

D.O.H' 28/02/24

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
AT PRINCIPAL BENCH, NEW DELHI**

**ORIGINAL APPLICATION NO. 141 OF 2022**

**IN THE MATTER OF:**

Manish Jain

... Applicant

-versus-

Union of India &amp; Ors.

... Respondents

**I N D E X**

Sl. No.	Particulars	Pages
1.	Additional Reply on behalf of Respondent No. 5 - The Upper Doab Sugar Mills and Respondent No. 6 - Sir Shadi Lal Enterprises Ltd. as directed vide order dt. 18.12.2023 with affidavit.	1 - 5
2.	<b><u>Annexure R-5/30:</u></b> Copy of Feasibility Report dt. 07.02.2024 with regard to possibility of installation of Electro-Static Precipitators (ESP).	6 - 12
3.	<b><u>Annexure R-5/31:</u></b> Copy of Feasibility Report dt. 07.02.2024 with regard to utilization of fly ash generated for manufacturing of bricks.	13 - 18



P. SINHA & PALLAK BHAGAT  
Advocates for the respondent Nos. 5 & 6  
Lawyers' Chamber No.5  
Supreme Court Compound  
New Delhi - 110001  
Mob: 9810055169

Dated: 27.02.2024

Email ID: office@associatelawyers.in

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
AT PRINCIPAL BENCH, NEW DELHI**

**ORIGINAL APPLICATION NO. 141 OF 2022**

**IN THE MATTER OF:**

Manish Jain

... Applicant

-versus-

Union of India & Ors.

... Respondents

**ADDITIONAL REPLY ON BEHALF OF THE RESPONDENT  
NO. 5 - THE UPPER DOAB SUGAR MILLS AND  
RESPONDENT NO. 6 - SIR SHADI LAL ENTERPRTSES  
LTD. AS DIRECTED VIDE ORDER DT. 18.12.2023.**

**MOST RESPECTFULLY SHOWETH:**

1. That vide order dt. 18.12.2023 passed in the above-mentioned matter, this Hon'ble Tribunal directed the Respondent Nos. 5 and 6 to file additional replies giving details regarding further remedial measures taken particularly the status of Online Continuous Emission/ Effluent Monitoring Systems (OCEMS), continuous operation of wet scrubbers, possibility of installation of Electro-Static Precipitators (ESP) and also disposal of fly ash to the proposed land fill sites on daily or alternate days directly from the sugar mill to such land fill sites.

2. That with regard to connectivity of OCEMS with CPCB and UPPCB servers, it is submitted that the burnt cable and instrument were replaced with a new cable as well as a new system by the Respondent Nos. 5 & 6 and the same is operational from 11.01.2024.
3. That with regard to continuous operation of wet scrubbers, it is submitted that the system of operation of wet scrubbers is such that it operates on 24 hour basis and the said wet scrubbers have been running continuously on 24 hour basis.
4. That with regard to possibility of installation of ESP, it is submitted that vide feasibility report dt. 07.02.2024 received from Dr. Prakash Biswas, Professor & Head, Indian Institute of Technology, Roorkee, recommending inter-alia that based on the inlet and outlet connections of the flue gases and support structure, it may not be possible to get ESP installed in the boilers stacks. Copy of the said Feasibility Report dt. 07.02.2024 is annexed as **Annexure R-5/30**.
5. That with regard to disposal of fly ash to the proposed land fill sites on daily or alternate days directly from the sugar mill to such land fill sites, it is submitted that fly ash is disposed to the land fill sites from the sugar mill on daily basis.
6. Further, with regard to utilization of fly ash generated for manufacturing of bricks, it is submitted that vide feasibility report dt. 07.02.2024 received from Dr. Prakash Biswas, Professor & Head, Indian Institute of Technology, Roorkee, recommending inter-alia that these two types of fly ash are not

suitable for the production of fly ash bricks. Copy of the said Feasibility Report dt. 07.02.2024 is annexed as Annexure R-5/31.

FILED BY:



P. Sinha & Pallak Bhagat  
Advocates for the Respondent No. 5 & 6

भारतीय गैर न्यायिक

दस  
रुपये  
रु.10



TEN  
RUPEES  
Rs.10

INDIA NON JUDICIAL

उत्तर प्रदेश NOTARY UTTAR PRADESH  
BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL  
AT PRINCIPAL BENCH, NEW DELHI

45AE 670352

ORIGINAL APPLICATION NO. 141 OF 2022

IN THE MATTER OF:

Manish Jain

.....Applicant

Versus

Union of India & Ors.

