

**IN THE HONOURABLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH AT NEW DELHI**

O. A. NO. 85 OF 2020
(ORIGINAL O.A. NO 22 OF 2020 (WZ))

IN THE MATTER OF :

**ARYVRAT FOUNDATION THROUGH ITS
PRESIDENT**

APPLICANT

VERSUS

**1. YASHASHAVI RASAYAN PVT LTD
2. GUJARAT POLLUTION CONTROL
BOARD**

RESPONDENTS

The respondent no2 most respectfully the comments on the reports of the committee as under:

Before dealing with each paragraph of the reports, following general remarks are submitted which will make things clear at the outset:

1. Company had SOP for all activities. SOP for every activity including the material receipt and loading unloading are prepared and are followed.
2. Mock drills have been carried out at frequent interval. Training to all concerned imparted from time to time.
3. The Company remained operational during the intervening period between 25 March 2020 and 2 June 2020, in compliance with the law and with all requisite permissions in place. Therefore no unskilled local labour were used.
4. As a matter of practice and in compliance with industrial standards, the Company has designated separate tanks at the factory for storage of Nitric



Acid and Dimethyl Sulphate (“DMS”). Considering that Nitric Acid is incompatible with steel and there is likelihood of leakage and release of toxic gases if Nitric Acid is stored in steel tanks, glass lined storage tanks were used for the storage of Nitric Acid, specifically Tanks 8 and 9 at the Factory. DMS, on the other hand, was stored in tanks constructed from mild steel, specifically Tanks 5 and 6 at the Factory.

5. Dike walls were constructed between incompatible material storage tanks. This is to prevent any mixing in case of spillage from any tank.
6. On 2 June 2020 at around 14:00 hours, due to an inadvertent human error, DMS was unloaded in Tank # 8 instead of the designated Tank # 5 and at around 15:30 hours on 2 June 2020 Nitric Acid, in turn, was partially unloaded in Tank 5 instead of the designated Tank # 8. It is submitted that the two unloading events were inadvertent and unintentional. Thus, despite following the Standard Operating Procedures (“SOP”) and associated work permits, on 2 June 2020, DMS and Nitric Acid (the two essential chemicals involved in manufacturing process at the Factory) were inadvertently and mistakenly unloaded in wrong containers at the Factory. Upon realization of the error on 2 June 2020 at around 16:00, the issue was notified immediately escalated to the senior officials in the Factory and following remedial actions were initiated:
 - a. The respective Tanks were inspected by the senior officials and it was noted that no leakage or release of liquid was visible.
 - b. As first step, it was prudently decided to transfer the Nitric Acid mixture to the glass lined Tank 9 to avoid any release of toxic material due to leakage that may develop because of the reaction of Nitric Acid with steel. The transfer was successfully completed promptly by around 18:30 hours on 2 June 2020.
 - c. Simultaneously, R and D engineers began preparation of mitigation measures, including understanding if there is scope for



any mishap due to the human error in transfer of chemicals. As a first step, an artificial test mixture was created in the laboratory by the abovementioned employees to check if the two components- Nitric Acid and DMS, would react adversely. The observations noted were as follows –

- i. No symptom of reaction was found.
 - ii. No temperature rise was noticed.
- d. After conducting the requisite laboratory trials to understand scope of issues that may arise due to inadvertent and unintentional transfer of chemicals, the Company officials arrived at two viable alternatives to ensure safety at the Factory.
- e. The first alternative was to safely decompose/ destroy the mixture or one of the components of the mixture.
- i. For decomposing Nitric Acid, Urea was considered to be used. However, it was not deemed feasible given that it could have resulted in release of large amounts of toxic fumes of Nitrogen Oxide and other by-products like monomethyl urea sulphate etc.
 - ii. The option of incineration of the material was also considered but due to presence of Nitric Acid, incineration was not feasible.
 - iii. It was also considered to drain the material within the dyke. However, the same could have led to multiple problems such as, Release of toxic fumes of Nitrogen Oxide. And DMS is toxic and releasing it in open could have affected employees and people working in the immediate vicinity.
- f. The second alternative was to find a method to separate the components of the mixture.



