CD6/1/A

RE: APPEAL BY FCC RECYCLING (UK) LTD PURSUANT TO REGULATION 31 OF THE ENVIRONMENTAL PERMITTING (ENGLAND AND WALES) REGULATIONS 2016 REGARDING DANESHILL SOIL TREATMENT FACILITY AT DANESHILL LANDFILL SITE AND 3C WASTE LIMITED PURSUANT TO REGULATION 31 OF THE ENVIRONMENTAL PERMITTING (ENGLAND AND WALES) REGULATIONS 2016 REGARDING MAW GREEN SOIL TREATMENT FACILITY AT MAW GREEN LANDFILL SITE

APPEAL REFERENCE APP/EPR/636 AND APP/EPR/651 (DANESHILL)

APPEAL REFERENCE APP/EPR/652 (MAW GREEN)

ENVIRONMENTAL PERMIT REFERENCE EPR/NP3538MF (DANESHILL)

ENVIRONMENTAL PERMIT REFERENCE EPR/BS7722ID (MAW GREEN)

SUMMARY PROOF OF EVIDENCE OF SIMON JAMES COLE

Report Reference: 28480-HYD-XX-XX-RP-GE-0006

February 2024

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1. Introduction

1.1.1 My name is Simon James Cole and I am the Practice Lead for Geoenvironment within Hydrock's Geo Division. Hydrock is an engineering design, energy and sustainability consultancy with offices across the UK. I have a PhD and BEng (Hons) degree in Environmental Engineering from Cardiff University, and I am a chartered member of the Chartered Institution of Water and Environmental Management, a Chartered Environmentalist under the Society of the Environment, and an accredited risk assessor under the Society of Brownfield Risk Assessment accreditation scheme. I have 25 years of environmental consultancy experience, primarily focused on land contamination risk assessment.

1.1.2 I have been instructed by FCC Recycling (UK) Ltd and 3C Waste Limited to provide evidence with respect to the potential fugitive emission of airborne asbestos fibres and associated health risk relating to the treatment of asbestos contaminated soils at the Daneshill and Maw Green landfill sites. My evidence is in relation to the above companies' appeals against Environment Agency Environmental Permits EPR/NP3538MF/V009 (Daneshill) and EPR/BS7722ID/V010 (Maw Green).

1.1.3 I have specifically been instructed to consider (1) the potential emission of airborne asbestos fibres during the proposed soil treatment; (2) the presence of loose, free asbestos fibres in processed soil and the associated potential health hazard; (3) the potential for material processing to increase the quantity of loose, free asbestos fibres in the treated soil; and (4) the potential off-site dispersion of airborne asbestos fibres and the associated potential health risk to off-site receptors.

1.1.4 The evidence which I have prepared and set out in my Proof of Evidence is based on published information, air dispersion modelling carried out by Matt Stoaling of Isopleth Limited [CD6/4], and on extensive measurement and monitoring data that has been collected by, or on behalf of, Provectus Soils Management Limited (Provectus) at their Maw Green and Edwin Richards Quarry Soil Treatment Facilities (STF).

1.1.5 There are a number of published guidance documents that I reference in my Evidence that either relate to good practice in air monitoring for 'asbestos in soil' activities, or relate to the assessment of fibre release from soil containing asbestos. These include the Environment Agency's guidance on monitoring particulate matter in ambient air around waste facilities, the Health and Safety Executive's second edition of HSG248, CIRIA guidance documents C733 and C765, the Joint Industry Working Group CAR-SOIL™ guidance, and guidance published by the Dutch National Institute for Public Health and the Environment on the assessment of the risks of asbestos contamination with asbestos.

1.1.6 The disturbance of asbestos-containing soils has the potential to release asbestos fibres into the air and this is a well-established issue that has been addressed by UK and international guidance (both from a regulatory and an industry perspective). There are a number of factors that have been shown to influence the emission of asbestos fibres from soil, and the risk of airborne fibre emission can vary greatly dependent on the site-specific conditions. Published approaches for the estimation of airborne fibre release from soil and the calculation of the associated health risk from human exposure to airborne asbestos fibres in non-occupational scenarios are summarised in the Society of Brownfield Risk Assessment (SoBRA)'s Asbestos in Soil Human Health Risk Assessment Toolbox and I have drawn on some of the methods outlined in this SoBRA guidance in my Evidence.