.....Respondents

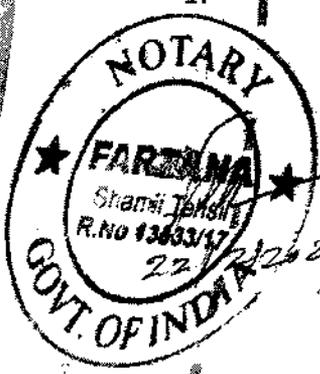
AFFIDAVIT

I, Vinay Kumar Sharma S/o Shri A.C. Sharma, aged about 58 years, r/o Upper Doab Sugar Mills, Shamli, Distt. Shamli, Uttar Pradesh 247776, do hereby solemnly affirm and state as under:-

That I am working as Assistant General Manager- Environment, Health and Safety, with the respondent No. 6, of which the respondent No. 5 is a Unit. As such, I am aware of the facts and circumstances of the case and competent to depose thereon. NOTARY

That the statements of facts in the accompanying reply are true to my knowledge and/or are true to the records of the

Vinay Kumar



NOTARY

NOTARY

case/Respondent No.6 . Rest of the statements are in the nature of submissions to this Hon'ble Tribunal on the basis of advice received and believed to be correct. **NOTARY**

3. That the annexures to the accompanying reply are true copies of their respective originals.

*(Handwritten Signature)*  
**DEPONENT**

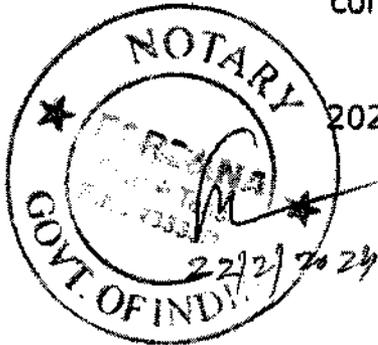
**VERIFICATION:**

I, the deponent abovenamed, do hereby verify that the contents of the foregoing affidavit are true to my knowledge and belief. No part of it is false and nothing material has been concealed therefrom. **NOTARY**

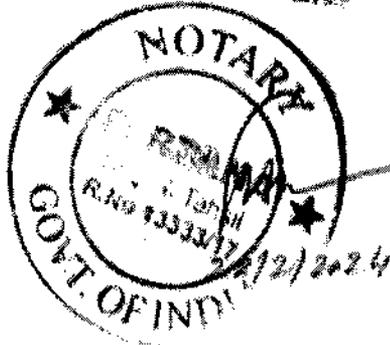
Verified at Shamli(U.P.) on this the 22<sup>nd</sup> day of February, 2024. **NOTARY**

**NOTARY SIGNATURE OF DEPONENT**

*(Handwritten Signature)*



**ATTESTED**



*(Faint text in Hindi/Urdu script)*

*(Handwritten signature)*



**REPORT ON  
FEASIBILITY STUDY FOR INSTALLATION OF  
ELECTROSTATIC PRECIPITATORS (ESP) IN THE STACKS OF THE  
BOILERS FOR THE CAPTURE OF PARTICULATE MATTER**

**Introduction**

The sugar mill was established in western U.P. in the year 1933 by Sir Shadi Lal who was the Chief Justice of Lahore High Court. Sir Shadi Lal established the Upper Doab Sugar Mills Ltd., Shamli for the production of white crystal sugar by the way of vacuum pan evaporation process. In the same year Upper Doab Sugar Mills, Shamli started producing white crystal sugar in the area using sugar cane. The farmers of the area started sowing the sugar cane and producing large quantity of sugar cane and got benefits in terms of monetary uplifting which resulted in development of the society due to the establishment of this sugar industry. The Company Upper Doab Sugar Mill did the CSR work in the society and established Government Hospital with the help of State Government and also established a number of schools in the area for education and modernized them by installing computers lab in the schools of area and also Dharamshala for the public welfare.

The initial crushing capacity of the sugar plant was 2500 TCD and at present crushing capacity has been enhanced to 6250 TCD and uses the sulphitation process. 10 tonnes per day bottom dry ash 35 tonnes per day wet fly ash is generated in this facility. This study has been conducted to evaluate the feasibility of installing the ESP in the boilers stacks for the capture of particulate matter.

**2.0 Electrostatic Precipitators**

An electrostatic precipitator (ESP) is a particle control device that uses electrical forces to move the particles out of the flowing gas stream and onto collector plates. The particles are given an electrical charge by forcing them to pass through a corona, a region in which gaseous ions flow. The electrical field that forces the charged particles to the walls comes from electrodes maintained at high voltage in the center of the flow lane. Once the particles are collected on the plates, they are removed from the plates without re-entraining them into the gas stream. This is usually accomplished by knocking them loose from the plates, allowing the collected layer of particles to

slide down into a hopper from which they are evacuated. Some precipitators remove the particles by intermittent or continuous washing with water.

### 3.0 Types of the ESP

The following are the different types of the ESP which have been developed over a period of times.

