

ENVIRONMENTAL PERMIT APPEAL

REF: CAS-02313-Z1D6V4

APPEAL BY: PLATTS AGRICULTURE LIMITED

SITE AT: LLAY INDUSTRIAL ESTATE, NORTH, LLAY, WREXHAM, LL12 0PJ

PROOF OF EVIDENCE (REBUTTAL / FORMALDEHYDE II)

OF

OLIVER MATTHEWS

JULY 2024

ENVIRONMENTAL COMPLIANCE LIMITED

Unit G1,

The Willowford,

Treforest Industrial Estate, Pontypridd, CF37 5BF

I am **OLIVER MATTHEWS** of **ENVIRONMENTAL COMPLIANCE LIMITED** (“ECL”), whose address is Unit G1, The Willowford, Treforest Industrial Estate, Pontypridd, CF37 5BF.

1. **DECLARATION (§1)**

- 1.1. The evidence which I have prepared and provide for this appeal (ref. CAS-02313-Z1D6V4) in this proof of evidence is true and I confirm that the opinions expressed are my true and professional opinions. This Proof of Evidence includes the following appendices:

Appendix 31	Compilation of SDS sheets	Proof, p.4, para.2.9
Appendix 32	Letter from Dr Tranter (Chirilabs)	Proof, p.5, para.2.14
Appendix 33	WRA Workshop Classification Slides	Proof, p.8, para.3.4

- 1.2. At the end of the first week of the inquiry the inspector asked the experts (myself and Mr Morris, and also myself and Ms Thomas) to discuss and if possible to come to an agreement about various issues. These were, first, the consequences of Mr Morris’ Rebuttal Statement and, secondly, NRW’s position in relation to the EPTR with its accompanying EMS documents.
- 1.3. As for the formaldehyde issue, a lengthy Position Statement dated 4 July and signed by Mr Jones has now been submitted by NRW, and since then Mr Morris has not replied to an email I sent to him on 3 July. I have heard back from Ms Thomas, who I contacted on 2 July, with her response on 03 July 2024. I then submitted additional information on 04 July 2024.
- 1.4. NRW’s Position Statement suggests that board manufacturers are sending out hazardous products to their users. This is an extremely surprising suggestion for the reasons set out below.
- 1.5. In my original Rebuttal / Formaldehyde Proof I only had time to address Mr Morris’ reference to section 3 of the SDS sheet at Appendix 5. Since then, and in the light of the Position Statement, which states that the Appellant should be applying for a permit to process hazardous waste (classification 03 01 04*), on the basis that it has been processing this type of waste, I have had a closer look at the SDS sheet relied on by Mr Morris. Section 8 of the SDS shows conclusively, in my opinion, that he is wrong, and I

have been asked to record my reason in writing for the inspector in the absence of further contact with Mr Morris.

- 1.6. In this Statement I also add some information about the issues which were supposed to be discussed between the experts in the event that I do not hear from Mr Morris or Ms Thomas.

2. **FORMALDEHYDE (§2)**

- 2.1. I refer to the Rebuttal Statement of Mr Morris dated 14 June 2024 (CD 4.2.3 Tim Morris Rebuttal Proof of Evidence), in which he makes reference to the formaldehyde results which NRW received in November 2023 when presented in the Platts Library of Results (CD 4.1.4 Appendix AF24), an MSDS for Kronospan MDF boards (CD 4.2.3 Appendix 5), and the 'GB MCL List' for the formaldehyde (CAS 50-00-0) entry at row 1417 that cites hazard code H350 and hazard statement Carc. (Carcinogenic) 1B. Utilising this information for a WM3 assessment, Mr Morris concludes that using the threshold for H350 of 0.1% (1000mg/kg) would result in a hazardous classification for the materials received by Platts where the formaldehyde results exceeded 1000mg/kg threshold. The classification would be 03 01 04*.
- 2.2. I concluded in my Proof of Evidence Statement (Rebuttal / Formaldehyde) dated June 2024 (CD 4.1.7 Oliver Matthews Rebuttal Proof of Evidence) that the specific substances of UF and MUF, as detailed on the Kronospan MSDS should not be used in the WM3 assessment against the Formaldehyde 50-00-0 GB MCL listing and should not result in a hazardous classification. They have hazard codes and associated hazard statements with significantly higher thresholds which would lead to a classification of non-hazardous 03 01 05. At Inquiry, this perspective was questioned as the UF and MUF would be cured polymers (binders/resins) where 'free' formaldehyde would not be released. Subsequent discussions with Dr George Tranter (Director of Chiralabs Limited) has established that when UF and MUF breakdown they release ammonia and not formaldehyde (see further below).
- 2.3. I turn, then, to an important element of the Kronospan MSDS that has been overlooked, which is section 8 relating to Exposure Controls / Personal Protection.