2. Airborne asbestos fibre emission from soil during mechanical processing

2.1.1 An initial screening of STF activities can be made using the US EPA AP-42 guidance and this indicates that the greatest emission activities most likely to contribute to measured ambient air concentrations are likely to be vehicle movement on the concrete slab, followed by surface wind erosion from exposed concrete pad. Other emission activities (such as the screener, material transfer, and the picking station) are likely to be insignificant by comparison. Material transfer might become more significant (and greater than vehicle movement emissions) if the material is exceptionally dry (<2%), however, screener and conveyor emissions remain insignificant in comparison. I note that the underlying moisture content of soils processed to date at Maw Green and ERQ shows that processed soils are rarely this dry. A separate surface wind erosion calculation for exposed stockpiles indicates that the maximum wind speed would need to approximate gale-force before the threshold frictional velocity for 'overburden' soils is exceeded. This indicates that for the majority of the time, wind erosion is not expected to contribute to air emissions relative to the operational activities noted above.

2.1.2 Mechanical screening of soil and aggregate is identified in the CAR-SOIL™ guidance as a 'high intensity' activity that is associated with a higher risk of fibre release as a result of higher material agitation and the consequent deterioration of fragments of asbestos containing materials, whereas mechanical excavation of soil is classified as'low intensity'. It is advocated in paragraph 182 of CAR-SOIL™ that steps to take to control exposure to the lowest level reasonably practicable should be recorded in the risk assessment, and includes the example of using low intensity work methods as one of those potential controls, and therefore the 'intensity' of the screening activity at the STF is a relevant consideration. Mechanical (or 'power') screening is grouped in the CAR-SOIL™ guidance with grading and crushing and there is a logical graduation in activity intensity from mechanical excavation and movement of material at the low end of the scale and material crushing at the high end of the scale. The three-way screener used at Maw Green is one of the smallest versions of its type and Provectus operates the screener well below its maximum operating rate. Based on my observation of its operation at Maw Green it is not evident that the material disturbance created by the screener is significantly different to that created by the loading and unloading of soil from road haulage trucks, or from stockpile management. I evaluate whether or not the material processing deteriorates the asbestos present in the soil and releases airborne asbestos fibres in my evaluation of available air and soil monitoring data for the Maw Green and ERQ STFs.

2.1.3 Ambient (i.e. outdoor) dust monitoring data from the Maw Green STF during the summer of 2023, that included periods of hot, dry conditions, indicate that the process contribution (i.e. the increase in measured concentrations compared to those before operations start and after operations cease for the day) to near-source airborne dust concentrations might be between 20-40 µg/m^3. Short-term peak concentrations of up to 1.33mg/m^3 were recorded but these peak concentrations did not persist for more than a few minutes (i.e. they are short-lived, transient concentrations).

2.1.4 Activity-based near source air monitoring at both the Maw Green and Edwin Richards Quarry (ERQ) STFs has been carried out daily by Provectus since 2019 at ERQ and since 2022 at Maw Green. The combination of high-volume sampling and use of UKAS-accredited Scanning Electron Microscopy (SEM) laboratory testing by the Institute of Occupational Medicine (IOM) has enabled a limit of quantification of 0.0005f/ml compared to the Environmental Permit associated emission limit (AEL) of 0.01f/ml (i.e. x20 lower). The monitoring datasets comprise 395 daily measurements for Maw Green and 809 daily samples for ERQ. Detectable asbestos fibres were reported in 14% of the Maw Green samples, of which quantifiable concentrations of asbestos were reported in just 8 samples (2% of total samples taken). The highest reported concentration was 0.0015f/ml (1500f/m^3). Detectable asbestos fibres were reported in 24% of the ERQ samples, of which quantifiable concentrations of asbestos were reported in just 26 samples (3% of total samples taken). The highest reported concentration was 0.001f/ml (1000f/m^3). As the soil processing at ERQ is conducted in a building it is anticipated that the measured process-derived dust concentrations will be higher than those measured at an equivalent outdoor facility due to the lower air dispersion within the building.

2.1.5 Supplementary air monitoring undertaken by Hydrock at the Maw Green STF during a week of particularly hot, dry weather in early September 2023 reported near-source and further downwind air concentrations all below a lower limit of quantification of 0.00005f/ml (50f/m^3).

2.1.6 All reported concentrations are significantly below the criterion of 0.01f/ml (expressed as PCMe concentrations) referenced in Environment Agency Environmental Permit requirements, and are additionally below the perimeter/boundary LoQ of 0.002-0.005f/ml (PCMe) advocated by HSE in HSG248. The results also appear to be consistent with the findings of research conducted and/or evaluated by the HSE and RIVM.

3. Presence of loose asbestos fibres in post-processed soil and associated hazard potential

3.1.1 The potential for asbestos fibre release from soil is related to the type, form and amount of asbestos present in the soil being processed. The soil acceptance criteria used by Provectus are <0.1% wt/wt chrysotile, and <0.01%wt/wt amphibole, and bonded asbestos containing material (as opposed to unbound material). The potency (a function of fibre size and asbestos type) of chrysotile asbestos in these materials is such that it poses a considerably lower health risk than amphibole asbestos. The release of fibres from bonded asbestos is also comparatively low. These two factors combined indicate a low potential for chrysotile fibre release as a result of processing fragments of bonded chrysotile asbestos materials compared to that for more friable amphibole asbestos materials.