1. Plate-wire precipitator
2. Flat plate precipitator
3. Tubular precipitator
4. Wet precipitator
5. Two-stage precipitator

Depending upon the composition of the gas and the particle properties the type of electrostatic precipitator is decided. For the bagasse based boilers the generalized configuration of the ESP is shown in Figure 1. This figure shows that dust laden gas enters a chamber wherein electrodes are arranged as shown in Figure 2. First the particulate matter/dust particles are charged and then are collected on the grounding electrode. The particulate matter is then periodically removed from bottom hopper. The mechanism of particle charging and collection is shown in Figure 3. The moisture in the flue gas also plays a vital role since the resistivity varies very strongly with moisture content as shown in the Figure 4.

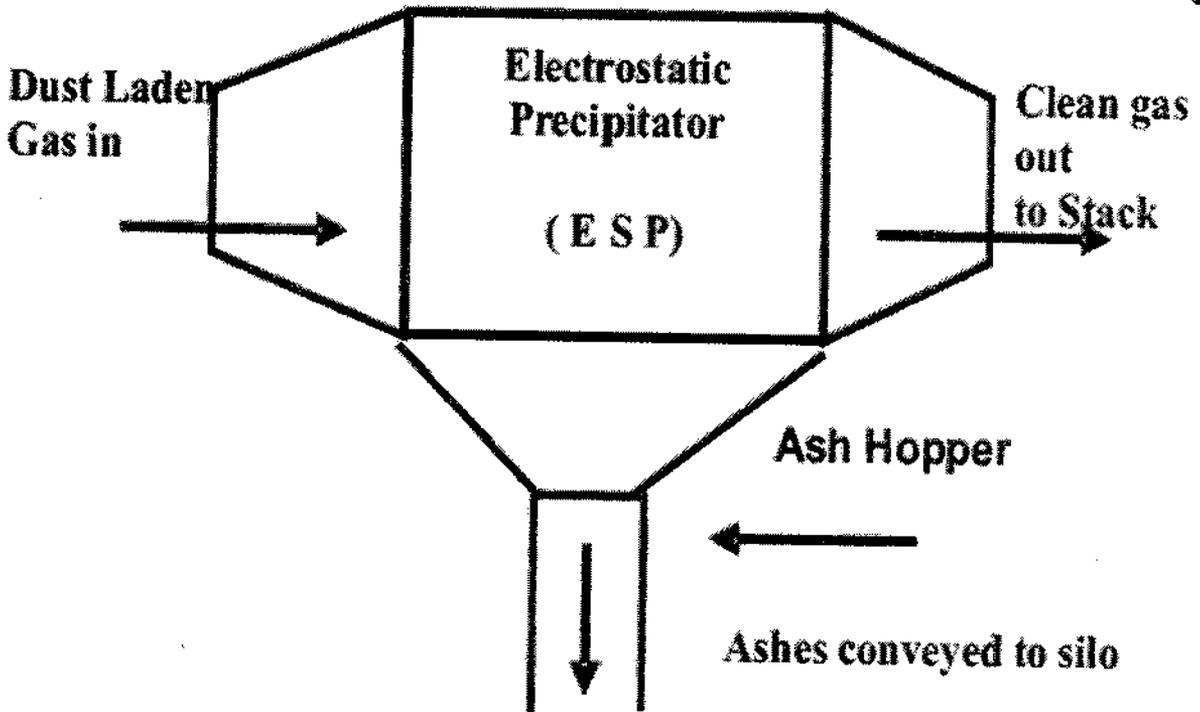


Figure 1. Generalized Configuration of Electrostatic Precipitator

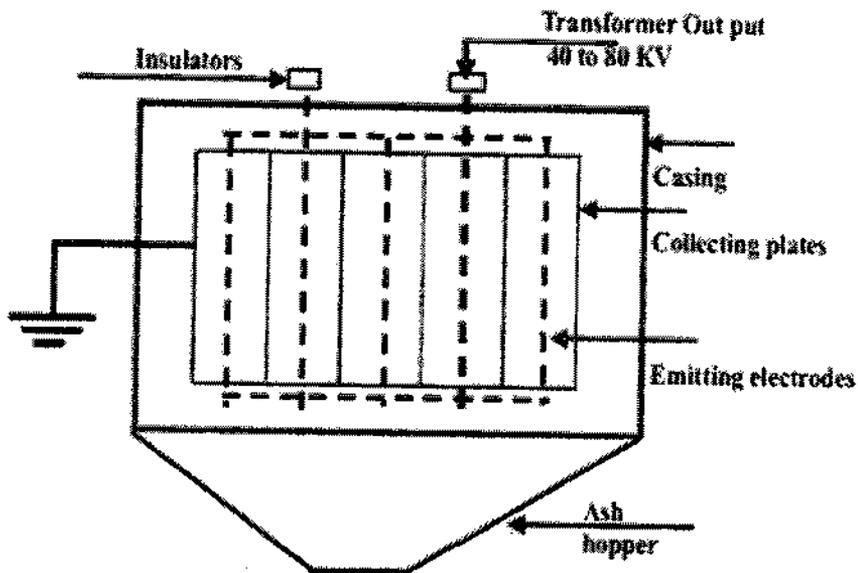


Figure 2. Electrode Orientation Inside ESP Housing

