

SECTION 5 ASSUMPTIONS, LIMITATIONS AND GAPS IN KNOWLEDGE

5.1 EMISSIONS INVENTORY

No empiric models exist to predict reliably the exact effect of waste streams on the emissions from a kiln. As a result, MES were forced to adopt an iterative approach to understanding the relationship between emissions changes and the effects on community health. PPC has adopted EU limits for those parameters which may be affected by secondary materials co-processing. For NO_x and dust, current emissions levels will be adhered to. If PPC is unable to attain these emissions limits, the burning of secondary materials will cease. These self-imposed emission limits was applied in the air dispersion modelling. The emissions inventory was developed on the following philosophy:

1. That the introduction of secondary materials should not affect the emission of particulates and therefore PPC's commitment is to continue to comply with their current APPA permits for each kiln. MES' literature review agrees that no increase in particulates accompanies the introduction of secondary materials.
2. That NO_x levels should not increase as a result of the introduction of secondary materials. MES' literature review has identified that a reduction of NO_x normally accompanies the introduction of secondary materials. We therefore felt that it was in accordance with the precautionary principle of NEMA to propose that the current NO_x levels are used for our impacts assessment process.
3. That, for the other parameters, EU limits are assumed. We believe, again, that this is in accordance with the principles of NEMA since Europe has a far greater industrial density than South Africa, and that the EU standards were developed in cognisance of a greater residential proximity to the cement kilns than that which occurs in general around PPC's facilities.

As cement kilns have been designed primarily to produce clinker, it has to be realized that a thorough understanding of the chemistry and mechanism involved with incineration of hazardous waste should become an acquired skill at the factory operations. The effect that impurities in waste could have on emissions must be well understood and must be applied in the selection and management of secondary materials. More regular and comprehensive stack monitoring of emissions is required to ensure compliance with acceptable health standards. ***Therefore, trial burns should always precede the actual utilisation of secondary materials in the cement manufacturing process.***

MES were unable to find any successful model at predicting the reaction kinetics of the kiln which would be able to accommodate the type of inputs contemplated in this application. Based on a literature review, conventional chemical engineering approaches to determine changes to the current outputs resulting from input changes using secondary materials were not regarded as feasible. This was further confirmed by PPC's engineers.

MES assumed an emissions inventory and clinker quality (following the application of secondary materials) and determined whether such represent an acceptable risk to the environment and community health. Control mechanisms can then be put in place to ensure that such emissions and clinker quality are achieved. Such controls would include:

1. Controls on the input material (i.e. the components of the secondary materials which may contribute to the environmental impacts of the outputs. Example of such are carbon content and chlorides as they may affect the generation of dioxins and furans in the emissions gases).
2. Controls on the emissions monitoring program: PPC would need to ensure that they detect changes in their emissions as a result of introducing secondary materials and report such to the authorities timeously.
3. Controls on the implementation of the project subject to an acceptable environmental risk: that PPC would only be able to burn secondary materials if they are able to demonstrate that their emissions are not introducing a significant risk to the environment and community health.

5.2 CURRENT AND FUTURE EMISSIONS

Current emissions data from the stack was normalised for airflow and Oxygen percentage. In addition the process data from the kiln was used to perform theoretical calculations to determine the gas flow in the kiln. Standard false air theory and practice was used to extrapolate the kiln gas flow to the stack gas flow.

It should be noted that there are no EC limits for dust, CO and NO_x. The dust limit for PPC De Hoek is set by the relevant APPA permits at 350mg/Nm³ for DK5 and 200mg/Nm³ for DK6. Assumed future limits for dust are 150 mg/Nm³. Assumed future limits for CO and NO_x are based on the current emission rates. Further, future limits for SO₂ emissions are also based on current emissions.

The EC emission factors that applied to Kilns were used to quantify the air quality ground level impacts from the plant for the proposed co-processing of secondary materials. It was recommended that a "Trial Burn" be done to verify the EC emission limits used in the current study for the proposed operations.

5.3 WASTE STREAMS

PPC has determined several waste streams that will not be considered at all as part of the Secondary Materials Co-Processing Program. Including:

1. Anatomical Hospital Wastes;
2. Asbestos-containing Wastes;
3. Unsorted Electronic Scrap;
4. Bio-hazardous Wastes;
5. Entire Batteries;
6. Explosives;
7. Mineral Acids;
8. Radioactive Wastes, and
9. Unsorted Municipal Waste

5.4 BASELINE COMMUNITY HEALTH SURVEY

Some significant limitations exist for the Baseline Community Health Survey that was undertaken and are as follows:

1. Information from rural hospitals can not be readily extrapolated to metropolitan centres.
2. The quality of the public health information: information regarding the prevailing current morbidity profile of the population is sketchy and limited. The data is often clumped in terms of diagnosis and often of low specificity with regards to aetiology.
3. In many cases where the ICD 10 (International Classification of Diseases, Version10) is used, the final classification has limited accuracy as the person doing the data capturing would be a non-medical office worker.
4. We have encountered problems with obtaining information from the public sector service providers for the determination of the current situation. The reasons were unavailability of information in some cases. In other cases where information was available, it was of such a nature that it did not indicate the size of the reference population, therefore incidence and prevalence figures could not be calculated. The figures were merely that of numbers of patients seen, with no indication as to the size and demographics of the serviced population.