IN THE MATTER OF: **PCAC/PEDW ref CAS-02313-Z1D6V4**

THE ENVIRONMENTAL PERMITTING REGULATIONS 2016, REGULATIONS 31 AND SCHEDULE 6 and

AN APPEAL AGAINST THE DEEMED REFUSAL OF A PERMIT

B E T W E E N:

PLATT'S AGRICULTURE LIMITED

Appellant

- and -

NATURAL RESOURCES WALES

Respondent

EXPERT REPORT ON RISK ON BEHALF OF THE APPELLANT

Dr Ivan Vince CEng FIChemE CSci CChem MRSC FEI

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Coach House, 132 Bromley Road, Beckenham BR3 6PG

Introduction

1. Platts Agriculture Limited (Platts), based in Wrexham, LL12 0PJ, has applied to Natural Resources Wales (NRW) for a permit under the Environmental Permitting Regulations 2016 to enable it to continue selling a woodchip based material to dairy farmers, who apply it as a conditioner over the rubber mats on which their cows lie.

2. Platts obtains the material from various sources, mainly furniture manufacturers. The material is then pulverised before sale. Platts considers that the material it receives is a by-product of the original manufacturing process, and not a waste. However, NRW has disagreed and required Platts to apply for an environmental permit, and thereby implicitly accept that the material it receives is a waste. Thus, in order to receive the permit, Platts has to satisfy certain end-of-waste (EoW) criteria, as set out in Article 6 of the Waste Framework Directive (WFD). In response to a Schedule 5 Notice From NRW, Platts commissioned Environmental Compliance Ltd (ECL) to produce a detailed EoW justification.

3. I have been instructed by Saunders and Partners LLP (Saunders Law) to review the ECL report among other documentation relevant to health, safety and environmental aspects mandated in the following paragraphs of WFD Article 6:

> *1.(d) the use of the substance or object will not lead to overall adverse environmental or human health impacts.*
>
> *[EoW criteria shall include]*
>
> *2.(c) quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards, including limit values for pollutants where necessary.*
>
> *2.(d) requirements for management systems to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate.*
>
> *2.(e) a requirement for a statement of conformity.*

I have been instructed also to comment on NRW's approach to the risk of harm.

I am advised by those instructing me that if I refer to any document which is covered by litigation or legal advice privilege then I do so without any authority to waive that privilege.

4. I am Dr Ivan Michael Vince, trading as ASK Consultants. I have over forty years' experience of research, lecturing and consultancy related to health, safety and environmental risks. I have Master's and Doctorate degrees in Chemical Engineering. I am a Chartered Scientist, a Chartered Chemist and Member of the Royal Society of

Chemistry, a Chartered Engineer and Fellow of the Institution of Chemical Engineers (and a member of its Loss Prevention Panel and Hazards Editorial Panel) and a Fellow of the Energy Institute. I have taught modules on safety, loss prevention and risk assessment at postgraduate level at several universities in the UK and overseas, and have given evidence on related matters in ten public inquiries, as well as in criminal trials, High Court actions and in arbitrations in the UK, US, Canada and Australia. My CV is appended.

5. My instructions were accompanied by the following documents:

<u>NRW prosecution papers (extracts)</u>

- Witness statement of Paul Challender dated 29 March 2021
- Witness statement of Sarah Lucy Walton dated 30 September 2021
- Witness statement of Paul Moor dated 11 August 2021
- Exhibit PC5 Natural Resources Wales Waste Technical Group Meeting dated 11 January 2018, Paper Title Wrong waste, wrong place – regulation of waste wood and update on …, Paper reference WTG26-02
- Exhibit SW1 (4 page spreadsheet of suppliers to Platts)
- Undated document Covid-19 RBB Sub Group Decision Request Form, Unique Reference RBBC19 WIRS #2000440 Platts Animal Bedding (Llay).
- Letter dated 18 July 2022 from Natural Resources Wales.

<u>Documents generated by Platts prior to its application for a permit</u>

- ECL Wood Waste WM3 Assessment dated October 2000 (Newmor Group)
- Enclosures accompanying a letter to NRW dated 1 February 2021, CP02, CP07, CP09

<u>Documents generated during the permit application process (including extracts from the permit application)</u>

- Permit application (extracts)

Application contents

Section 2: Non-Technical Summary

Section 6: Environmental Permitting Technical Requirements

Section 10: Wood Waste Review

- NRW Schedule 5 request for further information dated 19 July 2022
- ECL Response to NRW's Schedule 5 request dated September 2022, together with six appendices and XLSX spreadsheets
- NRW Schedule 5 request for further information dated 9 November 2022 (second Schedule 5 request)
- Note of TEAMS call with NRW dated 15 November 2022 (prepared by Oliver Matthews of ECL)

Legal document

- Waste Framework Directive

Guidance documentation

- Link to Technical Guidance WM3
- PAS 111 guidance, May 2012
- Regulatory Position Statement ("RPS") 207, updated 21 September 2017
- WRA Waste Wood Assessment Guidance for the UK Waste Wood Industry, Nov 2021

Additional documentation

- Email from Mr Matthews (ECL) to Paul Moor (NRW) dated 3 April 2020
- Letter from NRW dated 17 April 2020 to Caroline Platt
- Email from NRW dated 9 July 2020 to ECL
- NRW document received on 23 December 2022: PAN-016818 Waste Wood Classification
- Letter from Saunders Law dated 13 January 2023 to NRW
- Letter from NRW dated 10 February 2023 to Saunders Law

- Letter of instruction dated 8 February 2023 to Dr Atkinson
- Letter of instruction dated 16 February 2023 to Dr Atkinson
- Index of policy, guidance and consultation documents disclosed by NRW

In the course of my work, I have had communications with Mr Matthews and Dr Atkinson and have seen further documents, including NRW's statement of case, an Addendum to the Permit Application dated June 2023, Dr Atkinson's report dated 03/07/23 and Dr George Fisher's preliminary report dated 17/07/23.

The NRW approach to risk assessment

6. According to NRW[1],

> *only untreated and clean … waste wood can be used for animal bedding or in any other setting where it will come into direct contact with animals/livestock* [para 23].
>
> *Natural Resources Wales draws no distinction between the terms 'animal bedding' and 'cubicle conditioner' for the purposes of environmental regulation. This is due to associated issues and risks, including but not limited to animal health and welfare impacts, impacts upon the environment and impacts upon the food chain* [para 51].

