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GLOSSARY OF TERMS

| | |
|--------------------------------------|--|
| Aggregates | Crushed stone, sand and gravel. Concrete and mortar are made by using aggregates mixed with cement and water. |
| Absorbent | Solid material that removes components from a gas or liquid. |
| Alkaline conditions | Condition of high pH where acidic compounds could be neutralized or acid-base reactions can take place. |
| Bag filter | Dust collection device using fabric filter bags for cleaning exhaust gas from a process plant. |
| Baseline emission level | The historical or normal emission level of an entity in a process without changes to input material or changes to the process. |
| Best practice | Internationally recognized, most efficient / effective techniques applied in manufacturing and production processes. |
| Biomass | A material of biological nature that is continuously generated by industrial processes or human activity. |
| Blending silo | Stores and blends finely ground materials |
| Bypass system | Arrangement whereby material or gas flow is directed around the normal process equipment, and not through it. |
| By-products | By-products are materials which are co-produced in manufacturing processes. Fly ash from coal combustion in electricity generation, and blast furnace slag from the production of iron are two examples. |
| Calciner | See "Pre-calciner" |
| Carbonaceous Spent Pot Lining (CSPL) | The carbonaceous portion of the SPL is the carbon lining that forms the cathode material that is used in the aluminium smelting process. |
| Carcinogens | Cancer causing substance or agent. |
| Cement (Portland Cement) | Hydraulic cement (that not only hardens by reacting with water but also forms a water-resistant product) produced by grinding clinker, (essentially calcium silicates), together with about 5% gypsum (calcium Sulphate, which is added to regulate the cement setting time). The name "Portland cement" is derived from the similarity in colour of cement after setting to the grey slate from Portland, UK. |
| Clinker | Nodular to powdery material produced in a rotary kiln by heating a blended, finely ground mixture of limestone (or calcium carbonate), shale (or other suitable material for silica and alumina), and a source of iron oxide to a temperature of approximately 1450°C |
| Coal mill | The plant required to dry and grind coal to produce a fuel for kiln firing. |
| Combustion | Reaction of a fuel with oxygen |
| Combustion efficiency | Indication of completeness of combustion of organic material (containing carbon) to carbon dioxide (CO ₂) |
| Condensation | Phase change of vapour to liquid |
| Cooler | Cools the clinker discharged from a cement kiln (at about 1100°C) to typically less than 200°C prior to transport to storage. |
| Cooler – Grate type | Cooling is achieved by cross-flow air blown through a clinker layer travelling slowly on a reciprocating grate which consists of perforated plates. |

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| Cooler – satellite type | Nine to eleven tubes arranged peripherally at the discharge end of the rotary kiln. Hot clinker enters the tubes through inlet ports and passes through the tubes in counter current flow to cooling air. Also called a planetary cooler. |
| Co-processing | Utilization of alternative fuel and raw materials for the purpose of energy and resource recovery. Co-processing in cement manufacturing means substituting scarce primary energy and virgin raw materials with waste materials. |
| Counter current | Solid material and gas flowing in opposite directions. In all kiln systems the solid material moves counter current to the hot combustion gases. |
| “De novo” effect | The reformation of dioxins and furans is known to occur by “de novo” synthesis within the window of cooling from 450 to 200° C. |
| Effluent | A liquid waste stream. |
| Excess air | Ensures complete combustion of fuel due to the presence of excess oxygen (O ₂) |
| Extender (Pozzolanic) | See Pozzolan. |
| Extender (Filler) | See Non-Deleterious Materials |
| Flue gas | Exhaust gas from a combustion process. |
| Fly ash | A by-product from coal-fired power stations. Fly ash can be added to Portland cement as an extender or NDM (Non-Deleterious Materials) |
| Fossil fuel | A general term for combustible deposits of carbon in reduced (organic) form and of biological origin, including coal, oil, natural gas, and oil shale. |
| Greenhouse gases | Gases in the earth’s lower atmosphere that may contribute to global warming, of which CO ₂ is a major component |
| Hazardous Waste | A material defined by regulation or legislation as flammable, explosive, corrosive or toxic, therefore requiring special handling or disposal |
| Heavy metals | All metals heavier than Titanium (4.51 g/cm ³) are termed heavy metals. The heavy metals make up a small proportion of the materials in the earth’s crust. Not all heavy metals are toxic and not all toxic heavy metals have the same toxicity. |
| Hydrocarbons | Chemical compounds consisting of the elements carbon and hydrogen used as building blocks in their structure |
| Incinerator | Plant used for the combustion of waste materials to yield a non-combustible residue or ash and exhaust gases, such as carbon dioxide and water. |
| Kiln dust | Particulate, solid material entrained in the exhaust gas from a cement kiln. |
| Kiln feed | Homogenised raw meal added to a rotary cement kiln at a controlled rate. |
| Leachate | Contaminated water or a solution with the potential to cause pollution, if the liquid is permitted to percolate through soil to ground water. |
| Lepol kiln | A kiln in which the feed is preheated on a horizontal travelling grate before entering the kiln. |
| Life cycle | Industrial processes involved in production including upstream extraction, manufacturing, distribution, use, and re-use or disposal of resulting waste materials |

