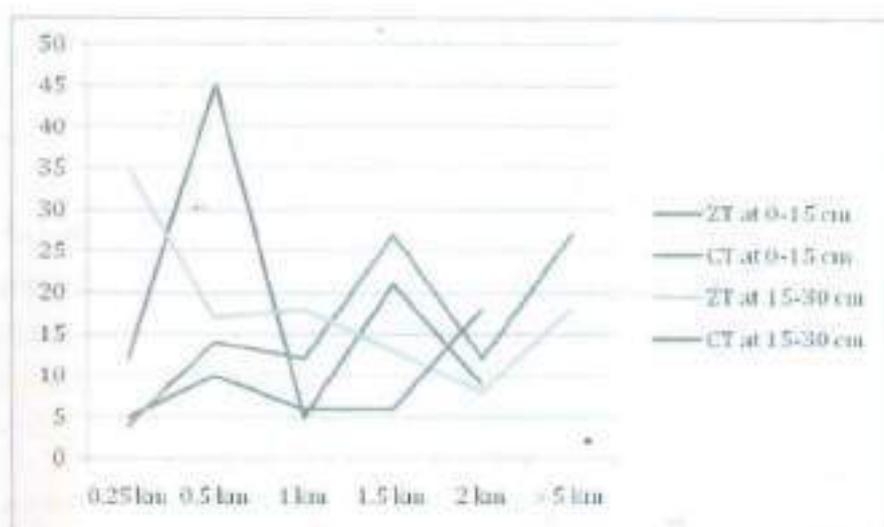
#### **B) Soil micro fauna:**

In the study site, composite surface and sub-surface soil samples at two depths i.e. 0-15 cm and 15-30 cm were collected randomly in both conventionally tilled land and zero tilled lands at about 0.25 km, 0.5 km, 1 km, 1.5 km, 2 km and >5 km distance towards North-East direction where the actual flow and spread of styrene gas leak was recorded and brought these soil samples in sterilized new polythene packets along with sampling code to the soil biology laboratory by maintaining its field moist condition and further stored in the refrigerator at 10°C in later cases after 48 hours of sampling in order to estimate the total population of bacteria, fungi and actinomycetes. The collected soil samples have been analysed for enumeration of microbial population by following serial dilution plate count technique. The results obtained are given in table 6.

Table 6. Soil biological properties of study area.

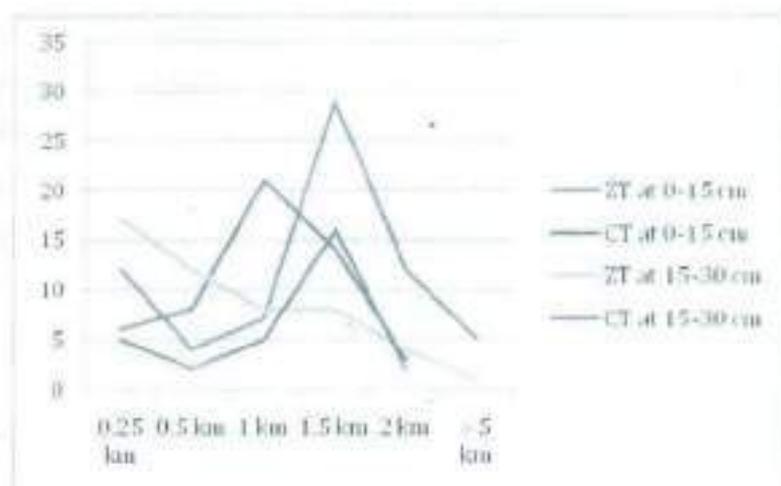
S.No	Location/ Distance	ZT/CT*	Bacteria ( $\times 10^6$ ) (cfu)		Fungi ( $\times 10^4$ ) (cfu)		Actinomycetes ( $\times 10^3$ ) (cfu)	
			0-15	15-30	0-15	15-30	0-15	15-30
1	0.25 km	ZT	4	35	12	17	320	115
		CT	12	5	6	5	120	321
2	0.5 km	ZT	14	17	4	12	238	120
		CT	45	10	8	2	124	206
3	1 km	ZT	12	18	7	8	192	107
		CT	5	6	21	5	118	54
4	1.5 km	ZT	27	13	29	8	235	216
		CT	21	6	14	16	157	184
5	2 km	ZT	12	8	12	4	120	149
		CT	9	18	3	2	98	154
6	>5 km	ZT	27	18	5	1	21	26
<b>Mean</b>			<b>17.09</b>	<b>14.00</b>	<b>11.00</b>	<b>7.27</b>	<b>158.45</b>	<b>150.18</b>

As per the results obtained, minimum bacterial population ( $4 \times 10^6$  cfu) was recorded at a depth of 0-15 cm in zero tilled (ZT) land within the vicinity of 0.25 km from the place where gas leakage occurred and increased population ( $35 \times 10^6$  cfu) was recorded comparatively at a depth of 15-30 cm in the same zero tilled land (fig.2). However, the trend of less bacterial population at depths of 0-15 cm was observed as compared to the population at depths of 15-30 cm among all zero tilled (ZT) soils at about 0.25 km, 0.5 km and 1 km distances from the LG Polymers Pvt. Ltd., Venkatapuram. It was also noticed that bacterial population at depths of 0-15 cm was more than that of 15-30 cm depth among conventionally tilled soils at about 0.25 km, 0.5 km and 1.5 km distances from the styrene tank.



**Fig.2. Bacterial population (x10<sup>6</sup>) (cfu)**

With regard to fungal population in the styrene affected area, the same trend was observed as that of bacterial population i.e., less population at depths of 0-15 cm as compared to the population at depths of 15-30 cm in all zero tilled (ZT) soils (fig.3). But, it was more at depths of 0-15 cm than that of soil at depths of 15-30 cm in conventionally tilled (CT) soils at about 0.25 km, 0.5 km and 1 km distance from the LG Polymers Pvt. Ltd., Venkatapuram. It indicates that fungal population was decreased with increase of soil depth among conventionally tilled (CT) soils in three sites and also vice-versa among zero tilled (ZT) soils. These observations of maximum and minimum fungal populations may be associated or influenced based on the availability of soil moisture and organic carbon content prevailed in the study site.



