NO PROOF OF NO HARM
A CITIZEN SCIENCE INVESTIGATION (CSI)

Photography by Alan Bishop

EXECUTIVE SUMMARY

Social networking revealed a number of communities across the UK experiencing similar health issues living near waste wood recycling and processing plants. Symptoms include respiratory problems such as nasal septum erosion, nosebleeds, rhinitis, chest infections, sore and runny eyes and nose, sore throats, headaches and fatigue. More recently, concerns have been raised about Alzheimer's/Dementia and cancer incidences. Documentation shows complaints of dust emissions in residential areas since 1996, as well as a Site of Special Scientific Interest.

Since wood dust was classified as a Group 1 carcinogen by the International Agency for the Research on Cancer (IARC) for the World Health Organisation in 1995 and the majority of waste wood is contaminated (Defra 2008), these communities have raised concerns to the regulators and health authorities, but feel they have been ignored. Critically, no health pollution concentration tests have been done in the Summer when conditions are at their worst.

Wood dust is classed as a carcinogenic health hazard for employees, who are protected by a Workplace Exposure Limit of 5mg/m3 over an 8 hour day under HSE legislation. However, it is only tested on the basis of being (classed as) a nuisance to residents, using tests which do not reveal the level of concentration in the breathable air.

To bridge this critical **gap in evidence** and available data, and in the interest of the public, a Citizen Science Investigation (CSI) was instigated to research the waste wood industry to ascertain community impact, and undertake independent dust residential exposure tests in affected communities across the UK. However, research led to examining exposures to industry workers following information which came to light.

The '*nuisance only'* dust tests that were undertaken by the Environment Agency and local authorities did however reveal residents' exposure to hazardous substances such as aluminium, barium, boron, cadmium, calcium, chromium, copper, iron, lead, lithium, magnesium, manganese, nickel, potassium, sodium, strontium and zinc. Samples also contained brick coloured dust, carbonaceous material, crystalline, fine particles, foam, glass pieces, lignin, metal fragments, mica, paint chips, plastic, phloroglucinol, quartz, rubber, textile fibres, vegetable matter and very large amounts of sawdust like particles.

Independent dust samples were tested for aluminium, arsenic, cadmium, chromium, copper, formaldehyde, lead, magnesium, sulphates, wood and zinc. Samples also contained barium, calcium carbon, cerium, chloride, flouride, flyash, gypsum, iron, lanthanum, limestone, manganese, phosphorus, potassium, silica & silica sand, sodium, sulphates and titanium.

A study of 4 wood recycling plants undertaken in 2011 by the HSL, Health & Safety Laboratories, measured 27 exposures ranging from 0.23 to 150mg/m3, up to 30 times the workplace exposure limit. Concerns were raised about activities generating significant amounts of airborne wood dust, with a risk to other sites in close proximity (ie: residents, businesses or schools and local environments). The study also revealed a '*scarcity of data'* and '*substantial deficiencies'* in the control of substances hazardous to health (COSHH).
This scarcity of data held by the authorities, coupled with our own findings of even less data for residents, reflects and confirms the evidence gap referred to above.

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Disclaimer

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ABBREVIATIONS

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DEFRA	-	Department of Environment and Rural Affairs
EA	-	Environment Agency
FOI	-	Freedom Of Information
HPA	-	Health Protection Agency
HSE	-	Health & Safety Executive
HSL	-	Health & Safety Laboratory
IARC	-	International Agency for the Research on Cancer
ICP-OES	-	Inductively Coupled Plasma - Optical Emission Spectroscopy
MEAG	-	Mossley Environmental Action Group
PCT	-	Primary Care Trust
SEM	-	Scanning Electron Microscope
WRA	-	Wood Recyclers Association
WRAP	-	Waste & Resources Action Programme

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1. INTRODUCTION

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What instigated this CSI – Citizen Science Investigation?

Communities across the UK have complained about dust emissions in and around their homes from waste wood recycling* and processing as far back as 1996 (**a**). In desperation at the lack of effective action by the authorities, these people turned to the media to draw attention to their concerns. This in turn led to widespread social networking, which has revealed members of several communities across the UK experiencing similar respiratory problems including nasal septum erosion, nosebleeds, irritated or runny nose (Rhinitis) and chest infections, sore and stinging eyes, headaches, fatigue and sore throats. These people are now collectively seeking answers to questions such as:

Q. Are current regulations failing to protect the health of communities?
Q. Is there a connection between reported illnesses and waste wood emissions?
Q. Are resident's concerns justified?
Q. Is there 'no proof of harm' or '*no proof of no harm*'?

This **CSI** has been undertaken in the public's interest as an avenue of awareness and education about wood dust and waste wood recycling and processing and was inspired by *The White House initiative – 'Champions of Change' (1).* It offers an insight into the industry by collating regulatory dust reports and studies (**b**) and information readily available on the internet. This CSI also presents collaborative research and publishes the results of independent dust testing in communities across the UK (**c**), who believe that ongoing concerns for their health and wellbeing continue to be ignored by the regulators and health advisors.

***Recycled waste wood is chipped/processed for the production of animal bedding, panel board manufacturing and industrial and commercial applications amongst other uses. However, waste wood converted to Bioenergy to generate electricity, hot water or other forms of energy, is NOT recycling, it is a RECOVERY process, which is below recycling in the waste hierarchy. For the purpose of this document, the term recycling, chipping or processing, is used having regards for (to refer to) all wood processing activities within the legislation.**
https://www.gov.uk/waste-legislation-and-regulations

(a) All complaints, including resident's 7 year diary (1999 – 2006) are held at Tameside MBC
(b) Govt monitoring results, technical guidance documents and studies examined are held with the EA
(c) Full independent dust results are presented separately online @ *www.breathecleanairgroup.co.uk*

1. Seeking Outstanding 'Open Science '- Champions of Change.
http://www.whitehouse.gov/blog/2013/05/07/seeking-outstanding-open-science-champions-change

2. WHAT IS WASTE WOOD?

© Photography by Alan Bishop

Waste wood is recovered wood largely generated from demolition and construction sources and '*commonly contains chemically treated wood*' according to the Wood Recyclers Association (2). The UK generates around 4.5 million tonnes of waste wood per year and *'recycling'* has increased from less than 4% in 1996 to more than 60% in 2011 (3)**.** However, the term recycling is misleading in this context, since it wrongly includes burning wood for energy. Rises in landfill and haulage costs have been a key factor in the continuing growth of the waste wood 'recycling' industry.

An example of a major waste wood generating source was the preparation of the *London Olympic Games,* which included the redevelopment of the 490 acre Olympic Park, constructed on a former industrial site (4).
In 2003, it was reported that upwards of 65% of recovered wood was made up of panel board material/ wood composite boards (5).
Defra's report '*Wood waste: A short review of recent research,* July 2012 (6), quotes the Waste & Resources Action Programme (WRAP 2011) declaring that construction and demolition activities accounted for approximately 50% of waste wood arisings, based on 2011 figures (6). The report lists the panel board sector as the largest end market use of waste wood. However, this changed in 2012, when, for the first time, bioenergy accounted for the majority of UK waste wood use when exports are included*.

**** Materials Recycling World – Biomass overtakes panel boards, says The Wood Recyclers' Association (May 2013)***
http://www.mrw.co.uk/news/biomass-boost-for-wood-recyclers/8647933.article

BSI PAS 111: 2012 *'Specification for the requirements and test methods for processing waste* wood' (*WRAP 2012*) (7) was commissioned by WRAP in association with the WRA – Wood Recyclers Association and the British Standards Institute (BSI) as a definitive industry guide to waste wood classification**.** The Environment Agency (EA) are amongst several other organizations accredited as being instrumental in the development of PAS 111, described as a confidence boosting specification for waste wood and is the first of its kind for the industry.

