



**DENR ADMINISTRATIVE ORDER**  
**No. 2010-06**

**SUBJECT: GUIDELINES ON THE USE OF ALTERNATIVE FUELS  
AND RAW MATERIALS IN CEMENT KILNS**

Pursuant to the provisions of Executive Order No. 192, series of 1987, Republic Act 6969 otherwise known as the "Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990" and its Implementing Rules and Regulations, Republic Act 8749 otherwise known as the "Philippine Clean Air Act of 1999" and its Implementing Rules and Regulations, and Republic Act 9003 otherwise known as the "Ecological Solid Waste Management Act of 2000" and its Implementing Rules and Regulations, the following guidelines on the use of alternative fuels and raw materials in cement kilns are hereby promulgated for the guidance of all concerned:

Section 1. Basic Policy. These guidelines adhere to the policy of the government to regulate, use and dispose of hazardous substances and wastes as stipulated in RA 6969, promote compliance to emissions standards as contained in RA 8749 and advocate resource recovery as specified in RA 9003.

Section 2. Scope and Coverage. These guideline set the registration and permitting requirements, standards and procedures on co-processing of alternative fuels and raw materials (AFR) for clinker for cement production, which include among others, the following:

- a) Waste delivery control;
- b) Waste acceptance criteria;
- c) Occupational health and safety requirements;
- d) Co-processing operations;
- e) Emission limits and monitoring;
- f) Documentation and reporting; and
- g) Enforcement of standards and requirements

Section 3. Definition of Terms. For the purpose of these guidelines, the following terms are hereby defined:

- a) **Alternative fuels** refer to non-traditional fuels, such as waste materials, that provide thermal energy in the production of cement.



- b) **Alternative raw materials** refer to non-traditional raw materials, such as waste materials, providing minerals essential in the production of cement.
- c) **Baseline emissions test** refers to the measurement of emissions from the kiln stack of a cement plant operating under normal conditions, in order to determine compliance to emission limits and emission factors for trace metals.
- d) **Co-processing** is the reuse or recovery of mineral or energy content of waste materials while simultaneously manufacturing cement in a single combined operation.
- e) **EMB** refers to the Environmental Management Bureau of the Department of Environment and Natural Resources.
- f) **Emission factor** refers to a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. The emission factor of each trace metal is obtained by measuring the quantity of the trace metal coming out as stack gas and dividing this by the quantity entering the kiln. An emission factor of 0.05 % for a particular trace metal means that for this particular trace metal, 0.05% of this metal entering the kiln (coming from the raw materials and/or from the fuels) will appear in the stack gas. The measurements are done during the stack emissions test.
- g) **Hazardous wastes** are: (a) substances that are without any safe commercial, industrial, agricultural or economic usage and are shipped, transported or brought from the country of origin for dumping or disposal into or transit through any part of the territory of the Philippines; (b) by-products, side-products process residues, spent reaction media, contaminated plant or equipment or other substances from the manufacturing operations and as consumer discards of manufactured products which present unreasonable risk and/or injury to health and safety and to the environment.
- h) **Healthcare wastes** include pathological wastes (such as tissues, organs, fetuses, bloods and body fluids), infectious wastes and sharps (such as syringes, scalpels).
- i) **ISO 17025** - General Requirements for the Competence of Calibration and Testing Laboratories.
- j) **PD 1586** - Philippine Environmental Impact Statement (EIS) System.
- k) **Pre-processing** are operations performed on waste materials in order to improve its handling characteristics or to maintain the stability of the cement manufacturing process. For certain wastes, pre-processing is necessary to transform waste to AFR with defined characteristics

that complies with the technical specifications of the cement plant. These may involve removal of dirt, size reduction, placing in discrete containers, mixing with other wastes and/or other materials, or homogenizing.

- l) **Traditional fuels** refer to non-renewable energy sources such as coal, fuel oil, pet-coke and natural gas.
- m) **Traditional raw materials** refers to limestone, marl, sand, shale, clay, pyrite cinder, gypsum (natural and synthetic), diorite, silica, tuff, greywacke, iron concentrate and slag.
- n) **Waste materials** refer to any material, product or by-product, liquid or solid that the generator intends to dispose or is required by law to be disposed of.

#### **Section 4. Hazardous Waste Materials Acceptable for Co-processing.**

A waste material can be co-processed provided it meets the following criteria:

- a. It qualifies as alternative fuel or alternative raw material as defined in these guidelines;
- b. Its use in the cement kiln complies with applicable environmental standards provided in RA 8749 and RA 6969;
- c. It should pass waste acceptance criteria based on its calorific value, mineral oxides, heavy metal content and other substances, and impacts on kiln operation, clinker and cement quality as follows:
  - i. Heavy metal content and other substances should not exceed the limits given in the waste acceptance criteria submitted by the Facility.
  - ii. As an alternative raw material, its ash content should be greater than 50% and its total mineral oxide content should be greater than 75% (ash basis). Mineral oxide refers to CaO, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub> and sulfur compounds (expressed as SO<sub>3</sub>).
  - iii. As an alternative fuel, its gross calorific content should not be less than 2,000 kcal/kg.
  - iv. The wastes can undergo pre-processing to comply with requirement (ii) or (iii).