**Fig.3. Fungal population (x10<sup>4</sup>) (cfu)**

The trend of Actinomycetes population was summarised in table 6 and shown in fig.4. Maximum population of actinomycetes ( $320 \times 10^3$  cfu) was recorded followed by ( $238 \times 10^3$  cfu) and ( $235 \times 10^3$  cfu) at depths of 0-15 cm in zero tilled (ZT) soils at a distance of 0.25 km, 0.5 km and 1 km respectively than with the minimum population ( $98 \times 10^3$  cfu) at depth of 0-15 cm in conventionally tilled (CT). Among conventionally tilled soils, it was observed that more population at depths of 15-30 cm than the population at 0-15 cm depth. However, Maximum population of actinomycetes was recorded in zero tilled (ZT) soils than that of conventionally tilled (CT) soil.

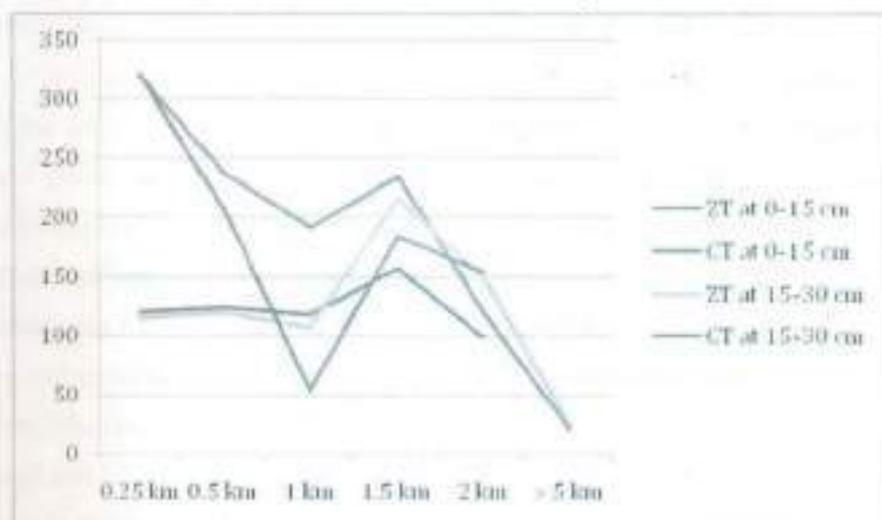


Fig.4. Actinomycetes population ( $\times 10^3$ ) (cfu)

On the basis of mean values of microbial population it can be concluded that microbial count was more on the soil surface and decreased with increase of soil depth as usually and might not be stimulated by the effect of styrene gas spread in affected area. Fluctuation in microbial populations recorded due to site-specific soil reaction (pH), soil moisture and organic carbon content as energy source prevailed in the study site. It was also observed that more population of actinomycetes enumerated nearer to the LG Polymers within the vicinity of 0.25 km to 2 km and decreased with gradual increase of distance from LG Polymers Pvt. Ltd., Venkatapuram. These results and observations straightly indicates that there is no effect of released styrene gas on microbial population as it is readily biodegradable by a wide variety of micro-organisms and may lead to extensive or complete destruction of the compound in soil.

### C) Water quality:

In study site, open dug well and bore wells are the main irrigation sources to the crops being cultivated in styrene affected fields. As part of the study, total 3 no. of water samples have been collected from two irrigation sources i.e open dug well and bore well at about a distance of 1.5 km, 2 km under styrene affected area and 5 km under unaffected location from the LG Polymers Pvt. Ltd., Venkatapuram. The water samples were collected into sterilized new bottles and brought to the laboratory within 36 hours to analyse quality parameters as mentioned in table 2. The results were summarised in table 7.

Pertaining to the results obtained, the pH of water samples was neutral in reaction and on par with each of them. It indicates that irrigation water is normal in reaction and safe for plant growth as it does not contain other elements at hazard levels. Mean electrical conductivity of water in affected area was 1,428 dS/m having 914 mg/l of average content of total dissolved salts in irrigation water and is on par with the water sample collected from unaffected area i.e > 5 km distance. It is indicative that the irrigation water has moderate salinity and requires leaching at higher range after its irrigation to sensitive crops like peas, beans etc. The chloride content of dug well and bore well water samples of affected area was 5.7 meq/l and 2.8 meq/l respectively and low in residual sodium carbonate (RSC) also. The results indicate that water from these two irrigation sources is generally safe for all plants with respect to chloride and RSC content as it is categorised as low. However, Keeping the the quality of water in view, it has moderate salinity and requires 12 to 17.5 % of leaching after its irrigation to sensitive crops.

**Table 7: Details of water sampling at Venkatapuram village under study.**

S.No	Location/ Distance	Source of irrigation water	Sample Code	pH (at 25°C)	EC (dSm <sup>-1</sup> )	Chlorides (meq/l)	RSC
1	1.5 km	Dug well	W1	7.49	1.780	5.7	Low
2	2 km	Bore well	W2	7.33	1.076	2.8	Low
3	>5 km	Bore well	W3	7.54	1.258	4.5	Low
<b>Mean</b>				<b>7.45</b>	<b>1.37</b>	<b>4.33</b>	<b>Low</b>

**Some of the salient features and observations were recorded during the visit to study site:**

1. It was observed that, sufficient number of earth worm **population was present** in all the surveyed lands and was satisfactory.
2. High percent of in situ seed germination (from the fallen Okra seeds) was also observed in the affected soils.
3. Active flying and substantial population of butterflies and dragon flies were also observed.
4. In few coconut palms (nearly 10 palms) drying of lower leaves was recorded. Fronds and other younger leaves were green and healthy. Flowering, fruit setting and new spadix emergence was normal and **no abnormalities were observed**.
5. No damage symptoms were observed in fruit crops cultivated like mango, sapota, banana and also vegetables viz. brinjal, okra and gourds as well as fodder grass.
6. In one casuarina field drying of younger plants was observed which might be due to the effect of styrene gas but new sprouting was observed from axillary buds in dried plants.
7. No toxicity effects were recorded /observed with those persons who have eaten the vegetables and fruits from the affected area.
8. At present the residents are using the open well water and bore well water for drinking.
9. The ridge gourd fruits were collected from the field left over without harvesting and extracted the seed at HRS, Kovvur and observed more than 85% seed germination which was normal and found no effect of toxic gas.
10. It is also assumed that, due to the recent rains, the soil should have reached 100% saturation and the soil bound styrene may escape from the soil pore space.
11. Full bearing and profuse flowering was recorded in sapota orchard which is adjacent to the L.G. Polymers plant.
12. Native Earth worm activity was noticed while taking soil sample at a depth of 0-15 cm under zero tilled casuarina plantations and at depth of 15-30 cm under conventional tillage practice after gas leak at the distance of 0.5 km from LG

Polymers and also recorded 7-12 no. of adult earth worms per square foot area under zero tilled grass land at a distance of 2 km from LG Polymers site.

