

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Holcim Philippines
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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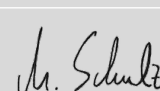
Production of Holcim OPC at Davao plant, Bagged
Ordinary Portland Cement
Type I 28 MPa min
ASTM C150, PNS 07

Holcim Philippines

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1. General Information

Holcim Philippines	Holcim OPC						
Programme holder IBU - Institut Bauen und Umwelt e.V. Hegelplatz 1 10117 Berlin Germany	Owner of the declaration Holcim Philippines 7/F Two World Square McKinley Hill, Fort Bonifacio 1634 Taguig City Philippines						
Declaration number IBU-CEI-HOL-2203120-PH2024000199-ISUE001-EN	Declared Product / Declared Unit Cement / 1000 kg						
This declaration is based on the product category rules: Cement, 07/2023 (PCR checked and approved by the SRV)	Scope: This environmental product declaration shows the life cycle assessment of the production of Ordinary Portland Cements Holcim OPC (Type I 28 MPa min) at the Davao plant of Holcim Philippines.						
Issue date 26/08/2024	The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.						
Valid to 25/08/2029	The EPD was created according to the specifications of <i>EN 15804+A2</i> . In the following, the standard is simply referred to as <i>EN 15804</i> .						
 Hans Peters (Chairman Institut Bauen und Umwelt e.V.)	The EPD was calculated with the pre-verified software CarbonCLARITY™ EN 15804 EPD Generator – Cement of Climate Earth.						
 Florian Pronold (Managing Director Institut Bauen und Umwelt e.V.)	Verification <table border="1"> <tr> <td colspan="2">The standard <i>EN 15804</i> serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to <i>ISO 14025:2011</i></td> </tr> <tr> <td><input type="checkbox"/> intern</td> <td><input checked="" type="checkbox"/> extern</td> </tr> </table>  Matthias Schulz (Independent verifier)	The standard <i>EN 15804</i> serves as the core PCR		Independent verification of the declaration and data according to <i>ISO 14025:2011</i>		<input type="checkbox"/> intern	<input checked="" type="checkbox"/> extern
The standard <i>EN 15804</i> serves as the core PCR							
Independent verification of the declaration and data according to <i>ISO 14025:2011</i>							
<input type="checkbox"/> intern	<input checked="" type="checkbox"/> extern						

2. Product

2.1 Product description/Product definition

Holcim OPC is an ordinary Portland cement composed mostly of clinker which is produced and monitored according to PNS 07.

It consists of a mixture of finely ground, non-metallic, inorganic components. After adding water to the cement, a suspension (cement paste) is formed, which solidifies and hardens both in air and under water due to the onset of a hydration reaction and remains permanently solid.

This cement is a hydraulically hardening binder for the production of concrete and mortar.

For the use and application of the product the respective national provisions at the place of use apply.

2.2 Application

Holcim OPC is used as a binder in the manufacture of concrete and mortar.

The cement is preferably for general use, precast, mid rise and high rise building construction.

2.3 Technical Data

Holcim OPC has according to ASTM C150 and PNS 07 a standard compressive strength of at least 28 MPa at 28 days.

Constructional Data

Name	Value	Unit
Strength class acc. to ASTM C150, PNS 07	28 MPa min (28 days)	N/mm ²

Performance values of the product are listed in the standard PNS 07:2018 Portland cement - Specification. Type I is approximately equivalent to a cement CEM I 42.5 N based on composition and compressive strength.

2.4 Delivery status

Holcim OPC is delivered in sacks of 40 kg or in big bags of 1 tn.

2.5 Base materials/Ancillary materials

Portland cement clinker (ca. 95-100 %)

Cement clinker is made from a mixture of raw materials that is heated in a kiln at a temperature of over 1400°C until it is sintered. The starting materials for the production of cement clinker must mainly contain calcium oxide (CaO) and silicon dioxide (SiO₂) as well as small amounts of oxides of aluminum (Al₂O₃) and iron (Fe₂O₃). Rocks that provide these compounds are limestone, marl and clay or their naturally occurring mixture.

Limestone (ca. 0-5 %)

This product contains substances listed in the candidate list (date: 14.06.2023) exceeding 0.1 percentage by mass: no

This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no

2.6 Manufacture

Holcim OPC is manufactured at the Davao plant.

