

N.D.H.: 24.07.2024

BEFORE THE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH  
AT NEW DELHI

**ORIGINAL APPLICATION NO. 375 OF 2024**

**IN THE MATTER OF :**

NEWS ITEM TITLED "AROUND 40 INJURED AS BOILER  
EXPLODES IN FACTORY IN HARYANA" APPEARING IN THE  
HINDU DATED 16.03.2024 .....APPLICANT

VERSUS

HARYANA STATE POLLUTION CONTROL BOARD & OTHERS  
.....RESPONDENTS

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**Place:** New Delhi

**Date:** 23.07.2024

FILED BY:

  
**(GAURAV AGARWAL)**  
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**BEFORE THE NATIONAL GREEN TRIBUNAL,  
PRINCIPAL BENCH, NEW DELHI**

ORIGINAL APPLICATION NO. 375 OF 2024

**IN THE MATTER OF :**

News item titled “Around 40 injured  
as boiler explodes in factory in Haryana”  
appearing in the The Hindu dated 16.03.2024.

Versus

Haryana State Pollution Control Board  
and Others

...Respondents

**RESPONSE ON BEHALF OF RESPONDENT NO. 3,  
M/S LIFELONG INDIA PVT. LTD.**

1. That the answering Respondent has been directed to be impleaded as party by this Hon’ble Tribunal by its order dated 18.04.2024 and notices were issued to the answering Respondent to file response. Hence, in compliance of the said order the present response is filed.
2. That the answering Respondent is engaged in the business of manufacturing of the auto parts for various automobiles companies. The unit of the Respondent is located at Dharuhera, Rewari Haryana and is covered under the Factories Act.
3. That the report of the National Safety Council explains that “on evening of 16.03.2024 when all activities in Fettling Section were in progress, a total of 67 workers (Contractual + Regular) were working in shed, suddenly fire ball was observed near buffing machine number 21, in fraction of seconds, the fire was transferred to dust collectors through duct and explosion occurred at 05:42 PM due to excessive pressure in the Dust Collectors. The Dust Collectors were located outside the shed and separated by brick wall.

Eventually due to the explosion in dust collector and subsequent turning into major fire and due to excessive pressure flame travelled back through ducting and entered into the fettling area. Fire in the work area badly caused harm to occupants and the workers sustained injuries due exposure to heat of fire and few of them burnt badly.

4. That all the 39 injured workers were immediately taken for medical care at PGI Rohtak. Some of the workers were also treated at Safdurgunj Hospital, New Delhi. However, out of the 39 workers 16 workers succumbed to the burn injuries while undergoing treatment and could not survive.
5. That it is stated that the report about the boiler blast/explosion at the unit of the answering Respondent is incorrect. Answering Respondent unit does not have any boiler installed. It is rather the felting machine as stated above where the fire originated and explosion was caused.
6. That it is submitted with respect to the compensation to the deceased workers, all the 16 deceased workers were paid in total 24.50-23.50 lakhs out of which Rs. 7 lakhs was paid directly by the answering Respondent to the family members of the deceased, while Rs. 10.50 lakhs was paid through the Labour Commissioner under the Workman Compensation Act and rest of the amount is paid by the Labour Welfare Board as the workers were covered under the Employees State Insurance.
7. That the answering Respondents submits that entire payment of the hospital bills of all the deceased while undergoing treatment was paid by the it and it has also arranged for travel and other expenses of the attendants of the deceased during the treatment. Thereafter, the dead bodies of the deceased workers were also sent to their native

places/ villages by ambulances by the answering Respondents at its expenses.

8. That at no point of time the answering Respondent left the workers and their families to themselves and ensure that they get best treatment. However, 16 unfortunate workers could not survive but for their last rites their dead bodies were respectfully sent to their native place/villages.

A true copy of the chart showing the payments and details to the deceased workers dated Nil is **ANNEXURE R-1**

9. That with respect to the compensation to the injured workers all the 23 workers were paid compensation of Rs. 2.0- 1.5 lakhs in total out of which Rs. 1.00 lakhs is paid by the answering Respondent while rest of the amount is paid by the labour welfare board as the workers were registered with the Employees State Insurance.

10. That the answering Respondents submits that entire payment of the hospital bills of all the 23 injured while undergoing treatment was paid by the it and has also arranged for travel and other expenses of the attendants of the injured during the treatment. It is pertinent to mention that many of the workers desired to get treatment at their native places hence they were arranged by the Respondent to be sent to their native places and the expenses for their treatment even there was borne by the Respondent.

11. That answering Respondent ensured the best treatment to its workers. Some of the workers have even returned to the work after getting well. As of now, to the information to the answering Respondent all the 23 injured workers have been treated and are doing well. A true copy of the chart showing the payments and details to the injured workers dated Nil is **ANNEXURE R-2.**

12. That since the accident was completely unexpected as there was no inflammable liquid, oil or gas used in the process, the cause of the fire and especially the explosion was not understood at the relevant time. As such, independent of the investigation of the accident undertaken by the Chief Inspector of Factories and Police, the management was also anxious to know the cause of the explosion and fire accident. Hence a decision was taken to have the accident thoroughly investigated by an independent committee, with detailed technical input to prevent such accidents in future and to seek guidance to improve the work systems in the unit regarding industrial safety, if required.
13. That it may not be out of place to mention that the management of the answering Respondent also got the accident investigated by the National Safety Council as per the direction of the District Collector, Rewari to get the safety audit conducted through the National Safety Council to submit the cause of action. The National Safety Council submitted its report after carrying out the inspection on 15-17 April 2024 which shows that the accident was not caused due to the lapse or gross negligence on part of the answering Respondent. A true copy of the report of National Safety Council dated NIL is ANNEXURE R-3
14. That there is also no violation of any of the environmental norms and the answering Respondent has been carrying out its operations in strict compliance with the statutory provisions of Environment laws. The Respondent herein have valid consent under the Air and Water Act till 30.09.2028 and similarly the grant of authorisation under

the Hazardous and Other Waste Management Rules is also valid till 30.09.2028.

14. That the Respondent submits that it has duly complied with the provisions of the Public Liability Insurance Act 1991 and no provision of the same has been violated. There is also no offence of non compliance committed by the Respondent of the aforesaid Act. Thus, the Respondent prays that this response may be taken on record.