7. In their response, Saunders Law included a number of specific questions asking NRW to explain and justify its position concerning risk and "associated issues"[2]. NRW, having repeated that its position is based on risk, now further asserted that it was based on identified risk, but was unable or unwilling to reveal any details of the identification, merely sharing its speculation that the risks had been considered by Parliament[3]:

> *NRW's regulatory position described in the document – like that of other UK regulators – is based on risk. The EPR 2016 makes provision for certain exemptions (as detailed in the document) for the conditional use of untreated wood as animal bedding, in what are considered 'low risk' activities. That this*

[1] NRW document received on 23 December 2022: PAN-016818 Waste Wood Classification.
[2] Letter from Saunders Law dated 13 January 2023 to NRW.
[3] Letter from NRW dated 10 February 2023 to Saunders Law.

was not extended to include treated wood was a matter for Parliament, which we would suggest also involved consideration of risk.

... the reference to 'associated risks and issues' relates to the same concerns as apply to NRW's regulatory position on use of treated non-hazardous wood waste in animal bedding. As noted above, this is based on identified risk; NRW has not undertaken or commissioned any scientific research or opinion.

8. My impression from the NRW correspondence was that NRW appears to be misapplying the precautionary principle, in effect viewing any risk as intolerable unless proved otherwise. This impression has unfortunately been confirmed by several passages in NRW's statement of case:

236. ... Whilst the Appellant has proposed measures to 'clear the process system', there is no evidence to demonstrate that these measures will be completely effective and no evidence to demonstrate that all waste residue will in fact be removed by these measures. Therefore, we cannot be confident that there will be ***absolutely no risk*** *of cross contamination between the processed, treated waste wood and the processed, clean waste wood.*

252. (x) In relation to waste pre-acceptance arrangements, sections 4.2.4.8 and 4.2.4.9 of the EPTR claims that if elevated results for certain substances are found that this can be queried and means of reducing such substance content can be identified. ***To remove any potential risk, NRW would expect the substance to be removed rather than to reduce it.***

206. [repeated almost verbatim in para 234]*... Regardless of the amount of the cubicle conditioner [animal bedding] recommended to be used within the cubicle,* ***there is no de minimis in our position on the use of treated waste wood in animal bedding***. [Emphases added]

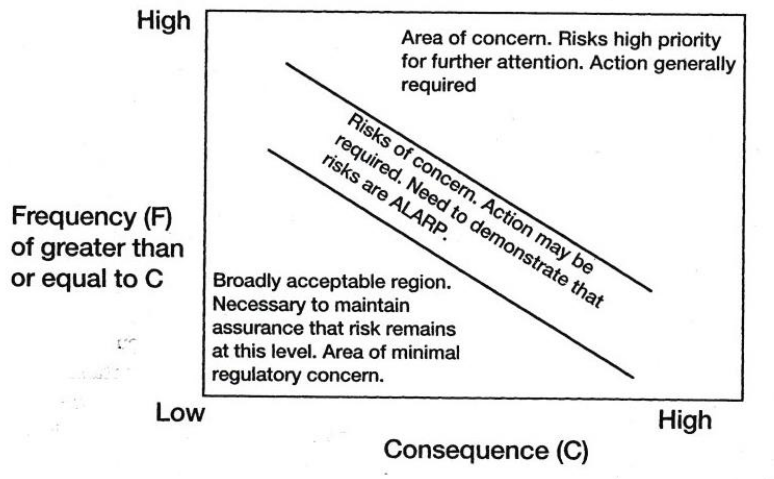
Taken at face value – as they surely are intended to be taken – the above position statements would seem to preclude virtually any industrial process whatsoever from obtaining a permit from NRW.

9. The precautionary principle is intended to apply in situations where (a) the science is uncertain AND (b) there are threats of serious or irreversible harm[4] – manifestly neither of which is true in the application of very small quantities of minimally contaminated material to cow cubicles. Of course, to account for inevitable uncertainties, any risk assessment should incorporate a degree of conservatism, within reason. Thus, the Health and Safety Executive recommends aiming for a "cautious best estimate" of risks[5].

10. Risk has two components and risk assessment needs to take account of both:

- the likelihood (or probability/frequency) of a hazard being realised; and
- the severity of the consequences if it is realised.

The diagram below depicts a customary triage in the initial stages of risk assessment[6]. The acronym "ALARP" stands for "As Low As Reasonably Practicable".



11. The criteria by which the zones are demarcated depend on the social and economic (cost v benefit), as well as technical (state of the art), considerations, bearing in mind that not proceeding with the development or activity in question may also incur risks – in the present case, an increased incidence of mastitis[7]:

[4] UN (1992) Rio Declaration on Environment and Development (https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_CONF.151_26_Vol.I_Declaration.pdf).
[5] https://www.hse.gov.uk/foi/internalops/hid_circs/technical_osd/spc_tech_osd_30/; https://www hse.gov.uk/foi/internalops/hid_circs/permissioning/spc_perm_39.htm.
[6] DETR (1998) Management of harm to the environment: criteria for the management of unplanned releases. ISBN 0 11 753456 0.
[7] Appendix 5, ECL Response to NRW's Schedule 5 request dated September 2022.

Took a load of oat husks, as price of Finebed increased, had terrible problems with mastitis – never had issues when using the Finebed, desperate to go back…

Cow comfort, less mastitis, less lameness, easier slurry handling, improved somatic cell count, kinder to teats than alternative bedding

Very dry and absorbent material - therefore no issues with mastitis.

Consistently keeps cows clean and with low bactoscan, keeps mastitis rates very low.

12. Before commencing an in-depth risk assessment (the appropriate depth depending on the zone the risk(s) are expected to lie within), it is customary to screen out any risks that lie so far towards the bottom left corner of the diagram, i.e. well within the "broadly acceptable region … of minimal regulatory concern" as to be safely neglected, apart from monitoring to ensure the risk remains at this level. Again, as with all phases of a risk assessment, the screening process should incorporate a degree of conservatism[8].