- g. Attempt to separate the components of the aforementioned mixture by adding excessive quantities of one of the components with the aim to achieve separation of components due to difference in their respective densities. However, as a consequence,
 - i. No separation of components was observed.
 - ii. No temperature rise was noticed.
 - h. Attempt to separate the components of the artificial mixture by adding water to check for separation. Separation was observed in the artificial test mixture after addition of excess water to mixture.
 - i. The option of addition of solvent extraction to the artificial test mixture was also considered. However, considering that majority of organic solvents are incompatible with acids/oxidizing agents, the same was not deemed feasible. A small confirmatory experiment was also conducted in test tube with all safety precautions to determine the viability of this alternative. However, vigorous reaction was observed and hence, the option was abandoned.
7. R and D after conducting experiments in laboratory, consulting experts and exploring available literature and information about the result of mix up of NA and DMS advised that
- a. Both chemicals are heterogeneous. There cannot be any reaction between them.
 - b. Temperature of mixture is not going up when mixed in laboratory. There is no exothermic reaction.
 - c. Eventhough there is difference in densities of both the chemicals they are not segregating in two zones but remain in mixed condition.
8. As the Company could not arrive at a conclusive and safe measure to ensure the safety of the aforementioned mixture by around 17:00 hours



on 2 June 2020, certain external experts were consulted for their inputs on the available recourses including:

- a. Mr Harshad Mavani - BE Chemical, IIT Bombay (1978)
- b. Dr Anilkumar Jivani – M.Sc. (Chemistry), Ph.D – Former Quality Control Head of the Company
- c. Dr. Jignesh Desai – M.Sc. (Chemistry), Ph.D

However, even the experts were unable to devise an immediate solution for dealing with the situation.

9. In the meanwhile, extensive research to arrive at a viable solution to the possible issue at hand was continued by the Company's employees as well as the associated experts to arrive at a feasible solution. However, none of these bonafide and genuine efforts undertaken by the Company provided any insight or evidence of the slightest possibility, let alone apprehension, of an explosion/ accident.
10. The Company however continued to constantly work towards a solution internally as well as by consulting experts to ensure no safety hazard is caused due to such human error. Further, no available precedent suggested that such an explosion has occurred anywhere in the world due to the mixture that the Company was dealing with. Hence, there was no readily available information or data on the likelihood of such an explosion/ accident and precautionary and remedial steps, if any. Therefore, it was not possible for the Company to objectively assess the likelihood of occurrence of the Accident despite undertaking the above mentioned bonafide steps.
11. The responsibility of unloading the tank was with Mahesh Gulchur. He was ITI AOCF with several years of experience.
12. Small quantity left in skeleton of second tank started reacting after 7 days. Information about it was given at 7.30 am. Later when another tank



containing mixture of DMS and NA showed signs of reaction after a week of blast, no experts of Disaster Management Department, GPCB, Factory Inspector, Health and Safety Department could give any solution. Small experiments were carried out for three hours and then results were studied. Then the mixture was slowly drained out and placed in soak pit admeasuring 25ft x 15 ft x 10 inch containing 8 tons of 100% lime and took 17 hours to neutralised 3 ton of NA. Therefore evenif this process would have been attempted for the main tank which blasted, it would have needed huge quantity of lime and large soak pit. This could not have been done in 20 hours. The blast had occurred within 20 hours of detection of the mistake.

13. Draining out NA and DMS is dangerous. IDLH (Immediate danger to life or health) for DMS is 7 ppm (7gm/cubic meter). It was 7.5 MT DMS in mixture means 5,25,00,000 cubic meter volume will be required for draining the liquid at level which is less than IDLH. It will be equal to 1,31,25,000 square meter (3281 acre) area. This is more than area of entire SEZ. Therefore it could not be drained.
14. Committee has specifically stated that there is no damage to environment on account of water pollution
15. Company paid more compensation for 10 out of 11 deceased cases than was recommended by the committee. One case envisages outgo of about Re . 61 lakhs
16. Committee has erred in applying formula for assessing damage to environment on account of air pollution. The methodology is not in question at this stage. According to the company an amount of Re 57 lakhs is assessment of the environmental damage.
17. In stead of paying to each individual an ex gratia payment for displacement, company suggests to make lumpsum payment of Re 25 lakhs to the Panchayat of two villages where displacement took place



and Panchayat to utilise this amount for water works construction or school improvement.