13. Burning effect of casuarina trees up to a height of 5-8 feet and coconut trees up to height of 10-12 feet was observed in the immediate vicinity of LG polymers where the actual flow and spread of styrene gas leak in the north-east direction.
14. Luxurious growth of weeds like *cynodon* sps (star grass), *cyperus rotundus*, *Parthenium* etc. were noticed in styrene affected fields.

#### Conclusion:

Further, it is to submit that based on laboratory results and other scientific findings, there is no effect of styrene vapour on soil physicochemical and biological properties during the observation at 40 days after gas leak. It can also be concluded that there is no antagonistic impact on soil micro-flora as it may readily bio-degraded by aerobic microorganisms leading to complete destruction of the compound into other degradable sub-compounds i.e CO<sub>2</sub> etc.

As per the quality of irrigation water, it has moderate salinity that limits the yield of various crops. But, it can be managed with the practice of leaching and good drainage after its irrigation to the crops. Based on the observations made during the visit on 18.06.2020 and results of soil biological properties, it can be concluded that there is no adverse impact on the crops to be grown in upcoming *kharif/rabi* seasons.

As per the overall observations recorded on different crops, soil physical and biological properties, the team did not find any adverse effect of styrene gas. Hence, the farmers can grow the vegetables and other horticultural crops by adopting the regular good agricultural practices.

Dr. B.V.K. Bhagavan      Principal Scientist (Hort.)  
and Head & Zonal Research  
Head (CZ-I), HRS,  
Ambajipeta

Dr. N.B.V. Chalapathi Rao      Principal Scientist (Ento.),  
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Dr. K. Ravindra Kumar      Scientist (Hort.), HRS,  
Kovvuru

Sri. P. Raja Sekhar      Scientist (SS&AC), KVK,  
Pandirimamidi

**Division of Crop Chemistry & Soil Science  
ICAR-CTRI, Rajahmundry**

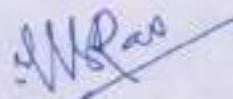
**SOIL ANALYSIS REPORT**

Date: 06-07-2020

Name : Dr. B.K.V.Bhagavan  
Principal Scientist (Hort.) & Head  
Horticultural Research Station  
Ambajipeta-533214  
East Godavari District

S.No	Sample details	Texture (Feel method)	pH (Soil Reaction) (1:2)	E.C (dS/m)	OC (%)	Available Nitrogen (kg/ha)	Available Phosphorus (kg/ha)	Available Potassium (kg/ha)	Available Sulphur (ppm)
1	1	SL	8.16	0.170	0.32	113	43	156	9.7
2	2	SCL	8.03	0.297	0.18	150	27	189	45.4
3	3	SL	6.79	0.270	0.26	141	168	281	5.0
4	4	SCL	7.52	0.166	0.01	156	38	259	10.5
5	5	SCL	7.95	0.209	0.41	133	74	450	7.1
6	6	CL	8.44	0.665	0.47	138	18	1721	64.9
7	7	SL	7.89	0.236	0.44	116	67	356	6.7
8	8	SCL	8.05	0.213	0.41	166	69	356	6.7
9	9	SCL	8.47	0.626	0.92	161	45	2066	64
10	10	CL	8.54	0.659	0.99	173	43	2197	66
11	11	SCL	8.46	0.758	0.82	116	31	2161	72
12	12	CL	8.66	0.573	0.37	141	27	1540	50
13	13	LS-SL	8.06	0.355	0.85	121	67	1111	12
14	14	SCL	8.17	0.266	0.38	131	13	234	5.3
15	15	SCL	7.67	0.543	1.41	166	168	1294	33
16	16	CL	8.54	0.718	0.91	163	49	2388	70
17	17	SL	7.83	0.299	0.53	133	16	385	10.4
18	18	SCL	7.95	0.288	0.40	138	56	310	13
19	19	SL	8.16	0.282	0.63	138	43	702	11
20	20	SCL	7.99	0.285	0.73	123	52	785	7.4
21	C <sub>1</sub>	SL	7.36	0.146	0.45	133	170	657	6.25
22	C <sub>2</sub>	SCL	7.83	0.260	0.41	136	152	666	10.2

\*SL-Sandy loam \*SCL-Sandy clay loam \*CL-Clay loam \*LS- Loamy sand



**(C.CHANDRA SEKHARA RAO)**

Head

Div. of Crop Chemistry & Soil Science

Microflora enumerated in the soil samples (in CFU)

Bacteria (Nutrient agar)

Fungi (Potato dextrose agar)

Actinomycetes (Kenknights and Munaier's medium)

Soil Sample No.	Bacteria ( x 10 <sup>6</sup> )	Fungi ( x 10 <sup>3</sup> )	Actinomycetes ( x 10 <sup>3</sup> )
1.	4	12	320
2.	35	17	115
3.	12	6	120
4.	5	5	321
5.	14	4	238
6.	17	12	120
7.	45	8	124
8.	10	2	206
9.	12	7	192
10.	18	8	107
11.	5	21	118
12.	6	5	54
13.	27	29	235
14.	13	8	216
15.	21	14	157
16.	6	16	184
17.	12	12	120
18.	8	4	149
19.	9	3	98
20.	18	2	154
C1	27	5	21
C2	18	1	26

J. L. Rao 9/7/2020

M. Rao  
09/07/2020

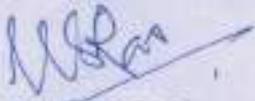
**Division of Crop Chemistry & Soil Science  
ICAR-CTRI, Rajahmundry**

**WATER ANALYSIS REPORT**

Date: 06-07-2020

Name : Dr. B. K. V. Bhagavan  
Principal Scientist (Hort.) & Head  
Horticultural Research Station  
Ambajipeta-533214  
East Godavari District

S.No	Sample Details	Source of water (well, borewell, pond, stream)	pH (at 25 °C)	E.C (dS/m)	Chlorides (meq/l)	RSC
1	C <sub>1</sub>	Bore water	7.49	1.780	5.7	Low
2	1	Well water	7.33	1.076	2.8	Low
3	2	Bore water	7.54	1.258	4.5	Low