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| Limestone | Rock consisting essentially of carbonates with the most important constituents being calcite (CaCO ₃). |
| Mineral additions | In blended (or “composite”) cements, a portion of the cement consists of materials (mineral additions) originating from natural or industrial sources such as blast furnace slag |
| Non-Deleterious Materials | Materials that can be added at the clinker grinding stage that do not have any negative effects on the cement performance. There are limits to the quantities of extenders that can be added to the cements based on the relevant SANS specification (SANS 50197). |
| Organic material | Chemical compound from natural sources with carbon as its core element |
| Oxidizing conditions | High oxygen content allowing complete oxidation of compounds (see excess air) |
| Physico-chemical absorption | Absorption due to chemical reaction and physical inclusion |
| Planetary Clinker Cooler | Refer to Cooler – satellite type |
| Pozzolan | A material that, although itself not cementitious, contains silica (and alumina) in a reactive form and is able to combine with lime in the presence of water to form compounds with cementitious properties. |
| Pre-calciner | A fluidized reaction vessel located above the feed end of the kiln which enables preheated kiln feed to be calcined before entering the kiln. |
| Preheater | Before entering the kiln, the kiln feed is preheated by suspension in the hot kiln exhaust gas stream in several cyclone stages (from 1 to 6) arranged vertically. The cyclone tower is known as the preheater. |
| Quarrying | Extracting raw materials from the earth. |
| Raw meal | Raw materials that are dried and ground in defined and well-controlled proportions in a raw mill |
| Raw mill | The plant for proportioning, drying and grinding the raw materials used for cement production. |
| Reducing conditions | Low oxygen content not allowing complete oxidation of compounds by oxygen |
| Refractory Spent pot lining (RSPL) | Waste refractory bricks which have been used for thermal protection of the pots at an aluminium smelter |
| Residues | Unwanted materials left by a manufacturing process. |
| Retention time | Time taken for material to pass through a process at the optimal operating conditions. |
| Rotary kiln | An inclined rotating steel cylinder lined with refractory bricks used to produce cement clinker. |
| Rotary kiln burner | Positioned at the kiln discharge end (firing end) to introduce fuel to the kiln process. |
| Scrubber | Equipment to remove impurities from a gas stream using a wet or dry process. |
| Secondary materials | Waste or by-products used in cement manufacturing as alternatives to fossil fuels and natural raw materials. |
| Shale | An argillaceous sedimentary rock |
| Sintering | Formation of clinker minerals in the cement kiln. |
| Stack | A chimney that exhausts gas from various stages in the cement manufacturing process. |

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| Sustainable development | The ability of the present generation to continually meet its needs without compromising the ability of future generations to meet theirs. |
| Trace elements | Chemical elements present in minute quantities. |
| Turbulence | Condition under which intense and aggressive mixing and contact of materials occurs. |
| Volatility | Tendency of a chemical compound to form vapour under a given set of conditions. |
| Waste | An undesirable or superfluous by-product, emission, or residue of a process or activity which has been discarded, accumulated or stored for the purpose of further use by another process. |

ABBREVIATIONS

| | |
|----------------|--|
| ACMP | Association of Cementitious Material Producers |
| AFR | Alternative fuels and raw materials |
| ANSI | American National Standards Institute |
| APPA | Atmospheric Pollution Prevention Act (No 45 of 1965) |
| BAT | Best Available Techniques |
| BCHS | Baseline Community Health Survey |
| BID | Background Information Document |
| BEP | Best Environmental Practice |
| CAPCO | Chief Air Pollution Control Officer |
| CHRA | Community Health Risk Assessment |
| DEAT | Department of Environmental Affairs and Tourism |
| DRE | Destruction and Removal Efficiency |
| DWAF | Department of Water Affairs and Forestry |
| EA | Environmental Assessment |
| EAP | Environmental Assessment Practitioner |
| EC | European Community |
| ECA | Environmental Conservation Act (Act 73 of 1989) |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EPA | Environmental Protection Agency |
| ESP | Electrostatic Precipitator |
| ETR | Environmental technical Review |
| EU | European Union |
| FCC | Fluidized catalyst cracking |
| g | Gram |
| HAZOP | Hazard and operability study |
| HCS | Hazardous Chemical Substances |
| HM | Heavy metals |
| I&APs | Interested and Affected Parties |
| IDP | Integrated Development Plan |
| ISO | International Standards Organization |
| kg | Kilogram |
| kJ | Kilojoule |
| kPa | Kilopascal |
| LCA | Life Cycle Assessment |
| LOI | Loss on ignition |
| m ³ | Cubic meter |