- 2.4. In this section it clearly states in the last sentence of the section, **“Formaldehyde is present in the product at less than 0.01% and therefore is unclassifiable under the CLP Regulations”**. This is consistent with my findings at paragraph 2.17 of my Rebuttal / Formaldehyde Statement, and in my opinion it is conclusive that the correct classification could not be 03 01 04*.
- 2.5. It is important for the manufacturers of boards that their board products meet the 0.01% threshold since if they were not doing so, then kitchen and furniture manufacturers would be selling kitchens and furniture with materials which would be deemed hazardous. In addition, the waste they would be left with would have to be treated as hazardous, which would mean extra precautions at the manufacturers and in terms of disposal. It would make no sense at all for boards such as the ones manufactured by Kronospan (as referenced in Appendix 5) to be sold into the market place.
- 2.6. The International Agency for Research on Cancer (“IARC”) has developed a set of standards governing the safe use of formaldehyde, and the important standard is known as “E1”, which includes the cut-off level of 0.01% to which I have referred in paragraph 2.4 above. The E1 standard accepts the release of free formaldehyde but only at this threshold level. The 0.01% threshold is a factor of 10 below the cut-off threshold which applies to the ‘GB MCL List’ categorisation of H350, which Mr Morris says is represented by the references “MU” and “MUF” in section 3 of the SDS. It is not credible that Kronospan would sell such products (categorisation H350) into these markets.
- 2.7. It has been pointed out to me that versions 2 and 3 of the Statement of Common Ground both state at para.3.37 that reads “The parties agree that the wood waste accepted at the site falls within classification 03 01 05”. This does not surprise me. Mr Morris’ evidence is contrary to the Statement of Common Ground.
- 2.8. It could conceivably be argued that the materials sampled and analysed for formaldehyde had not come from Kronospan and that other sources may indeed have higher concentrations present. Therefore, a re-review of other board manufacturers’ SDS was undertaken by me in order to determine the likelihood of such a scenario.

2.9. The compilation of a range of data and technical sheets, considered to be the most recent available, are shown in Appendix 31. These all illustrate (through yellow highlighted sections) that the board manufacturers appear to claim they are compliant with the E1 standard for emissions from boards, with some stating the maximum concentration of formaldehyde present in the board production. These are significantly lower than the 0.1% threshold for H350. A summary from the MSDS is shown below.

Name	Products	Substances	Concentration	Additional
Kronospan (V. 5, 2017)	Range of boards	Polymerised Resin (UF, MUF, Phenolic, p-MDI)	8 – 20%	Formaldehyde present in product at less than 0.01%
Kronospan (2021) Tech Data sheet	MF & MDF	Formaldehyde	None listed	Releases all E1
Norbord (2017)	CaberWood MDF Boards	Free Formaldehyde	E1 <= 0.009% E2 > 0.009% =< 0.025% (Tested against EN 120)	Softwood Dust Maximum Exposure Limit 5mg/m3 (8h Time Weighted Average)
Medite MR	MDF	Formaldehyde	None listed	E1 & CARB* Phase 2 <0.11ppm
Medite Premier	MDF	Formaldehyde	None listed	E1 & CARB Phase 2 <0.11ppm
Unilin	MDF & HDF Boards	Urea formaldehyde & Melamine-Urea Formaldehyde adhesives	7 – 15% resin	Formaldehyde Standard E1 < 0.008% (EN 120), CARB II < 0.09 ppm (ASTM D6007)
Vigo Twinlomba	Plywood	Formaldehyde	None listed	E1 / Carb 2 / NAUF
Egger	Particle Board	Solid Resin Total Extractable Formaldehyde (50-00-0)	8 – 10% 0.008% max	Emission Class E1
Finsa	MDF Board	Formaldehyde	<= 8mg/100g	EN ISO 12460-5