With the help of PAS 111 we are now aware of the following:

Waste wood *is derived from 3 main sources*

Construction & Demolition (C&D)

Commercial & Industrial (C&I)

Municipal Solid Waste (MSW)

There are ***4*** *categories for waste wood, developed by the WRA - Wood Recyclers Association:*

Grade A - *Clean recycled wood (includes scrap pallets/cable drums/packaging waste)*

Grade B - *Industrial feedstock (MDF /chipboard/panel products- may contain building and demolition materials)*

Grade C - *Fuel (Biomass & others) – (high content of panel products/chipboard/MDF/plywood/OSB and fibreboard)*

Grade D - *Hazardous waste (fencing/transmission poles/ railway sleepers/ CCA treatments and creosote)*

- *Only grade A waste should be used and tested for animal bedding*
- *There are over 30 contaminants that could be present in waste wood including: Oil, tar, cardboard, plastic bottles, rubber and silicone, ferrous and non- ferrous metals, aggregate, rubble, bricks, grit, glass, plasterboard and textiles.*
- *High levels of moisture (in the waste) can lead to rapid deterioration and accelerate moulds and pathogens*
- *Hazardous waste contains Creosote or CCA (Chromated Copper Arsenate) treated wood.*
- *Most types of wood preservatives cannot be identified by visual inspection*
- *Some waste woods will contain unacceptable chemical compounds detrimental to end of use*
- *Chemical testing for invisible contaminants is 'unlikely' to be practical for wood processors at the present time*
- *Current technology does not make the testing of recycled material 'commercially viable'*

- *Older chemically treated woods will continue to exist within the recycling stream for years to come, particularly when recovered from civic amenities*

The main contaminants in treated wood are *(pg.19):

- *Arsenic, Cadmium, Chromium, Copper, Flourine, Chlorine, Lead, Mercury, Nickel, Zinc*
- *The upper limit for chemical contamination for each end use in panel board manufacture is Arsenic 25 mg/kg, Chromium 25mg/kg and Copper40mg/kg*
- *The combined upper limit for all of the above is 4000mg/kg*

*** (These figures vary for other end uses)**

The need for detection of chemical contaminants in waste wood was recognised in 2004, with trials for the development of techniques to identify contaminated wood at source (8).
Another WRAP document, *'Guidance on separating wood for recycling at* source' *(2005)*, sets out how the contaminants in waste wood can impact on the end product as well as the effects on the wood recycling machinery (9).
In the government report '*Waste wood as a Biomass Fuel' (April 2008*), Defra states that the majority of waste wood is too contaminated for recycling applications and is being diverted from landfill (10). Instead, waste wood, an '*overlooked resource',* is being converted to Biomass fuel or 'renewable energy' for biomass incinerators and converted to electricity to '*keep the lights on'*.
A report outlining the UK and Global impact of the rapidly expanding Biomass industry, *'Biomass – Chain of Destruction'*, is available at http://www.biofuelwatch.org.uk/?s=chain+of+destruction

The latest press release from the EU Commission (02 July 2014), outlines plans for an increase in municipal and packaging waste, with a ban on '*burying recyclable waste in landfill as of 2025' (11).*

Waste wood is widely used by panel board and chipboard manufacturers, and although only Grade A clean wood *should* be used to produce animal bedding, the Environment Agency reported in 2013 that contaminated treated waste wood (Grades B and C) has been shredded and marketed for animal bedding, creating a risk to livestock and the environment (12). Animal bedding was studied for waste wood contaminants in Japan as far back as 2004 (13).

Q. So what ARE the risks to livestock and the environment from contaminated animal bedding?
Q. What are the risks to humans?

The waste recycling industry per se is reputed to be '*heavily regulated'*, however this is questionable when numerous communities have had to resort to taking private legal action against waste companies (14). In addition, there is reportedly on average a fire every day in the recycling industry (15), yet the Wood Recyclers' Association were keen to publish their own fire storage guidelines (16). New fire control guidance for waste operators was drafted 27th June, 2014 (17).

(Online references 1 - 17 last accessed 22 Aug 2014)

2. Biomass: The Chain of Destruction
http://www.biofuelwatch.org.uk/2013/chain-of-destruction/
3. Wood Recyclers' Association - Intro
http://www.woodrecyclers.org/recycleintro.php
4. 2012 Summer Olympics
http://en.wikipedia.org/wiki/2012_Summer_Olympics
5. WRAP (Nov 2003) - Wood waste recycling in furniture manufacturing – a good practice
http://www2.wrap.org.uk/downloads/CompleteFurn.57821431.320.pdf
6. DEFRA (July 2012) - Wood waste: A short review of recent research
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82571/consult-wood-waste-researchreview-20120731.pdf
7. BSI PAS 111: 2012 Specification for the requirements and test methods for processing waste wood
http://www.wrap.org.uk/content/bsi-pas-111-processing-wood-waste
8. WRAP (2005) - Development of colour indicator techniques to detect chemical contamination in wood waste for recycling
http://www.wrap.org.uk/sites/files/wrap/WOO0034Final_Report21_June2005.1844.pdf
9. WRAP - Guidance on separating wood for recycling at source
http://www.wrap.org.uk/sites/files/wrap/Guidance%20on%20separating%20wood%20for%20recycling%20at%20source.pdf
10. DEFRA (2008) –Waste wood as Biomass Fuel
http://archive.defra.gov.uk/environment/waste/topics/documents/wastewood-biomass.pdf
11. European Commission - IP/14/763 (02 July 2014)
Environment: Higher recycling targets to drive transition to a Circular Economy with new jobs and sustainable growth
http://europa.eu/rapid/press-release_IP-14-763_en.htm
12. letsrecycle.com (June 2013) - Warning over using dirty wood in animal bedding
http://www.letsrecycle.com/news/latest-news/wood/warning-over-using-dirty-wood-in-animal-bedding
13. Asari et al 2004 Jul;30(5):639-49.[online] Environ Int.
Waste wood recycling as animal bedding and development of bio-monitoring tool using the CALUX assay
http://www.ncbi.nlm.nih.gov/pubmed/15051240
14. Hugh James Solicitors – Current environmental cases
http://www.hughjames.com/service/environmental-solicitors/environmental-group-actions/current-cases/
15. FireVu Video Smoke Detection (April 2014) – Waste management fire statistics are up for 2013
http://www.firevu.co.uk/waste-management-fires-statistics-are-up-for-2013/
16. WRA (March 2014) – WRA eager to publish fire storage guidance
http://www.letsrecycle.com/news/latest-news/wood/wra-eager-to-publish-fire-storage-guidance
17. letsrecyclce.com - Fire guidance suggests bale separation distances
http://www.letsrecycle.com/news/latest-news/waste-management/fire-guidance-suggests-bale-separation-distances

3. CONTAMINANTS IN WASTE WOOD

Waste wood contains contaminated treated wood (Grades B & C). Other contaminants include heavy metals and metalloids such as aluminium, arsenic, cadmium, chromium, copper, lead and nickel, as well as brick dust, grit, plastics, glass, paint flakes, textile fibres, rubber, silicone, oil and tar. Many of these contaminants are carcinogenic and hazardous to health. Furthermore, there is acknowledgement that CCA (Copper Chromium, Arsenate) - a banned wood preservative, and creosote treated waste wood which is hard to detect, is likely to be present in the waste wood stream for many years to come as outlined in PAS 111.