  
Respondent No. 3  
(M/s Lifelong India Pvt.Ltd.)  
Through  
Sri Subhash Rana  
DGM HR and Admin

Filed by :

  
Gaurav Agarwal,  
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Status of Compensation given by M/s Lifelong India Pvt Ltd,Dharuhera,Rewari to Deceased Person ( SI No 1-16 )

Sr. No	Name	Father's Name	Contractor	Address	Treatment at	% of burn	Treatment bear individual or Company	Comp.Paid directly and Through ALC under Workman Compensation	Comp. paid by Labour welfare board	Total Comp.
1	DAYA SHANKAR	GHANSHYAM	SHIVAM	B-1/120,NAND NAGRI,MANDOLI SABOLI,NORTH EAST,DELHI PIN-110093	PGI ROHTAK	90	Company	700000.00 + 1050000.00*	700000	2450000
2	MANOJ	RAM SHEHI	SHIVAM	VILLAGE-PANDIT PURVA,SEJHIA TARABGANJ,DISTRICT-GONDA(UP) PIN-271403	PGI ROHTAK	80-90	Company	700000.00 + 1050000.00*	700000	2450000
3	SALLU	HARINDER	INCREDIBLE MANPOWER FORCE	VILLAGE-CHAINPUR DISTRICT-SARAN( BIHAR) PIN-841424	PGI ROHTAK	70	Company	700000.00 + 1050000.00*	600000	2350000
4	RAJESH	RAMSABD	SHIVAM	VILLAGE-JHAKOLI,DISTRIC T-FAIZABAD (UP) PIN-225408	PGI ROHTAK	90	Company	600000.00 + 1150000.00*	700000	2450000

5	AIAY	SHIV CHARAN	INCREDIBLE MANPOWER FORCE	VILLAGE- USANEDHA DISTRICT- MAINPURI (UP)	PGI ROHTAK	90-100	Company	600000.00 + 1150000.00*	700000	2450000			
6	DIVESH	BHANU PARTAP	SHIVAM	VILLAGE- KAPORPURA, DIST RT- BAHRACH(UP)	PGI ROHTAK	60	Company	700000.00 + 1050000.00*	600000	2350000			
7	DEV ANAND	RAM GARIB	SHIVAM	VILLAGE- TABGANJ, DISTRICT-GONDA(UP) PIN-271403	PGI ROHTAK	60	Company	700000.00 + 1050000.00*	600000	2350000			
8	RAMU	PW/ARU	SHIVAM	VILLAGE- SEWAL, POST- KAKARAKHOR SEWALE, DISTRICT- GORAKHPUR(UP) 273401	PGI ROHTAK	75	Company	600000.00 + 1150000.00*	600000	2350000			
9	GHANSHA YM	TOTA RAM	SHIVAM	VILLAGE- SIKRONA, POST- SIKROHARI, DISTRICT-HARDOI(UP) PIN-241001	SAFDARJ UNG, NEW DELHI	Above 75	Company	700000.00 + 1050000.00*	700000	2450000			
10	PANKAJ	VIAJY	SHIVAM										

		BAHADUR		VILLAGE- KAPORPURA, DIST RICT-HARDOK(UP)	SAFDARJ UNG, NEW DELHI	Abov e 75	Company	700000.00+ 1050000.00*	700000	2450000
11	NEERAJ	BALRAM	SHIVAM	VILLAGE- GOKULPUR, TEHSI L- BAHRAICH, RUPA DIHA(UP) 271881	PGI ROHTAK	Abov e 75	Company	700000.00+ 1050000.00*	700000	2450000
12	SURYA MOHAN	SHIV KUMAR	INCREDI BLE MANPO WER FORCE	VILLAGE- SOHIAN DIHAMMA DIST- MUJAFARPUR (BIHAR)	PGI ROHTAK	70	Company	700000.00+ 1050000.00*	100000	1850000
13	KANHIYA KUMAR	SHRI RAM MATHO	INCREDI BLE MANPO WER FORCE	VILLAGE- SANICHANDA, DIS TRICT- SARAN (BIHAR)PIN- 841419	SAFDARJ UNG, NEW DELHI	51-75	Company	700000.00+ 1050000.00*	600000	2350000
	VIJAY	BALKISHAN	SHIVAM	VILLAGE-	SAFDARJ					

14				BAKHRARI, DIST- BAHRAICH (UP) 271855	UNG, NEW DELHI	Abov e 75	Company	600000.00+ 1150000.00*	700000	2450000
15	AMAR JEET	LALMAN	SHIVAM	VILLAGE-JANGI KA PURA, DIST- AYODHYA (UP)	SAFDARJ UNG, NEW DELHI	60	Company	1750000.00*	600000	2350000
16	MUKESH	NATHUSINGH	INCREDI BLE MANPO WER FORCE	VILLAGE-AKURRI SALEMPUR DISTRICT- KASHGANJ (UP) PIN-207403	PGI ROHTAK	60	Company	1750000.00*	100000	1850000

Note:- \* denotes Amount Deposited at "Commissioner Under Workmen/Compensation Act 1923" vide Reference No-YESIG41160014164.

//TRUE COPY//

Status of Compensation given by M/s Lifelong India Pvt Ltd, Dharuhera, Rewari to Injured Person ( SI No 17-39 )

Sr. No	Name	Father's Name	Contractor	Address	Treatment at	% of burn	Treatment cost bear by individual or Company	Total Comp. Paid by Company	Comp. paid by Labour welfare board	Total Comp.
17	RATILAL	TRILOK SINGH	INCREDIBLE MANPOWER FORCE	VILL- MADARIA DISTRICT- GORAKHPUR (UP) PIN 273402	PGI ROHTAK	60%	COMPANY	100000.00	100000	200000
18	ROHIT	SUNIL KUMAR	ASHWANI INDUSTRIES	ARJUN NAGAR, BAHRAICHA (UP) PIN- 271825	PGI ROHTAK	60%	COMPANY	100000.00	100000	200000
19	RAHUL	SUNIL KUMAR	ASHWANI INDUSTRIES	VILLAGE- ARJUN NAGAR, DISTRICT- BAHRAICHA (UP) PIN- 271825	CIVIL HOSPITAL REWARI	60%	COMPANY	100000.00	100000	200000
20	RAKESH SAHU	JAGDISH	LIFELONG	VILLAGE- BADAGANI, POSTTEHSR OL, DISIHA NSI(UP)	CIVIL HOSPITAL REWARI	40%	COMPANY	100000.00	50000	150000

				284206						
21	MANISH	RAM PRAKASH	INCREDIBLE MANPOWER FORCE	VILLAGE- GARM TIYARA (BIHAR) PIN 802132	CIVIL HOSPITAL REWARI	40%	COMPANY	100000.00	50000	150000
22	VIKAS	JAI KUMAR	INCREDIBLE MANPOWER FORCE	VILL- RAMDIHRA, DISTRICTB HOJPUR (BIHAR) PIN-802351	PGI ROHTAK	25%	COMPANY	100000.00	50000	150000
23	DHARME NDRA RAY	DHURENDR A RAY	INCREDIBLE MANPOWER FORCE	VILLAGE- CHORMA,DI STRICT- SIWAN BHAGWAN PUR HAT (BIHAR) PIN- 841406	PGI ROHTAK	30%	COMPANY	100000.00	50000	150000
24	SOMVEER	KALYAN SINGH	INCREDIBLE MANPOWER FORCE	VILLAGEBA BANPUR DISTRICT- BULANDSH AHR (UP)	VERMA NURSING HOME	30%	COMPANY	100000.00	50000	150000
25	ARVIND	CHADILAL	ASHWANI INDUSTRIES	VILLAGEJA NAGI KA PURWA,JHA KOLI,DISTR ICTFAIZAB AD(UP) PIN 225408	PGI ROHTAK	20%	COMPANY	100000.00	50000	150000