13. In my opinion, a cursory examination of the risks presented by the Platts cubicle conditioner strongly suggests that they are insignificant. I proceed below to confirm this opinion. I am not in a position to comment on the unspecified "associated issues", i.e. issues other than risk, in the NRW passages quoted above.

Potential risks posed by application of the Platts cubicle conditioner

14. Exposure pathways for cattle to potentially harmful contaminants in the cubicle conditioner are via dust inhalation, skin contact and ingestion. Consideration needs to be given also to human consumption of milk and dairy products and to the spreading on agricultural land of slurry which contains the cubicle conditioner.

15. The cupful of conditioner is normally applied while the cubicle is unoccupied, thus effectively precluding any realistic inhalation hazard to the cows from this material – in contrast with, for example, chopped straw bedding, which can create a very dusty environment and thereby exacerbate the risks from respiratory pathogens[9]. Likewise,

[8] Defra (2011) Guidelines for environmental risk assessment and Management – Green Leaves III.
[9] Report of Dr O Atkinson 3.05(4).

the quantities involved and the application method preclude any inhalation hazard to farm operatives, let alone the wider community[10]. In any case, inhalation of (untreated) wood dust is a potent cause of adverse respiratory health effects[11], which would not be perceptibly aggravated by the presence of somewhat higher – but still trace – levels of contaminants in cubicle conditioner than in untreated wood.

16. Decades of experience, together with a large volume of testimonials, confirm that skin contact with the cubicle conditioner is, if anything, beneficial to cows. Again, the quantity of contaminants in the conditioner that can credibly enter the blood of a cow via an open wound before the wound is discovered and treated is negligible, bearing in mind not only the very low concentration, but also the general lack of mobility, of the contaminants – since substances soluble in water (and thus in blood) are necessarily avoided in surface coatings and adhesives applied in furniture manufacture.

17. According to Dr Atkinson, it is unlikely that even a hungry cow would ingest any of the cubicle conditioner[12]. Nevertheless, it is convenient to quantify the potential for ingestion in order to demonstrate that the risk to cows is negligible.

18. ECL's review of the industry sector identified a wide range of potential contaminants for chemical analysis by a laboratory with suitably accredited test methods. I have reviewed the spreadsheets containing chemical analysis results of samples from furniture manufacturers supplying Platts[13]. The concentrations are all orders of magnitude below any possibility of acute toxicity from possible ingestion. Any potential hazard can only be from chronic exposure. Therefore, the key data are the mean concentrations of each chemical, ignoring short-term fluctuations, rather than the maxima, to which any individual cow will seldom, if ever, be exposed. However, I have chosen the mean values with a degree of conservatism.

19. I have focused on the 891 samples from the 12 suppliers who each provided at least 20 samples[14]. For each inorganic contaminant element of concern, I have selected the highest of the 12 mean values (having first corrected the spreadsheet calculations in

[10] ECL Response to NRW's Schedule 5 request dated September 2022.
[11] https://www.hse.gov.uk/woodworking/wooddust.htm
[12] Report of Dr O Atkinson, para 3.05(8).
[13] Attached to ECL Response to NRW's Schedule 5 request dated September 2022.
[14] Suppliers identified as AZ, B, C, D, E, F, G, H, I, J, L and O.

respect of these substances by including the very large number of results that were below the limit of detection (LOD), setting these to equal the LOD – a customary, conservative approach). The values are as follows:

Element of concern	Highest of 12 mean concentrations (mg/kg)
Cadmium	0.26
Chromium	23.08
Copper	45.00
Lead	65.39
Mercury	0.33
Nickel	3.15
Zinc	72.25
Arsenic	13.27
Selenium	1.00

20. Dr Atkinson estimates that the maximum a cow would ingest is approximately 15g.[15]. I assume, extremely conservatively, that a cow will ingest 15g of conditioner each time it is applied, i.e. 30g per day, every day.

21. Dr Atkinson further informs me that food intake varies depending on factors including the cow's age, size and stage of lactation (or pregnancy). The lowest intake is when a cow is heavily pregnant, just before calving, and may dip to 13kg dry matter (DM) per day. Again conservatively, I set 13kg/day as a constant, rather than minimum, level of food intake.

22. From the above, the maximum amount of cubicle conditioner ingested long-term as a fraction of total ingested material is 30/(13,000+30) = 0.0023. The calculated elemental concentration increments in the feed due to ingested cubicle conditioner are tabulated below:

[15] Dr O Atkinson, personal communication.

Element of concern	Highest of 12 mean concentrations in conditioner (mg/kg)	Concentration increment in material ingested by cows due to conditioner (mg/kg)
Cadmium	0.26	0.00060
Chromium	23.08	0.053
Copper	45.00	0.10
Lead	65.39	0.15
Mercury	0.33	0.00076
Nickel	3.15	0.0073
Zinc	72.25	0.17
Arsenic	13.27	0.031
Selenium	1.00	0.0023

23. Several of the above are essential trace elements, but four are highly toxic and have no known physiological function. However, the above calculated concentration increments in the latter due to ingested conditioner are very small percentages of their maximum permitted content in animal feed, let alone of their toxicity thresholds, expressed as NOAELs/LOAELs (No/Lowest Observed Adverse Effect Levels)[16], as shown in the table below:

Element of concern	**A** Concentration increment due to ingested conditioner (mg/kg)	**B** Maximum permitted in feed[17] (mg/kg)	**C** NOAEL/LOAEL (mg/kg)	**A ÷ B** x 100 (%)	**A ÷ C** x 100 (%)
Cadmium	0.00060	0.57	1	0.11	0.06
Lead	0.15	5.7	250	2.6	0.06
Mercury	0.00076	0.11	5	0.70	0.015
Arsenic	0.031	2.27	30	1.4	0.10

[16] López-Alonso M, Chapter 9: Animal feed contamination by toxic metals; in Fink-Gremmels J (2012) Animal feed contamination - effects on livestock and food safety (Cambridge: Woodhead Publishing).
[17] Dr O Atkinson, personal communication.