  
(C. CHANDRA SEKHARA RAO)

Head

Div. of Crop Chemistry & Soil Science

## Annexure-IV

**GOVERNMENT OF ANDHRA PRADESH  
ANIMAL HUSBANDRY DEPARTMENT**

From Dr.D.Ramakrishna, B.V.Sc & A.H., FAC. Joint Director (A.H), Visakhapatnam.	To The Chairman, Collector & District Magistrate, Visakhapatnam District.
--	--

Lr. Rc. No.1/RRT/2020 Dated 18.09.2020

Sir,

Sub: APPCB RO VSP – Hon'ble NGT Matter 73/2020 & connected matters related to gas leak incident at M/S. LG Polymers Ltd., Visakhapatnam (Andhra Pradesh) – Committee for final Quantification of compensation in compliance with Hon' ble NGT order dt.01.06.2020 – ***Plan of Restoration and compensation for damage to livestock***– Submission – Regarding.

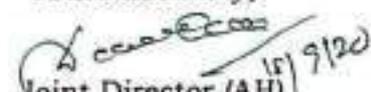
Ref: 1.This Office Proc.Roc.No.1/RRT/2020 Dt.29.05.2020 to the Joint Chief Environmental Engineer, APPCB, Visakhapatnam  
2. Lr. No. Gen/PCB/RO-VSP/NGT/2020 Dated 31.08.2020 of the Environmental Engineer, APPCB, RO, Visakhapatnam.  
3. Report of the High Power Committee  
4. Minutes of the meeting & instructions of the Chairman (District Collector, Visakhapatnam) on submission of restoration and compensation plan for damage to livestock Dt.15.09.2020  
\*\*\*\*\*

In obedience to the instructions issued by the Chairman and District Collector, Visakhapatnam regarding submission of ***Plan of Restoration and compensation for damage to livestock*** vide reference 4<sup>th</sup> cited, I herewith submit the detailed plan of action pertaining to livestock sector for perusal and kind consideration:

Thanking You sir

Encl: Proposal for Restoration and compensation for damage to livestock.

Yours faithfully,

  
Joint Director (AH),  
Visakhapatnam.

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## **REPORT ON LG POLYMERS STYRENE GAS LEAK**

### **Sub Component -2: Plan for Restoration and compensation for damage to Livestock**

#### **1. IMMEDIATE RELIEF MEASURES UNDERTAKEN:**

##### ***A. Deployment of Rapid Response Teams***

The Animal Husbandry Department has constituted **12 Rapid Response Teams (RRTs)** each team comprising of one Veterinarian, 1 Paravet and 2 Office Subordinates/ Gopalamitras in response to the Styrene gas leak disaster on 07.05.2020. The Assistant Director (A.H), Area Veterinary Hospital, Gopalapatnam was designated as Team leader and was entrusted the responsibility of coordinating the relief operations at field level by assigning the duties to the RRTs. A control room was also set up in the Office of the Joint Director (A.H), Visakhapatnam to receive the information from the field and report the information to the District Collector, Visakhapatnam and the Director of Animal Husbandry, A.P., Vijayawada. A Whatsapp group was also created for this purpose with the members of RRTs, Joint Director (A.H), Deputy Director (A.H), Addl. Director (A.H), Director of A.H., A.P, to monitor the relief operations effectively.

##### ***B. Handling of dead and affected animals:***

A total of 27 livestock died on exposure to the styrene gas (25 livestock between 07-05-2020 and 09-05-2020 and 2 animals subsequently). The teams deployed ensured hygienic disposal of the carcasses in coordination with the GVMC and local revenue authorities duly taking all the necessary precautions to prevent spread of diseases. **242 animals were treated** in the affected villages by organizing Veterinary health camps. The ailing animals were provided with supportive therapy by distributing mineral mixture and supplements.

**C. Laboratory Investigation**

The Animal Disease Diagnostic Laboratory, Visakhapatnam has collected the blood, urine and milk samples from the ailing animals and also fodder samples and sent to "Pharmacovigilance Laboratory for Animal Feed and Food Safety" Tamil Nadu Veterinary and Animal Sciences University, Chennai for analysing the residues of Styrene gas. The test reports of the laboratory has indicated that the milk and urine samples had levels below detection limit (<0.2ppm) and the vital organs had no traces of the styrene metabolite.

**D. Advisory for the Livestock owners**

The livestock owners are advised not to feed the feed and fodder stocks available with them that are exposed to the gas. They are also advised not to feed the green fodder available in the fodder plots in the gas affected villages until further instructions. The farmers are advised to milk the animals but to discard the same till further instructions.

**E. Monitoring and Surveillance**

A total of 5 teams constituting of One Veterinarian, One Para Veterinarian and one Office Subordinate/ Animal Husbandry Assistant were deputed to the 5 gas affected villages from 12.05.2020 as per the instructions of the District Administration to create awareness on the use of feed and fodder and also regarding use of milk for human consumption in these villages.

**F. Feed and Fodder support**

The livestock owners were distributed with concentrate feed (20 MTs) and silage fodder (10 MTs) as an immediate relief measure to feed their animals for an amount of Rs.3,75,914/- only from the funds of Animal Husbandry Department. Besides, mineral mixture and nutritive supplements were also provided for faster recovery.

**G. Compensation for deceased livestock:**

As per the immediate instructions of the Hon'ble Chief Minister, the District Administration has released an amount of R.8.75 lakhs towards the ex-gratia for the 25 reported livestock deaths between 07-05-2020 to 09-05-2020. Subsequently two more livestock succumbed post exposure for which ex-gratia proposals were submitted to the District Administration.

**2. RESTORATION AND COMPENSATION FOR DAMAGE TO LIVESTOCK**

**A. Livestock profile in the affected villages**

The livestock owners in the affected villages which are in the peri-urban area mainly sustain on direct milk sales to the consumers in the city. As such the farmers maintain mostly productive animals (milk yielding animals) and very few dry animals are in their possession.

As per the survey on the livestock and their productivity, it was noted that the average daily milk yield was 6 litres for buffalo and 8 litres for cows. The selling price of buffalo milk ranges from Rs.40-50 per litre and Rs.30-40 per litre in case of cow milk.