26	MUKESH	RAMESH	ASHWANI INDUSTRIES	GOVINDA PUR MUKRELA, DISTBAHRA ICH(UP) 271851	CIVIL HOSPITAL REWARI	30%	COMPANY	100000.00	50000	150000
27	HARITESH	SHREE RAM	ASHWANI INDUSTRIES	VILLAGE- JANI KA PURVA JAKHAULI, DISTRICT- FAIZABAD(UP) PIN 225408	CIVIL HOSPITAL REWARI	15%	COMPANY	100000.00	50000	150000
28	SANJAY	RAM KISHAN	ASHWANI INDUSTRIES	VILLAGE & POST- BHAGRAID ISTGONDA(UP)	VERMA NURSING	40%	COMPANY	100000.00	50000	150000
29	SANOJ	NBULA	ASHWANI INDUSTRIES	ALIJABUL BUL,DIST-BAHRAICH(UP) 271802	CIVIL HOSPITAL REWARI	30%	COMPANY	100000.00	50000	150000
30	SONU	SHIVKUMAR	ASHWANI INDUSTRIES	VILLAGE & POST- GAUDHEE FUSAI ISHANNAGAR DIST-KHERI(UP) 261502	CIVIL HOSPITAL REWARI	15%	COMPANY	100000.00	50000	150000
31	MAHABIR	GAURI	ASHWANI	NAYYA	CIVIL	20%	COMPANY	100000.00	50000	150000

		SHANKAR	INDUSTRIES	BASAUNA MAFI BAHARAIC H DIST- NEWADA(U P)-2771825	HOSPITAL REWARI					
32	PRITAM	RAM RATTAN	SHIVAM CONTRACTO R	VILLAGE- JANGI KA PURWA,JAK HAULI,DIST RICT- FAIZABAD( UP) PIN- 225408	CIVIL HOSPITAL REWARI	38%	COMPANY	100000.00	50000	150000
33	RAJ KUMAR	RADHE SHYAM	SHIVAM CONTRACTO R	VILLAGE- SEHIA RETADAL SINGH,TAR ABGANJ,DI ST- GONDA(UP) PIN-271403	CIVIL HOSPITAL REWARI	30%	COMPANY	100000.00	50000	150000
34	SONTOSH	KRISHAN LAL	SHIVAM CONTRACTO R	VILLAGE- JAKHOLIDI ST- FAIZABAD( UP) PIN- 225408	PGI ROHTAK	50%	COMPANY	100000.00	50000	150000
35	SANJAY	JAGAN NATH	SHIVAM CONTRACTO R	VILLAGE & POSTBHAG RAI,DISTGO NDA(UP)	CIVIL HOSPITAL REWARI	20%	COMPANY	100000.00	50000	150000

36	ANIL KUMAR	RAM GARIB	SHIVAM CONTRACTO R	VILLAGETA BGANJ,DIST RICTGOND A(UP) PIN- 271403	VERMA NURSING HOME	15%	COMPANY	100000.00	50000	150000
37	SACHIN VERMA	SANTRAM	SHIVAM CONTRACTO R	VILLAGE SEJHIA TEPRA PANDIT PURWA TARABGAN J DIST- GONDA(UP) 271403	VERMA NURSING HOME	25%	COMPANY	100000.00	50000	150000
38	MULAYAM	RAMESH CHAND	SAINI CONTRACTO R	VILLAGE- BHASENDE R KALA,TEHS IL- NEJA,DISTP RAYAGRAJ( UP)	VERMA NURSING HOME	20%	COMPANY	100000.00	50000	150000
39	SURAJ	KANHAIIYA LAL	ASHWANI INDUSTRIES	VILLAGE- JHAKOLIDI STRICT- FAIZABAD( UP) PIN- 225408	CIVIL HOSPITAL REWARI	10%	COMPANY	100000.00	50000	150000

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# **REPORT**

## **ACCIDENT AUDIT**

CONDUCTED AT



**Lifelong India Pvt. Ltd**

**Dharuhera, Harayana**

April 15-17, 2024

BY



## **NATIONAL SAFETY COUNCIL**

98-A, Sector 15, Institutional Area,  
CBD Belapur, Navi Mumbai-400 614  
Tel. 022-27579924/5/6/7, Fax: 022-27577351,  
Email: [safetyaudit@nsc.org.in](mailto:safetyaudit@nsc.org.in), Website: [www.nsc.org.in](http://www.nsc.org.in)

A handwritten signature in black ink, appearing to read "Mahendra Singh".

**Mahendra Singh**  
Director



## Abstract

During Visit of NSC Safety Audit Team comprising of three Expert Members along with the senior staff of M/s Lifelong India Pvt. Limited, accident site was visited on 15<sup>th</sup> to 17<sup>th</sup> of April 2024, and closely analyzed the post-accident scenario.

From the CCTV footage it is evident that fire originated near one of the buffing machine.

During Inspection no serious lapse or gross negligence was observed. No apparent or obvious cause of accident was found but following may be the probable cause or contributing factors.

- i) Spark generated due to some short circuit/electrical fault in the buffing machine.
- ii) Due to electrostatic charge.
- iii) Buffing operations were carried out against rotating emery belts. Possibility of sparks due to friction exists. As this is a special process, expert opinion will matter.

It is evident that generated spark/energy initially ignited the accumulated fine dust near foundation structure of one buffing machine. PVC suction pipe which was adjacent to aluminum dust caught with fire and started smoldering.

As clearly seen in the CCTV footage, the operator observed this and tried to snuff-out the blaze/smoldering in dust at his own efforts by striking with the foot.

As at source of ignition, an adequate energy was present causing the PVC hose pipe to ignite locally and dispersed into an atmosphere containing sufficient oxygen to permit combustion and subsequent rubbing action of operator by foot might have likely exaggerated the smoldering and the same is propagated immediately in surrounding atmosphere where a few dispersed fine dust was already present and created a huge aluminum dust fireball called as "deflagration", followed by which eventually flame getting propagate to the bag filter (confined Area) through duct due to negative pressure, giving rise to the major explosion. (The PVC suction hose was fitted with dust collection hood and main duct to extract aluminum dust).