**Section 5. Waste Materials Not Acceptable for Co-processing.** Any waste materials with impacts on kiln operation, that fails to pass the waste acceptance criteria, and including the following, shall not be accepted for co-processing:

- a. Health care wastes
- b. Asbestos-containing wastes
- c. All types of batteries

- d. Electronic assemblies and scraps
- e. Explosives
- f. Cyanide wastes
- g. Mineral acids
- h. Radioactive wastes
- i. Unsegregated Municipal solid wastes

The EMB shall review this list every two (2) years or as the need arises.

Section 6. Procedure for accepting hazardous waste materials for co-processing. Hazardous waste materials that will be used for co-processing should pass the following procedure:

1. The waste material must be properly documented, labeled and packaged.
2. The delivered waste material shall be subjected to inspection for contamination and adulteration.
3. The waste material must be sampled and tested according to the approved sampling and testing plan.
4. The waste material upon acceptance shall be weighed and properly stored.
5. A transport permit must accompany waste materials that are regulated under RA 6969.
6. Waste materials regulated under RA 6969 that do not conform with the waste acceptance criteria must be rejected and a non-conformance report prepared and sent to the waste generator. A copy of the report should be furnished to EMB.

Section 7. Minimum Qualifications of Co-Processing Facilities. All existing and operational cement plants that intend to engage in co-processing of waste materials shall:

- a. Have existing personnel, processes and systems that demonstrate its strong commitment to the protection of the environment, health and safety. The facility's quality, environmental and health and safety management system should be ISO (or its equivalent) compliant;
- b. Be compliant with the provisions of the following laws and regulations:
  1. Philippine Clean Air Act (RA 8749)
  2. Philippine Environmental Impact Statement (EIS) System (PD 1586)
  3. Philippine Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969)



4. Philippine Mining Act of 1995 (RA 7942) and their corresponding rules and regulations and
  5. DOLE Department Order No. 16, series of 2001 (Amendments to Rule 1030 of the Occupational Safety and Health Standards
- c. Be capable of controlling inputs and process parameters required for the effective co-processing of waste materials.
  - d. Have an approved protocol/procedure for each type of waste material to be co-processed.

The co-processing operation of a proposed cement plant shall be incorporated in its EIS and subject to evaluation and approval of the EMB.

Section 8. Registration Requirements for Co-Processing Facilities. A cement plant that co-processes waste materials must be registered at the EMB as an Alternative Fuel and Raw Materials (AFR) co-processing facility. The registration shall be valid for a period of one (1) year and shall list the types of wastes that the facility is allowed to co-process. The facility may apply for an amendment of the list of allowed wastes at any time after registration.

Minimum requirements for registration as an AFR Co-processing facility are:

1. Official notarized Letter of Request, including an accountability statement;
2. New or amended Environmental Compliance Certificate (ECC) of cement plant;
3. A baseline emissions test report showing compliance with emissions regulated by the Philippine Clean Air Act (RA 8749), which includes National Emission Standards for Source Specific Air Pollutants (NESSAP) substances and dioxins and furans. The baseline emissions test shall be conducted by a DENR recognized third-party laboratory/stack sampling service provider or foreign laboratory with ISO 17025 accreditation. The EMB may require the test to be supervised by either the Department of Science and Technology or other institutions that have the capability to do so as determined by EMB. The report shall include emission factors for trace metals calculated based on the emission test conducted.
4. Process flow diagram and detailed description of each treatment process identifying all by-products, end-products and residues and including pre-processing facility (if applicable);
5. Valid Permit to Operate pollution control facilities, Pollution Control Officer Accreditation Certificate, and an organization chart showing



the names and positions of responsible persons at the co-processing facility;

6. Storage management plan for waste materials, by-products and end-products, including pre-processing facility (if applicable);
7. Photograph(s) of the facilities' processing and storage areas;
8. Emergency and Contingency Plans including Abandonment Plan;
9. Financial resources and accountability;
10. Protocols for each type of waste material that the cement kiln proposes to co-process. The protocol shall include but not limited to the following information or data i.e. heating value of the material, raw material and fuel substitution, feed rate, etc.
11. The proponent shall pay a processing fee of P5,500.00 in accordance with prescribed standard costs and fees set by EMB.