**Table I: Livestock census in the 5 affected villages**

S. No.	Village	Livestock population			
		Cattle	Buffalo	Young	Total
1	Venkatapuram	29	80	38	147
2	Venkatadrinagar	13	3	8	24
3	Nandamurinagar	6	43	32	81
4	Pydimamba Colony	30	31	29	90
5	BC Colony	8	37	16	61
<b>TOTAL</b>		<b>86</b>	<b>194</b>	<b>123</b>	<b>403</b>

## B. Compensation for loss of milk

On the recommendations of NEERI and upon the instructions of the District Administration, the livestock farmers were advised to discard the milk of cows and buffaloes in the affected villages. Based on the findings of the test report of "Pharmacovigilance Laboratory for Animal Feed and Food Safety, TANUVAS, Chennai" received on 15-07-2020 which indicated that the milk samples had no residues of Styrene metabolite i.e, *DL - Mandelic acid*, instructions were passed for safe use of milk of the affected animals for human consumption.

It is therefore proposed to compensate the loss incurred by the livestock farmers by enumerating the volume of milk discarded and its saleable value for a period of 30 days. The financial outlay for the proposed compensation is as detailed in Table 2.

**Table 2: Estimated value of milk discarded during 30 days.**

S. No	Village	Lactating		Total Daily Milk yield* (Ltrs)		Value of milk discarded for 30 days # (Lakh Rs.)		Total Amount (Lakh Rs.)
		Cow	Buff	Cow	Buff	Cow	Buff	
1	Venkata puram	23	71	184	426	1.656	5.112	<b>6.768</b>
2	Venkataadri nagar	10	2	80	12	0.720	0.144	<b>0.864</b>
3	Nandamuri nagar	5	38	40	228	0.360	2.736	<b>3.096</b>
4	Pydimamba Colony	29	25	232	150	2.088	1.800	<b>3.888</b>
5	BC Colony	7	32	56	192	0.504	2.304	<b>2.808</b>
<b>TOTAL</b>		<b>74</b>	<b>168</b>	<b>592</b>	<b>1008</b>	<b>5.328</b>	<b>12.096</b>	<b>17.424</b>

\* Avg. Milk yield of cow per day – 8 litres; buffalo – 6 litres

# Saleable price of cow milk per litre @ Rs.30/- & buffalo milk @ Rs.40/-

### C. Providing replacement livestock

As an immediate relief to the livestock farmers whose animals have died due to the impact of the styrene gas, 8 farmers have been provided with an ex-gratia amount of Rs.8.75 Lakhs to help him sustain due to lack of livelihood. It is therefore proposed to provide replacement livestock to the farmers who have lost their animals by grounding from the adjoining District. A total of 4 cows, 10 buffaloes and 1 cross bred Jersey heifer belonging to 8 farmers have died and the financial implication for providing animals are submitted in Table 3.

**Table 3: Amount required for providing replacement animals**

S. No	Name of the farmer	Village	Livestock lost	Qty	Market value + Transport # (Rs.)	Total amount (Rs.)
1	Baliji Pyci Raju	Venkata puram	Cow	3	55000	165000
2	Noonela Nooka Raju	Venkata puram	She Buffalo	3	65000	195000
3	B. Sanyasamma	Venkata puram	She Buffalo	1	65000	65000
4	Yellapu Tatarao	Venkata puram	Cow	1	55000	120000
			She Buffalo	1	65000	
5	Noonela Sagar	Venkata puram	She Buffalo	2	65000	130000
6	Ch. Nookaratnam	Venkata puram	She Buffalo	2	65000	130000
7	Pala Amaravathi	Venkata puram	She Buffalo	1	65000	65000
8	G. Atchibabu	BC colony	CB Heifer	1	30000	30000
<b>TOTAL</b>				<b>15</b>		<b>9,00,000</b>

# the proposed market value of the animal including transport for cow is Rs. 55,000/- and for buffalo is Rs. 65,000/-

#### D. Feed and fodder support

The survey conducted by the Animal Husbandry Department to analyse the impact of the styrene vapours on the productivity of livestock has indicated that there is a drop in the milk production by 30% in cows and 60% in buffaloes 10 days post exposure.

It is therefore proposed to provide feed and fodder support to all the animals in the affected villages for a period of 6 months to help them re-coop and regain the production. It is also proposed to provide mineral and vitamin supplementation to the needy animals for improved fertility. The provision of these feeding inputs will help the animals in better reproduction and also sustained milk production in the next lactation. It is submitted that an amount of **Rs. 62, 33,472/-** is required for providing the proposed feed and fodder support.

Animal	Allowance of Concentrate feed per day	Allowance of TMR per day
Adult	4 Kg @ Rs.15.17 per kg	5 Kg @ Rs. 12.60 per kg
Young	2 Kg @ Rs.15.17 per Kg	3 Kg @ Rs. 12.60 per kg

**Table 4: Cost estimation for feed and fodder support for 180 days**

S. No	Village	Livestock population		Feeding inputs for 180 days in MTs		Cost (Rs.)		Amount Rs.
		Adult	Young	TMR	Conc.	TMR	Conc.	
1	Venkata puram	109	38	98.10	78.48	1236060	1190542	2426602
2	Venkata d ri nagar	16	8	14.40	11.52	181440	174758	356198
3	Nandamu ri nagar	49	32	44.10	35.28	555660	535198	1090858
4	Pydimam ba Colony	61	29	54.90	43.92	691740	666266	1358006
5	BC Colony	45	16	40.50	32.40	510300	491508	1001808
<b>TOTAL</b>		<b>280</b>	<b>123</b>	<b>252.00</b>	<b>201.60</b>	<b>3175200</b>	<b>3058272</b>	<b>6233472</b>

### **E. Long term monitoring and surveillance**

The Animal Husbandry Department has deployed special teams to monitor the health of the animals in the affected villages till 30.06.2020. Thereafter, the Area Veterinary Hospital, Gopalapatnam has been providing the required Animal Husbandry services by keeping a close watch on these affected villages.

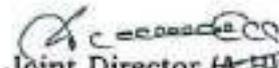
It is now proposed to organize at least one health camp per month in each of these 5 gas affected villages for a period of one year to monitor the health of the animals and also to collect the data on production and reproductive parameters to assess the long term impact on the livestock due to styrene vapours.

It is submitted that a total amount of **Rs. 3,00,000/-** is required to conduct 60 camps in one year with an estimated budget of Rs. 5000/- per camp towards drugs/medicines and logistics.