Classification of carcinogens:

- *Group 1: The agent is carcinogenic to humans*
- *Group 2A: probably carcinogenic to humans*
- *Group 2B: possibly carcinogenic to humans*
- *Group 3: The agent is not classifiable as to its carcinogenicity to humans*
- *Group 4: The agent is probably not carcinogenic to humans*

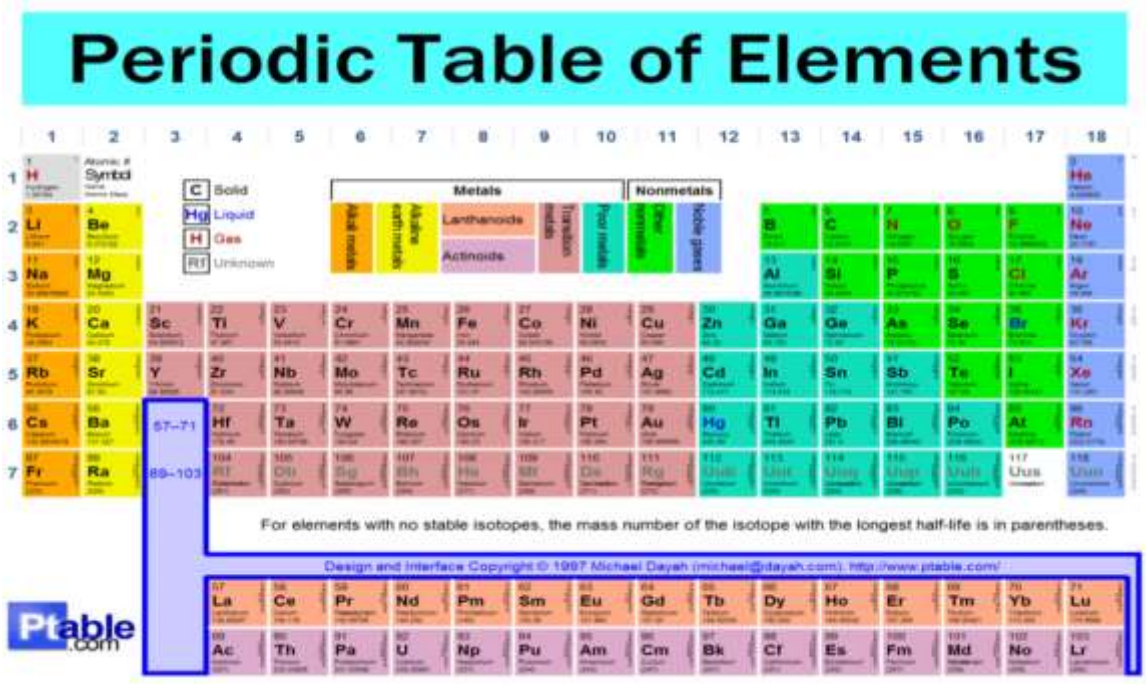
The IARC –International Agency for the Research on Cancer, has classified the following waste wood contaminants as carcinogenic: (18/19)

Group 1

Aluminium, arsenic, asbestos, cadmium, chromium VI, formaldehyde, nickel

Groups 2 & 3

Chromium III, creosote, copper, lead, mercury



Ferrous and non-ferrous metals

In essence ferrous metals contain iron and non-ferrous metals do not (21).

Ferrous metals include, and are composed of:

Mild steel	-	*low carbon, high Iron*
Carbon steel	-	*low carbon – high Iron*
Stainless steel	-	*Iron, nickel and chromium*
Cast iron	-	*low carbon, high Iron*
Wrought iron	-	*100% Iron*

Non-ferrous metals include and are composed of:

Aluminium	-	*an alloy of aluminium, copper and manganese*
Copper	-	*100% copper*
Brass	-	*copper and zinc (averages 35% and 65%)*
Silver	-	*natural substance (mixed with copper creates sterling silver)*
Lead	-	*natural substance*

'Heavy metals exhibit very long biological half-lives and are toxic at very low doses'. National Institute of Environmental Health - (Assessing Cumulative Health Risks from ***Exposure to Environmental Mixtures – Sexton et al, May 2007 115(5)***
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1867955/

Glass is made by the mixing of raw materials such as sand and limestone (21).

Table to show Chemical Composition of Glass		
Silica (SiO2)	-	*72%*
Iron Oxide (Fe2O3)	-	*0.08%*
Alumina (AL2O3)	-	*0.75%*
Magnesium Oxide	-	*2.50%*
Sodium Oxide	-	*14.50%*
Potassium Oxide	-	*0.50%*
Sulphur Trioxide	-	*0.25%*
Calcium Oxide (CaO)	-	*7.50%*

Some of the chemicals in waste wood are considered potential endocrine disrupters, meaning they interfere with hormone production or activity and health effects can range from mild to serious. Amongst the recognised chemicals are arsenic, cadmium, lead, mercury and zinc (22).

CCA – Chromium Copper Arsenate was developed in 1933 and is the most widely used wood preservative in the world (23). Until a partial ban in 2004, CCA, which is mostly derived from the demolition and construction sector, was reported as being the most popular wood preservative in the UK, due to its ability to prolong the service life of wood by 20 – 50 years. However, due to concerns relating to the chemical component of CCA on both human health and the environment, new legislation was introduced to ensure safe disposal in Hazardous Waste Landfills (24).

Chromium VI is used as a wood preservative (25). Desktop research of *chromium + nasal erosion,* found a study of workers diagnosed with nasal ulceration, which reported exposure periods of less than a month. (26)
Long-term health effects of exposure to chromium (VI) include perforations and ulcerations of the septum, bronchitis, decreased pulmonary function, and pneumonia. Other symptoms are asthma, nasal itching and soreness, and it can also affect the liver, kidneys and autoimmune system. (27/28)

Formaldehyde is a known carcinogen and common contaminant in the waste wood stream. Urea formaldehyde (UF), Melamine Urea formaldehyde (MUF) and Phenol-formaldehyde resins, are used in the production of particleboards and furniture (29). Exposure to Formaldehyde can cause allergic reactions such as nasal, eye and throat irritation (30).

MDF – Medium Density Fibreboard - Formaldehyde is also used in the manufacture of MDF (31). Research led us to a study '*Exposure to and acute effects of medium-density fiber board dust'* (Priha *et al* 2004), from the Finnish Institute of Occupational health (32). The online abstract states:
*'several workers exposed to the MDF dusts experienced nasal, eye, and skin symptoms at the end of a work shift. Both exposed groups had significantly more nasal symptoms, although the median dust level was only 1.2 mg/m3, considerably less than the occupational exposure limit for wood dust in Finland. Nasal symptoms were more frequent among workers exposed to MDF board dust and did not correlate with smoking. Our results suggest that the occupational exposure limit of 5 mg/m3 is probably too high for MDF board dust***.'**

We searched *plywood + nosebleeds* and was taken to the HSE's Toxic woods web page (33).
A web search for *plasterboard + nasal irritation* produced a Material Safety Data Sheet (MSDS) containing 95% Calcium Sulphate Dihydrate, aka Gypsum (34). We then searched for Calcium Sulphate Dihydrate and was led to an MSDS containing <5% Crystalline Silica, which says exposure can cause eye, skin, nose, throat, and upper respiratory irritation. It also states that crystalline silica is a carcinogen (35).
Another MSDS says Gypsum can cause nosebleeds as well as eye, skin and respiratory irritations and nosebleeds (36). Nosebleeds or Epistaxis, can be caused by environmental factors as well as trauma and other medical conditions (37).