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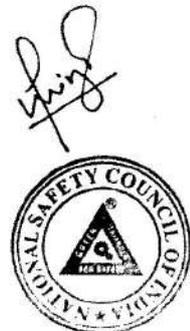
**Brief Details about Incident of Fire and Explosion at M/s Lifelong India Pvt. Ltd., Dharuhera, as obtained by NSC Team comprising Shri Mahendra Singh, Director, NSC, Shri Satish D Bharambe and Shri Govindan Kutty, Expert Panel Members.**

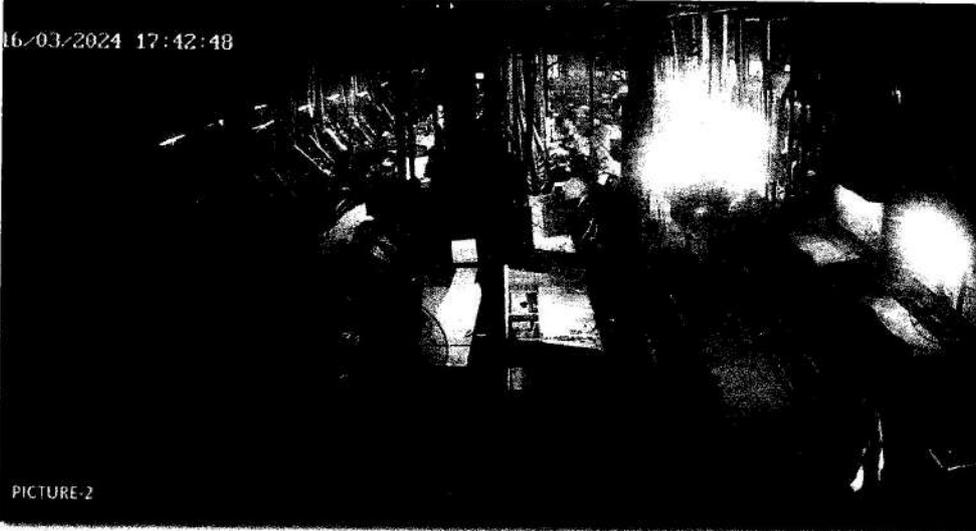
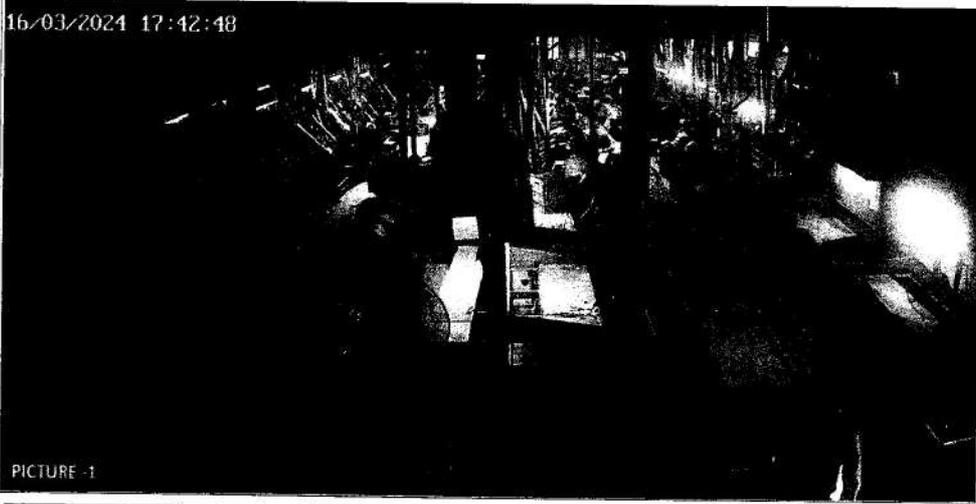
**1.0 Incident Details:**

Date	:	March 16, 2024
Time	:	1742 hrs
Location	:	Fettling Section
Nature of Incident	:	Fire and Explosion
Injuries	:	Burn Injuries to 39 Employees working in the area

**2.0 Sequential Information of Incident:**

In the southwest corner of premises of M/s Lifelong India Private Limited, a section called Fettling Area is located. After pressurized aluminium die casting process the raw auto ancillary components are brought to Fettling Section for further finishing of castings. In this section mainly filing, lancer (emery) and buffing polishing activities were carried out. On 16th March 2024 when all activities in Fettling Section were in progress, a total of 67 workers (Contractual + Regular) were working in shed, suddenly fire ball was observed near buffing machine number 21, in fraction of seconds, the fire was transferred to dust collectors through duct and explosion occurred at 05:42 PM due to excessive pressure in the Dust Collectors. The Dust Collectors were located outside the shed and separated by brick wall. Eventually due to the explosion in dust collector and subsequent turning into major fire and due to excessive pressure flame travelled back through ducting and entered into the fettling area. Fire in the work area badly caused harm to occupants and the workers sustained injuries due exposure to heat of fire and few of them burnt badly. A few photographs of incident scenario are given below:





*Ying*



**3 Injuries and Equipment Damages:**

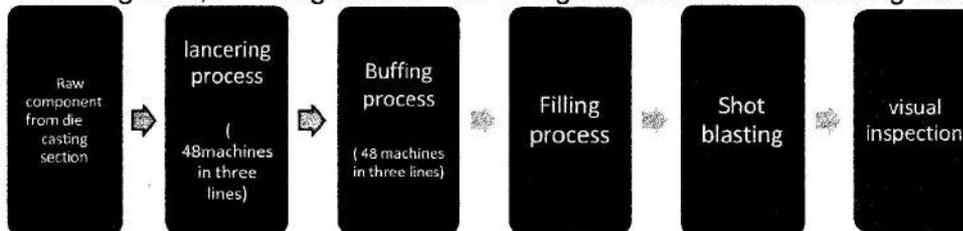
It was reported that at the time of incident, 67 no. of workers were at the job in Fettleing area. 39 workers were found injured just after explosion out of which 16 workers who burnt badly were expired during treatment in hospital. 20 workers were recently discharged from hospital and 3 workers are still under treatment at PGI Rohtak and shifted in general ward for further recovery. The company provides all financial support to all affected workers. In addition to Government benefits of life insurance, ESI, welfare and Pension, M/s. Lifelong India Private Ltd. has voluntarily taken up the responsibility of providing monetary support to families of injured employees. Due to this accident involving multiple causalities, other following losses encountered by the company\* include:

Losses	In Rs
Property loss /Building loss	1.1 Crore
Machine and Equipment	2.25 Crore
Material /Stock Loss	7.5 Lacs
Operational/Production Loss	1.32 Crore
Revenue loss	31.0 Crore