Production of Portland cement clinker

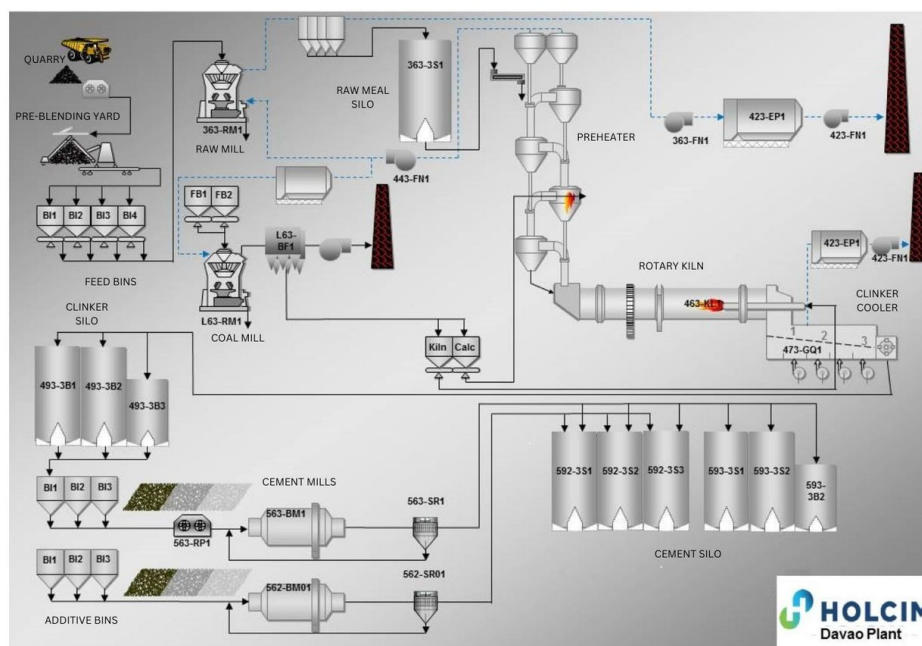
Limestone, marl, clay or their natural mixture, are required for the production of Portland cement clinker. These starting materials are mined in quarries, pre-crushed and transported to the nearby cement works. There they are homogenized into an intermediate product, with additional natural or secondary corrective substances being added to fine-tune the chemical composition. In the subsequent heating process, the Portland cement clinker is produced from the intermediate product. The firing process takes place in a rotary kiln, where the material is thermally converted at around 1450 °C and then rapidly cooled. The finished clinker is stored in silos.

Extraction of limestone

The limestone is extracted from natural deposits in opencast quarries.

Cement Production

To produce the ready-to-sell cement Holcim OPC, the cement components are finely ground and combined. A sulfate carrier is added to control the setting behavior.



Note: dashed lines indicate production steps that do not necessarily apply to this cement

2.7 Environment and health during manufacturing

The operation of the Davao plant is subject to the provisions of the *Philippines Environmental Impact Statement System (PD 1586)*, the *Philippines Clean Air Act 1999 (RA 8749)*, *Philippines Clean Water Act of 2004 (RA 9275)* and the *Ecological Solid Waste Management Act of 1990 (RA 6969)*.

An environmental management system according to *ISO 14001* is installed in this plant.

2.8 Product processing/Installation

General

Mixing cement and water creates the cement paste, which encases the individual grains of the aggregate in concrete or mortar and binds them together firmly as it hardens. The cement paste, which is liquid after the addition of water, turns into the solid cement paste. Today, fresh concrete is produced almost exclusively in ready-mixed concrete plants, on large construction sites or in precast plants in medium-sized and large mixing plants.

Environment and health during product processing

The dust particles of the product can irritate the eyes and respiratory system.

If the product comes into contact with water or if the product gets wet, an alkaline solution will be formed which may cause skin and eye irritation.

The abrasiveness of the aggregate in concrete and mortar can also support skin irritation. Water-soluble chromate may develop allergic chromate dermatitis with prolonged contact.

Further details are available in the product's material safety data sheet.

2.9 Packaging

The following packaging materials are used when the product is sold in paper sacks or big bags (weighted average profile):

- Plastic bag: 0.37 kg
- Plastic pallets: 0.67 kg

2.10 Condition of use

Not relevant for Holcim OPC.

2.11 Environment and health during use

Not relevant for Holcim OPC.

2.12 Reference service life

Not relevant for Holcim OPC.

2.13 Extraordinary Effects

Fire

Holcim OPC is neither flammable nor explosive. The product is classified in Class A1 according to *EN 13501-1*.