Section 9. Operating Conditions and Process Control in Co-Processing Facility. To ensure safe and effective operations of the co-processing facility, the following must be observed:

1. The feed point of waste materials should be properly located in a cement kiln in accordance with manufacturer/design specifications or with international standards, specifically:
  - a. Waste materials with organic content must be fed only at the high-temperature (at least 850 °C) regions of the kiln.
  - b. Waste materials containing more than 1% halogenated organic substances, expressed as chlorine, and must be fed at the main kiln burner.
  - c. Under no circumstances should waste materials be fed into kiln until a minimum of 850 °C is attained at the feed point.
2. The facility must be equipped with a continuous temperature monitoring system at the feed point (point where waste materials are introduced).
3. Waste materials should only be fed into the kiln when operating conditions are stable. The facility must be equipped with a control system to either shut-off or reduce the feed rate of waste materials when abnormalities or upset conditions in the kiln operations occur. Feeding of waste materials must be discontinued under any of the following conditions:
  - a. failure of the dust collector;
  - b. power failure;



- c. failure of feed point temperature monitoring system;
  - d. failure of the CEMS; and
  - e. failure of the process equipment
4. The co-processing facility must be equipped with a continuous emissions monitoring system (CEMS) capable of measuring the following parameters: CO, Particulates, VOC or HCl, NO<sub>x</sub>, and SO<sub>x</sub>. Monitoring of VOC shall be required only once the VOC emission standard has been established by EMB.
  5. Under no circumstances shall a co-processing facility allow feeding of waste materials to continue beyond four hours of continuous non-compliance with CEMS monitored emission limit values.
  6. Each facility must develop, implement and communicate a detailed spill response plan to ensure effective and rapid containment and clean up in the event of a spill. The facility must be equipped with adequate fire fighting devices as certified by the Bureau of Fire.
  7. All personnel of the facility directly handling or exposed to waste materials shall be provided with proper personal protection equipment (PPE) in compliance with existing laws, rules and regulations.

Section 10. Emissions Monitoring. Emissions must conform to the standards specified in the Philippine Clean Air Act (RA 8749) or approved by the EMB. The emissions must also conform to the internationally accepted level of 0.1 ng TEQ/NCM for dioxin and furan.

**National Emission Standards for Source Specific Air Pollutants (NESSAP)**

POLLUTANT	STANDARD APPLICABLE TO SOURCE	MAXIMUM PERMISSIBLE LIMITS (mg/NCM)	METHOD OF SAMPLING	METHOD OF ANALYSIS
Antimony and its Cmpds	Any source	10 as Sb	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method
Arsenic and its Cmpds	Any source	10 as As	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method
Cadmium and its Cmpds	Any source	10 as Cd	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method
Carbon Monoxide	Any industrial source	500 as CO	USEPA Method 3 or 10	Orsat Analysis or NDIR
Copper and its Cmpds	Any industrial source	100 as Cu	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method
Hydrofluoric Acid and Flouride Cmpds	Any source other than manufacture of Aluminum from Alumina	50 as HF	USEPA Method 13 or 14 as appropriate	As per sampling method
Hydrogen Sulfide	i) Geothermal power plants ii) Geothermal Exploration and Well testing iii) Any source other than (i) and (ii)	c, d e 7 as H <sub>2</sub> S	USEPA Method 11, 15 or 16 as appropriate	Cadmium Sulfide Method or per sampling method
Lead	Any trade, industry or process	10 as Pb	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method