*\*(information provided by M/s Lifelong India Pvt. Ltd.)*

**4 Process Workflow**

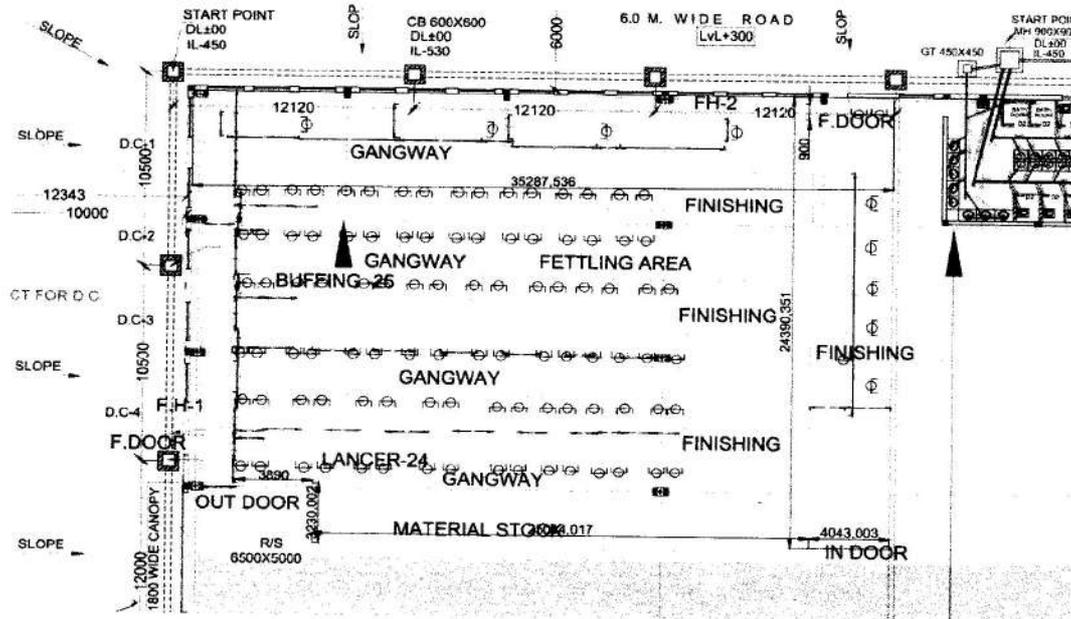
In fettling area, following activities are being conducted at M/s Lifelong India



Pvt. Limited:



**The lay-out of the Fettleing Section are as follows:-**



**5 Description of the Incident:**

During Visit of NSC Safety Audit Team comprising of three Expert Members along with the senior staff of M/s Lifelong India Pvt. Limited, accident site was visited on 15<sup>th</sup> to 17<sup>th</sup> of April 2024, and closely analysed the post-accident scenario.

**The observations concluded that:**

The initial fire originated inside near one of the buffing machine's MS foundation structures and was caused either by:

- i) Spark generated due to some short circuit/electrical fault in the buffing machine (LIL/BM/24, make -Power Master) at workstation in line 2 (as per below sketch) that OR
- ii) Generation of electrostatic charge due to inadequate earthing of equipment and building.

It is evident that generated spark/energy initially ignited the accumulated fine dust near foundation structure of said buffing machine. PVC suction pipe which was adjacent to aluminium dust caught with fire (Picture-6) and started smouldering.

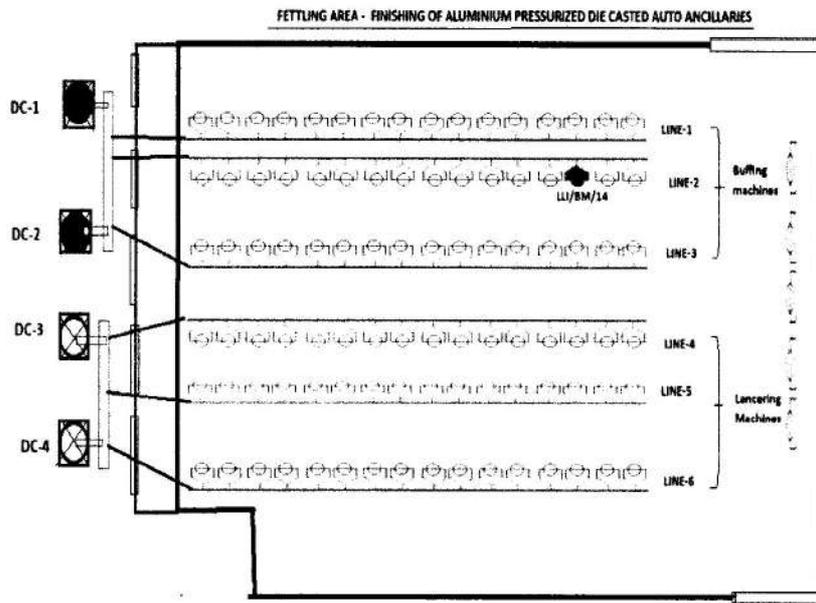
As clearly seen in the CCTV footage, the operator observed this and tried to snuff-out the blaze/smouldering in dust at his own efforts by striking with the foot

*Ying*



At source of ignition, an adequate energy was present causing the PVC hose pipe to ignite locally and disperse into an atmosphere containing sufficient oxygen to permit combustion and subsequent rubbing action of operator by foot likely exaggerated the smouldering and the same is propagated immediately in surrounding atmosphere where a few dispersed fine dust was already present and created a huge aluminium dust fireball and followed by which eventually flame getting propagated to the bag filter through duct due to negative pressure, giving rise to the major explosion. (The PVC suction hose was fitted with dust collection hood and main duct to extract aluminium dust).