(Online references 18 - 28 last accessed 22 Aug 2014)

18. IARC - Agents Classified by the IARC Monographs Volume 1-110
http://monographs.iarc.fr/ENG/Classification/ClassificationsAlphaOrder.pdf
19. Cancer.org - Known and probable human carcinogens Introduction
http://www.cancer.org/cancer/cancercauses/othercarcinogens/generalinformationaboutcarcinogens/known-and-probable-human-carcinogens
20. Castle metals-Ferrous & Non-Ferrous Metals and their Uses
http://www.castlemetalsuk.com/blog/ferrous-nonferrous-metals-uses/
21. All about glass
http://www.pfg.co.za/all-about-glass.aspx
22. Georgescu et al (2011), 44(2) - Heavy Metals Acting as Endocrine Disrupters
http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CC4QFjAB&url=http%3A%2F%2Fspasb.ro%2Findex.php%2Fspasb%2Farticle%2Fdownload%2F556%2F513&ei=wKnXU67HObKf7AbemIGoAw&usg=AFQjCNHxknqfnMPywxJWxRBNl3I7pGqMxw&sig2=YkIsut2lgoqee7dfqr1HIA&bvm=bv.71778758,d.ZGU
23. Chromated copper arsenate
http://en.wikipedia.org/wiki/Chromated_copper_arsenate
23. EPA - Chromium Compounds - Hazard Summary - Created in April 1992; Revised in January 2000
http://www.epa.gov/ttnatw01/hlthef/chromium.html
23. HPA (2007) - Chromium General Information
http://www.hpa.org.uk/webc/hpawebfile/hpaweb_c/1194947365800
24. Mercer and Frostick - Leaching characteristics of CCA- treated wood waste: A UK study 2012
http://www.academia.edu/1255997/Leaching_characteristics_of_CCA-treated_wood_waste_A_UK_study
25. Chromium
http://en.wikipedia.org/wiki/Chromium#Wood_preservative
26. ATSDR Chromium Toxicity – What Are the Physiological Effects of Chromium Exposure (CE Original Date: December 18, 2008) http://www.atsdr.cdc.gov/csem/csem.asp?csem=10&po=10
27. Geiger and Cooper, (2010) online - Overview of Airborne Metals Regulations, Exposure Limits, Health Effects, and Contemporary Research
http://cooperenvironmental.com/wp-content/uploads/2013/02/Airborne-Metals-Health-Effects-120910.pdf
28. Harkema et al (2006), 34(3)252-69 online The Nose revisited: A brief Review of The Comparative Structure, Function, and Toxicological Pathology of the Nasal epithelium
http://www.ncbi.nlm.nih.gov/pubmed/16698724

(Online references 29 - 37 last accessed on 22 Aug 2014)

29. Wood based panels International (2012) - Monitoring the air in our environment
http://www.wbpionline.com/features/monitoring-the-air-in-our-environment
30. Environmental Health & Safety Iowa State University (1999) - Formaldehyde Awareness Training Booklet
http://www.ehs.iastate.edu/publications/manuals/formaldehyde.pdf
31. HSE - Medium Density Fibreboard (MDF)
http://www.hse.gov.uk/woodworking/faq-mdf.htm
32. Priha et al (2004) Nov;1(11):738-44 (online) J Occup Environ Hyg.- Exposure to and acute effects of medium-density fiber board dust (Finnish Institute of Occupational Health, Tampere, Finland.)
http://www.ncbi.nlm.nih.gov/pubmed/15673094
33. HSE - Toxic woods
http://www.hse.gov.uk/pubns/wis30.pdf

34. BGC Plasterboard – Material Safety Data Sheet
http://www.bgc.com.au/plasterboard/media/pdf/msds/interior.msds.pdf
35. Michigan Gypsum - MATERIAL SAFETY DATA SHEET 2007 - Gypsum (Calcium Sulfate Dihydrate)
http://www.ncmissouri.edu/hea/barton_epaosha/Gypsum%20Calcium%20Sulfate%20msds.pdf
36. Calcium Sulphate Dihydrate Manufacturers, MSDS Sheet
http://www.mubychem.com/MSDS/Calcium_sulfate%20MSDS.htm
37. Nosebleed
http://en.wikipedia.org/wiki/Nosebleed

4. TOXIC OR NON-HAZARDOUS?

© Google
https://www.google.co.uk/search?q=warning+signs+toxic&source=lnms&tbm=isch&sa=X&ei=uDXzU7XxLebG7AbPp4HwBA&ved=0CAYQ_AUoAQ&biw=1051&bi=458

Definitions:
Toxic – a substance that is poisonous if swallowed or breathed in. It may even go through the skin.
https://hwb.wales.gov.uk/cms/hwbcontent/Shared%20Documents/vtc/ngfl/science/103_new/asc1/hazardsymbol.htm
Non – hazardous - A risk not involving the ordinary or average hazard of its class, or a risk free of the average hazards of all classes of risk.
http://www.ibc.ca/en/need_more_info/glossary/n.asp

Grades A, B & C of waste wood are classed as non-hazardous, however wood dust is toxic (HSE) and therefore a hazard as well as a group 1 carcinogen (IARC). Plus waste wood contains other toxic contaminants such as arsenic, cadmium and lead. A point of interest is that waste wood treated

with creosote, a Grade 2 carcinogen in waste wood Group D, is classed as *hazardous* waste **above** '*non-hazardous'* Groups B & C which contain aluminium, arsenic, cadmium, chromium VI, formaldehyde and nickel, all Group 1 carcinogens as per IARC Monographs. As trees act as filters for air pollution, if allowed to grow in these days of the biomass boom, it means that virgin wood *could* contain significant levels of toxic elements.

We researched '***Is wood dust toxic?***' and the first link was the HSE Toxic woods WIS30 website. Another link *'Wood Allergies and Toxicity'* said '*all inhaled wood dust is hazardous to your long-term health'.* ***Wood Database (blog)*** - *http://www.wood-database.com/wood-articles/wood-allergies-and-toxicity/*

The Canadian Centre for Occupational Health and Safety (2009) outlines the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which states online:
'The GHS system has set up a method for classifying toxic and very toxic materials using the following health hazard classes':

- *acute toxicity (e.g. LD_{50}, LC_{50})*
- *skin irritation/corrosion*
- *serious eye damage/eye irritation*
- *respiratory or skin sensitization*
- *mutagens (material known or suspected to cause changes to cells)*
- *carcinogens (material known or suspected to cause cancer)*
- *reproductive toxicity (material known or suspected to cause a negative impact on reproductive functions (male or female) or on a developing fetus)*
- *specific target organ toxicity - single exposure (materials that produce an adverse effect on one or more organ systems in the body after a single exposure)*
- *specific target organ toxicity - repeated exposure (materials that produce an adverse effect on one or more organ systems in the body after repeated exposure)*
- *aspiration hazard (a liquid or solid material that may enter the body's respiratory system directly through the nose or mouth)*
- *chemical mixtures*

The Canadian Centre for Occupational Health and Safety – Globally Harmonized System (GHS)
http://www.ccohs.ca/oshanswers/chemicals/ghs.html - Last updated 22 July 2014

A further link was for a firm of solicitors which says: '*Inhalation of wood chip dust can cause a flu-like condition called Organic Dust Toxic Syndrome (ODTS).* It also lists the symptoms of wood chip exposure including nosebleeds.
Simpson Millar - *http://www.simpsonmillar.co.uk/services/disease_illness/wood-chip-dust-claim.aspx*

When we searched for '*non-hazardous waste'*, we were taken to Nottingham City Council's website which states in Table 14.1

'Hazardous
Hazardous wastes are solid wastes that are toxic, ignitable, reactive or corrosive. It is also waste that may be harmful to human health or the environment.