- 2.10. It appears clear from these data sheets that boards (not just MDF) are not being manufactured with concentrations of formaldehyde that could be 'free' formaldehyde at levels which would be deemed hazardous through WM3 assessment.
- 2.11. This naturally begs the question of why such high levels were apparently obtained through laboratory analysis.
- 2.12. The laboratory who undertook the analysis (Elab) have provided a description of the method used. This was provided to me by Mr Tim Reeve, of Elab, both verbally and by email as detailed below.
- The method was based on a 6:1 water extract (absorption of the extractant was noted due to the very low moisture content of the samples),
 - The extractant was then diluted by 10 before being reacted with chromotropic acid in 50% H₂SO₄ in a water bath to provide a purple complex.
 - The extracting time was one hour with the sample being horizontally shaken at typically between 120 – 135 rpm.
 - The purple extract was read off a spectrophotometer (Jenway 6300) at 570nm against a 0.5 – 20mg/litre 4-point calibration.
- 2.13. Mr Reeve said the laboratory noted that some samples of the waste wood were more problematic for sample preparation due to non-uniform size and shape/dimension. The finer dust materials were easier for preparation. The method was not an accredited method and analysis undertaken with 'best endeavours', meaning they would do their best to obtain results for formaldehyde analysis.
- 2.14. Following the evidence of Dr Vince, Dr Vince supplied me with the details of Dr George Tranter, of Chiralabs, Oxford. Dr Vince spoke with Dr Tranter and Dr Tranter passed on web links to various research papers to Dr Vince, which were forwarded to me. I then had a follow-up discussion with Dr Tranter. The following paragraphs, therefore, are made after discussions with Dr Tranter. I understand that after I have concluded this further Statement, Dr Tranter will be asked by Mr Garratt of Saunders Law to comment on them, although I do not believe that he has formally been instructed as an expert. I intend to add that letter as an appendix to this Statement. It will be Appendix 32.

- 2.15. First, it seems that there is evidence that the use of chromotropic acid for formaldehyde analysis can be affected by interference from a number of other substances, such as phenols (<https://www.tandfonline.com/doi/pdf/10.1080/15298668491399776>) and nitrate (<https://pubs.acs.org/doi/10.1021/ac50020a059>). These interference characteristics can lead to both cumulative impact on results, false significantly higher results, and masking effects where the formaldehyde is reported at lower concentrations (see Appendix 32).
- 2.16. Secondly, the interference from phenols can become important when considering the recycled wood content that is used for some board manufacture and the substances that may be contained in those post-consumer wood waste streams, which will have been treated by the furniture manufacturing sites. The wide range of determinands in the analysis suite considered this aspect. Part of the raw material input to board manufacturing will be treated wood waste sources.
- 2.17. Thirdly, the very low moisture content of the samples (average 0.3% for the 20 samples analysed) can cause absorption issues and have an effect on dilution factors. This can result in false high results.
- 2.18. Fourthly, if either the sample preparation or analysis methods involve the use of heat at 50°C and above, then this can generate formaldehyde release from the wood due to carbohydrates in the wood being broken down. Through discussion with an analytical expert, it has been established that if urea formaldehyde were to break down (through analysis or sample preparation) then this can result in ammonia being released that would likely become an interference factor for any free formaldehyde present when assayed by chromotropic acid.
- 2.19. Fifthly, the use of spectrophotometry in the analysis methodology can lead to issues such as samples that may have cloudiness or particles present in them will lead to light scattering and results being higher, potentially significantly higher, than they should be. Interference from other substances reacting with the chromotropic acid can become 'merged' with the formaldehyde reaction such that spectrophotometer would provide a higher result through combining the interference sources with the formaldehyde.

2.20. Sixthly, in cases where samples are considered to be cloudy or contain particles the use of filtration will sometimes be used to remove these particles; however, the filtration process itself can introduce contaminants that may affect the formaldehyde results obtained. It is considered that use of a centrifuge is a better alternative, prior to spectrophotometry.

2.21. For all of these reasons, it seems much more likely than not, that levels of formaldehyde result concentrations in the samples on which Dr Vince commented at paragraphs 15-18 of his Proof are wrong.

3. **NRW POSITION STATEMENT (04 July 2024) (§3)**

3.1. Prior to me completing this Proof, I was made aware of the lengthy NRW Position Statement dated 4 July 2024 in respect of Formaldehyde Hazardous / Non-hazardous. I was extremely surprised to see this document and the contents of it, having been liaising with Mr Morris on the evening of 03 July 2024, and sending a final email on 3 July 2024 setting out the concerns of Dr Tranter, following his description to me of the various circumstances through which an analysis of formaldehyde can be compromised and lead to false high results, as detailed in section 2 above. I had expected to continue these discussions with Mr Morris through the course of 04 July 2024. I have not heard from Mr Morris in reply, so that it would seem that the action of NRW shows that there is no intention on their part to want to achieve a consensus of opinion to allow agreement between experts in this matter.