#### **ABSTRACT OF FUNDS REQUIRED FOR PROPOSED RESTORATION AND COMPENSATION**

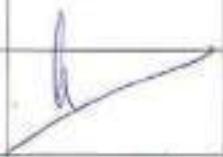
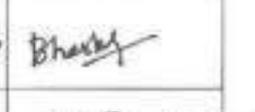
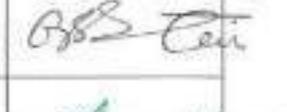
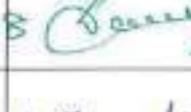
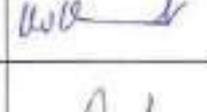
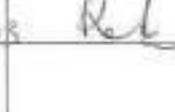
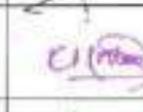
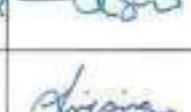
<b>S. No.</b>	<b>PROPOSAL</b>	<b>ESTIMATED EXPENDITURE (Rs.)</b>
1	Compensation for milk discarded for 60 days	17,42,400
2	Provision of replacement animals	9,00,000
3	Feed and fodder support	62,33,472
4	Veterinary Health camps	3,00,000
<b>TOTAL</b>		<b>91,75,872</b>

Submitted for kind perusal.

  
Joint Director (A.H/S) 9/20  
Visakhapatnam.

23/12/19

Attendance for Sub-Committee meeting on Restoration and Compensation plan for damage to Health, Property, Crops, Livestock etc, on 15.09.2020 at 12:00 Noon

S.No.	Name of the official	Name of the Department	Email & Phone No.	Signature
1.	V. Vinay Chandras	District Collector		
2.	Dr. P.V. SUDHAKAR	PRINCIPAL A.P.C SUPERINTENDENT, KA4	Kghsuperintendas@gmail.com 9849903060	
3.	DR. K. VIJAYA LAKSHMI	DM HO	9849902299	10.9.2020 
4.	T. Rajananda Reddy	J.C.E.E APPCB	7177301430	
5.	R.J. Vidyullathia	Town planning, GVMC	ccpgvmc@gmail.com 9848308227	
6.	D. Rambabu	Town planning GVMC	8987898435	
7.	K.V. Bhaskar	Town Planning GVMC	9848923236	Bhaskar
8.	G.S. N. Sreekrishna	J.D. Agri	8331056469	
9.	Dr. D. Ramakrishna	J.D. (A.H)	9989932828	
10.	Dr. K.V. Ramana Murthy	Principal Scientist RAPS, Anapalle	9849636324	
11.	Dr. Ch. S. Ramalakshmi (SSCS)	Regional Synd. Research Station, Anapalle.	9441210908	
12.	Sudhakar. K	Inspector of factories Vijayachandran	9618789799	
13.	K. Parvathi Kishore	RDO, Vizag	9849903825	
14.	A. P. K. S. S. B	DAS, Vizag	987503820	
15.	R. Govindaraj	J.C. (A&W)	9849903828	
16.	G. Sujana	Commissioner GVMC	9121243377	

**‘Records of Discussion’ of the 1<sup>st</sup> meeting of the MoEFCC Nodal Committee constituted for Finalisation of Compensation in reference to the order passed by Hon’ble NGT in the matter of OA 73/2020 & connected matters related to Gas Leak incident at M/s LG Polymers Limited, Visakhapatnam (Andhra Pradesh)**

A meeting of the MoEFCC Nodal Committee constituted for Finalisation of Compensation was convened under the chairmanship of Dr. Prashant Gargava, Member Secretary, CPCB on 10.09.2020 at 11 A.M. through video-conferencing. All the designated members of the Committee attended the meeting in person. The following members were present:

- Dr. Prashant Gargava, Member Secretary, CPCB – in Chair
- Dr. Dharmendra K. Gupta, Director, HSM Division – Member Convenor
- Shri Amardeep Raju, Addl. Director/ Scientist-E (Violation Projects), MoEFCC
- Shri Hemant Bherwani, Scientist, CSIR-NEERI

Special Invitees

- Shri Raghu Kumar Kodali, Director/ Scientist-F, MoEFCC
- Shri Dinbandhu Gouda, Divisional Head (IPC-I) & Additional Director, CPCB
- Shri Bharat Sharma, Addl. Director and In-charge, CPCB Regional Directorate, Pune

2. At the outset, Chairman welcomed all the participants and meeting began with brief round of introduction. The Member Convenor informed the Committee about the background and purpose for which it has been constituted and highlighted that the task assigned to it i.e. finalisation of compensation is a follow-up activity which needs to be undertaken once the report of ‘Finalisation of Restoration Plan’ is ready. The Chair supplemented that for undertaking the compensation assessment, a detailed restoration plan need to be in place covering both ‘environmental restoration measures and cost’ and ‘assessment of damages and associated cost’. The Committee members agreed to the above.

3. The Chair mentioned that in line with the deliberations of the 1<sup>st</sup> meeting of ‘Finalisation of Restoration Plan’, the CPCB has further lined up with CSIR-NEERI for undertaking the work related to ‘Preparation of Restoration Plan w.r.t. Environmental Media’. The scope of engagement is under discussion and would be finalised soon. It was further informed that the CSIR-NEERI report, upon finalisation, is expected to cover the damage cost as well as environmental restoration cost which would form the basis of finalisation of compensation w.r.t. environmental aspects. Similarly, an assessment with regard to damages to property, health, livestock, agriculture etc. by another sub-Committee constituted under DM, Vizag. A report from the sub-Committee constituted under the chairmanship of DM, Vizag is expected to cover the damage cost as well as restoration cost w.r.t. damage to property, agriculture, health, livestock etc. which would form the basis of finalisation of compensation. The MoEFCC nodal committee for ‘Finalisation of Restoration Plan’ shall examine and consider the reports from both the sub-committees and thereafter, finalise the restoration plan.

4. During the deliberations, the Committee noted that since finalisation of compensation is a skilled activity that requires experience/ expertise, services of a couple of experts can be

utilised for the same. Accordingly, the Chair requested all members, especially CSIR-NEERI expert (*having experience in handling similar issues*) to explore and suggest some experts that can guide the committee in undertaking the task assigned to it. The Director (HSMD) informed that to enable the on-boarding of experts in the committee, approval would be required from the Competent Authority and IFD, in the Ministry. Hence, members are requested to share the CVs of expert(s) and thereafter, the on-boarding shall be finalised in consultation with Chairman.