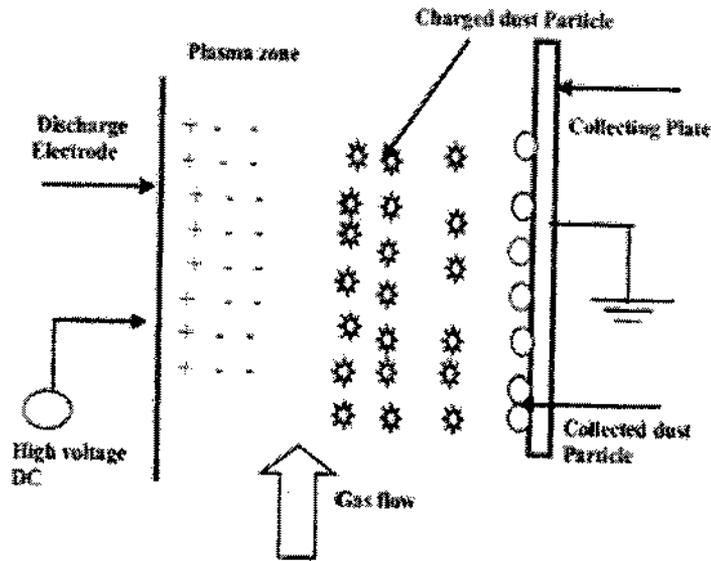


Figure 3. Mechanism of Particulate Charging and Discharging

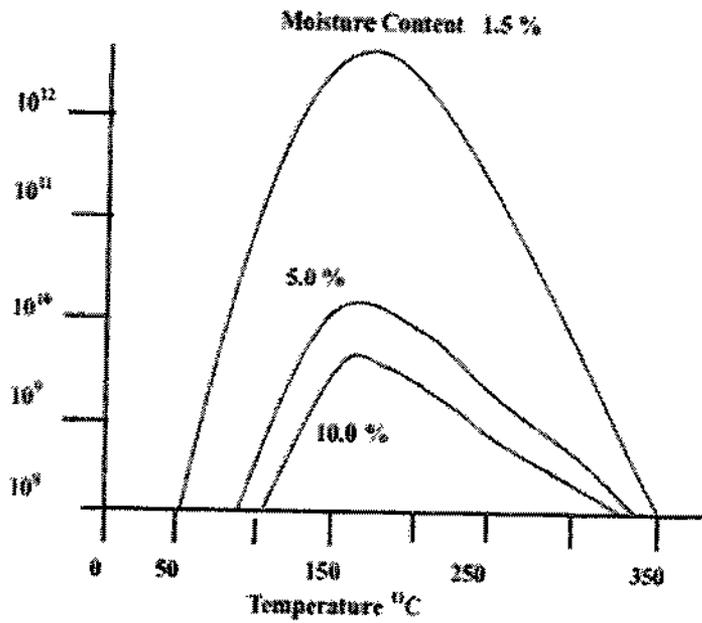


Figure 4. Effect of Moisture Content on Resistivity

This factory is having five number of boilers as given in the table 1 below.

**Table 1 Boiler details**

Particulars	V.K.W-1	V.K.W-2	Surya-1	Surya-2	Taxmaco.
Pressure (kg/cm <sup>2</sup> )	13.9	13.9	21	21	21
Height of chimney (m)	35	35	35	35	35
Capacity (Tonnes/hr)	25	25	25	25	25
Steam temperature (°C)	320-340	320-340	320-340	320-340	320-340
Grate area (m <sup>2</sup> )	6.92	6.92	15	15	19
Flue gas temperature (after wet scrubber in °C)	60-70	60-70	60-70	60-70	60-70
Furnace temperature (°C)	750-800	750-800	750-800	750-800	750-800
Provision of ash Separator	Wet Scrubber	Wet Scrubber	Wet Scrubber	Wet Scrubber	Ventury and Wet Scrubber

Based on the theoretical calculations and industry data for determining the total surface area for the ESP has been determined for the stacks of these boilers and is given below.