Paragraph wise response to the report of the committee:

| | |
|------------------------------------|---|
| Section 1 paragraph 1 and 2 | No comments |
| Section 2 paragraph 1 to 6 | No comments |
| Section 2 paragraph 7 | All details of the payments made have been furnished and have been noted additional report by the committee. |
| Section 3 paragraph 1 to 13 | No comments. All the provisions made in statute have been complied with by the company. |
| Section 3 paragraph 14. And 15 | Suggestions made in this paragraphs are based on safety audit report and have been implemented before the accident took place. 180 observations and recommendations have been complied with by now. |
| Section 3 paragraph 16, 17 and 18 | No comment except that dyke walls are provided so that two incompatible chemicals may not mix in case of leakage. |
| Section 4 paragraph 19, 20, 21, 22 | Actions under several acts are initiated and multiplicity of the punishment is contemplated even though the incident is purely an accident and the company or management have shown no negligence or irresponsibility on their part |
| Section 5 paragraph 24 | The procedure followed for unloading the tankers is not showing any casual approach or negligence. The deficiency pointed out are of mine. |
| Section 5 paragraph 25 to 29 | The company was exempted from the lock down and company has not employed any local or casual unskilled person. The operator in charge of tanks farm is qualified having ITI |

| | |
|------------------------------|---|
| | AOCP. Rest of the discussions describes the procedure and compliance thereof by the company but it does not disclose any deficiency. |
| Section 5 paragraph 32 | Describes procedure and requires no further comment. The company followed all procedures on 02.06.2020 but human error lead to accident. |
| Section 6 paragraph 33 to 41 | Statements of various witnesses recorded by DISH have been analysed and it is found that the story given by different persons do not corroborate with each other. Moreover it is stated that there is a serious breach of safety norms as some important documents are not available and the questions on space available in tanks Before unloading of the tanker has started is not been answered properly. All these are matters under investigation by various authorities. However the table given showing overflow is suffering from misunderstanding. The actual position is explained in table given at the end. |
| Section 7 paragraph 42 to 51 | Company is aware about all the precautions and are complying from time to time. However it is specifically submitted that no literature anywhere has noted that these two incompatible materials, HNO ₃ and DMS can react and there can be temperature rise or explosion. |
| Section 7 paragraph 52 to 54 | The observations herein are on the basis of theoretical calculations and /or misinformation. It is not true that it took three hours for avoiding second disaster to be applied to the |

| | |
|-------------------------------|--|
| | <p>first occurrence. This is made amply clear in foregoing submissions.</p> <p>The calculations given by committee to indicate that the production was 563 MT but consumption of material indicate 1137.9 MT is illogical and impractical. Such calculations cannot be applied to actual manufacture. There are several losses in manufacturing process but the calculation is made on the basis of atomic balance which does not envisage all such losses and therefore such calculations are irrelevant and cannot be taken into consideration</p> |
| Section 8 paragraphs 55 to 64 | No comments on the suggestions made |
| Section 9 paragraph 65 to 67 | <p>The recommendations given are not adequate and the company has adopted several positive changes to avoid occurrence of such incidents. These changes are separately submitted with the request to this honourable tribunal that they may be circulated to all the industries which uses number of hazardous chemicals in the same factory premises to avoid such unfortunate incident anywhere in India in future.</p> |
| Section 10 paragraph 68 | The trucks of hydrogen were removed by order of the Director of the DISH who came immediately after accident. |
| Section 10 paragraph 69 to 76 | Only submission is that the hydrogen cylinders were removed from the debris under instruction of the director of DISH. |
| Section 11 paragraph 77 to 91 | The company has complied with the instructions of payments as arrived at by the |



| | |
|--|--|
| | committee. Details of payments required to be made and actually made is given in the IA. |
|--|--|

