SECTION 8 ISSUES IDENTIFICATION

This section of the report describes the approach and methodology employed in determining the environmental risks arising from the proposed activity, identifying the potential environmental effects (impact) through the change the raw materials and fuels inputs into the process through the introduction of secondary materials. The objective is to determine what changes occur to the current outputs as a result of changing the current inputs by using secondary materials.

Furthermore to identify the potential environmental impacts, both positive and negative, associated with the proposed development. This was based on a review of the following:

1. Literature review: Technical papers, books, reports, etc. published by the cement industry, independent research organisations, non-governmental organisations, etc. ;
2. The experience of PPC's engineers as derived from previous test and trial burns, and experience gained internationally, as derived through personal interviews;
3. Empirical engineering principles;
4. Specialist studies, which were conducted separately to inform this report;
5. The experience and observations of the authors; and
6. Comments and issues raised by the Interested and Affected Parties, both during Focus Group Meetings and Open Days.

8.1 GEOLOGY

This group is mainly characterized by chemical and biochemical sediments, such as dolomite, chert, limestone and banded ironstone. It should be noted that the only construction envisaged for the proposed activity will include storage areas for waste streams. The impact of the underlying geology on these structures is negligible and no significant impacts are expected.

8.2 TRAFFIC

It is anticipated that the delivery of Secondary Materials at PPC PE will require an additional 6 to 10 heavy vehicles travelling to and from the plant each day. In terms of the Manual for Traffic Impact Studies, as published by the Department of Transport in October of 1995, a threshold of 50 additional peak hour trips is considered a significant impact on traffic flows, as shown in the following table.

Table 8-1: Trip Generation Threshold Value for a Traffic Impact Study

Recommended Threshold	
i)	More than 150 peak hour trips – prepare a Traffic Impact Study (TIS).
ii)	Less than 150 and more than 50 peak hour trips – prepare a Traffic Impact Statement (TISm).
iii)	Less than 50 peak hour trips – no study required except if the surrounding road network is operating at or above capacity.
iv)	Discretion of the responsible road authority. [(b)]

(a) Refers to "trip-ends" which includes primary and by-pass trips.

(b) Based on the discretion of the responsible authority, a Traffic Impact Study or Statement can be required, eg. If the development is located in a sensitive area, even though less than 50 peak hour trips are generated. Alternatively, only a Traffic Impact Statement can be required although the development generates more than 150 trips, but is for example located in a sensitive area.

8.3 FAUNA, FLORA AND HERITAGE

The biophysical environment surrounding the PPC PE Plant is regarded as transformed. It is not anticipated that any sensitive ecosystems will be inpcated on by the proposed SMCP.

8.4 GENERATION OF WASTE AND EFFLUENT

The following issues may be dismissed as being insignificant:

1. Generation of Liquid Effluent, as the cement process produces no liquid effluent.
2. Generation of Solid Waste, as all "waste" from the burning of secondary materials is incorporated into the product.
3. Leaching of metals into water from cement made from Secondary Materials. This is considered insignificant as compared to the risk of "ordinary cement" if the levels of Cr^{VI} remain equivalent to their current levels (i.e. without the use of secondary materials).

8.5 EMISSIONS

Emissions to atmosphere: Particulate and gaseous emissions to the atmosphere i.e. dust, SO_2, NO_x, CO, VOC from the raw materials, and CO_2, comprise the major environmental impacts in the manufacture of clinker and cement. Gaseous emissions – except for NO_x – are mainly caused by the chemical characteristics of the raw materials, and not of the fuels. Other gaseous emissions such as hydrochloric acid or hydrofluoric acid are nearly completely captured by the inherent and efficient alkaline scrubbing effect of the cement kiln system, and are usually far below the regulatory limits.

Mercury, Thallium and, to a lesser degree, Cadmium, as the only volatile metals in the kiln system, are only partly captured with the kiln dust in the de-dusting device and represent an emission risk.

Process conditions in cement kilns – i.e. high combustion temperatures and long retention times – will effectively destroy organic compounds in the fuels. Thus, dioxins and furans originating from the introduction of hydrocarbons and chlorine with any fuel could not easily survive. [51 & 52] Usually, the level of dioxins and furans emitted is far below the limit value of 0.1 ng/Nm^3 for dry process kilns with preheaters (which is not the case in PE). In rare cases[53], this limit has been slightly exceeded with some long wet kilns and kilns without preheaters (such as PE). The mechanism of Dioxins/Furans formation in these cases is not fully clear but is definitely linked to the presence of organic precursors in the raw materials.

A summary of these emissions issues is presented in Table 8-2:

Table 8-2: Constituents and Properties of the Secondary Materials and their environmental risks

Constituent or Property	Production Risk	Environmental Risk
Chlorides	Build-up in kiln system resulting in process blockages	HCl or dioxin emissions if introduced in raw material in excessive quantities, and in the presence of VOC's
Fluorides	Kiln instability due to lowering temperature required to achieve sintering	HF emissions
Sulphur in fuels	Build-up in kiln system resulting in process blockages	SO_2 emissions

[51] *2nd North American Symposium on Assessing the Environmental Effects of Trade May 30, 2003*
[52] *Behaviour of Toxic Elements in Cement Kilns", A. Iskraut, Report N° VA 87/5423/E,Technical Meeting Bern, 1987*
[53] *http://europa.eu.int/comm/environment/dioxin/stage1/cement.pdf*

Constituent or Property	Production Risk	Environmental Risk
Non-volatile and semi-volatile metals	Quality of clinker	None (absorbed in clinker)
Volatile Metals	Quality of clinker	Metals emissions by-passing the ESP and being released to atmosphere
Calorific Value of fuel	Too low – reduction of flame intensity Too high – overheating of kiln resulting in gas change at back-end	CO emissions (but fully oxidised in riser) None
Moisture	Weak flame and gas flow changes	None (CO fully oxidised in riser)
Fuel particle size	Slow rate of combustion & incomplete combustion	CO emissions

Furthermore, a reduction in greenhouse gas emissions shall result from the project as discussed in Section 3.8. This is a positive impact resulting from the proposed project.

8.6 INCIDENTS AND ACCIDENTS

Emergencies such as fire, explosions or spillage/leakage are extremely rare in the cement industry. Potential consequences for the environment are minimised by adequate prevention and protection measures such as fire and explosion proof design of machinery and emergency response schemes. Spills and accidents on-site or during transport may result in soil, surface water and/or groundwater contamination.

8.7 REDUCTION OF WASTE SENT TO LANDFILL

Another positive impact arising from this proposed project is the reduction in waste sent to landfill. This has many secondary benefits including the reduction of the risk of groundwater contamination resulting from landfill operation, but also the environmental impacts of the construction of further hazardous waste landfills as the airspace of the current landfills is occupied. Thus this secondary materials project could be seen as contributing to the delay of constructing further hazardous landfills in the Eastern Cape.

8.8 OCCUPATIONAL EXPOSURE TO CEMENT AND CONCRETE

The USEPA report (see section 3.2.16) states that the risk of dioxin formation is present in the heating section of long dry kilns such as PE due to Cl and organics introduced with the raw materials. Any dioxins so formed will not be incorporated into the final product, which is produced at a later stage in the production process. Metals, especially non-volatile metals, will however be incorporated into the final product. It is worth noting that coal and other current raw materials contain significant quantities of metals, which are incorporated into the “normal” cement currently available on the market. As a result of these measures, the health risk posed to end-users of the product require the use of PPE (i.e. dust masks) as using cement made from secondary materials.