**Boiler No. V.K.W.-1**

Flue gas flow:	52,034 Nm <sup>3</sup> /hour
Flue gas temperature:	113 °C
Total collection area:	941 m <sup>2</sup>
Gas velocity inside ESP:	0.92 m/sec
Gap between emitting and collecting electrode:	304 mm
Migration velocity of dust particles:	6.72 cm/sec
No. of fields:	2
Field characteristic:	1st Field 300 mA and 40 kV 2nd Field 500 mA and 40 kV
ESP Efficiency:	98.75 %

//

**Boiler No. V.K.W.-2**

Flue gas flow:	53,444 Nm <sup>3</sup> /hour
Flue gas temperature:	117 °C
Total collection area:	966 m <sup>2</sup>
Gas velocity inside ESP:	0.92 m/sec
Gap between emitting and collecting electrode:	304 mm
Migration velocity of dust particles:	6.72 cm/sec
No. of fields:	2
Field characteristic:	1st Field 300 mA and 40 kV 2nd Field 500 mA and 40 kV
ESP Efficiency:	98.75 %

**Boiler (Surya 1&2)**

Flue gas flow:	1,21, 713 Nm <sup>3</sup> /hour
Flue gas temperature:	114 °C
Total collection area:	2201 m <sup>2</sup>
Gas velocity inside ESP:	0.92 m/sec
Gap between emitting and collecting electrode:	304 mm
Migration velocity of dust particles:	6.72 cm/sec
No. of fields:	2
Field characteristic:	1st Field 300 mA and 40 kV 2nd Field 500 mA and 40 kV
ESP Efficiency:	98.75 %

**Boiler (Taxmaco)**

Flue gas flow:	82, 692 Nm <sup>3</sup> /hour
Flue gas temperature:	102 °C
Total collection area:	1495 m <sup>2</sup>
Gas velocity inside ESP:	0.92 m/sec
Gap between emitting and collecting electrode:	304 mm
Migration velocity of dust particles:	6.72 cm/sec
No. of fields:	2
Field characteristic:	1st Field 300 mA and 40 kV 2nd Field 500 mA and 40 kV
ESP Efficiency:	98.75 %

The present lay out of the boilers is shown in Figure 5. The space available, as per the layout, is limited one for all the four ESPs as detailed above. The support structure, inlet and out let to the ESP also requires the space. Accordingly, it is envisaged that it will be difficult to get installed the ESPs at the existing layout.

### **Recommendation**

Based on the electrode collection area required, inlet and outlet connections of the flue gases and support structure it is recommended that it may not be possible to get installed the electrostatic precipitators (ESPs) in the boilers stacks.



**(Prakash Biswas)**

  
**True Copy**

## FEASIBILITY STUDY FOR USAGE OF BOTTOM ASH AND WATER SCRUBBING ASH FOR THE MANUFACTURE OF BRICKS/BLOCKS

The sugar mill was established in western U.P. in the year 1933 by Sir Shadi Lal who was the Chief Justice of Lahore High Court. Sir Shadi Lal established the Upper Doab Sugar Mills Ltd., Shamli for the production of white crystal sugar by the way of vacuum pan evaporation process. In the same year Upper Doab Sugar Mills, Shamli started producing white crystal sugar in the area using sugar cane. The farmers of the area started sowing the sugar cane and producing large quantity of sugar cane and got benefits in terms of monetary uplifting which resulted in development of the society due to the establishment of this sugar industry. The Company Upper Doab Sugar Mill did the CSR work in the society and established Government Hospital with the help of State Government and also established a number of schools in the area for education and modernized them by installing computers lab in the schools of area and also Dharamshala for the public welfare.

The initial crushing capacity of the sugar plant was 2500 TCD and at present crushing capacity has been enhanced to 6250 TCD and uses the sulphitation process. 10 tonnes per day bottom dry ash 35 tonnes per day wet fly ash is generated in this facility. The samples of the bottom ash (dry) and wet fly ash were taken in person from the premises.

The proximate analysis was carried out of these two types of the ash samples and is given below.

### A. Wet ash sample (As received basis, wt %)

Moisture content	43.3
Volatile matter	17.3
Fixed carbon	4.6
Ash	34.8

### B. Dry ash sample (As received basis, wt%)

Moisture content	7.9
Volatile matter	7.0
Fixed carbon	3.5
Ash	81.6

Similarly, the thermogravimetric analyses (TGA) of the ash samples were also carried out to see effect of heating rates in the oxidizing atmosphere to assess the loss of mass as a function of temperature and heating rates. Heating rates of 5 and 10 °C per mint were employed. These plots are given at Figures 1 to 3 respectively. The plot of Figure 1 shows the mass loss with temperature and the final ash which is left. It shows a maximum loss of mass as 61.4 %. It is also noteworthy that the moisture is getting lost up to a temperature of 100 °C and then the devitalization takes place. Finally, the ash is left as residue.