Concentration increments of the remaining elements are less than 1% of their maximum permitted content in feed:

Element of concern	**A** Concentration increment in material ingested by cows due to conditioner (mg/kg)	**B** Maximum permitted in feed[18] (mg/kg)	**A ÷ B** x 100 (%)
Chromium	0.053	11.0	0.48
Copper	0.10	22.7	0.44
Nickel	0.0073	50.0	0.015
Zinc	0.17	100.0	0.17
Selenium	0.0023	0.3	0.77

24. Nickel concentrations in dairy cattle feed in England and Wales are typically in the approximate range 0.5-1.0 mg/kg DM, i.e. two orders of magnitude higher than the increment due to cubicle conditioner[19].

25. Chromium, copper, zinc and selenium are essential elements, present in natural forage and, where necessary, deliberately added as feed supplements, in concentrations orders of magnitude above the calculated concentration increments due to ingested conditioner.

26. Finally, the vast majority of analysis results for the broad suite of organic compounds were below the LOD. Among the small proportion of compounds where fewer than 75% (!) were below the LOD, the mean values of (conservatively calculated) concentration increment were of the order of 0.01mg/kg or below, far below their respective LOAELs.

27. I conclude that ingestion of cubicle conditioner, if it occurs at all, makes a negligible contribution to any toxic load inherent in the regular feed of dairy cows.

[18] Dr O Atkinson, personal communication.

[19] Nicholson FA et al (1999). Heavy metal contents of livestock feeds and animal manures in England and Wales. Bioresource Technology, **70**, 23–31. (cited by European Food Safety Authority Panel on Contaminants in the Food Chain https://efsa.onlinelibrary.wiley.com/doi/pdfdirect/10.2903/j.efsa.2015.4074).

28. Dr Atkinson estimates that approximately 2g of cubicle conditioner per milking, i.e. 4g per day, might be transferred from the cow's udders to (a minimum of) 15 litres of milk collected[20]. Virtually all of the contaminants will remain bound to the dust particles and be filtered out. I assume highly conservatively, indeed unrealistically, that up to 10% will dissolve in the milk. The resulting concentrations of toxic contaminants in milk, tabulated below, are small fractions of regulatory limits:[21]

Element of concern	Highest of 12 mean concentrations in conditioner (mg/kg)	Concentration in milk due to transfer from udders during milking (mg/litre)	Lowest maximum permitted in foodstuffs[22] (mg/kg)	Concentration in milk as % of limit
Cadmium	0.26	0.0000069	0.005	0.1
Lead	65.39	0.0017	0.01	17
Mercury	0.33	0.0000088	0.1	0.01
Arsenic	13.27	0.00035	0.01	3.5

29. I conclude that transfer of cubicle conditioner from the udders of cows during milking can make at most a negligible contribution to substances of concern in the milk of the subject cows.

30. Dr Atkinson has informed me that low-yielding cows produce approximately 290 litres of slurry a week[23], i.e. 41 litres (~41kg) per day, thus diluting the cubicle conditioner by a factor of approximately 82 (the factor is substantially greater for medium- and high-yielding cows). I have transmitted this factor, together with the maxima of mean metal concentrations in paragraph 19 above, to Dr George Fisher, the soil expert instructed on behalf of Platts, who concludes that the cubicle conditioner, and in particular its heavy metal content, is very unlikely to have a negative impact on soil health[24].

[20] Dr O Atkinson, personal communication.
[21] Commission Regulation (EC) No 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006R1881-20230326)
[22] For cadmium, lead, arsenic, the limits refer to infant formulae; for mercury, to food supplements.
[23] Dr O Atkinson, personal communication.
[24] Dr G Fisher, paras 32-36.

31. Risks from the application of cubicle conditioner can therefore be considered to have been screened out: to require no statistical or other detailed assessment, nor any management measures apart from the important one of monitoring to ensure the current situation does not deteriorate.

Risk management

32. ECL on behalf of Platts has proposed a management programme, at the heart of which is a sampling regime summarised as follows:

> *Firstly, each load received will be sampled and the material held in a sealed container with mixing of the material on each addition from a new load. At the end of the month, a sample from the homogenised mix would be taken and sent for analysis. Secondly, each month a specific randomly selected trailer would be sampled and sent for analysis. This would provide spot checks on individual loads along with monthly averages.*
>
> *All results would be combined into the library of results. Where supplies are less regular, i.e. not more than one trailer a month, then each load would be sampled and sent for analysis. Again, all results would be combined into the library of results*[25].

In my opinion, the above regime offers adequate assurance that risks continue to be negligible, provided that appropriate EoW criteria are applied.

33. It is striking that the proposed sampling and testing frequencies are vastly in excess of those required by PAS 100 in the case of compost[26].

34. ECL had proposed EoW criteria for the cubicle conditioner of 0.1% acceptability cut-off for each individual toxic substance (associated with hazard statements H4xx), together with the same criterion for the sum of all contaminant concentrations. I note, in passing, that if the total concentration of contaminants does not exceed 0.1%, then no individual contaminant can exceed 0.1%; therefore, the latter criterion would make the former superfluous.

[25] ECL Response to NRW's Schedule 5 request dated September 2022, paras 3.4.9-3.4.10.
[26] Addendum to the Permit Application, paras 3.6.6-3.6.7.

35. More seriously, the conservative assumption above regarding ingestion of cubicle conditioner is incompatible with the 0.1% criterion for some contaminants, including the elements regulated in animal feed. For example, 0.1% of cadmium, i.e. 1,000mg/kg, translates to 23mg/kg increment due to ingested conditioner, which is a multiple not only of the maximum permitted in feed but also of the LOAEL. I would therefore recommend tightening the criterion for the regulated elements.

36. In any case, too lenient a criterion carries the risk that changes, whether gradual or sudden, which might require investigation, would be overlooked. I recommend that the alert criteria which I develop below for the Platts product should act as alert values for supplier samples to trigger such investigation.

37. I recommend EoW criteria for the regulated elements such that the concentration increment due to ingestion of 30g/day of cubicle conditioner will not exceed 10% of the maximum permitted in feed at the lowest rate of feed intake of 13kg/day. The figure of 10% is higher than usual for a screening criterion, but justified by the marked conservatism of the above assumptions, especially that of chronic twice-daily ingestion of conditioner. NB the calculated EoW values in the table below have been rounded down.