| | |
|-----------------|---|
| MES | Marsh Environmental Services |
| MHSA | Mine Health and Safety Act (No 29 of 1996) |
| MJ | Megajoule |
| MSDS | Material safety and data sheet |
| NDM | Non-Deleterious Materials |
| NEMA | National Environmental Management Act (Act 107 of 1998) |
| ng | Nanogram (1 x 10 ⁻⁹ grams) |
| Nm ³ | Normal or standard volume under standard conditions (0°C & 1.01 bar) |
| OEL | Occupational exposure limits |
| OH&S | Occupational Health and Safety |
| OSHAct | Occupational health and safety act (No 85 of 1993) |
| OSHAS | Occupational health and safety management systems (British) |
| pH | Acidity scale 1 to 14 |
| PM10 | Particulate matter smaller than 10 µm |
| POPs | Persistent organic pollutants |
| PoSS | Plan of Study for Scoping |
| ppb | Parts per billion |
| PPC | Pretoria Portland Cement |
| PPE | Personal protective equipment |
| PPM | Public Participation Meeting |
| ppm | Parts per million |
| PPP | Public Participation Process |
| RDF | Refuse derived fuels |
| SANS | South African National Standard |
| SHE | Safety, Health & Environment |
| SHEQ | Safety, Health, Environment & Quality |
| SK1 | PPC equipment terminology (Plant & Kiln number, S=Slurry; PE=Port Elizabeth; DB=Dwaalboom; H=Hercules; D=De Hoek, K=Kiln) |
| SM | Secondary materials |
| SP | Suspension (or cyclone) preheater kiln |
| PC | Calciner kiln (which also has a cyclone preheater) |
| SPL | Spent Pot Lining |
| SR | Scoping Report |
| T | Temperature |
| TEQ | Toxicity Equivalent |
| TCLP | Toxicity Characteristic Leaching Procedure |
| TOC | Total organic carbon |
| UNEP | United Nations Environment Program |
| VOC | Volatile organic compound |
| WBCSD | World Business Council for Sustainable Development |

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| WC DEADP | Westren Cape Department of Environmental Affairs and Development Planning |
| WDF | Waste derived fuel |
| WUL | Water use Licence |
| µg | Microgram |

S=Slurry; PE=Port Elizabeth; DB=Dwaalboom; H=Hercules; D=De Hoek.

CHEMICAL ABBREVIATIONS

| | |
|--------------------------------------|---------------------------------------|
| Ag | Silver |
| Al ₂ O ₃ | Aluminium oxide |
| As | Arsenic |
| Ba | Barium |
| Be | Beryllium |
| BTX | Benzene, toluene, xylene |
| C ₆ H ₆ | Benzene |
| CaCO ₃ | Calcium carbonate |
| CaO | Calcium oxide |
| CaSO ₄ | Calcium sulphate |
| CaSO ₄ .2H ₂ O | Gypsum |
| Cd | Cadmium |
| CFCs | Chlorofluorocarbons |
| CH ₄ | Methane |
| CO | Carbon monoxide |
| Co | Cobalt |
| CO ₂ | Carbon dioxide |
| Cr | Chromium |
| Cu | Copper |
| F | Fluoride |
| Fe ₂ O ₃ | Iron oxide |
| FeS ₂ | Iron sulphide |
| H ₂ O | Water |
| HCB | Hexachlorobenzene |
| HCl | Hydrogen chloride (hydrochloric acid) |
| HF | Hydrogen fluoride (hydrofluoric acid) |
| Hg | Mercury |
| K ₂ O | Potassium oxide |
| MgO | Magnesium oxide |
| Mn | Manganese |
| Mn ₂ O ₃ | Manganese trioxide |
| NH ₃ | Ammonia |
| N ₂ | Nitrogen |
| Na ₂ O | Sodium oxide |
| Na ₂ SO ₄ | Sodium sulphate |
| Ni | Nickel |
| NO _x | Nitrogen oxides |

| | |
|-------------------------------|--------------------------------|
| O ₂ | Oxygen |
| P ₂ O ₅ | Phosphorus pentoxide |
| PAH | Polyaromatic hydrocarbons |
| Pb | Lead |
| PCBs | Polychlorinated biphenyls |
| PCDDs | Polychlorinated dibenzodioxins |
| PCDFs | Polychlorinated dibenzofurans |
| Pd | Palladium |
| Pt | Platinum |
| Rh | Rhodium |
| Sb | Antimony |
| Se | Selenium |
| SiO ₂ | Silicon dioxide |
| Sn | Tin |
| SO ₂ | Sulphur dioxide |
| SO ₃ | Sulphur trioxide |
| SO _x | Sulphur oxides |
| TCE | Trichloroethylene |
| TCM | Tetra-chloromethane |
| Te | Tellurium |
| Ti | Titanium |
| TiO ₂ | Titanium dioxide |
| Tl | Thallium |
| V | Vanadium |
| Zn | Zinc |
| °C | Degrees Celcius |