Non-Hazardous
Non-hazardous waste means waste that is not classified as hazardous waste such as commercial/industrial waste.'
Nottingham City Council - *http://www.nottinghamcity.gov.uk/netphase2/CHttpHandler.ashx?id=23205*
We asked search engines '*what is the difference between toxic and hazardous wastes?*'
answerbag – Every Question Deserves a Great Answer *http://www.answerbag.com/q_view/1329349*
The above link says:
2) "A hazardous waste is waste that poses substantial or potential threats to public health or the environment and generally exhibits one or more of these characteristics:
- ignitable (i.e., flammable)
- oxidizing
- corrosive
- toxic
- radioactive
- explosive

We searched for *'What is a health hazard?'*
'The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins (liver toxins), nephrotoxins (kidney toxins), neurotoxins, agents that act on the hematopoietic (blood-forming) system, and agents that damage the lungs, skin, eyes, or mucous membranes'.
Environment, Health - Ernest Orlando Lawrence Berkeley National Laboratory (Safety Division)
Chemical Hygiene and Safety Plan - Definition of Hazardous Chemicals (Last updated 31/8/10)
http://www2.lbl.gov/ehs/chsp/html/hazard_eval_.shtml

Q. Why is contaminated waste wood containing carcinogens and toxins that are hazardous to health classed as non-hazardous?

NB: Research indicates that panel boards/wood composite boards are not hazardous in their primary manufactured state, however the cutting, crushing and reprocessing of boards, can generate dusts that are harmful to human health and protection is recommended by manufacturers.

5. WOOD DUST – NUISANCE OR CARCINOGEN?

Oxford Dictionary definitions:
Nuisance – a person or thing causing inconvenience or annoyance
Carcinogen – a substance capable of causing cancer in living tissue

Social networking informs us that there are GP's, physicians, nurses, opticians, teachers, firefighters, police officers, scientists, professors, demolition and construction workers, general builders and even wood workers, who are not aware that wood dust is a Group 1 carcinogen and that exposure can cause allergic reactions, respiratory illnesses and cancers.

Email from the IARC

From: *Nicolas Gaudin [mailto:GaudinN@iarc.fr]*
Sent: *25 August 2011 15:42*
To:
Cc: *COM*
Subject: *RE: Classing wood dust as a Human carcinogen in 1995.*

Dear Madam,
Wood dust was classified as a Human carcinogen at the close of an evaluation meeting which took place 11-18 October 1994. The volume of the corresponding Monograph was printed in 1995 (I would need to do more research to find out exactly when it came out). For research purposes, I would say ***October 1994****, as these results are made public immediately (before the actual printed volume is published).*

I hope this is useful.
With best regards,
Nicolas Gaudin

International Agency for Research on Cancer
World Health Organization

Dr Nicolas Gaudin
Head, Communications Group
Email: ********************
Web: ***www.iarc.fr***

The first reference to adverse health effects from wood was reportedly made in 1700 by Bernadino Ramazzi, who noted nose and eye irritation in pit sawers (loggers) and headaches in wood turners.
U.S Department of Health & Human Services (June 1987) - Health effects of exposure to wood dust
http://www.cdc.gov/niosh/docs/wooddust/pdfs/exposures-references.pdf.

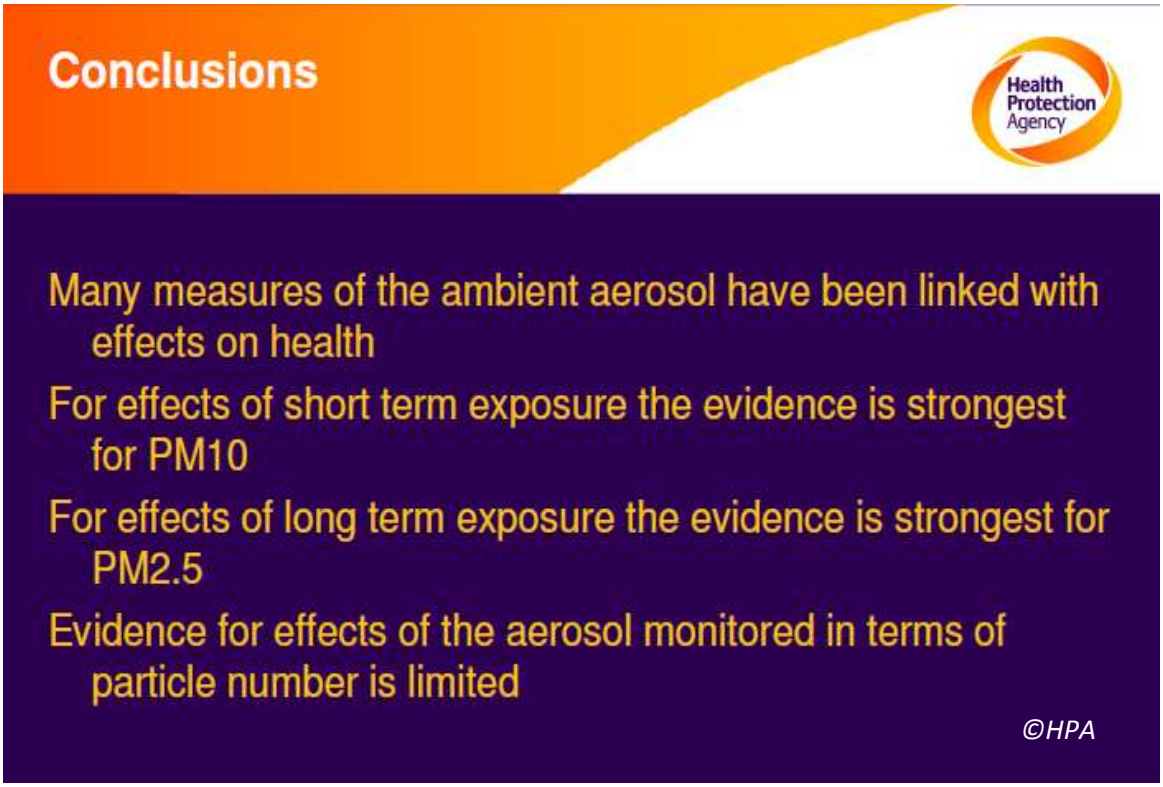
Employees in the UK are, at least on paper, protected against exposure to wood dust under HSE legislation, using a Workplace Exposure Limit or WEL of 5mg/m3 per 8 hour working shift and provided with PPE – Personal Protection Equipment (38/39). However, residents exposed to waste wood processing are not. Furthermore, the WEL of 5mg/m3 as a maximum recommended exposure for employees is calculated using 5 x 8 hour weekly shifts over 44 weeks, equating to 1760 hours a year. Local residents on the other hand, can be exposed 24/7 for 365 days, which equates up to 8760 hours a year or **4.96** times greater than employees, without protective equipment. The EA (2011), also acknowledges that the exposure to residents '***may have no recovery period between exposure sessions and exposure could be for a lifetime'*** (40).