Actual position of materials in various tanks involved in accident : (Ref Para 33 of the Report)

| Tank | Designated for | Design cap (L) | Density kg/L | Content MT | Vol of content L | Remaining space L | Fill % | Remark |
|------|----------------|----------------|--------------|------------------------|------------------|-------------------|--------|-------------------------------------|
| 4 | DMS | 60000 | 1.33 | 0 | 0 | 60000 | 0.0 | |
| 5 | DMS | 60000 | 1.45 | 7.5 T D 18.8 T H | 18140 | 60000 | 0.0 | 7.5 T DMS ALREADY IN TANK |
| 8 | HNO3 | 20000 | 1.34 | 0.9 T H 25.0 T D | 19400 | 600 | 97.0 | 0.9 T HNO3 ALREADY IN TANK |
| 9 | HNO3 | 20000 | 1.45 | 26.3 MIX | 18140 | 1860 | 90.7 | |

Comments on additional report submitted by the committee:

- a) Quantification of compensation and damages is required to be dealt with for the purpose of present application.
- b) The committee has suggested certain payments for compensation. At page 67 of the report summary of compensation amount recommended for heirs of 11 deceased is produced. Following table gives exact position as to how much payment to each of them is made by the company either directly or through DM:

| Name | Compensation amount suggested by the committee in the report Re | Amount actually paid by the company directly and through DM Re | Shortfall or Excess |
|--------------------|---|--|---------------------|
| Rashmikan Chauhan | 1,15,42,738 | 54,58,122 | 60,84,616 |
| Naresh Prajapati | 40,67,216 | 55,39,645 | (14,72,429) |
| Kunal Patel | 40,15,862 | 56,95,927 | (16,80,065) |
| Suraj Singh | 20,77,980 | 29,77,385 | (8,99,405) |
| Munna Singh | 21,64,920 | 30,42,594 | (8,77,674) |
| MD. Azhar | 20,77,980 | 32,65,261 | (11,87,281) |
| Pramaod Yadav | 20,77,980 | 38,85,075 | (18,07,095) |
| Arun Kori | 19,10,400 | 37,67,144 | (18,56,744) |
| Jayanta Mahata' | 21,64,920 | 32,20,568 | (10,55,648) |
| Hari Chaudhry | 20,10,400 | 31,01,400 | (10,91,000) |
| Tripurarikumar Rai | 19,92,300 | 32,71,445 | (12,79,145) |
| TOTAL | 3,61,02,696 | 4,32,24,566 | |

Therefore yet **Re 60,84,816** is required to be paid no.1. Excess paid to others cannot be recovered. Company is accepting the recommendation and not entering into the factor applied.

- c) 22 persons received grave injuries while 28 had simple injuries. They have been paid respectively Re 5,00,000/- each and Re 2,50,000/- each. Company had paid all the expenses incurred on treatment of all of them. List of the payments made is annexed hereto and marked as **Annexure: S**.
- d) No villagers were hurt or had suffered from any suffocation or other difficulties.
- e) Total 480 villagers had claimed damages to their properties. All were paid entire amount of claim. Total amount of Re 27,11,430/- has been paid. List of the recipients is annexed hereto and marked as Annexure:
- f) Committee has noted that there was no damage to sea water or aqua life. It is also noted that no animal had received any injury.
- g) Committee has noted that the claims received from third parties, that is neighbouring industries. It is also noted that in absence of evidence, no recommendation is made for payment. The company will deal with them on merit of each of the case.
- h) Damages to the environment due to water pollution is assessed at nil.
- i) However damage to the environment due to air pollution is assessed in supplementary report. As regards methodology for arriving at the monetary impact of the pollution caused, the company is at present not entering into. Committee has quantified pollution load as under :



| Pollutant | SO2 | NOX | HCL | CO2 | TOTAL |
|--|-----------|--------|--------|--------|-------|
| Pollutant Load Mt (a) | 59.4 | 60.4 | 90.5 | 348.6 | |
| Damage Value per tonne in Rs. Lacs (b) | 2.1989 | 2.1729 | 0.2189 | 0.0225 | |
| Damage Value in Rs. Lacs (c =a x b) | 130.61466 | 131.2 | 19.8 | 7.8 | 289.5 |

j) Company has differences in respect of damage value per ton of pollutant arrived at by the Committee. Even if the methodology adopted by the committee is followed in toto and not disputed, the factors taken into consideration are not correct. Following table gives calculation of damage value per ton for SO2 and NOX.