5. Environmental Restoration Plan shall be prepared based on assessment of extent of damage. Hence, project proposal shall be divide into two phases i.e. Phase-I: Damage assessment, and Phase-II: Restoration plan. During damage assessment, preliminary investigation of soil and groundwater/ surface water/sediment may be done, so that the outcome of preliminary study may be ascertained whether detailed investigation of contaminated soil, groundwater/ surface water/sediment including Risk assessment study is needed or not. Phase I report should be delivered in two month and phase II report in next three months.
6. MoEF&CC may pray Hon'ble NGT for extension of time for implementation and mentioning above technical reasons.
7. The Director (HSMD) further suggested that, if considered appropriate by members, the meetings of both the Committees can be convened jointly to have better understanding and coherence among them. The Chair, and members welcomed the suggestion and consented for a joint meeting in future.

The meeting ended with vote of thanks to the Chair.

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**Tabulation of the technical and administrative/ regulatory recommendations made by High Power committee constituted by Govt. of Andhra Pradesh**

S. No.	Item Description	Observations/ Recommendations
1.	Recommendation w.r.t. M/s LG Polymers	<ol style="list-style-type: none"> <li>1. To shift the Hazardous Chemical industry of M/s LG Polymers from the present location and it may be relocated away from the human habitations preferably in the established notified industrial estates. Government/APIIC may allot suitable land in any industrial estates as per rules, for smooth shifting of the factory.</li> <li>2. The present M/s LG Polymers industrial land may be used for either green or white category industry, subject to the outcome of Environment Clearance. In case this is not feasible, then conversion of the land for residential purpose/ commercial purpose may be examined.</li> <li>3. The concerned Revenue Department may examine the aspect of Ceiling surplus land, which has been raised in representations.</li> <li>4. The M/s LG Polymers may be asked to continue the staff employed in the White or Green category industry at the same location or may be asked to provide employment to the staff in the new factory location.</li> </ol>
2.	Technical suggestions regarding Styrene industries	<ol style="list-style-type: none"> <li>1. The tank must have a floating valve circulation or any other technology which provides circulation for Styrene. The change in design was a critical aspect in the case of LG Polymers.</li> <li>2. There must be provision for mixing in case of failure of the circulation system.</li> <li>3. The material of construction of the tank should be carbon steel with coating inside.</li> <li>4. Tank life should be clearly defined; tank cleaning and coating should be carried out once in two years.</li> <li>5. The roof of the tank should be supported with outside structures.</li> </ol>

S. No.	Item Description	Observations/ Recommendations
		<p>6. The number of nozzles in the tank should be kept to the minimum required.</p> <p>7. All Styrene monomer tanks should have flare system or cryogenic system so that there is no Styrene vapour release even under normal circumstances. These systems will also prevent pollution of air.</p> <p>8. There must be multiple continuous temperature measurement probes at different levels of the tank linked to the control room.</p> <p>9. Temperature monitors and Refrigeration system should be interlinked in such a way to maintain temperature of the entire tank below 20°C at any point of time.</p> <p>10. The standards for the refrigeration system in terms of pumping capacity and cooling capacity should be clearly defined for the various mass of Styrene by the industry, duly taking into account the ambient condition of the city where the factory is located.</p> <p>11. In case of failure of the operating refrigeration system, standby refrigeration system shall be started automatically.</p> <p>12. Automatic monitoring of inhibitor content (in ppm) and measurement at different levels of the tank with data recording and alert facility in the control room is essential. Further, the industry standards need to define clearly the quantity of inhibitor to be added depending upon the ppm level of the inhibitor content at various levels. Similarly, the industry standards should define the action to be taken in case the inhibitor content increases above the threshold level.</p> <p>13. Dissolved Oxygen measurement system must be available at different levels of the tank and linked to the control room. Further, the industry needs to define clearly the action to be taken in case the Dissolved Oxygen reduces below/increases above the threshold range.</p> <p>14. Polymer content measurement (in ppm) must be available at different levels of the tank and linked to the control room. The acceptable range of polymer content in ppm also needs to be clearly defined by the industry standards. Further, the</p>

S. No.	Item Description	Observations/ Recommendations
		<p>industry standards need to define clearly the action to be taken in case the polymer content increases above the threshold level. This was the critical gap in the case of LG Polymers.</p> <p>15. Use of Siren even during minor emergencies should be made mandatory practice.</p> <p>16. Safety protocol for units/factories storing/ processing Styrene Monomer must include vapour release, apart from the possibility of fire and explosion in the Emergency Plans. Besides, the possibility of leakage/spillage of liquid Styrene monomer must also be a part of the safety protocol and Emergency Plans.</p> <p>17. Units/Factories storing/processing Styrene monomer must undertake an annual safety audit.</p> <p>18. The PESO which has classified Styrene monomer as B category petroleum should look into this issue again and classify it as A category as it needs to be stored below 20°C, although the flashpoint is 31°C.</p> <p>19. SCBAs and other equipment needed for dealing with chemical disasters should be made compulsory for the units storing/ processing Styrene monomer.</p> <p>20. Vapour Detectors shall be provided at the boundary of the factory also, to indicate in DCS the Styrene vapour escape outside the factory premises.</p> <p>21. The industry shall provide the Styrene detectors at unloading point, near all the vents, downwind, upwind directions and factory boundary, and the same shall be connected to the Control room with alert facility. In the case of exceedance, SMS alert shall be sent to the Plant Safety Officer, Plant Head, local Police Station and Fire Station, District Collector Control Room, Factories Department, APPCB etc.</p> <p>22. Plant Control rooms shall be located at the strategically safe location and shall be made easily accessible and shall be made gas-tight and accident proof to the extent feasible.</p> <p>23. Process safety management is a systematic, comprehensive approach towards various aspects of chemical safety with 19 elements; this shall be made</p>