The loss on ignition was determined as per the procedure laid down in IS 1727-1967. First the wet ash samples were dried in an oven maintained at a temperature of 100 °C. After cooling the sample to room temperature about 1.00 g finely ground sample was taken in a platinum crucible of 20 to 25 ml capacity and kept in a muffle furnace at  $1000 \pm 25^\circ\text{C}$  to constant weight. Air had free access to the sample to maintain oxidizing conditions. The loss on ignition was determined by the following relationship:

$$\text{Loss on ignition, percent} = A/B \times 100$$

where A = loss in weight, mg  
B = weight of moisture free sample, mg

**Loss of ignition**

Dry ash (bottom ash)	: 18.4%
Wet fly ash	: 17.3% (after drying at 100 °C)
Wet fly ash	: 60.6% (43.3+17.3) on as received basis

IS-3812/1981 specifies the analysis of the fly ash obtained from the thermal power plants employing the fluidized bed combustion technology using coal as the fuel and given at Table 1.

The fly ash should meet the requirements as mentioned Siliceous Pulverized fuel ash and Calcareous fuel ash. The bricks which are to be made should contain the ash as mentioned herein which will result in the desired compressive strength. The loss on ignition is very important factor which dictates the suitability of the fly ash for brick making. The IS-3812 1981 sets the upper limit of the loss on ignition as 5.0 % which is a very strong parameter to decide the suitability of ash for the usage for brick/block making. The boilers installed in the sugar factory are very old and are

employing the grate combustion technology which is very inefficient and a much higher percentage of carbon remains unburnt vis-a-vis fluidized bed combustion technology.

**Table I Chemical Requirements**  
(Clause 6.1)

Sl No.	Characteristic	Requirements		Method of Test, Ref to	
		Siliceous Pulverized Fuel Ash	Calcareous Pulverized Fuel Ash	Annex	IS No.
(1)	(2)	(3)	(4)	(5)	(6)
i)	Silicon dioxide (SiO <sub>2</sub> ) plus aluminium oxide (Al <sub>2</sub> O <sub>3</sub> ) plus iron oxide (Fe <sub>2</sub> O <sub>3</sub> ) in percent by mass, <i>Min</i>	70	30	-	IS 1727
ii)	Silicon dioxide (SiO <sub>2</sub> ) in percent by mass, <i>Min</i>	35	25	-	IS 1727
iii)	<sup>1)</sup> Reactive silica in percent by mass, <i>Min</i>	20	20	B	-
iv)	Magnesium oxide (MgO) in percent by mass, <i>Max</i>	5.0	5.0	-	IS 1727
v)	Total sulphur as sulphur trioxide (SO <sub>3</sub> ) in percent by mass, <i>Max</i>	3.0	3.0	-	IS 1727
vi)	Available alkalis as sodium oxide (Na <sub>2</sub> O) in percent by mass, <i>Max</i>	1.5	1.5	-	IS 4032
vii)	Total chlorides in percent by mass, <i>Max</i>	0.05	0.05	-	IS 12423 <sup>2)</sup>
viii)	Loss on ignition in percent by mass, <i>Max</i>	5.0	5.0	-	IS 1727

<sup>1)</sup> Optional test.

<sup>2)</sup> For the purpose of this test, wherever reference to cement has been made, it may be read as pulverized fuel ash.