| | | | NOx | SOx |
|--|-------|---------------|----------|-----------|
| DAMAGE COST OF as per UK DEFRA at 2017 prices ¹ | £/T | A | 2547 | 13026 |
| EXCHANGE RATE 2017 ⁴ | £ : ₹ | B | 83.81 | 83.81 |
| DAMAGE COST OF Nox | ₹/t | C=AxB | 2,13,469 | 10,91,736 |
| PPP UK v/s US (2017) ² | | D | 0.682 | 0.682 |
| PPP India v/s US ² | | E | 20.648 | 20.648 |
| PPP adjustment factor | | F=D/E | 0.033 | 0.033 |
| Inflation Rate in India from 2017 to 2020 ³ | % | G | 11.74% | 11.74% |
| Calculation as per Value Transfer Method | ₹/t | H = CxFx(1+G) | 7,878.42 | 40,292.22 |

k) If the values arrived at as above is applied, damage valuation comes to :

| Pollutant | SO2 | NOX | HCL | CO2 | Total |
|--|------|------|--------|--------|-------|
| Pollutant Load Mt (a) | 59.4 | 60.4 | 90.5 | 348.6 | |
| Damage Value per tonne in Rs. Lacs (b) | 0.40 | 0.08 | 0.2189 | 0.0225 | |
| Damage Value in Rs. Lacs (c =a x b) | 23.9 | 4.8 | 19.8 | 7.8 | 56.3 |

- l)** Summary of the payment as per report of the committee and as per calculations of the company is as under :

| | On account of | Committee Recommendation | Company calculation |
|---|------------------------------------|--------------------------|---------------------|
| 1 | Death Claims to 11 persons | 3,61,02,696 | 4,93,09,382 |
| 2 | Grivious Injury to 22 persons | 1,10,00,000 | 1,10,00,000 |
| 3 | Simple Injury 28 persons | 65,00,000 | 65,00,000 |
| 4 | Villagers damage claim 480 persons | 27,11,430 | 27,11,430 |
| 5 | Damage to environment | 2,89,50,000 | 56,30,000 |

- m)** Payments to affected parties at Sr 2, 3 and 4 are fully made. One affected person Sr no1 is required to be paid Re 60,84,616/-. Damage to environment needs recalculation on line of the suggestion made hereinabove.
- n)** Committee has not dealt with the amount to be paid to the villagers for displacement. However total number of persons displaced is assessed at 3100. Hon Tribunal suggested Re 25,000/- each.



The respondent no 2 company has taken following steps to avoid occurrences of such events:

1. Tank farms for incompatible chemicals are separated. Two tank farms are now made. One will exclusively house acid tanks only. Other tank farm will house other chemicals.
2. Unloading of tankers is provided with AUTO CONTROL equipment which will analyse density of the input material and if it matches with the density of material inside the storage tank, then only will allow inflow into the tank.
3. For chemicals have similar densities, sound velocity instruments are provided which will allow inflow after due verification.
4. Management control for all input materials is strengthened and double check system is introduced.
5. A qualified manager is appointed for tank farms.
6. Pressure and temperature measurement instruments are fitted in every tanks. The readings are connect to Control Room.
7. All underground tanks are also provided with all these measures.
8. In addition to dyke walls, underground tank has been provided for any collection of possible leakage . This will avoid spilled material flowing over4ground causing any danger.
9. Fresh HAZOP study is carried out for each and every chemical handling.

Vadodara

DATED: 24th January 2021

