ECOMATERIAL TECHNOLOGIES

Fly Ash

Harvested Fly Ash

Reliable, high-quality fly ash supply for concrete production

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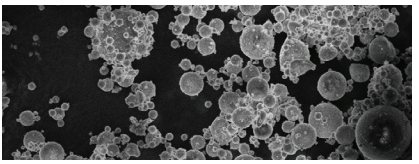
2 MILLION TONS OF FLY ASH IS BEING MADE COMMERCIALLY AVAILABLE

Eco Material Technologies is harvesting and making available for beneficial use approximately 2 million tons of high-grade Class F Pozzolan from a fly ash monofill in Pennsylvania. The fly ash was produced by a coal-fueled generating station in the 1980s and 1990s, when the surplus was stored in a covered 30-acre site above natural grade.

MATERIALS SAMPLED AND TESTED COMPREHENSIVELY

In preparation for making the fly ash commercially available, Eco Material Technologies has sampled and tested the materials comprehensively. Samples were drawn from 12 boring locations at depths ranging from 15 to 50 feet and collected at five-foot intervals. Boring samples were evaluated using X-ray fluorescence (XRF) to determine chemical properties. Carbon content, loss on ignition (LOI), particle size distribution, fineness, organic impurities (ASTM C40), foam index, and adsorption were also evaluated for consistency.



No evidence of material quality degradation while stored in the monofill

Harvested ash before and after processing

TESTING CONFIRMS CHEMICAL/PHYSICAL ATTRIBUTES OF FLY ASH

Comprehensive testing of the fly ash has determined it to be of consistently higher quality than current-generation ash across a range of criteria. The harvested ash has a higher pozzolanic content than the as-produced ash and far lower levels of loss on ignition (LOI) and sulfur as shown in the following chart. Moreover, foam index tests show that the ash's adsorption of air-entraining agents is extremely low—making the harvested ash particularly suitable for applications requiring freeze-thaw resistance.

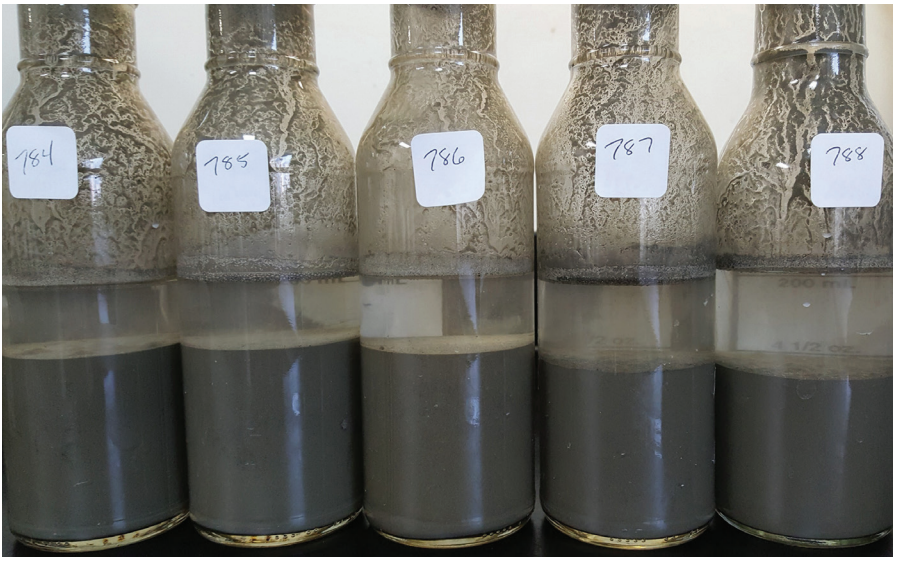
	SiO_2+ Al_2O_3+ Fe_2O_3+	SO_3	CaO	Moisture	LOI	Fineness	SAI 7 d	SAI 28 d	Water Req'
Current Generation	81.99	2.55	9.38	0.21	8.80	28.65	79	80	101
Harvested	90.84	0.19	2.21	0.16	3.05	11.90	79	83	100
ASTM C618 Class F	70% min	5% max	**	3% max	6% max	34% max	75% min	75% min	105% max