3.1.2 Soil received at both Maw Green and ERQ is sampled and tested before and after treatment. Provectus' protocol is to take one sample for every 500 tonnes of material or one sample for every consignment, whichever is the greatest number. Provectus has provided me with their soil reception and post-processing datasets for both STFs. The substantial datasets comprise 118 reception (acceptance) and 87 post-processed (validation) soil samples for Maw Green, and 768 reception and 253 post-processed soil samples for ERQ. Based on the site of origin information provided it is estimated that this data relates to approximately 300 different remediation/construction sites across the UK. Asbestos was not detected in the majority of reception samples, and the 90th percentile concentrations ranged from 0.003-0.008%wt/wt – much lower than the Provectus acceptance criteria. Similarly, post-processed soil data indicates that asbestos was not detected in the majority of validation samples, and the 90th percentile concentrations ranged from 0.007-0.008%wt/wt.

3.1.3 The soil data is either from the finer separated soil fraction post screening or from the finer fraction of unscreened, picked material dependent on the processing operations in use at the time of sampling. Post-processing, this material is less likely to contain visible fragments of ACM and is more likely to contain the loose fibre bundles and loose fibres that were present in the originally received material (if present originally). Overall, the data indicates that approximately 30% of processed soil at Maw Green has an asbestos concentration greater than the LOQ of 0.001%wt/wt. For ERQ it is lower, at less than 15%. Where higher concentrations are reported, other samples for the processed material from the same site of origin report lower concentrations. The data does not therefore provide compelling evidence of continuously elevated soil concentrations in processed material following soil screening.

3.1.4 The Joint Industry Working Group for Asbestos in Soil and Construction & Demolition Materials Decision Support Tool for work categories classifies the fibre release hazard from soil with loose fibre concentrations less than 0.001% as 'negligible'. The hazard from 'very low' quantities (<0.01%wt/wt) of loose fibres/fibre bundles (closest DST description to the detected 'fibre bundles/clumps' reported in the gravimetric analysis test results for soil validation samples) is described as 'medium' in the JIWG DST. As the DST does not distinguish between fibre bundles and individual loose fibres, and loose free fibres have been reported to be <0.001%wt/wt, the 'medium' DST hazard designation will be an overestimation. An overall hazard ranking of 'low' to 'very low' is more appropriate. Asbestos fibre type is not considered in the work categories DST but is considered in the JIWG DST for receptor ranking. The DST classifies the fibre release hazard from soil containing loose fibres and fibre bundles as 'low' if the fibres are chrysotile asbestos, and as 'medium' if the fibres are 'mainly amosite'. The DST takes no account of fibre concentration at this step in the DST. The soil validation data noted above suggests that soil asbestos content is mixed, with chrysotile-only asbestos identified in 16% of samples from ERQ and 29% of samples from MG. Amosite and/or combinations of chrysotile and amosite is identified in 5% of ERG samples and 22% of MG samples.

3.1.5 Evidence published by HSE in 2 scientific papers (Hodgson & Darnton, 2000, and Darnton, 2023), RIVM, and IOM all indicate that the type of asbestos present in the soil being processed (for example chrysotile or amosite), and its form (bonded, bound etc) makes a significant difference to the potential exposure risk. In summary, amphibole (e.g. amosite) fibres are more likely to be released from soil compared to chrysotile fibres, amphibole fibres pose a greater heath risk, and unbound, friable asbestos containing materials are likely to contain a higher proportion of respirable fibres compared to bonded asbestos materials.

3.1.6 Soil moisture also has a significant bearing on fibre release from soil with experimental evidence published by IOM and RIVM indicating that soil moisture contents of more than 5-10% reduce fibre release from soil by a factor of x10-x100. Excavated soil received at the STFs is unlikely to have zero moisture content, and the stated Provectus operating procedure is for the material to be stockpiled under sheeting before being processed, thus reducing the potential for stored soil to dry out prior to being processed. Laboratory moisture testing of pre- and post-processed soil at Maw Green and ERQ (same datasets outlined above for asbestos concentrations) confirms this, with reported soil sample moisture contents typically above 5% (5th percentiles 5-8%). Soil moisture contents such as these are consistent with the infrequent detection of airborne asbestos fibres in the near-source air monitoring data.