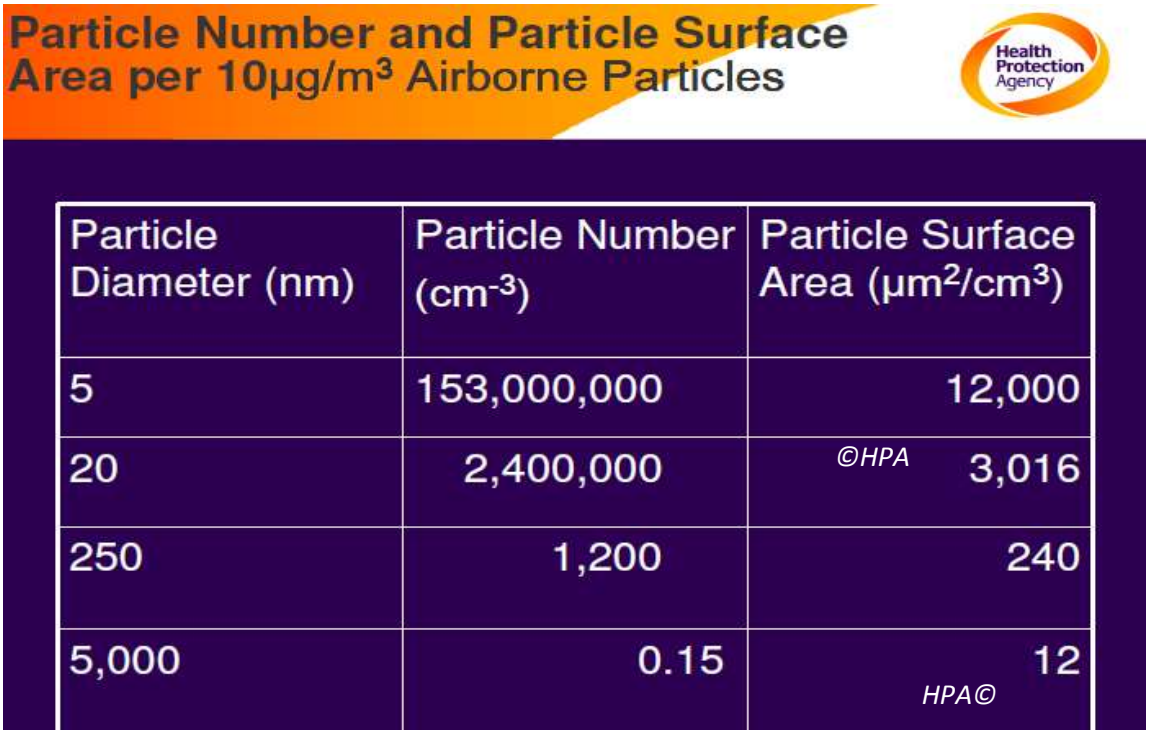
DEFRA classes wood dust as a ***nuisance*** to residents, using a 1983 BMHB (British Materials Handling Board, Schofield and Shillito) guideline of 200mg/m2/day for dust deposition (41), which since 1995 at least, contradicts the IARC classification of wood dust as a Group 1 carcinogen for the World Health Organisation (42). At the same time, the HSE, Health & Safety Executive, admits that wood dust is carcinogenic to workers, whilst Defra have no guidelines for wood dust at all, only a general one that measures surface deposition and not air concentration. It is therefore implied that wood dust is a carcinogen to workers but not local people, based on the premise that the concentration of dust emissions reaching receptors outside of a site boundary, will be less than the exposure to workers.

But is this contradicted if:

- *Fine dust particles that are more hazardous to health, travel further than the larger (more coarse) particles which fall closer to the source? (M17 Technical Guidance Note 2004)*
- *There is no known safe level of exposure to a carcinogen?*
- *There is no identification or quantification of particles to assess the level of hazard?*
- *Residents are equidistant from outdoor dust generating activities?*
- *Evidence on monitoring particle number is limited (see diagrams below)?*

Q. Does this imply that smoking at work is carcinogenic but smoking at home is not?





From PowerPoint presentation 'Particulate Matter and Particles Metric' by Professor Robert Maynard
© HPA 2010 - Metrology of Airborne Nanoparticles, Standardisation and Applications (MANSA)
http://www.npl.co.uk/events/measurement-network-event/8-9-jun-2010-mansa

Q. When is a carcinogen NOT a carcinogen ?

The TUC-Trade Union Congress (2012), states in '*Occupation Cancer A WORKPLACE GUIDE'* (pg.5): *'no safe exposure limit for any carcinogen and even levels well below the Workplace Exposure Limits can lead to some workers developing cancer'*. *http://www.tuc.org.uk/extras/occupationalcancer.pdf*

It is further recognised that it is the coarser particles which get trapped in the nasal passage and can eventually cause nasal cancer (43). And even low toxicity dusts previously viewed as a *nuisance*, can cause COPD (Chronic Obstructive Pulmonary Disease or other non-malignant respiratory disease. Current exposure limits are deemed to be 30 years out of date with suggestions they should be slashed by **75%** (44).

(Online references 38 - 44 last accessed 22 Aug 2014)

38. HSE – Wood dust – what you need to know
http://www.hse.gov.uk/woodworking/wooddust.htm
39. HSE – Wood dust controlling the risks
http://www.hse.gov.uk/pubns/wis23.pdf
40. Environment Agency - H1 Annex F 2.2. (December2011) pg.44.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/298239/geho0410bsil-e-e.pdf

41. Schofield and Shillito, Guide to the handling of dusty materials in ports: IMPACT, PREVENTION AND CONCTROL. *ASCOT, UK: British Materials Handling Board, 1983.*

42. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 62 - Wood Dust and Formaldehyde
http://monographs.iarc.fr/ENG/Monographs/vol62/volume62.pdf

43. Cherrie JW, et al - Ann Occup Hyg. 2013 Jul;57(6):685-91
Low-toxicity dusts: current exposure guidelines are not sufficiently protective
http://www.ncbi.nlm.nih.gov/m/pubmed/23835898/

44. Blog posted by John Cherrie 25 July 2013 - Low toxicity dusts still hazardous – 30 years out of date
http://johncherrie.blogspot.co.uk/2013/07/the-british-position-on-occupational.html?m=1

Peer reviewed studies such as the IARC monographs, show that long term occupational exposure to wood dusts causes nasal and sinus cancer, hence the Grade 1 status in 1995 (45).
As well as being recognised as a cancer causing agent, exposure to wood dust can induce allergic reactions and respiratory problems. On the HSE website under *'Toxic woods'*, the HSE offers information on the ill health effects and symptoms associated to wood dust exposure which include asthma, nosebleeds, rhinitis (runny nose), lung disease and cancer (46).
Elsewhere, there are a number of reports and studies available relating to wood dust exposure and cancers for workers. Desktop research of '*wood dust + colorectal cancer*' for instance, found a report on the disease in young men which declared an excess risk was '*strongest for wood and metal dusts' (Peters et al 1989) (47).*
A similar search was applied to *wood dust + Hodgkin's disease*, prostate and other cancers (48/49).

' Epidemiology & Biostatistics, Community Health Sciences, Aga Khan University, Karachi (Mirza,S. *online abstract ref: June 2010*) (50), states:
'RESULTS: *Wood workers are exposed to wood dust, fungi, bacteria, endotoxins, formaldehyde, phenol and various injuries in their working environment. This leads to impaired pulmonary functions; non-cancerous respiratory diseases like rhinitis, chronic bronchitis, hypersensitivity pneumonitis; occupational cancers like sinonasal cancer, laryngeal carcinoma, lung cancer, mesothelioma, Hodgkin's disease, bladder cancer, skin cancer, prostate and brain cancer. This can be prevented by decreasing exposure to wood fumes in air by proper ventilation and decreasing work hours by increasing shifts, personal protective equipment and regular nasal lavage.*
CONCLUSION: *Wood workers are exposed to various biohazards at their work place which increases risk of occupational diseases which can be prevented by provision of healthy work environment'.*

5.1 Silica

The effects of dusts containing silica have been documented for over 50 years:
The Fate of Siliceous Dust in the Body - Holt, P.F. BrJ.In.Med. Jan 1950: 7(1)
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1036253/

More than **0.5%** silica in wood is harmful to cutting tools, (*Pettersen R.C, pg. 74 online ref*) (51).