Element of concern	**A** Maximum permitted in feed (mg/kg)	**B = 10% of A** Recommended maximum concentration increment due to ingested conditioner (mg/kg)	**C ≈ B ÷ 0.0023** Recommended EoW for conditioner (mg/kg)
Cadmium	0.57	0.057	24
Chromium	11.0	1.10	470
Copper	22.7	2.27	980
Lead	5.7	0.57	240
Mercury	0.11	0.011	4.7
Nickel	50.0	5.00	2100
Zinc	100.0	10.00	4300
Arsenic	2.27	0.227	98
Selenium	0.3	0.03	13

38. Finally, since the EoW criteria recommended above are so much greater than the mean values among the 891 sample analyses recorded, I recommend setting an alert at ~20% above the respective maximum concentrations recorded:

Element of concern	Maximum concentration in 891 samples (mg/kg)	Recommended alert trigger for conditioner (mg/kg)
Cadmium	0.8	0.96
Chromium	100	120
Copper	150	180
Lead	160	190
Mercury	1	1.2
Nickel	42	50
Zinc	360	430
Arsenic	40	48
Selenium	1.2	1.4

While these values would result in ingested concentration increments that are all far beneath the respective NOAELs/LOAELs, repeated marked exceedances in supplied materials may be a sign of adverse changes in composition and should be investigated.

39. My recommendations above re EoW criteria have been incorporated in the Addendum to the Permit Application, with the modification that the proposed Statement of Conformity is based not on my recommended EoW values but on the above, much stricter, alert values, thus inserting a further layer of conservatism. Finally, in order to bring them in line with the limits in PAS 100 and PAS 111, even the very low alert values for chromium, mercury and zinc have been further decreased in the Statement of Conformity[27].

Conclusions

40. NRW appears to be misapplying the precautionary principle, in effect viewing any risk as intolerable unless proved otherwise. However, a cursory examination of the

[27] Addendum to the Permit Application, paras 3.8.6-3.8.7.

risks presented by the Platts cubicle conditioner strongly suggests that they are insignificant and can be “screened out”, on the basis of conservative assumptions.

41. Ceasing to use the conditioner is not risk free, but carries documented health risks to cows.

42. Inhalation exposure to the conditioner, to the extent that it occurs at all, is no more harmful, whether to cows or humans, than exposure to untreated wood dust. Skin exposure is actually beneficial to cows, in comparison with alternatives, in particular reducing mastitis.

43. Potential chronic ingestion of the cubicle conditioner by cattle, while highly unlikely, is quantifiable, and thus a convenient means to demonstrate that the risk to cows is negligible. Based on conservative assumptions, informed by advice from the veterinary expert witness and a review of analysis results of a large number of product samples, I conclude that ingestion of cubicle conditioner, if it occurs at all, makes a negligible contribution to any toxic load inherent in the regular feed of dairy cows.

44. There is negligible contamination of milk by conditioner transferred from udders.

45. I understand that the soil scientist instructed on behalf of Platts concludes that cubicle conditioner, as a minor component of slurry spread over land, makes a negligible contribution to the toxic burden of agricultural soil and dependent food chain(s).

46. Risks from the application of cubicle conditioner can therefore be considered to have been screened out: to require no statistical or other detailed assessment, nor any management measures apart from monitoring to ensure the current situation does not deteriorate.

47. I endorse ECL’s rationale for the proposed Statement of Conformity and proposed management programme to ensure continued compliance with permit conditions.

48. In my opinion, the approach set out in the Addendum to the Permit Application will ensure full compliance with the health, safety and environmental requirements mandated in WFD Article 6 paragraphs 1.(d), 2.(c), 2.(d) and 2.(e).

Expert declaration

1 Statement of conflicts

I have no known conflict of interest in preparation of this report. I have no relationship, social, professional or other, with Platts Agricultural Ltd. I have no current or previous relationship, professional, social or other, with NRW or their personnel.

I will advise the party by whom I am instructed if, between the date of this report and any possible trial, there is any change in circumstances which affects this statement.

2 Statement of compliance

I understand my duty as an expert witness is to the court or tribunal concerned. I have complied with that duty and will continue to comply with it. This report includes all matters relevant to the issues on which my expert evidence is given. I have given details in this report of any matters which might affect the validity of this report. I have addressed this report to Saunders Law Solicitors who instructed me but it may be addressed to the court or other tribunal if necessary in the future. I further understand that my duty to the court or tribunal overrides any obligation to the party from whom I received instructions.

3 Declaration of Awareness and Statement of truth

I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer. I understand that proceedings for contempt of court may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief in its truth.

Dr Ivan Vince

14/07/23

CONTENTS

IVAN VINCE

Coach House, 132 Bromley Road BR3 6PG, UK

[redacted]

CURRICULUM VITAE

EDUCATION:

1969 Sydney University (Commonwealth Scholar), BSc (Biochemistry, Pharmacology)
1974 Sheffield University, MSc (Combustion Science and Pollution Control)
1978 Sheffield University, PhD (Styring Scholar; "Nitric oxide formation in flames")

INSTITUTIONS/ AFFILIATIONS:
Institution of Chemical Engineers (CEng FIChemE)
Royal Society of Chemistry (CSci CChem MRSC)
Institute of Energy (FEI)
Institute of Refrigeration (MIoR)
Combustion Institute, British Section
UK Explosion Liaison Group
Environmental Law Foundation.

PUBLICATIONS:

Books

Brazier A, Edwards D, Macleod F, Skinner C, Vince I (2021) Trevor Kletz compendium – his process safety wisdom updated for a new generation (Oxford: Elsevier) ISBN: 9780128194478

Vince I (ed) (2008) Major accidents to the environment – a practical guide to the Seveso II Directive and the COMAH regulations (Oxford: Elsevier) ISBN: 978-0-7506-8389-0.

Tomi DT, Vince IM, Matheussen D, Bishop R (1992) EML – Estimated Maximum Loss from explosion and/or fire: guidelines for assessment in the oil, gas and petrochemical industries (4th ed) (London: International Oil Insurers).

Vince I (1987) The Sick Building Syndrome (London: IBC Technical Services) ISBN-10: 1852710268.

Selected journal articles

Colbourne D, Vince I (2020) Keeping cool under threat of fire – managing the risks of flammable refrigerants, Hazards 30 (Rugby: IChemE)

Vince I, Fishwick T (2018) Beware: the witness may be telling the truth. *Loss Prevention Bulletin* 264, 6-8.

