Holly Patrick
Urbis

28 July 2017

Dear Holly,

RE: TNG Energy-from-Waste (EfW) Facility: Technical Memo - Asbestos

The issue of presence of asbestos within the waste feedstock for the proposed TNG Energy from Waste (EfW) facility has been raised by the community and other stakeholders.

Specifically, during a Parliamentary Inquiry (Portfolio Committee No. 6 – Planning and Environment – Energy from Waste Technology, proceedings dated 27 June 2017), several questions were raised as to the potential for asbestos to both enter the waste stream and subsequently to be disbursed to atmosphere.

The following commentary provides additional detail as to these concerns, and details, sequentially through the EfW process, why it is my opinion that this is not a potential issue.

Waste Receival and Sorting

I have visited the existing Genesis Material Processing Centre (MPC) at Eastern Creek that is operated by the proponent (Dial a Dump Industries; DADI).

The operation of the Genesis MPC is analogous to the operation of the receival hall that is proposed for the TNG EfW. The chute residual waste (residual waste with no potential for recycling) from the Genesis MPC will also form a significant proportion of the fuel stock for the TNG EfW facility.

During my site inspection, I saw first-hand the procedures and processes that are routinely utilised to inspect loads of waste material is it is delivered to the receival hall prior to processing.

All material is visually inspected as it is emplaced on the floor of the receival hall, with a specific focus on identifying potential Asbestos Containing Materials (ACMs).

In addition to the Work Place Health and Safety (WHS) and environmental issues associated with receiving / subsequently processing asbestos waste, there are explicit economic drivers that ensure that identification and segregation of asbestos waste is an imperative.

The first of these is regulatory; DADI would likely face prosecution in the event that asbestos was identified as having been inappropriately disposed of (i.e. not within a licenced asbestos landfill). Further, if ACMs inadvertently entered the Genesis processing plant, the cost of decontamination of this would be both costly and time-consuming (thus putting the MPC out of service at further economic cost.

Secondly, DADI operate a licenced asbestos landfill adjacent to the Genesis MPC; any loads that are delivered containing ACM either have to be removed from site, or will go straight to this facility at significant additional cost to the client compared to a conventional waste load.

It is therefore considered that there are significant drivers to ensure that ACM are identified at the point of delivery. It is considered extremely unlikely that ACM will enter the EfW facility fuel source.

Combustion Temperature

The owner's engineer, Ramboll, has confirmed that for the proposed TNG EfW facility, waste is ignited and burnt on the grate in the furnace at temperatures around 1,100°C and the temperature of the flue gases is thereafter kept above 850°C for at least 2 seconds in the afterburning chamber.

While these temperatures are optimal for the combustion of waste-derived fuel with a significant calorific value, this is not the case for asbestos-derived materials.

By its nature, asbestos was historically used in the construction industry due to its thermal properties – both as a thermal insulator, and as a combustion-retardant.

The common forms of asbestos used within building materials (chrysotile, amosite and crocidolite) are not flammable, and will undergo thermal decomposition when exposed to high temperatures (Kusiorowski et al, 2012).

Depending on the type of asbestos, a different temperature is required for thermal decomposition (about 700–800°C for chrysotile and more than 900°C for the amosite or crocidolite asbestos). As a result of this process, the mineral structure of the asbestos material is changed, meaning the crystalline structure (that is the cause of potential lung damage) of the asbestos is destroyed (Kusiorowski et al, 2012).

The matrix within which asbestos is contained is relevant. Typically, asbestos from construction waste may be bonded within a cement-type material. Bonded material would likely remain in situ (and be removed in larger pieces within the bottom ash).

Exposure of partially, or un-bonded, asbestos material to the high design temperatures at the furnace grate would likely cause thermal decomposition of asbestiform material, transforming it to a non-hazardous material (Kusiorowski et al, 2012).

Thermal decomposition of ACM, in addition to rendering it non-hazardous, is likely to entail that it would remain within the furnace bottom ash, which would be subsequently disposed of following stabilisation. As noted within Ramboll, 2017, material within the bottom ash extractor will be quenched with water and embedded in the clay-like matrix of the bottom ash and not be further released.

Flue Gas Treatment

The flue gas treatment stage consists of a reactor with injection of lime and activated carbon followed by a bag house filter for PM removal, including the activated carbon. In this manner, the flue gas treatment system is designed to ensure that the stack emissions comply with in-stack emission limits regardless the content in the raw, untreated flue gas within any realistic operational range.

Bag houses comprise a network of fabric filters (or 'bags') designed to remove particulate prior to discharge to atmosphere. Within these bags, the flue gas stream passes through a layer of sorbent lime and activated carbon (known as 'filter cake'), and then through the permeable bag medium. The filter cake is periodically removed from the filter using automated methods such as reverse pulses of air. Fabric filters have a high particle removal efficiency (as noted within Ramboll, 2017; near to 100%

for particles larger than 0.1µm) and are generally sufficient to meet the emissions limits than prescribed by the EU Waste Incineration Directive and typically employed at existing EfW facilities.

Thus, in the unlikely event that ACM is introduced into the EfW fuel source, is not rendered non-hazardous through thermal decomposition, and is not deposited into the bottom ash, it is anticipated that such material would be collected within the filter cake on the fabric filters within the bag house, and subsequently disposed of as a hazardous waste (along with spent activated carbon and lime used in the flue gas treatment process).

Dispersion beyond the stack tip

The above sections illustrate that existing systems should ensure that asbestos is appropriately managed and will not be released to atmosphere through the TNG EfW facility.

However, if such material was to somehow exit the EfW stack, the dispersion potential is significant.

As demonstrated within the air quality assessment for the TNG EfW facility (Pacific Environment, 2017), as a result of a 100m stack, and significant thermal buoyancy of the exhaust, the potential for particulate impacts at ground level is anticipated to be minimal.

Conclusion

It is considered that as a result of multiple processes and mechanisms summarised above, the potential for asbestos impacts associated with an atmospheric discharge from the TNG EfW facility is negligible.

I trust that the above information will satisfy your requirements. If you have any further queries, please do not hesitate to contact me.

Yours faithfully,

D.A. Roddis

Damon Roddis
National Practice Leader - Air Quality and Noise

References

Kusiorowski et al, 2012. Thermal decomposition of different types of asbestos; Journal of Thermal Analysis and Calorimetry, August 2012, Volume 109, Issue 2, pp 693–704; R. Kusiorowski T. Zaremba, J. Piotrowski, J. Adamek, 2012.

Pacific Environment (2017) Energy from Waste Facility – Air Quality and Greenhouse Gas Assessment. Prepared for The Next Generation, 27 July 2017.

Ramboll (2017) The Next Generation NSW Pty Ltd Project Definition Brief, 11 July 2017