4. Potential for material processing to increase loose, free fibres concentrations in the soil

4.1.1 There is the potential for mechanical processing of asbestos containing soil to increase the number of loose, free fibres in the soil. This will be a function of the degree of soil disturbance and the form of the asbestos containing materials (bonded, unbound etc). The limitations of standard commercial asbestos soil testing are such, however, that the determination of the degree to which this may be happening is constrained. A high proportion of the reported soil acceptance and soil validation concentrations for Maw Green and ERQ are less than the limit of quantification for current commercially available UKAS-accredited test methods and therefore any attempt to distinguish between pre- and post- processed data is subject to the uncertainties associated with attempting to compare datasets with a high proportion of non-detect results. Using simple statistical measures of the substantial pre- and post- processing soil datasets (i.e. percent detections and percentile concentrations), the results are mixed and do not provide compelling evidence that loose fibre concentrations in the soil change substantially during processing. This mixed picture is not altered by a sub-set of data relating to soil testing based on a more sensitive analytical method that counts individual fibres in the dust size fraction of the soil.

5. Potential off-site dispersion of airborne asbestos fibres and the associated potential health risk to off-site receptors

5.1.1 The first and most precautionary approach to evaluating the potential health risk from exposure to airborne respirable asbestos fibres is to consider the potential risk associated with measured near-source concentration. Measured near-source air concentrations at the Maw Green and ERQ STFs range from less than the LoQ (<500f/m^3) to a maximum of

1500f/m³. The 95th percentiles are <LoQ and 600 f/m³ respectively, and the long-term average will be <500f/m³. Because such a high proportion of the monitoring data is <LoQ it is not known just how low the actual long-term average concentration at these sites is. If the starting point is 500f/m³ as measured by SEM, this is half the value of 1000 f/m³ (500 f/m³ PCMe) that the WHO used to articulate its risk estimates. There is no published UK or EU AQG for asbestos. The 1000f/m³ level is also the 'negligible risk level' adopted in the Dutch guidance. The variation in published risk-based air quality guidelines (AQG) is summarised in the discussion paper published by SoBRA, and assumptions on the potency of asbestos type play a significant part in the risk estimates that underpin the AQG. The AQG summarised by SoBRA vary from 30-10,000 f/m³, with the lowest value applicable to amphiboles (e.g. amosite) and the highest value attributable to chrysotile. The air monitoring at Maw Green and ERQ indicates that both chrysotile and amosite fibres have been detected in air samples.

5.1.2 It is therefore plausible that long-term average near-source air concentrations could exceed published AQG at the lower end of the reported range in AQG (albeit with a low likelihood), noting the uncertainty in how low the likely long-term site average is. It is more certain (relative) that the near-source concentrations at the STF do not exceed either the HSE Control Limit of 0.1f/ml PCMe, or the permit limit of 0.01f/ml PCMe (equivalent to approximately 20,000 f/m³ as measured by SEM).

5.1.3 Off-site air quality impact will be a function of primary and secondary emissions of airborne asbestos fibres and subsequent off-site dispersion of those airborne fibres. Primary emission is the release of fibres from either specific short-term soil disturbance activities and/or continuous emission from wind erosion of the soil surface. Secondary emission is the resuspension of asbestos fibres that have already been previously released and sedimented.

5.1.4 The potential for air dispersion of asbestos fibres to off-site receptors is covered in Matt Stoaling's evidence [CD6/4], and I have used the results of that air dispersion modelling to estimate likely off-site receptor air concentrations and associated health risk. Key factors in the air dispersion from site to off-site receptors is wind speed, wind direction, rainfall, and receptor distance. It is evident from meteorological data for the sites that the combination of wind speed, direction, and absence of rain does not occur for the majority of the time for each receptor.

5.1.5 There is also published evidence from the HSE, IOM and RIVM that airborne asbestos fibres are not expected to travel significant distances, with a common expectation in these reports that air concentrations reduce substantially within 100m of the source.

5.1.6 The air dispersion modelling detailed in Matt Stoaling's evidence [CD6/4] indicates that off-site receptor concentrations should be at least a thousand times lower than those detected on-site (minimum dispersion factors for Daneshill are x4000 for daily minimum dispersion and x75,000 for annual average dispersion, and for Maw Green are x3000 for daily minimum dispersion and x50,000 for annual average dispersion).

5.1.7 I have chosen precautionary (i.e. overestimated) exposure point air concentrations at off-site receptors for both sites of 0.5f/m^3 for minimum daily dispersion and 0.05f/m^3 for annual average dispersion. Using the SoBRA calculation sheet for estimating health risk, I estimate that the lifetime risk of mesothelioma and lung cancer from asbestos fibre inhalation should not exceed 1 in 200 million.

5.1.8 To place the calculated receptor exposure risks in context a risk of 1 in a million is defined by prevailing contaminated land risk assessment guidance as 'minimal', and a risk of 1 in 50,000 as 'low'. Both risk levels are used to define 'acceptable' levels of soil contaminants. International soil, air, and water standards for carcinogenic substances tend to be set based on ELCR of 1 in 10,000 to 1 in a million.

5.1.9 My conclusion is that the predicted level of risk for both sites is so low as to be of negligible consequence.