A peer reviewed study *'THE IMPORTANCE OF EXTRACTIVES AND ABRASIVIES IN WOOD MATERIALS ON THE WEARING OF CUTTING TOOLS' (Darmawan et al, 2012),* showed that the silica content in wood can

prematurely blunt steel and tungsten carbide woodworking tools. Wood composite boards such as MDF, wood cement board, OSB (Oriented Strand Board) and particle board, which are abundant in the waste wood stream, are reported to contain silica, with wood cement board having the highest content. The cutting edge of the '*bits*' were dulled at a faster rate by the silica in wood cement boards, particles boards and Tapi-Tapi wood, than with MDF and OSB (52).

Silica in wood - A tangential longitudinal view of a walnut wood block showing silica particles in the rays

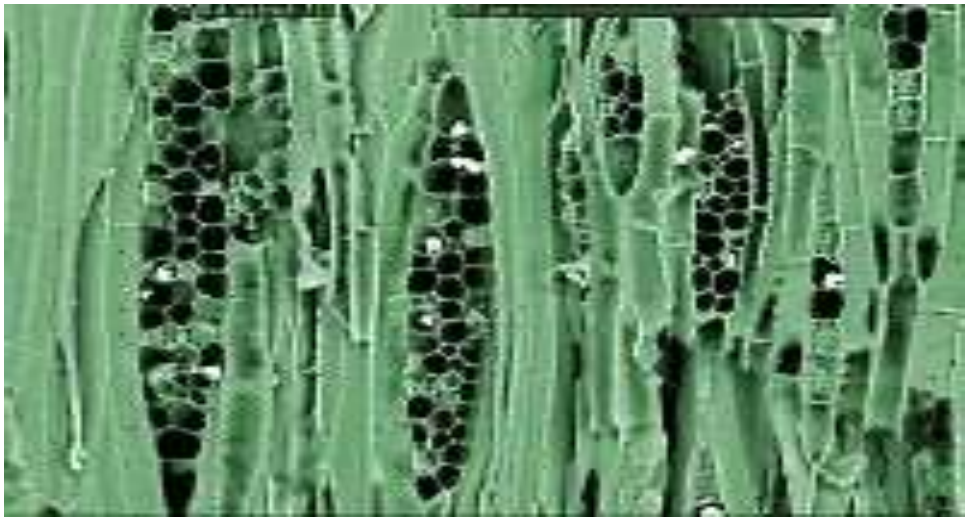


Image © 'A Tale of Three Timbers' ScienceWise - Jul/Aug 2007
http://sciencewise.anu.edu.au/articles/timbers

The UK imports much of its panel boards from Brazil, China, Malaysia and Uruguay, Brazil being the major supplier with 40% of the market share based on 2011 figures (53). A study published online in 2012 by *Santana et al*, analysed 36 species of Brazilian wood and found silica in 12 species ranging from **0.07 to 1.6%** (54). High silica content gives teak wood its unique non-skid properties, making it the number one choice for yachts and ship builders (55).
The authors of *'Pneumoconiosis and exposure to wood' (Bergiot et al, 1997),* report on silica particles found in the lungs of an employee in the wood processing industry using corupixa, a Brazilian wood, which contained **0.1%** of crystalline silica in the fresh wood dust.
Pneumconiosis and exposure to wood – Berthiot et al - Rev Mal Respir. 1997 Dec;14(6):
http://www.ncbi.nlm.nih.gov/m/pubmed/9496609/

Q. If just 0.5% of silica can blunt industrial cutting tools, what harm could exposure to hundreds of thousands of tonnes of recycled waste wood dusts containing as much as 3 times that level of silica do?

Desktop research of *Respirable Crystalline Silica + wood products* revealed SiO2 Crystalline silica powder is used in wood treatments, as a wood and metal primer and also in glassmaking (56).

Darley & Associates, energy from waste consultants, lists some waste wood recycling and processing companies as recyclers of demolition and construction (57). As waste wood is derived in part from demolition & construction waste, this prompted research of this sector.

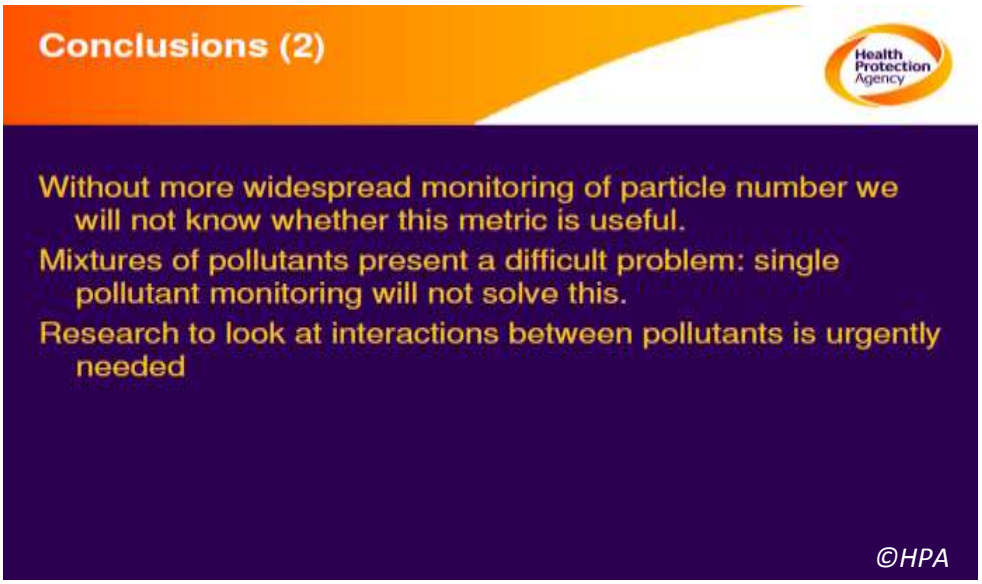
This image taken from the HSE fact sheet '*DUST - What is Construction Dust*'?', draws comparison between the one pence piece and the WEL for silica. The HSE states that '*when all controls are applied properly, less than 0.1 mg/m3 RCS is usually achievable (based on an 8-hour time-weighted average).'*

© Image shows the 'maximum' amount of silica you can breathe when averaged over a normal working day - *HSE - http://www.hse.gov.uk/construction/faq-dust.htm*

The Australian Council of Trade Unions report '*Inquiry into workplace exposure to toxic dust' (pg.5) (58)*, acknowledges:-

'*There is no safe level of exposure to carcinogens, occupational and public exposure must be reduced as far as is possible. Based on the adverse health consequences of acute and/or chronic exposure to crystalline silica – it is imperative that public and occupational exposures are kept as low as is possible.'*

Our research was unable to find any studies which have looked at waste wood dust emissions as '*mixed pollutants'* when combined with fungicides, paints and varnishes, solvents and heavy metals, some of which are also carcinogenic with '*no known safe level'* of exposure. Concerns of mixed pollutants were shared by the HPA in 2010 at a two day conference *'Metrology of Airborne Nanoparticles, Standardisation and Applications (MANSA, 2010)*, which suggests '*urgent research is required'*. Reference again to Professor Maynard's PowerPoint presentation (2010) :



© HPA 2010 - Metrology of Airborne Nanoparticles, Standardisation and Applications (MANSA)
http://www.npl.co.uk/events/measurement-network-event/8-9-jun-2010-mansa

Late online research revealed an abstract from 1997, which outlines that air quality standards ***should*** be health based. It says that setting standards for genotoxic carcinogens in ambient air are problematic to regulators, and that inaccuracy is suspected in predicting the health effects of low level exposure.