Water

When cement reacts with water, the so-called hydrate phases arise, which causes the cement paste to solidify and harden to form cement paste. If larger amounts of cement are accidentally released into bodies of water, the pH value in the body of water can increase.

Water hazard class: slightly hazardous to water.

Mechanical destruction

Not relevant for Holcim OPC.

2.14 Re-use phase

Not relevant for Holcim OPC.

2.15 Disposal

If Holcim OPC has to be disposed of, it should be hardened with water and disposed off in accordance with local regulations.

There are no waste codes for non-hazardous wastes such as hardened paste or concrete in Philippines. Waste code according to European Waste Catalogue Ordinance (WCO): depending on the origin 170101 (concrete) or 101314 (concrete waste and concrete slurry).

2.16 Further information

For more information: <https://www.holcim.ph/>.

3. LCA: Rules of calculation

3.1 Declared unit

The declared unit is 1000 kg.

Declared unit

Name	Value	Unit
Declared unit	1000	kg
Conversion factor to 1 kg	0.001	-

3.2 System boundary

Type of EPD: cradle-to-factory gate

The system boundaries include the manufacture of Holcim OPC including the extraction of raw materials through to the finished product at the factory gate. The product stage includes:



Module A1: Extraction and processing of raw materials



Module A2: Transport of raw materials to the factory gate and internal transport



Module A3: Manufacture of final product

The construction stage, the use stage and the disposal stage are not taken into account in the life cycle assessment for the final product.

3.3 Estimates and assumptions

No estimates or assumptions were made that would be relevant for the interpretation of the life cycle assessment results.

3.4 Cut-off criteria

The flows not taken into account are less than 0.01% of the total incoming mass of each elementary process and in total for module A1-A3.

3.5 Background data

The data on which the life cycle assessment is based comes from data collection at the Davao plant. Information on the use of material and energy resources as well as transport distances was provided by Holcim Philippines.

The emission data used in the life cycle assessment of clinker production are based on the legally prescribed emission measurements on rotary kilns of Holcim Philippines for the period 01/04/2022 to 31/03/2023. Gaps in kiln emission reporting were filled with proxy data from generic clinker profiles of the ecoinvent database.

The CarbonCLARITY™ EN 15804 EPD Generator – Cement, version 1.2.0 dated 07/11/2022 with the configuration file dated 09/08/2024 was used for the life cycle assessment. The calculation used the Ecoinvent database v3.8.

3.6 Data quality

The data basis for this EPD is the continuous data acquisition in the Davao plant.

The data was collected for the calendar year 01/04/2022 to 31/03/2023 by Holcim Philippines and checked for plausibility by Climate Earth. The data

quality can be rated as very good. Any gaps in the collected data were filled in with conservative proxy data.

The background datasets are on average less than 5 years old and their quality is rated as good or very good.

3.7 Period under review

Data from the period 01/04/2022 to 31/03/2023 were used for the life cycle assessment of Holcim OPC.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Philippines.

3.9 Allocation

There are no co-products at the Davao plant and therefore all environmental impacts are allocated to the final product.

Kiln dust or bypass dust can be co-produced during clinker production. The sum of the inputs and outputs of this production process are assigned to the clinker.

The materials resulting from reuse, recycling or recovery in the context of the manufacture of cements are:

- Alternative fuels
- Alternative raw materials

The alternative fuels used for production are classified as either secondary fuels or waste. Emissions from secondary fuels are included in the environmental impact assessment results, while emissions from the incineration of waste are reported as additional information according to the IBU Cement PCR. The waste status of the fuels concerned was verified using the waste key number. The exclusion of environmental impacts from the incineration of combustible waste was only applied to CO₂ emissions, as other emissions (e.g. NO_x, SO_x, etc.) could not be easily distinguished from different fuel types.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account.

The Ecoinvent background database is used (version 3.8).

4. LCA: Scenarios and additional technical information

The development of scenarios must be based on the end product (e.g. concrete) and not on the preliminary product Holcim OPC.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0	kg C
Biogenic carbon content in accompanying packaging	0	kg C

5. LCA: Results

The following table contains the results of the life cycle assessment for a declared unit of 1000 kg of Holcim OPC.