S. No.	Item Description	Observations/ Recommendations
		<p>mandatory for all factories which are covered by MSIHC Rules,1989. This is a regulation in Occupational Safety and Health Administration (OSHA) brought in the year 1992 in USA with similar criteria for application as in MSIHC Rules.</p> <p>24. The industry may examine the possibility that the sprinkler system is interlocked with tank internal temperature measuring devices. The sprinkler system shall start automatically whenever there are an unacceptable thermal profile (both internal tank temp as well as external ambient temperatures).</p> <p>25. The industry may examine the possibility to provide detachable insulation to the Styrene storage tank, in such a way that, it can be easily removed during any emergency.</p> <p>26. The industry shall ensure that there will not be any reverse pumping from the reactor / pre-mixing tank to the main storage tank.</p> <p>27. There are a number of Styrene storage/processing/trading/importing units across India. It is essential that all these units should all have their safety features audited. Further, the PESO/ Government of India may also consider regulations that no unit shall sell/ trade in Styrene Monomer with any unit which does not have the required safety features for storage and handling of Styrene Monomer.</p>
3.	Technical suggestions regarding Hazardous Chemical Industries	<p>1. Hazard and Operability Study (HAZOP) and its compliance shall be made compulsory for all Hazardous process factory/unit wherever there is processing/storage of hazardous chemicals.</p> <p>2. The industry should arrange for Annual Safety Audit and Annual Environmental Audit. The recommendations of the audit shall be meticulously complied within a reasonable timeframe.</p> <p>3. Industries handling hazardous chemicals shall compulsorily appoint a senior level safety officer with prescribed technical qualifications and experience. There should be a safety officer available in each shift viz., a safety officer should be available in the factory in 24 hours in the factory. The safety officer shall</p>

S. No.	Item Description	Observations/ Recommendations
		<p>mandatorily undergo 1-year Diploma course on safety by recognized Institutes.</p> <p>4. All officers working in regulatory departments dealing with factories shall undergo Safety course once in every 3 years. This is especially important for Fire Department and Police Department personnel posted in the areas having jurisdiction over the hazardous chemical units/factories.</p> <p>5. All employees and people in the vicinity of the industry shall be made aware of the MSDS of hazardous chemicals.</p> <p>6. The MSDS of the chemicals which has potential to create Offsite emergency should be displayed at the factory gate, on the website of the company and should also be informed during the Offsite emergency mock drill.</p> <p>7. The hazardous industry should prepare a uniform standard format for the emergency plans with full details including the equipment and chemicals required in the event of an emergency.</p> <p>8. Each State should develop a database of all industries/units handling, storing and processing hazardous chemicals as defined in MSIHC Rules,1989 including isolated storages and the respective Material Safety Data Sheets (MSDS) which should be available with the APSDMA, SDRF, Factories Department, Boilers Department, APPCB, Fire Department, Department of Industries, PESO, Transport Department etc.</p> <p>9. The CPCB/MOEF, GoI shall stipulate standards for the fugitive emissions from the Tank farms and isolated storages as they are equally potential areas for release of toxic/hazardous gases/pollutants to the environment.</p> <p>10. The industry shall identify Process Safety Competency-based training needs and shall develop training modules and the training to be imparted till the competency levels are improved.</p> <p>11. The hazardous industry must undertake competency mapping for all the operating and maintenance staff. The gaps incompetency should not be tolerated</p>

S. No.	Item Description	Observations/ Recommendations
		in respect of hazardous chemicals industries at all.
4.	Strengthening of Administrative/regulatory Framework w.r.t. Factory Safety	<ul style="list-style-type: none"> <li>• The major legislations dealing with industrial safety in factories are the Factories Act, 1948, Indian Boilers Act-1923, Indian Electricity Act- 1910, Petroleum Act, 1934, Explosives Act-1884, A.P. Fires services, MSIHC Rules Act, 1989; Building and Other Construction Workers Act, 1996. and different set of rules framed under these rules.</li> <li>• There are Factory Safety Regulatory Gaps due to the following: <ul style="list-style-type: none"> <li>▪ Multiple Agencies</li> <li>▪ Multiple Strong Laws.</li> <li>▪ Weak Structure of the Concerned Organization/ Department.</li> <li>▪ Absence of Compliance / Third Party Verification Systems.</li> <li>▪ More driven as License Permit System rather than facilitating industries.</li> </ul> </li> <li>• The HPC suggested to constitute a State Factory Safety Board in each state and a Central Factory Safety Boards with a single point regulatory agency for regulating all factory safety laws, rules and regulations. <ol style="list-style-type: none"> <li>a) The role of the Central Factory Safety Board would primarily be in setting up of safety norms, setting up of standards, capacity building of the state boards and dealing with certain large size hazardous factories.</li> <li>b) One of the special functions of the Central Factory Safety Board would be investigating each and every major factory accident, mandatorily by law.</li> <li>c) It is suggested to constitute the Factory Safety Board with sufficient manpower and Infrastructure, to deliver the solutions for all the existing safety aspects as a unified regulatory body.</li> </ol> </li> </ul>
5.	Strengthening of Administrative/regulatory Framework w.r.t.	<ul style="list-style-type: none"> <li>• To address the environmental regulatory gaps, the Committee has deliberated on the issue and suggest the following: <ol style="list-style-type: none"> <li>a) All SPCBs can be constituted as authorities under Section 3(3) of the E (P) Act; with the condition that all A Category projects will be sent with the</li> </ol> </li> </ul>

S. No.	Item Description	Observations/ Recommendations
	Factory Safety	<p>recommendation of the SPCB to the MoEF&amp;CC and for B category projects, SPCB shall be the final authority. In other words,</p> <ol style="list-style-type: none"> <li>i. The SEIAA will not be separately constituted but will be part and parcel of the SPCBs.</li> <li>ii. However, to assist the SPCBs, there can be SEAC constituted under Section 3(3) of the E(P) Act.</li> <li>iii. Requirement / Grant of EC under E(P) Act and CFE / CTE under Air Act and Water Act will be simultaneously examined by the SPCB, for both categories A and B projects. For category B projects, EC and CFE shall be issued simultaneously by the SPCB. For category A projects, the SPCB shall send the recommendation for EC to the MoEFCC. It shall issue CFE for category A projects, after issue of EC by MoEFCC.</li> <li>iv. It will save facilitate the project proponents to get their clearances in one place.</li> </ol> <ul style="list-style-type: none"> <li>• To effectively monitor and implement the provisions of the E(P) Act and rules and notifications issued thereunder, it is essential that all the officers of SPCBs are appointed as monitoring and competent officers under Section 4 of E (P) Act for all categories of industries including category A.</li> <li>• Section 5 of the E(P) Act provides for action for violation. This has been presently delegated to the State Governments. It is essential to delegate this function to the SPCBs, so that they can exercise the monitoring function effectively</li> <li>• Environment is a matter of concern for both State and Central Governments. "Environment" subject should be included in the Concurrent list of the Constitution.</li> </ul>

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