Vince I (2013) Explosion at a hazardous waste site caused by contaminated nitric acid. *Chemical Engineering Transactions* 31, 535-540.

Vince I (2011) Societal risk in land use planning – the scale of 'scale aversion', Hazards XXII, Symposium Series No.156, 408-410 (Rugby: IChemE).

Vince I (2002) Hydrogen sulphide release from a process vessel, *Loss Prevention Bulletin* 168, 12-14.

Fisher BEA, Metcalfe E, Vince I, Yates A (2001) Modelling plume rise and dispersion from pool fires, *Atmospheric Environment* 35, 2101-2110.

Vince IM, Vovelle C, Weinberg FJ (1984) The effect of plasma jet ignition on flame propagation and sooting at the rich limit of flammability, *Combustion and Flame*, 56, 105.

Hayhurst AN, Vince IM (1977) Production of 'prompt' nitric oxide and decomposition of hydrocarbons in flames, *Nature*, 266, 524.

Selected technical reports

Vince I (2015) Potential off-site risks of the proposed expansion of Burnaby Tank Farm (for City of Burnaby, BC, Canada).

Allum SM, Lemaignen L, Vince I (2010) Major accident hazards at natural gas-fired power stations (for Advanced Power (UK) Ltd).

Coull J, Holmes JW, Kelly MG, Locker BJ, Tonks J, Vince I (2006) Buncefield oil storage terminal explosion and fire, December 11, 2015 - root cause investigation report (for Hertfordshire Oil Storage Ltd).

Bridges JW, Bridges O, Scott P, Vince I (2000) The evaluation of possible health risks to landfill site workers from exposure to gaseous waste emissions (landfill gas), *Environment Agency R&D Technical Report* P257.

Vince I (1999) A pilot information system on environmentally hazardous activities (Institutional Strengthening of the Ukraine State Environmental Inspectorate), European Commission (TACIS, DG IA) Project No. ENVUK9701, 97-0728.00.

Nixon W, Bottelberghs PH, Vince I et al (1995) Environmental risk criteria for accidents: a discussion document, European Commission (DGXII) Contract no. ERBEV5VCT940417.

PROFESSIONAL EXPERIENCE

Current:

- Principal of ASK Consultants (1982), specialising in loss prevention in the process industries; also in related matters such as industrial air pollution, occupational exposure to hazardous chemicals and contamination of bulk cargoes.

- Member of Loss Prevention Panel, IChemE.

- Member of Technical Committee, Hazards Symposia, IChemE.

- Member of International Electrotechnical Commission (IEC) working group (TC61/SC61D/WG21) on highly flammable refrigerants in room air conditioners for revision of international standard IEC 60335-2-40.

- Visiting Lecturer/Trainer in Process Safety & Loss Prevention.

- Expert witness (UK Register checked; APIL Tier 1)

Previous:

1990-2003	Founding partner in AGEL-CBI Ltd (Budapest, 1990), pioneering process safety consultancy in the region.
1978-84	Post Doctoral Research Fellow, Department of Chemical Engineering, Imperial College, in team of Prof FJ Weinberg FRS; research on flammability limits and combustion generated pollution.
1979-82	Consultant for Watt Committee on Energy and others.
1978	Research Assistant, Monitoring and Assessment Research Centre, London University/UNEP.
1977-79, 1989-90	Course Tutor, Environmental Control and Public Health; and Chemistry, Open University.
1977-78	Assistant Editor, Progress in Energy and Combustion Science, Pergamon Press.

ASK Consultants – Safety and Loss Prevention – Major Hazards

Selected projects:

- Trans Mountain Pipeline. Evidence for public consultation on off-site risks from proposed expansion of Kinder Morgan oil storage terminal (on behalf of City of Burnaby, BC, Canada).

- Evidence in litigation on alleged negligence by consultancy contributing to major fire (Grosvenor Chemicals).

- Buncefield. Independent combustion/major hazards expert on team investigating explosion at Hertfordshire Oil Storage Ltd (Total/ChevronTexaco).

- Co-author, COMAH Safety Report for proposed European LNG terminal (ExxonMobil).

- Evidence at public inquiry on consequence analysis of oil fires, focussing on off-site thermal radiation hazard (BTP Hyder).

- Independent review of two internal risk assessments, of off-site risk and of risk to occupied buildings on refinery (BP Amoco).

- Assistance in setting up state-wide management system for sites holding hazardous chemicals, Ukraine (EU: TACIS).

- Co-authored internal guidelines for major accident risk assessment for power stations (InterGen).

- Investigated two university laboratory explosions (Cambridge, London Royal Holloway).

- Audit of major hazards and occupational safety and health, refinery, Russia (EBRD).

- DSEAR compliance audits and assistance with risk assessment (Unilever, Dairy Crest, Augean etc).

- Comparative hazard assessment of alternative chlorination systems, power plant, Egypt (InterGen).

- Quantified risk assessment, off-site safety and environment, hydrocarbon storage terminal, Israel (Pi-Gliloth Terminals)

- Risk assessment of fertiliser plant, Ukraine (EBRD). Production, storage and transport of ammonia, ammonium nitrate, nitric acid, urea, oleum.

- Risk analysis study of port extension and free port development, Mauritius (World Bank). Storage and handling of petroleum products including bulk LPG, ammonia and explosives. Review of safety management for Mauritius Marine Authority.

- Mathematical modelling and assistance with design of validation experiments to assess effectiveness of walls in preventing ignition of sensitive equipment by a pool fire on neighbouring equipment (UK National Grid Co).

- Fault-tree and consequence analysis, hydrodesulphurisation plant, Hungary (MOL Hungarian Oil & Gas).

- Chairing many HAZOP studies, eg Merox unit, alkylation plant, Colombia (Ecopetrol); PTA and aromatics plant, Middle East (Arabian Industrial Fibres); condensate/gas processing (Statoil) etc – also audits of HAZOPs.

- Expert safety evidence in litigation in connection with LPG explosion causing loss of life and serious injuries.

- Investigation of fire, explosion and pollution aspects of one of the largest oil tanker casualties, Greece (West of England P&I).