HARVESTED FLY ASH OUTPERFORMS AS-PRODUCED ASH IN DURABILITY APPLICATIONS

Chemical testing and analysis of both borings composite and 14-ton samples have been carried out and compared with that of the as-produced sample to determine suitability for concrete applications. The harvested fly ash was found to contain higher levels of alumino-silicates than the as-produced sample and is expected to outperform current-generation ash as a pozzolan.

SAMPLE CHEMICAL ANALYSIS

Plant Source	As Produced	14-Ton Sample	Borings Composite
Silicon Dioxide, SiO_2 %	40.19	51.77	51.30
Aluminum Oxide, Al_2O_3 %	21.96	24.03	27.18
Iron Oxide, Fe_2O_3 %	15.48	12.35	12.21
Sum of Primary Oxides (Si+Al+Fe)	77.63	91.15	90.69
Sulfur Trioxide, SO_3 %	3.22	0.21	0.89
Calcium Oxide, CaO %	12.99	2.54	2.72
Sodium Oxide, Na_2O %	1.20	0.25	0.23
Magnesium Oxide, MgO %	1.16	0.81	0.83



Samples taken from all depths—0-5', 5-10', 10-15', 15-20', and 20-25'—also tested negative for organic contaminants.

FLY ASH MEETS OR EXCEEDS REQUIREMENTS OF ASTM C618 AND AASHTO M295

Complete chemical and physical analyses of a boring composite sample of the landfilled fly ash have also been performed to assess it against both the ASTM C618 and AASHTO M295 standard specifications for coal fly ash and raw or calcined natural pozzolan for use in concrete. As shown in the table below, the sample met or exceeded the requirements of both standards.

ASTM C618/AASHTO M295 TESTING OF LANDFILLED FLY ASH

Sample Type: boring composite

Chemical Analysis	Results	ASTM Limit Class F/C	AASHTO Limit Class F/C
Silicon Dioxide (SiO_2)	51.30%		
Aluminum Oxide (Al_2O_3)	27.18%		
Iron Oxide (Fe_2O_3)	12.21%		
Sum of Primary Oxides (Si+Al+Fe)	90.69%	70.0/50.0 min	70.0/50.0 min
Sulfur Trioxide, SO_3	0.89%	5.0 max	5.0 max
Calcium Oxide, CaO	2.72%		
Magnesium Oxide, MgO	0.83%		
Sodium Oxide, Na_2O	0.23%		
Potassium Oxide, K_2O	2.41%		
Sodium Oxide Equivalent (Na_2O+0.658K_2O)	1.82%		
Moisture	0.73%	3.0 max	3.0 max
Loss on Ignition	3.22%	6.0 max	5.0 max
Carbon	2.10%		
Available Alkalies, as Na_2Oe	0.59%	Not Required	1.5 max*

Physical Analysis	Results	ASTM Limit Class F/C	AASHTO Limit Class F/C
Fineness, % retained on 45-µm sieve	24.72%	34 max	34 max
Strength Activity Index - 7 or 28 day requirement			
7 day, % of control	90%	75 min	75 min
28 day, % of control	90%	75 min	75 min
Water Requirement, % control	94%	105 max	105 max
Autoclave Soundness	0.03%	0.8 max	0.8 max
Density	2.48		

*when required by purchaser

ON-SITE PROCESSING PLANT IS USED TO PREPARE STORED ASH FOR COMMERCIAL USE

The on-site processing plant is being utilized to dry and beneficiate the harvested fly ash for commercial use. Ash is extracted from the landfill, screened, then fed into a rotary dryer for moisture reduction. The material is further processed for fineness to ensure consistency, ultimately yielding powdered fly ash suitable for beneficial use in ready-mix concrete and other durable/high-strength applications.

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