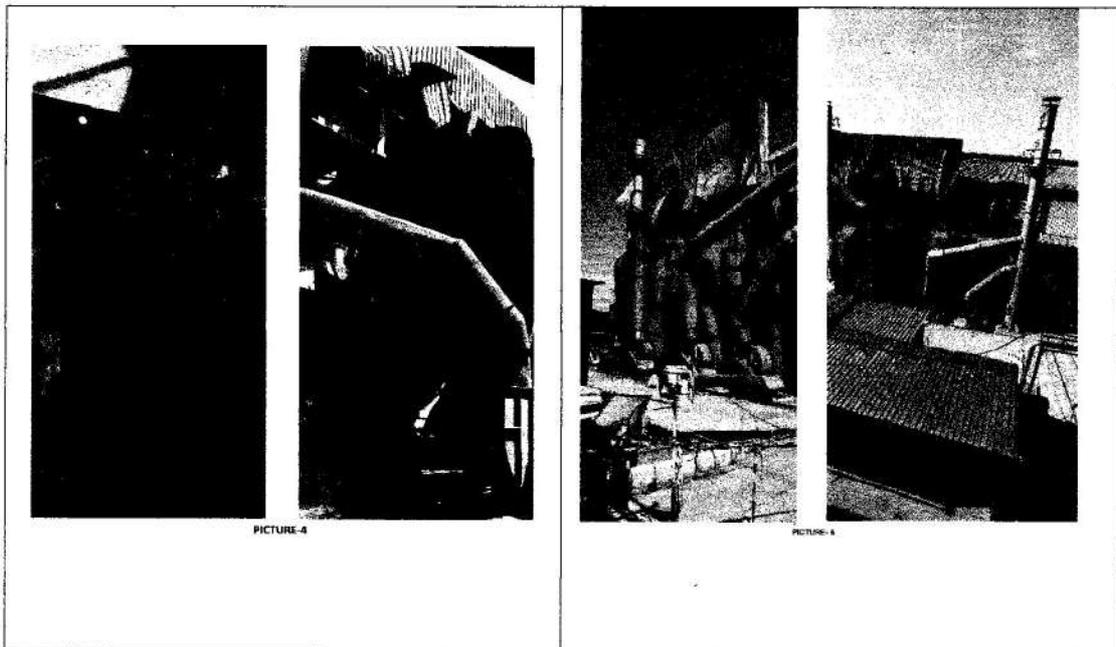
Typical layout of incident site:-



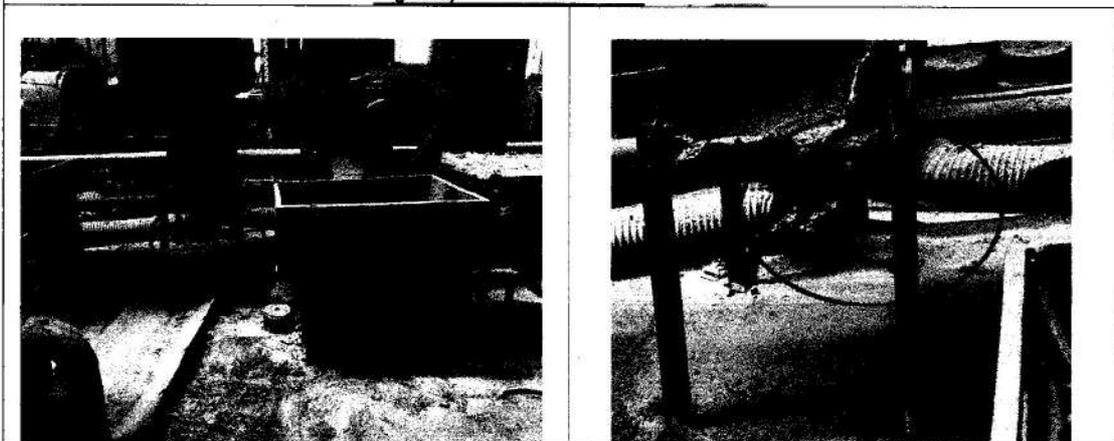
## 6 CCTV camera recording as Evidence:

The audit team closely observed the CCTV footage provided by management which could produce valuable context and helped to assess the possible reasons of explosion and injuries and damages occurred. Visual witness strengthens the report and provide valuable context to arrive at conclusion.





PICTURE-6 (Suspected source of ignition)



## 7 Facts and Technicality about Metal Dust Explosion [Literature Review]:-

- 7.1 Dust explosion is considered as a serious threat for the industry that use or handle combustible dust materials as it may lead towards a significant economic loss in terms of damage to the facilities and suspension of activities, severe workplace injuries and fatalities. A dust explosion is in reality, a dust "deflagration", that is, a combustion phenomenon in which the propagation of the combustion zone occurs at a velocity that is less than the speed of sound in the "unreacted" dust. However, for conformity with common usage, it is referred to as a dust explosion. A dust explosion results when finely divided combustible matter is dispersed into an atmosphere containing sufficient

oxygen to permit combustion and a source of ignition of appropriate energy is present. Aluminium fine dust, having a lower surface area, tends to heat up and therefore to burn very easily. The biggest mistake you can make, therefore, is considering aluminium as a harmless material without considering its characteristics specially in the form of fine dust.

Five elements are required to have a dust explosion. The removal of one or more of these elements can prevent an explosion from occurring:

- i) Combustible dust.
- ii) Oxidizer (e.g., air).
- iii) Ignition source.
- iv) Dispersion of dust.
- v) Confinement (confined Space).

Oxygen in air is the most common oxidizer in most combustible events.

Following are the most important properties of aluminium powder for correctly assessment of the hazard potential.

- Aluminium powder is combustible and classified as being flammable.
- Mixtures of aluminium powder and air are ignitable over a wide range of concentrations and can cause violent dust explosions.
- Highly flammable hydrogen can form on contact with water or other chemicals and present an additional risk of explosion, and possibly be responsible for causing a secondary dust explosion.
- The strong electrostatic charge on aluminium powder can lead to electrical discharges, which can possibly ignite a cloud of aluminium dust.

7.2 Dust explosions and fires are the principal hazards associated with dust handling systems. Other hazards that may occur include:

- The development of electrostatic charges on the conveyed material or system components which might ignite fine aluminium dusts in associated processes.
- Unexpected electrical shocks from static charges on ungrounded components, causing involuntary reaction.

7.3 Dust collectors inherently concentrate the smaller particles and employ pulse jet cleaning, which periodically generate dust clouds and thus a dust explosion hazard exist in presence of an ignition source.

Both ignition and explosion severity sharply increase as aluminium particle size decreases, hence, accumulation of fine dust particles on surfaces are required to be avoided.



- 7.4 Risk mitigation tactics that are used in different ways to prevent fire and explosion accidents, are listed below.
- a) Avoidance of Ignition Source:
- Observe a general ban on smoking; only allow smoking in designated areas that are marked accordingly and that are far enough away from the processing and storage areas.
  - Do not allow matches, lighters or other items that can produce spark to be taken into the processing or storage areas.
  - Do not allow any naked flames, lights or sparks in the processing and storage areas or in dusty areas. Introduce a system of hot work permits for work involving an ignition risk.
  - Avoid friction sparks and inadvertent metal-metal or metal-concrete contact.
  - Avoid any contact whatsoever of aluminium powder or items made from aluminium with rust or rusty metal parts as incentive sparks can be produced (thermit reaction).
  - Avoid electrostatic charges as otherwise electrostatic discharge sparks can occur.
- b) The rapid pressure developed during a dust explosion can be mitigated by venting. The present work explored the effects of venting on the explosion of different mixing weight ratios of aluminium and silver powder mixtures; NFPA 68 and EN 14491.
- c) Electrostatic discharges to be avoided: - Protection against electrostatic discharges is essential, particularly in view of the low minimum ignition energy of fine powders (< 1 mJ).
- Use of conductive tools aluminium powder builds up an electrical charge when in contact with a non-conductive surface. When cleaning, for example, only use brushes with natural bristles (coconut, horsehair, etc.).
  - Earthing is absolutely essential to avoid possibility of ignition due to electrostatic charges.
  - When handling and processing aluminium powder, it is essential that there is electrical contact between the plant components and that they are earthed to discharge static electricity. Portable items also have to be connected in an electrically conductive manner and earthed.
- d) Explosion Venting: - Generally, vent sizes are underestimated. While it is hard to conclude categorically without more information regarding the vent design (e.g., size, specific mass, static opening pressure), the explosibility of the dust and the assumed enclosure strength, this under sizing may be related to a scaling issue with metal dusts, and particularly aluminium dust. Hence, the re-



engineering is advised to design the dust collecting system based on internal actual pressure.

Explosion relief systems that were designed with organic materials in mind may not be adequate for metal dusts. Explosion relief should always be designed and evaluated considering the specific type of dust involved.