- Expert evidence in High Court concerning total loss of container vessel due to fire and explosion (Middle East).

- Consequence analysis and loss prevention advice, electrolytic zinc plant, Russia (EBRD)

- Assessment of off-site major hazard risks from novel chemical process for Environmental Statement (Zeneca).

- Safety audit and assessment of fire and explosion hazard, gas plant, Shanghai, on behalf of US investor (General Electric).

- Expert evidence at public inquiry, proposed expansion of UK international airport: on third-party risks from aircraft crashes onto CIMAH sites and residential areas (Liverpool Airport).

- Assessment of consequences of accidents in proposed hazardous items store, MoD Central Ordnance Depot. Consideration was given to CO, NOx, HCN, NH3, amines, HF, HCl, COCl2, SO2. Study concentrated on near-field (<200m) dispersion from pool fires and compartment fires (UK Ministry of Defence).

- Detailed consequence analysis of various spill scenarios of hydrogen fluoride kept liquid under pressure in alkylation plant, Spain (Repsol).

ASK Consultants – Exposure to Hazardous Substances/Processes

Selected projects:

- Development of toxic gas model to assess on-site risk for World Bank sponsored ISAS (Integrated Safety Audit System).

- Expert evidence for Judicial Review concerning health risks from use of fertiliser produced from power station ash (EPRL).

- Incident investigation and advice on mitigation of risk to workers from chlorine and hydrogen chloride evolved in electrolytic metal finishing process (Bundy International).

- Safety review of reception, storage, handling and use of very toxic and flammable gases in the manufacture of integrated circuits (Applied Materials/Applied Implant Technology).

- Experimental and modelling study to assess possible hazard from ingress of fire fighting materials into adjacent spaces (BBC).

- Expert evidence in many cases, for claimant, defendant and as single joint expert, eg

    - Fatal explosion of thinners vapours in a confined space.

    - Alleged injury due to exposure to theatre smoke in fire emergency training.

    - Chronic health effects allegedly from exposure to solvent vapours.

    - Assessment of legionella risk in previously affected apartments.

    - Injury during unloading of corrosive chemical from tanker.

ASK Consultants – Air Pollution

Selected projects:

- Evidence in class action against Haifa port and industrial complex, re alleged health effects of airborne emissions (for Haifa residents).

- Modelling local air quality impact of aircraft emissions at London Heathrow Airport (for British Airways).

- Expert evidence on air pollution risks relevant to odour nuisance, irritancy and food tainting at four Public Inquiries into planned hazardous waste treatment centres.

- Advice on odour nuisance from agricultural activities.

- Assistance in designing off-site odour monitoring for an industrial waste handling plant; submission of a report to the Environment Agency on modelled airborne pollutant concentrations off site.

- Modelling local and regional air quality impact on sensitive receptors, including island nature reserve, from off-shore flares, Arabian Gulf. Co-authored air quality assessment teaching package for use by Government client in Gulf.

- Modelling atmospheric concentration and deposition of toxic and ecotoxic material from rocket exhausts, for UK Ministry of Defence, Public Inquiry.

- Study of health effects of historic emissions from coke works on nearby residents, in support of High Court litigation. ASK contribution included the study of generation of irritants and other chemically active species in the coking process, and the adsorption of chemicals onto coke particulates; as well as adapting dispersion and deposition models for unusual sources. ASK also nominated the other experts and had overall responsibility for cohesion of their reports on aspects of engineering, toxicology, epidemiology and sample analysis.

- Research project: possible health effects of landfill gas. Co-funded by Shanks & McEwan and Department of the Environment. ASK carried out near-field dispersion modelling from complex area source, also developing a CFD (computational fluid dynamics) simulation. ASK was also involved in designing and interpreting wind tunnel experiments and field monitoring protocols.

- Successful litigation (High Court): investigating alleged damage to crops by fallout from power station burning unconventional fuel (Orimulsion). Modelling chemical transformations of pollutants within the plume and in atmospheric droplets; plume dispersion and agglomerate deposition; statistical investigation.

- Hydrogen sulphide exposure quantification after transient release in complex terrain, in support of successful High Court class action.

- Assessment of historic risks to nearby residents from emissions from asbestos factory, in support of successful High Court litigation by mesothelioma victim.

- Assessment of impact on air quality of planned expansion of Liverpool Airport.

- Supervising PhD research at University of Greenwich on dispersion of plumes from pool fires. (Supported by HSE.)

- Visiting Research Fellow (advisor on atmospheric transport of toxic substances) at the European Institute of Health and Medical Sciences.

- Comparative study of emissions from various sources of biomass for electricity generation (ETSU).

- For 5 years taught Environmental Risk Assessment at MSc level at University of Greenwich. Also 2 years at Open University (post-experience course: Environmental Protection and Public Health).

- Provided long-term regional expertise to CEC DG 1A for Monitoring and Assessment of the PHARE Programme.

- Development of toxic gas risk model, as part of the World Bank sponsored Integrated Safety Audit System.

- Theoretical treatment of diurnal "breathing" emissions from storage tanks and cargo vessels with volatile contents (New York arbitration).

- Ten years (Sheffield University and Imperial College) of full-time research on combustion generated air pollution and flammability of vapour-air mixtures.

- Advice to industry on air pollution impacts from planned novel chemical processes (eg pharmaceutical and semiconductor industries).

ASK Consultants – Industrial Waste

Selected projects:

- Health and safety review of treatment, storage, transfer and landfill operations (Augean).

- Provided risk assessments for novel processes (Castle Environmental).

- Prepared consequence analyses for major incident scenarios, to comprise part of Environmental Statement for planned hazardous waste treatment plant (incineration and acid neutralisation), on behalf of Trinco, Thames Water, BFI, Cory Environmental etc.

- Leading workshop on hazard assessment of accidental occurrences: on-site and transport, in short course: Risk Assessment for Waste Management, Loughborough University of Technology Centre for Hazard and Risk Management.

- Have given expert evidence on major hazard risk, odour nuisance and food tainting at five Public Inquiries on planned hazardous waste treatment centres:

    - on behalf of Doncaster Municipal Borough Council opposing Leigh Environmental (Leigh's appeal was dismissed by the Secretary of State, partly on grounds of tainting risk);

    - on behalf of Cory Environmental at Seal Sands (Cory were successful);

    - on behalf of Browning-Ferris Environmental Services (BFI) (the appeal by BFI succeeded and, unusually, costs were awarded against the Local Authority who had refused planning permission on grounds of risk).