Mercury	Any source	5 as elemental Hg	USEPA Methods 1 through 5 or 29 or 101	AAS <sup>b</sup> Cold Vapor Technique or Hg analyzer
Nickel and its Cmpds except Nickel Carbonyl	Any source	20 as Ni	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method
NO <sub>x</sub>	<ol style="list-style-type: none"> <li>1) Manufacture of Nitric Acid</li> <li>2) Fuel burning steam generators <ol style="list-style-type: none"> <li>a) Existing source</li> <li>b) New source <ol style="list-style-type: none"> <li>i. coal fired</li> <li>ii. oil fired</li> </ol> </li> </ol> </li> <li>3) Diesel powered electricity generators</li> <li>4) Any source other than 1,2,3 <ol style="list-style-type: none"> <li>a) Existing source</li> <li>b) New source</li> </ol> </li> </ol>	<p>2,000 as acid &amp; NO<sub>2</sub> calculated as NO<sub>2</sub></p> <p>1,500 as NO<sub>2</sub></p> <p>1,000 as NO<sub>2</sub> 500 as NO<sub>2</sub></p> <p>2,000 as NO<sub>2</sub></p> <p>1,000 as NO<sub>2</sub></p> <p>500 as NO<sub>2</sub></p>	USEPA Methods 1 through 4 and Method 7	Phenol-disulfonic acid Method or per sampling method
Particulates	<ol style="list-style-type: none"> <li>1) Fuel burning equipment <ol style="list-style-type: none"> <li>a) Urban &amp; Industrial area</li> <li>b) Other area</li> </ol> </li> <li>2) Cement Plants (kilns, etc)</li> <li>3) Smelting process</li> <li>4) Other stationary sources</li> </ol>	<p>150</p> <p>200 150</p> <p>150</p> <p>200</p>	USEPA Methods 1 through 5	Gravimetric per sampling method
Phosphorous Pentoxide	Any source	200 as P <sub>2</sub> O <sub>5</sub>	USEPA Methods 1 through 5 or 29	Spectrophometry or per sampling method
Sulfur Oxides	<ol style="list-style-type: none"> <li>1) Existing Sources <ol style="list-style-type: none"> <li>a) Manufacture of Sulfuric Acid and Sulfonation process</li> <li>b) Fuel burning equipment</li> <li>c) Other Stationary sources</li> </ol> </li> <li>2) New Sources <ol style="list-style-type: none"> <li>a) Manufacture of Sulfuric Acid and Sulfonation process</li> <li>b) Fuel burning equipment</li> <li>c) Other Stationary sources</li> </ol> </li> </ol>	<p>2,000 as SO<sub>3</sub></p> <p>1,500 as SO<sub>2</sub></p> <p>1,000 as SO<sub>3</sub></p> <p>1,500 as SO<sub>3</sub></p> <p>700 as SO<sub>2</sub></p> <p>200 as SO<sub>3</sub></p>	USEPA Methods 1 through 4 and 6 or 8 as appropriate	As per sampling method
Zinc	Any source	100 as Zinc	USEPA Methods 1 through 5 or 29	AAS <sup>b</sup> or per sampling method

Section 11. Documentation and Reporting. All aspects of co-processing waste materials in a cement kiln must be well documented. As such, documents and records as listed below shall be maintained for at least five (5) years and be made available for inspection.



1. Delivery record for each waste material received in the facility must be maintained for five (5) years. The record of each waste must show the following information:
  - a. Name of waste material and waste ID No. (if hazardous waste)
  - b. Category of waste material
  - c. Tons of waste delivered
  - d. Name of transporter and Transporter ID No. (if hazardous waste)
  - e. Name of waste generator and Waste generator ID No. (if hazardous waste)
  - f. Date delivered
  - g. Sample Reference No. (if random sampling was performed)
  - h. Copy Hazardous Waste Manifest record of each delivery
  - i. Copy of transport permit if hazardous
  
2. Daily co-processing operation log sheet must be maintained, covering a period of five (5) years, showing or attaching the following information:
  - a. IDs of waste materials co-processed
  - b. Quantity of waste material co-processed
  - c. CEMS printout
  - d. Temperature at materials feed point
  
3. Laboratory analysis of sample waste materials received in the facility shall be kept for a minimum of five (5) years.

Section 12. Public Access to Confidential Information on Co-Processing Facility Records and Reports. Confidential business information, including but not limited to, related to trade secrets, intellectual property rights and processes, production/sales figures or processes unique to the cement manufacturer, or would otherwise tend to affect adversely the competitive position of such cement manufacturer shall not be made available to the public.

Section 13. Auditing. The EMB shall conduct audits to ensure compliance of the facility with its co-processing permit and with these guidelines:

- a. The EMB at any time may collect waste samples to verify if it conforms to waste acceptance criteria. The cost of sample analysis shall be charged against the account of the facility.
  
- b. The compliance audit of the facility shall be done at least once a year. A third party audit may be required by EMB, as it may deem necessary.
  
- c. The tracking system for these guidelines shall use the system under DENR Administrative Order No. 04-36.




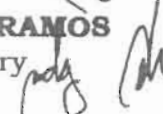
Section 14. Fines and Penalties. Fines and penalties for violating these guidelines shall be governed by pertinent provisions given in Philippine Clean Air Act (RA 8749), Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA 6969), and Environmental Impact Statement System, (PD 1586).

Violation of any provision of these guideline by a co-processing facility shall result to suspension or cancellation of Permit to Co-Process, as determined by DENR-EMB.

Section 15. Separability Clause. If any provision of these guidelines is declared void or unconstitutional, the remaining provisions hereof is not affected thereby shall remain in full force and effect.

Section 16. Repealing Clause. All DENR Administrative Orders that are inconsistent with these guidelines are hereby repealed or modified accordingly.

Section 17. Effectivity. This Administrative Order shall take effect fifteen (15) days after its publication in two (2) newspapers of general circulation and upon submission of a copy thereof to the Office of the National Administrative Registry (ONAR) at the University of the Philippines Law Center.

  
**HORACIO C. RAMOS**  
Secretary 



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