3.2. I will therefore deal with the matters raised in the Position Statement signed by Mr Jones (Counsel for NRW).

3.3. At para. 3, Mr Jones references my comments in respect of waste classifications not being undertaken, of which NRW are more than aware, having stated the same in their Waste Technical Group Meeting document of 11 January 2018 (CD 4.1.7 Oliver Matthews: Appendices OM1 to OM27 p. 156). Additionally, on p. 156 under 'Action currently in progress' NRW stated they are "working with the Environment Agency, The Wood Recycling Association and others to develop a code of practice for the assessment of waste wood based on wood type approval (for example structural, furniture or garden), supplemented by sampling and analysis if required." (my

emphasis). In my opinion, this illustrates a clear intention from NRW not to require WM3 classification of waste wood despite the previous page (p.155) containing a single sentence towards the bottom of the page stating, “The law allows no flexibility on this requirement.” This is yet more contradiction from the regulator and illustration that they want to ‘pick and choose’ when they want to apply the law.

- 3.4. It is ironic the emphasis now being placed on the formaldehyde results obtained by Platts when looking back over the documentation relating to waste wood and the efforts made to avoid appropriate WM3 classification. The PAS 111 document makes absolutely no reference to formaldehyde, neither do the WRA Waste Wood Assessment Guidance documents (July and November versions 2021), the WRA waste wood grading table does not refer to formaldehyde, and neither do the analysis suites used for the two project work streams that NRW have been involved with (Appendix 33, page 17), the results of which have yet to be published. Is the complete lack of reference to formaldehyde in relevant documentation spanning the last 12 years due to a recognition that formaldehyde is a very difficult substance to analyse with limitation of the methods, or because it is not considered to be a significant issue?
- 3.5. At para. 18, Mr Jones says that at the date of the Position Statement, NRW had not received any evidence or reasoned basis to establish or demonstrate that the record in the laboratory report was not correct or reliable. Details pertaining to these issues were provided to Mr Morris of NRW on the previous evening with an invitation to comment. No response has been received to date.
- 3.6. I refer again to section 2 above that details the real concerns with the assay methodology and the results obtained. If NRW are now insistent on such materials being hazardous (despite the contents of the Statement of Common Ground), then they are saying that the board manufacturers are providing false or misleading MSDS, putting human health at risk for those processing the boards in manufacturing, and the health of the public who purchase furniture manufactured from such boards. NRW can only be saying that board manufacturers are not representing the truth when they record in their documentation that they comply with the E1 standard. This cannot conceivably be the case.

4. **THE EPTR, EMS DOCUMENTATION AND DISCUSSION WITH MS THOMAS (§4)**

- 4.1. I emailed Ms Thomas on 02 July 2024 requesting confirmation of outstanding matters for the EPTR and EMS documentation, and a response was provided on 03 July 2024.
- 4.2. The EPTR was updated at sections 1.1 Overview, 4.2 Proposed Waste Activity, 7 Application Site Condition Report, and 9.5 Waste Minimisation and Benefits. In addition, EMS documents AGR F027, AGR F068, AGR P010, AGR P013, AGR P016 and AGR P017 were updated. All of these documents were submitted on 04 July 2024 and I await further contact. I understand that she was on leave on 5 July. The documents can be placed before the inspector at a roundtable discussion.

5. **CONCLUSIONS (§5)**

- 5.1. There are various factors associated with the 'best endeavours' method used by the laboratory for analysis of the formaldehyde that, in my opinion, may have led to significantly higher readings than would have been expected. Dr Vince commented during the inquiry that at the time of considering the laboratory results, he was surprised that they were so high.
- 5.2. The factors I have set out above, whether individually or in combination, are very likely in my opinion to have provided falsely high results.
- 5.3. The review of MSDS from a range of board manufacturers identifies that the majority manufacture to the E1 standard which requires less than 0.01% addition of free formaldehyde to ensure the releases are below the standard requirement. This addition rate is a factor of 10 below the H350 threshold of 0.1%. Even if some boards had higher concentrations than the standard allows (boards manufactured abroad), it is extremely unlikely that the formaldehyde additions would be above the H350 threshold.
- 5.4. In all these circumstances, the pragmatic conclusion to be drawn from the WM3 assessment scenario presented by Mr Morris is that the waste wood samples used to obtain the Elab laboratory results for formaldehyde were not hazardous, and that the appropriate waste code is indeed 03 01 05.

- 5.5. I have made attempts with Mr Morris to agree on the matter of the waste classification, through email correspondence on 03 July 2024 however, the NRW Position Statement issued on 04 July 2024 appears to have prevented this.
- 5.6. In conjunction with Ms Fuller, revisions to the EPTR and accompanying EMS documentation have been made in order to discuss matters with Ms Thomas. I sent these to her on 4 July, but as of the time of writing, she has not contacted me. It is acknowledged that she was to be on annual leave on 05 July 2024.