- e) Explosion suppression systems using inert gases like Nitrogen which will eventually reduce oxygen required for fire and explosion. Organic/flammable materials may not be suitable for metal dusts. The Suppression systems should always be engineered and tested for the specific dust involved.
- f) Explosion isolation: - While explosion venting protects the enclosure from structural damage, it is the role of explosion isolation to prevent the primary deflagration from propagating through interconnected pipes, especially when these pipes/ducts lead to workstations. The flame was found twice as fast in the case of aluminium dust, and the pressure was increased by more than a factor 10 after 20 m. This illustrates well the challenges associated with the isolation of aluminium dust explosions, both in terms of response time and pressure resistance required for the isolation device.
- g) In addition, one can reduce the damaging effects of explosions by adopting constructive explosion protection measures, such as a construction that is blast-resistant or resistant to explosion shockwaves, and explosion isolation and suppression.
- h) Design, monitoring and maintenance of dust collection systems:-  
Detailed guidance for the safe design and operation of industrial plants handling metal dusts may be availed from experts, including important safety recommendations for dust collecting systems. Wet-type systems are preferred to dry-type dust collectors since they offer an inherently safer design. However, they need to be monitored and maintained properly, the decrease in the water level inside the scrubber resulted in a lowering of the system's efficiency, leading to a decrease in conveying velocity, which allowed some dust powder settle, possibly overheat, and explode. Dry-type dust collection systems are subject to the same requirements. Loose dust particles became effective ignition sources. A minimum velocity throughout the conveying system should also be provided to avoid powder to accumulate and create explosive situations.
- i) Housekeeping: - Often referred as the last safeguard in a facility handling combustible dusts, housekeeping seems an easy task but is often neglected.  
Even if small quantities of aluminium dust escape from the dust collection systems into the main work rooms of the factory per day, significant quantities may accumulate on floors, process equipment, shelves, and other surfaces



over time. An effective housekeeping program is crucial in order not to fuel the primary explosion, and therefore prevent the development of secondary dust explosions.

- j) Personal protective equipment: Whenever dealing with aluminium powder in the open, one should always wear at least the following personal protective equipment.
- Respiratory protection: dust mask filter class FFP 1 (IS 9473:2002)) for normal dust formation; depending on the legal requirements, choose a higher class of protection for high dust concentrations (P2).
  - Hand protection: leather gloves with long cuffs (IS 12254).

Head / face protection: Helmet with mesh for protection against heat or flames (IS 1529 wire mesh or plastic visor).

## 8. Safety Guidelines – National and International and Statutory requirements

- 8.1 NFPA 484 (National Fire Protection Association) *Standard for Combustible Metals* applies to facilities that produce, process, finish, handle, recycle, and store metals and alloys in a form capable of combustion or explosion. OSHA often references this document as an industry consensus standard for facilities that produce or handle metal dust and was created by combining numerous standards related to specifically aluminium dust. This document describes explosion and fire.
- 8.2 Indian Standard IS: 4226:1988 (Reaffirmed in 2012) specifies Code of Practices for Fire Safety of Industrial Buildings: Aluminium/Magnesium Powder Factories.
- 8.3 Statutory Requirements specified in Punjab factories rule (applicable to Haryana)
- Equipment and plant involving serious fire or flash fire hazards shall, wherever possible be so constructed and installed that in case of fire, they can be easily isolated.
  - Ventilation ducts, pneumatic conveyers and similar equipment involving a serious fire risk shall be provided with flame-arresting or automatic fire extinguishing appliance or fire resisting dampers, electrically interlocked with heat sensitive or smoke detectors.
  - Effective measures shall be adopted for prevention of accumulation of static charges to a dangerous extent (earthing provisions made but potential source of electric spark existed).
  - Workers shall wear shoes without iron or steel nails to cause sparks by friction all electrical apparatus shall either be excluded from the area of risk, or they shall be of such construction and so installed and maintained as to prevent the danger of their being a source of ignition.




- effective measures shall be adopted for prevention of accumulation of static charges to a dangerous extent.
- workers shall wear shoes without iron or steel nails to cause sparks by friction.
- smoking lighting or carrying of matches, lighters, or smoking materials shall be prohibited.
- Transmission belts with iron fasteners shall not be used; and
- All other precautions as are reasonably practicable, shall be taken to prevent initiation of ignition from all other sources such as open flames, frictional sparks, overheated surfaces of machinery or plant, chemical or physico-chemical reaction and radiant heat.

9. **Contributing Factors/Possible Root Cause of the Accident:-**

During Inspection no serious lapse or gross negligence was observed. No apparent or obvious cause of accident was found but following may be the probable cause or contributing factors.

Sr. No.	Possible sources of ignition for aluminium powder	Existence at Fetting Area of Lifelong India Pvt. Ltd
1.	Naked flames e.g., flame from matches or cigarette lighters, furnaces, blowtorches, welding or cutting flames, combustion engines.	No such sources of ignition were present.
2.	Hot surfaces e.g., walls of boilers, hot pipe work, soldering irons, parts of machines (bearings) that overheat, hot gases.	No such conditions propagating ignition were present.
3.	Electric sparks and sources of sparks e.g., loose contacts, overloaded power cables, faulty control systems, arcs and sparks on switches, light bulbs, flashlights, electrical as well as battery-operated equipment.	Probability exists at a few locations similar situations observed.
4.	Electrostatic discharges non-earthed parts of plant or containers, unsuitable tools and fixtures, unsuitable clothing.	Probability of accumulation of static charges exist.  Employees were wearing Safety Shoes which has embedded metal toe cap.
5.	Friction or mechanical sparks e.g., grinding, hammering of machine parts, tools, containers.	Buffing operations were carried out against rotating emery belts. Possibility of sparks due to friction exist.




6.	Lightning strikes Voltage surges in cables or plant caused by a	No such weather condition exists. Lightening arrestors
<b>Sr. No.</b>	<b>Possible sources of ignition for aluminium powder</b>	<b>Existence at Fetting Area of Lifelong India Pvt. Ltd</b>
	lightning strike	have been provided on plant buildings.

**10. Emergency Response information:-**

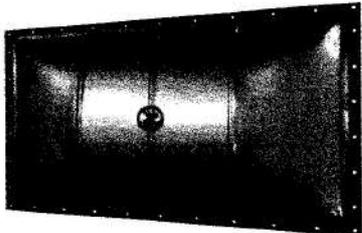
During our visit, our team appreciated the efforts taken by management being so concern about Safety parameters, almost all documents including "Emergency Response Plan" was prepared and maintained. But looking at the occurrence of subjected fatal accident on 16th March, it was evident that training part to the workers and responsive system mentioned in plan was incomplete to some extent. There are several elements in "Emergency Responsive Plan" important to handle the situation during real crisis. So it is advised to increase the frequency of such awareness safety awareness programs among the employees.

Training of individuals in the use of suitable extinguishing medium – dry sand or extinguishing powders for "Class D fires," play great role in emergency situation.