The characterization factors of the "Environmental Footprint reference Package 3.0" were used to determine the impact balance.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	ND	ND	ND	ND	ND

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT according to EN 15804+A2: 1000 kg Holcim OPC

Core indicator	Core indicator	Unit	A1-A3
GWP-total	Global warming potential - total	[kg CO ₂ -Eq.]	917
GWP-fossil	Global warming potential - fossil fuels	[kg CO ₂ -Eq.]	917
GWP-biogenic	Global warming potential - biogenic	[kg CO ₂ -Eq.]	0.05
GWP-luluc	GWP from land use and land use change	[kg CO ₂ -Eq.]	0.02
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.93E-5
AP	Acidification potential, accumulated exceedance	[mol H ⁺ -Eq.]	2.78
EP-freshwater	Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	0.16
EP-marine	Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	0.77
EP-terrestrial	Eutrophication, accumulated exceedance	[mol N-Eq.]	8.44
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	2.04
ADPE	Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	9.98E-5
ADPF	Abiotic depletion potential for fossil resources	[MJ]	4230
WDP	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m ³ world-Eq deprived]	23.1

RESULTS OF THE LCA – INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1000 kg Holcim OPC

Indicator	Indicator	Unit	A1-A3
PERE	Renewable primary energy as energy carrier	[MJ]	221
PERM	Renewable primary energy resources as material utilization	[MJ]	0
PERT	Total use of renewable primary energy resources	[MJ]	221
PENRE	Non-renewable primary energy as energy carrier	[MJ]	4230
PENRM	Non-renewable primary energy as material utilization	[MJ]	17.7
PENRT	Total use of non-renewable primary energy resources	[MJ]	4248
SM	Use of secondary material	[kg]	65.9
RSF	Use of renewable secondary fuels	[MJ]	1053
NRSF	Use of non-renewable secondary fuels	[MJ]	93.6
FW	Use of net fresh water	[m ³]	0.71

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1000 kg Holcim OPC

Indicator	Indicator	Unit	A1-A3
HWD	Hazardous waste disposed	[kg]	14.1
NHWD	Non-hazardous waste disposed	[kg]	270
RWD	Radioactive waste disposed	[kg]	8.11E-3
CRU	Components for re-use	[kg]	0
MFR	Materials for recycling	[kg]	0.35
MER	Materials for energy recovery	[kg]	0
EEE	Exported electrical energy	[MJ]	0
EET	Exported thermal energy	[MJ]	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1000 kg Holcim OPC

Indicator	Indicator	Unit	A1-A3
PM	Potential incidence of disease due to PM emissions	[Disease Incidence]	1.54E-5
IRP	Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	5.79
ETP-fw	Potential comparative toxic unit for ecosystems	[CTUe]	6562
HTP-c	Potential comparative toxic unit for humans - cancerogenic	[CTUh]	9.64E-8
HTP-nc	Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	5.43E-6
SQP	Potential soil quality index	[-]	1009



$$2.51e2 = 2.51 \times 10^2 = 251$$

$$4.25e-3 = 4.25 \times \frac{1}{10^3} = 0.00425$$

On Global Warming Potential (GWP):

Net values are declared for all GWP indicators in A1 – A3. The waste status of the (waste-based) fuels has been verified. Gross emissions (i.e. including CO₂ from incineration of waste) are 926 kg CO₂-eq. / t (GWP-total), 926 kg CO₂-eq. / t (GWP fossil), 0.05 kg CO₂ eq. / t (GWP-biogenic).

For wastes with biogenic carbon content, gross CO₂ emissions correspond to the uptake of biogenic CO₂ during the biomass growth phase.

Disclaimer 1 - for the indicator “potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor radioactive waste disposal in underground facilities.

Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 - for the indicators: “abiotic depletion potential for fossil resources”, “abiotic depletion potential for non-fossil resources”, “water (user) deprivation potential”, “deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans - cancer effects”, “potential comparative toxic unit for humans – non-cancer effects”, “potential soil quality index”.

The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

6. LCA: Interpretation

The following table shows the most important influencing factors on important indicators of the impact and life cycle inventory analysis.