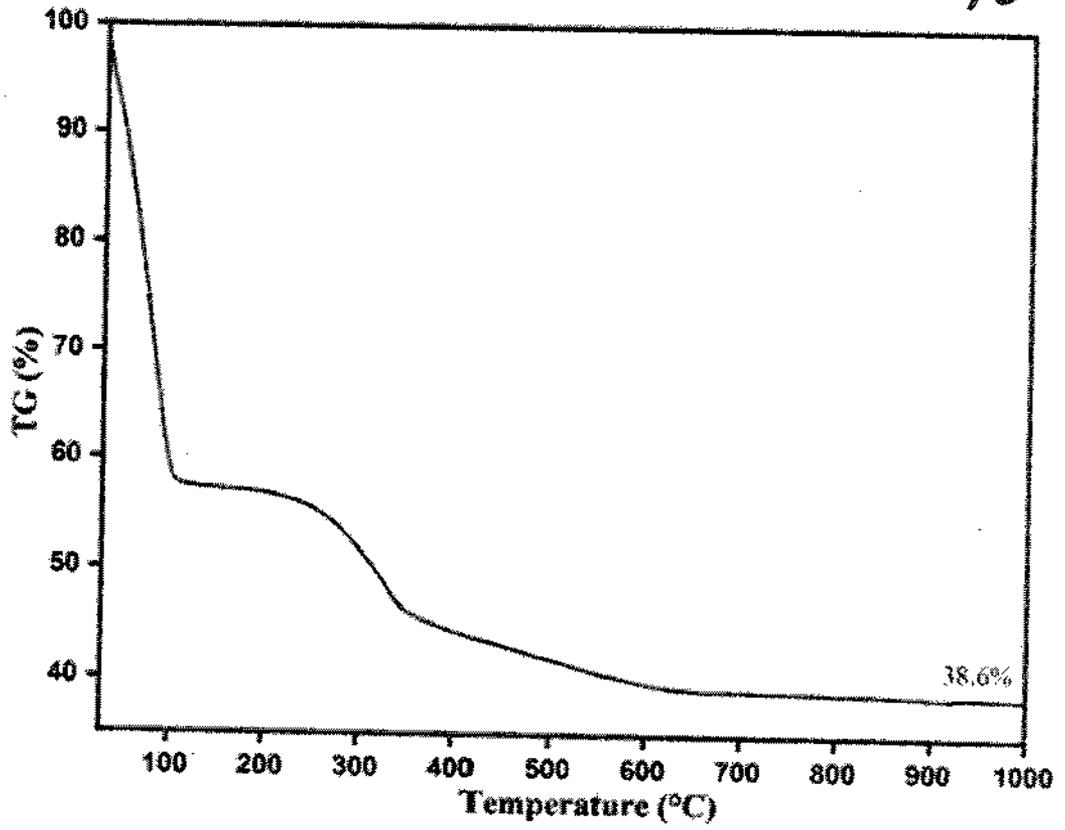


Figure 1. TGA of the wet fly ash at a heating rate of 5 °C/min in air

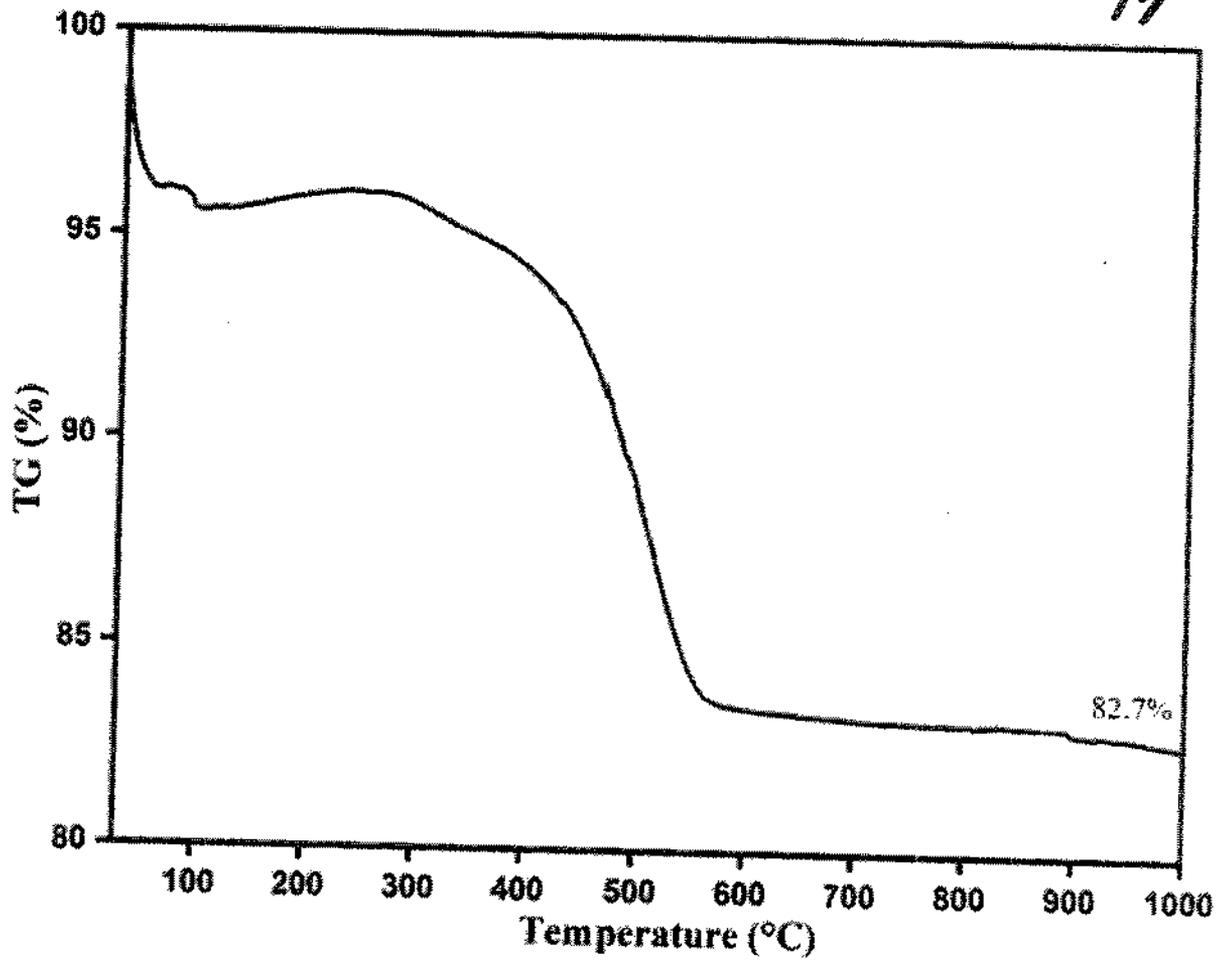


Figure 2. TGA of the dry fly ash at a heating rate of 10 °C/min in air

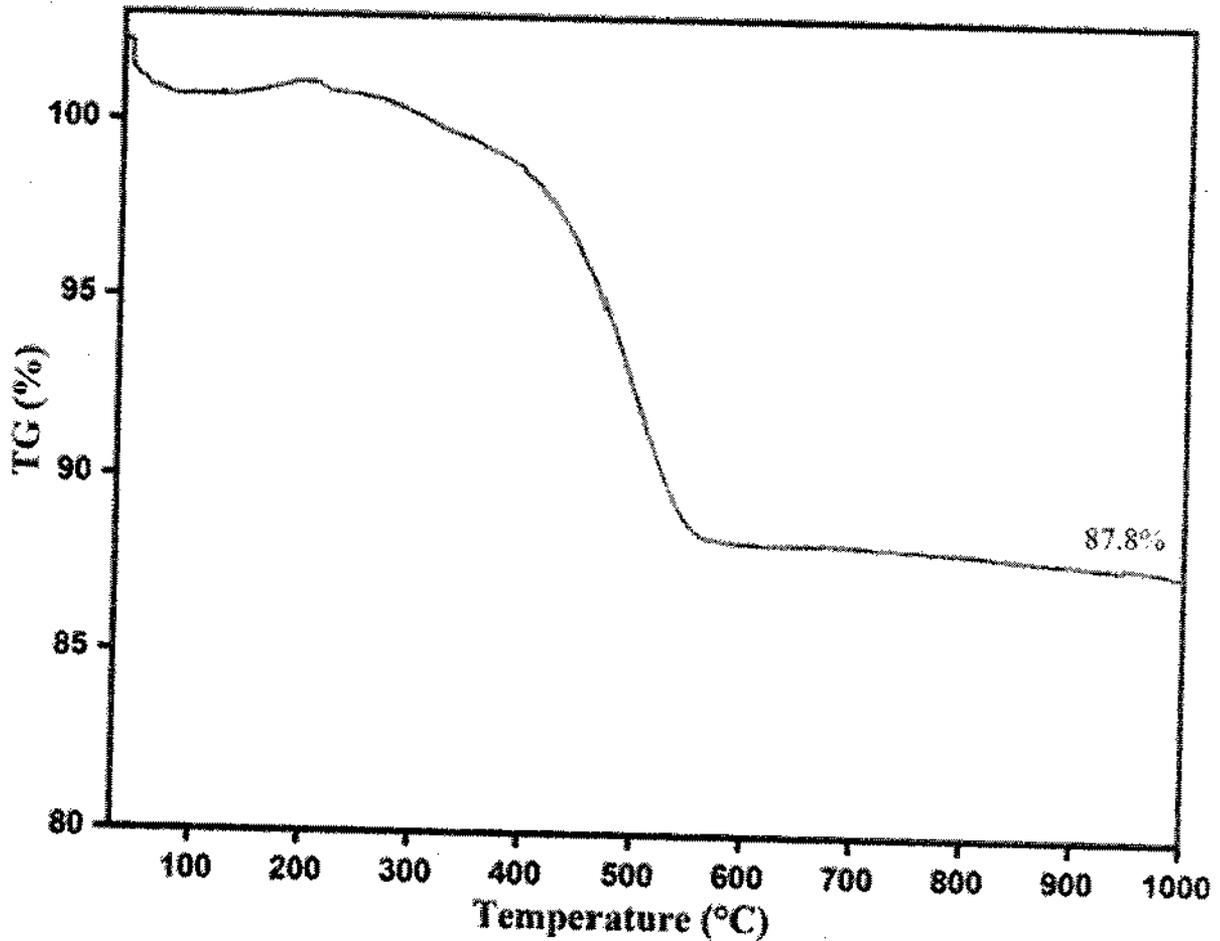


Figure 3. TGA of the fly ash at a heating rate of 5 °C/min in air

#### Recommendation

Based on the tests conducted on the wet fly ash and bottom fly ash it is concluded that these two types of the fly ash are not suitable for the production of fly ash bricks. The major cause being the high degree of LOI (18.4%, 17.3% and 60.6%). As per the IS-3812 1981, the upper limit of LOI is 5% for the suitability of the ash for brick /block making.

*(Signature)*

(Prakash Biswas)

*(Signature)*  
 Tarek Lopez