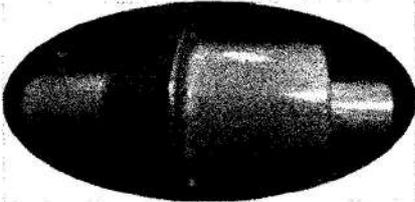
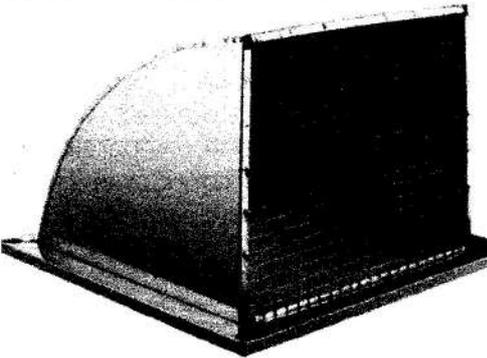
It was observed from the records that the workers underwent training for handling of material and manufacturing process.

**11. Plant Design Improvement:- (Management of LIL may please Explore the possibilities to make changes and introduction of new devises in system to avoid future accident)**

As the auditors who visited at site, are not expert particularly for metal industry and focused on basic "electrical and fire safety" during visit but following modification in equipment are being suggested by NSC for consideration. The same can be implemented under the consultancy of an expert's who can design the equipment as per required specification.

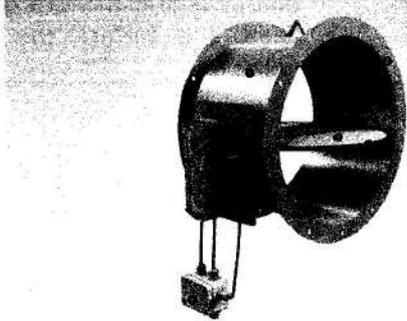
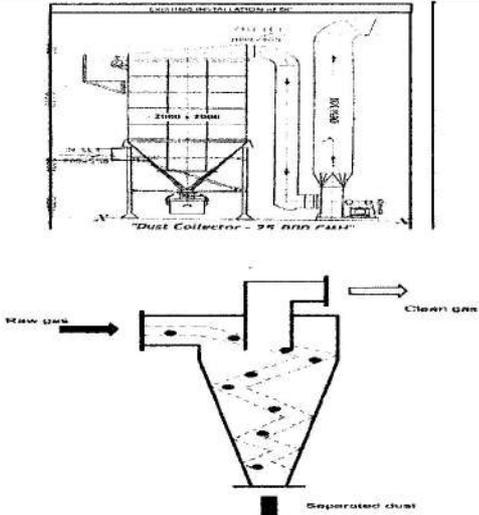
a)	To provide Explosion vents on the Casing of the Bag House/Dust collector	
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<p>b)</p>	<p>To provide Spark Arrestors/ cyclone spark arrester just before the Dust collector. (Picture is symbolic)</p>	 <p><b>SPARK ARRESTOR</b></p>
<p>c)</p>	<p>To provide suitable type of fire detectors inside the Dust collector over the tube sheet of bag house. (Picture is symbolic)</p>	
<p>d)</p>	<p>Spark Detection &amp; extinguishing system on the Duct line before the Dust collector: (Picture is symbolic)</p>	
<p>e)</p>	<p>To provide metallic mesh at the entry of the suction hoods of Buffing/Grinding &amp; polishing application. (Picture is symbolic)</p>	

*Ying*



<p>f)</p>	<p>All electrical motors must be Flame proof grade: Flameproof motors are designed with enclosures that can withstand and contain any internal explosion, preventing the ignition of explosive atmospheres in hazardous environments. (Picture is symbolic)</p>	
<p>g)</p>	<p>Fire Pneumatic dampers: Whenever there is fire, the pneumatic dampers which is interlocked with fire sensor will immediately get closed thereby stopping the smoke/fire to travel further. (Picture is symbolic)</p>	
<p>h)</p>	<p>Control Panel: Must have all interlocking feature like whenever the sensor will detect the spark/fire/smoke it will immediately give signal to the ID Fan (Blower) to stop.</p>	
<p>i)</p>	<p>Cyclone Separator It is advised to install a cyclone separator before Dust collector in the system. (Picture is symbolic)</p>	

*Ying*



IN THE NATIONAL GREEN TRIBUNAL,  
PRINCIPAL BENCH, NEW DELHI  
ORIGINAL APPLICATION NO. 375 OF 2024



VAKALATNAMA

IN THE MATTER OF :

NEWS ITEM TITLED "AROUND 40 INJURED AS BOILER  
EXPLODES IN FACTORY IN HARYANA" APPEARING IN THE,  
HINDU DATED 16.03.2024

...Applicant

Versus

HARYANA STATE POLLUTION CONTROL BOARD & OTHERS

...Respondents

KNOW ALL to whom these present shall come that I/We M/s Lifelong India Pvt. Ltd. the above named Respondent No. 3 do hereby appoint GAURAV AGARWAL (hereinafter called the advocate/s) to be my/our Advocate in the above noted case and authorize him :- To act, appear and plead in the above-noted case in this Court or in any other Court in which the same may be tried or heard and also in the appellate Court including High Court subject to payment of fees separately for each Court by me/ us. To sign, file verify and present pleadings, appeals cross objections or petitions for execution review, revision, withdrawal, compromise or other petitions or affidavits or other documents as may be deemed necessary or proper for the prosecution of the said case in all its stages. To file and take back documents to admit and/or deny the documents of opposite party. To withdraw or compromise the said case or submit to arbitration any differences or disputes that may arise touching or in any manner relating to the said case. To take execution proceedings. The deposit, draw and receive money, cheques, cash and grant receipts thereof and to do all other acts and things which may be necessary to be done for the progress and in the course of the prosecution of the said case. To appoint and instruct any other Legal Practitioner, authorizing him to exercise the power and authority hereby conferred upon the Advocate whenever he may think it to do so and to sign the Power of Attorney on our behalf. And I/We the undersigned do hereby agree to ratify and confirm all acts done by the Advocate or his substitute in the matter as my/our own acts, as if done by me/us to all intents and purposes. And I/We undertake that I / we or my /our duly authorized agent would appear in the Court on all hearings and will inform the Advocates for appearance when the case is called. And I /we undersigned do hereby agree not to hold the advocate or his substitute responsible for the result of the said case. The adjournment costs whenever ordered by the Court shall be of the Advocate which he shall receive and retain himself.

Dated this 22<sup>nd</sup> day of July, 2024

Accepted, identified and satisfied about the due execution of the Vakalatnama

  
Advocate

Memo Of Appearance

To  
The Registrar  
National Green Tribunal  
New Delhi

Sir,

Please enter my appearance for the above named Petitioners/Plaintiff(s)/Appellant(s)/Respondent(s)/Defendant(s)/Caveator(s) Intervener(s) in the above mentioned Petition/Appeal/Suit/Reference.

Thanking you,

Dated : 22.07.2024



  
Applicant/ Respondent  
(Subhash Chand Rana)  
(GM - HR)  
(M/s Lifelong India Pvt. Ltd.)

Yours Sincerely,

  
(GAURAV AGARWAL)  
Advocate

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