    - on behalf of British Cocoa Mills, whose plant is unique in Britain, concerned about the possibility of food tainting due to atmospheric emissions from planned industrial waste transfer station. Provided evidence on incident rates, loss of containment scenarios, atmospheric dispersion modelling, mass

transfer and risk tolerability criteria. (The appeal was dismissed, solely on account of tainting risk; the Secretary of State's decision was, however, overturned on judicial review.)

- Provided expert report (for Hampshire Waste) on risk of food tainting from proposed MSW incinerator (report unchallenged at inquiry).

ASK Consultants – Carriage of Crude Oil, Petroleum Products and Chemicals

Selected projects:

- Investigated many cargo contamination claims, appearing as expert witness in arbitrations and court hearings (London, New York, Sydney).

- Advised P&I club on environmental risk management following incident off South American coast: loss overboard of containers carrying toxic chemicals.

- Investigated several hydrocarbon fire/explosion incidents, including one of the largest oil tanker casualties (Greece), with detailed modelling of burning spill on sea, fire in partially intact cargo tanks and release of oil under water.

- Gave evidence in High Court concerning total loss of container vessel due to fire and explosion (Middle East).

- Investigated three unrelated fatal explosions, fuelled by hydrogen evolved from metal cargo.

- Studied evaporative loss and cross-contamination from volatile cargoes in transit; appeared as expert witness on this subject at commercial arbitrations in London and New York.

- Gave advice re safety of proposed inerting of vessel's non-cargo spaces containing explosive mixture.

- Developed CAROL (Control and Reconcile Oil Losses), a commercially available computer program for auditing custody transfer.

- Co-invented patented device for taking representative samples from stratified crude oil.

- Co-authored International Oil Insurers' EML (Estimated Maximum Loss) guidelines for assessment of fire and explosion hazards. Both the IOI Guidelines and associated software are commercially available.

- Investigated near-disastrous runaway reaction on board ship, with detailed physicochemical modelling, leading to precise identification of cause.

AGEL-CBI Ltd (Hungary)

Selected projects:

- MOL Rt: comprehensive risk assessment and safety report for Seveso II compliance.

- Paks Nuclear Power Station, Hungary: assessment of risks from oil fires to structural integrity of turbine hall and to electrical systems critical for safe shut-down. ASK involved in HAZOP and consequence analysis (thermal radiation effects, fires in confined spaces); and providing technical liaison between AEA Technology (SRD) and Hungarian client.

- Development of discussion document for CEC DG XII: Environmental Risk Criteria Relevant to Major Accident Hazards. Definitions of major accident, environmental harm index, acceptance criteria etc. (with AEA Technology and Netherlands Ministry of Environment).

- MOL Danube Refinery: risk assessment of HDS plant carried out post-incident, to satisfy requirements of insurers. ASK input includes fault-tree and consequence analyses.

- Specified in detail a two-week intensive training course in risk assessment (major hazards) for Hungarian National Oil & Gas Corporation. Course provided by UK Consultancy, financed by UK ODA Know-How Fund.

- Arranged and took part in multi-phase training programme for Hungarian engineers in the use of specialist risk assessment software, via UK consultancy.

- Nominated and subsequently seconded our senior associate (Elizabeth Siklos) to EC DG 1A as regional long-term expert providing technical assistance in monitoring and assessment of the PHARE Programme.

- Managed health, safety and environmental aspects of pre-acquisition audits of Hungarian industrial sites for western purchasers.

- Collaborated with UK Consultancy in safety study (funded by UNIDO) of Hungarian chemical works, one deliverable of which was an Outline Safety Document (OSD), whose format and methodology are transferrable to other major hazard sites. The OSD is regarded as a stepping stone towards full compliance with the Seveso Directive.

- Arranged and interpreted at presentation by HSE Principal Specialist Inspector (major hazards) to Hungarian Ministry of Industry and Trade on the structure and functions of the HSE, with special reference to land use planning near major hazards.

- Organised and participated in fundamental review, by UK experts, of post-incident (reactor explosion) audit of safety and environmental risks at Budapest Chemical Works (BVM). The review was on behalf of the Hungarian regulator, and its conclusions critically influenced permitting continued operation of the plant.

ASK Consultants – Partial List of Clients

Advanced Power
AEA Technology
Airedale Chemicals
Aon Risk Management
Applied Implant Technology
Arabian Industrial Fibres
Aspinwall
Augean Group
BBC
Booz-Allen
BP
Britannia Airways
British Airways
British Cocoa Mills
British Gas
Browning Ferris
Bundy International
Castle Cement
Castle Environmental
CEC DG XI/DG XII, PHARE, TACIS
Chem Systems
ChevronTexaco
City of Burnaby, BC, Canada
Coca Cola
Cory Environmental
CWA International
Dairy Crest
Dames and Moore
Davy Energy and Environmental
Deloitte and Touche
DETR
Department of Trade and Industry
DHV Netherlands
Doncaster Metropolitan Borough Council
DuPont
EBRD
Ecopetrol
Environment Agency
Energy Power Resources
ERM
ExxonMobil
General Electric
Grissan
Hampshire Waste Services
Henkel Surface Technologies
Hungarian Ministry of Industry and Trade
Intercollege, Cyprus
InterGen
International Oil Insurers
KBC Process Technology
Kelbit Bitumen
Kellogg's
Liverpool Airport
London City Airport
Mars Confectionery
Mauritius Marine Authority
Mauritius Ministry Econ Plan/Developmt
Ministry of Defence
MOL (Hungarian Oil)
Montgomery Watson
NewLincs Developments
Ove Arup
Paks Nuclear Power Plant, Hungary
Prudential Assurance
Ramboll
Resource Protection International
RPS Group
Shanks
SIGTTO
Sypol
Thames Water
TI Group
TotalFinaElf
UK Government Legal Department
UNIDO
Welsh Development Agency
West Yorkshire Waste Management
Willis Corroon
Willmott Dixon
World Bank
WorleyParsons
WRG
WSP Group
Zeneca