	GWP _{total}	AP	EP _{terrestrial}	POCP	PERT	PENRT	ADPE	FW	PM
Clinker production	93.7 %	81.9 %	91.1 %	90.2 %	56.5 %	83.5 %	70.1 %	77.3 %	89.0 %
Blast furnace slag production	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Fly ash production	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Burnt oil shale production	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Sulfate production	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Cement production	5.18 %	14.4 %	6.46 %	7.15 %	38.6 %	12.0 %	17.9 %	14.7 %	9.27 %
Dispatch	0.83 %	1.89 %	0.93 %	1.04 %	4.57 %	3.54 %	11.5 %	5.27 %	1.14 %
Other materials and processes	0.27 %	1.80 %	1.53 %	1.57 %	0.29 %	0.99 %	0.51 %	2.66 %	0.61 %
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%
Legend	Clinker production: Includes the impacts related to the production of cement clinker. Blast furnace slag production: Includes the upstream and processing impacts for the production of blast furnace slag. Fly ash production: Includes the upstream and processing impacts for the production of fly ash. Burnt oil shale production: Includes the impacts associated with burnt oil shale production. Sulfate production: Includes the impacts related to the production of primary and secondary sulfates. Cement production: Includes the impacts associated with the final grinding or mixing stage to produce the final product. Dispatch: Includes the impact related to product preparation for shipping. Other materials and processes: Includes the impacts of materials or production processes not covered by the above categories.								

The contribution of clinker production to the indicators GWP (Global Warming Potential), AP (Acidification Potential of Soil and Water), EP-terrestrial (Eutrophication Potential), POCP (Tropospheric Ozone Creation Potential) and PM (Potential Occurrence of Diseases due to Particulate matter emissions) is

largely determined by the exhaust air emissions from the rotary kiln, while the contribution to the PENRT indicator (non-renewable primary energy) is due to the use of fossil fuels and electrical energy.

7. Requisite evidence

7.1 Radioactivity

The radioactivity of cements is currently not routinely measured. Literature shows that the activity index for cement, is in the order of magnitude of the activity index for natural soils and rocks (IAEA).

7.2 Chromate

There are no legal requirements regarding the release of water-soluble chromate from cements or cement-

containing preparations. This cement is manufactured with less than 0.5 ppm of water-soluble chromate.

The content of water-soluble chromium(VI) is determined according to *US EPA 3060A*. Evidence of compliance with the limit value is provided as part of the factory production control.

8. References

Norms

ASTM C150

ASTM C150/C150M – 22, Standard Specification for Portland Cement

PNS 07

PNS 07:2018, Portland cement - Specification

PNS 63

PNS 63:2019, Blended Hydraulic Cements - Specification

PNS ASTM C91

PNS ASTM C91/C91M:2019, Standard Specification for Masonry Cement

ISO 14001

EN ISO 14001:2015-11, Environmental management systems - Requirements with guidance for use

EN 13501-1

EN 13501-1:2018, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests.

EN 15804

EN 15804:2012+A2+AC:2021, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

ISO 14025

EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

Other Literature

CarbonCLARITY™ EN 15804 EPD Generator – Cement

Version 1.2.0 dated 07/11/2022
www.climateearth.com

CPR

Construction Products Regulation
Establishing harmonized conditions for the marketing of construction products, (EU) No. 305/2011, March 09, 2011.

ECHA

European Chemicals Agency (ECHA): Candidate list of substances of very high concern.
<https://echa.europa.eu/>

IBU 2021

Institut Bauen und Umwelt e.V.: General instructions for the EPD program of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

PCR Part A

Product category rules for building related products and services. Part A: Calculation rules for the life cycle assessment and requirements for the project report according to EN 15804+A2:2021 (v1.3). Berlin: Institut Bauen und Umwelt e.V., 31/8/2022

PCR Cement

Product category rules for building related products and services. Part B: Requirements for the EPD for cement, version 5. Berlin: Institut Bauen und Umwelt e.V. (ed.), 04/07/2023.
www.ibu-epd.com

IAEA

International Atomic Energy Agency, Radioactivity in Building Materials: a first Overview of the European Scenario, 2008.

Philippines Environmental Impact Statement System (PD 1586)

Presidential Decree No. 1586 establishing an environmental impact statement system including other environmental management related measures and for other purposes

Philippines Clean Air Act 1999 (RA 8749)

Republic Act 8749, act providing for a comprehensive air pollution control policy and for other purposes

Philippines Clean Water Act of 2004 (RA 9275)

Republic Act 9275, act aiming to protect the country's water bodies from pollution from land-based sources (industries and commercial establishments, agriculture and community/household activities)

Ecological Solid Waste Management Act of 1990 (RA 6969)

Republic Act 6969, act aiming to control toxic substances and hazardous and nuclear wastes, providing penalties for violations thereof, and for other purposes

US EPA 3060A

SW-846 Test Method 3060A: Alkaline Digestion for Hexavalent Chromium

WCO

Waste Catalog Ordinance (WCO), December 10th 2001


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