Maynard. R.L et al. Regulatory Toxicology and Pharmacology, Volume 26, Issue 1, Pages S60-S70
Setting Air Quality Standards for Carcinogens: An Alternative to Mathematical Quantitative Risk Assessment—Discussion Paper
http://linkinghub.elsevier.com/retrieve/pii/S0273230097911405?showall=true

'Widespread exposure to multiple pollutants and chemicals and concerns about long-term damage to human health, together imply the need for more integral and precautionary approaches'.
***EEA** – Environment and Human Health 2013*
http://www.eea.europa.eu/publications/environment-and-human-health

A very recent publication questions the safety of *'Mixtures of Chemical Pollutants At European Legislation Safety Concentrations: How Safe are They? (Carvalho et al, 2014) (59). The results of* experiments highlighted *'the need of precautionary actions on the assessment of chemical mixtures even in cases where individual toxicants are present at seemingly harmless concentrations'.*

(Online references 45 - 54 last accessed 22 Aug 2014)

45. IARC Monographs, volume 62
http://monographs.iarc.fr/ENG/Monographs/vol62/mono62-6B.pdf
46. HSE – Toxic Woods
http://www.hse.gov.uk/pubns/wis30.pdf
47. Peters et al (1989) A case-control study of occupational and dietary factors in colorectal cancer in young men by subsite.
http://www.ncbi.nlm.nih.gov/pubmed/2766308
48. Thomas et al (2006 revised) - Ohio State University Extention, Food, Agricultural and Biological Engineering- Wood dust exposure hazards.
http://ohioline.osu.edu/aex-fact/0595_1.html
49. Stellman et al (1998), Cancer mortality and wood dust exposure among participants in the American Cancer Society Cancer Prevention Study-II (CPS-II).
http://www.ncbi.nlm.nih.gov/pubmed/9698991
50. SHIRIN MIRZA, MBBS; Epidemiology & Biostatistics, Community Health Sciences, Aga Khan University, Karachi (Zagazig Journal of Occupational Health and Safety Vol. 3 No 1 June 2010 online)
Risks To The Health of Wood Workers: What Can be Done?
http://www.zjohs.eg.net/pdf/vol3no1/1.pdf
51. Roger C. Pettersen, U.S Dept of Agriculture, Forest Services, Forest Products Laboratories.
The Chemical Composition of wood, (pg.74).
http://downloads4.org/t/the-chemical-composition-of-wood-forest-products-laboratory-book-w1787/
52. Darmawan et al (2012). THE IMPORTANCE OF EXTRACTIVES AND ABRASIVIES IN WOOD MATERIALS ON THE WEARING OF CUTTING TOOLS
http://www.ncsu.edu/bioresources/BioRes_07/BioRes_07_4_4715_Darmawan_RNM_Extractives_Abrasives_Wood_Wear_Tools_3002.pdf
53. Wood based Panels International (2011) - UK panel product imports grow, solid wood declines.
http://www.wbpionline.com/news/uk-panel-product-imports-grow-solid-wood-declines

54. Santana et al (2012) - Silica content of 36 Brazilian tropical wood species
Volume 67, Issue 1, Pages 19–24, ISSN (Published online 2012)
http://www.degruyter.com/view/j/hfsg.2013.67.issue-1/hf-2011-0240/hf-2011-0240.xml

(Online references 55 - 59 last accessed 22 Aug 2014)

55. Crown-Teak
http://www.crown-teak.com/teak-decking
56. READE ® Silica Powder (SiO2), Crystalline from READE
http://www.reade.com/products/35-oxides-metallic-powders/10024-crystalline-silicon-dioxide-quartz-tridymite-cristobalite-quartz-flint-chert-tripoli-sand-silica-dioxide-powder-silicon-dioxide-crystalline-silica-microcrystalline-silica-soft-silica-precipitated-silica-colloidal-silica-silica-dispersion-cas14808-60-7
57. Darley & Associates
http://www.energyfromwaste.com/clients.shtml
58. Australian Council of Trade Unions - Submission to the Senate Community Affairs Committee: Inquiry into workplace exposure to toxic dust
http://www.actu.org.au/Images/Dynamic/attachments/6463/Senate%20Inquiry%20on%20Toxic%20Dust%20050805.pdf
59. Carvalho et al (2014) - Mixtures of Chemical Pollutants at European Legislation Safety Concentrations: How Safe are They? Published by Oxford University Press on behalf of Toxicological Sciences Toxicol Sci.
http://www.ncbi.nlm.nih.gov/pubmed/24958932

6. ARE THERE ANY STUDIES ON THE HEALTH IMPACTS OF WASTE WOOD PROCESSING?

6.1 HSL – HEALTH & SAFETY LABORATORIES

The only UK report we found directly related to the wood recycling industry, was published by the HSL- Health & Safety Laboratories , '*Summary report - Occupational Hygiene implications of recyclers of wood' - Nov 2011, (60).* The HSL, *http://www.hsl.gov.uk/*, an agency of the HSE, visited 4 wood recycling plants undertaking dust sampling and observations of processing and dust generating activities.
The report established that the processing of wood generates substantial quantities of airborne wood dust, stating that dust emissions will be significantly worse in '*dry conditions*'.
Relating to wood dust exposures, the HSL study revealed (pg.6)

'A total of twenty seven exposures to wood dust were measured with results from 0.23 to 150 mg/m3, over sampling periods ranging from 32 to 400 minutes. Sampling was conducted during periods representative of typical production and for specific cleaning tasks. 8-hr TWA exposures were calculated taking account of, where appropriate, task based measurements and using shift patterns. In total fifteen 8-hr TWA exposures were calculated which yielded results from 0.29 to 52.4 mg/m3. Of the fifteen 8-hr TWA

exposures measured seven exceeded 5 mg/m3.
The results from nineteen static samples indicated background concentrations of wood dust in air ranging from <0.1 to 29.1 mg/m3.'

The HSL report informs us that:

- *Waste wood processing generates significant amounts of airborne wood dust resulting in commonplace and excessive exposures above the WEL.*
- *Machinery used for wood chipping become heavily contaminated due to high dust levels. Thorough cleaning is required at the end of every shift.*
- *High levels of airborne dust are generated by manual sweeping and the use of compressed air.*
- *There was a lack of exposure control at all 4 sites visited with substantial deficiencies of COSHH risk assessment for exposure to wood dust.*
- *The IARC makes no distinction between hardwood and softwood, classing both as a category 1 carcinogen to humans.*
- *Compressed airlines were commonly used to clean down machinery which resulted in 'excessive exposure to wood dust' .*
- *There is risk of dust contaminating other sites in the immediate vicinity.*
- *Three of the 4 sites visited did not have any COSHH assessments available for inspection.*
- *There were substantial deficiencies In COSHH risk assessments relating to employee exposure to wood dust, training of employees and in the management of any controls implemented.*
- *There is a scarcity of historical exposure data for this industry.*

A further point of interest says (pg.9):

"Site 4 had a hand picking gantry installed on site that was not in use during the site visit. It was reported by the company that it was used occasionally when chipped wood contained a high level of contamination."

An EIR – Environmental Information Request, which is the environmental equivalent of FOI, was made to the HSL on 22/1/13 for the names of the 4 wood recycling plants studied. This was refused, with the HSL only releasing two names. A further request was made via an internal review which was again refused. This refusal was eventually directed to the ICO - Information Commissioner's Office (61), an independent body on 3/2/14**,** requesting identification of all 4 wood recycling plants under the Aarhus Convention (62/63), an international agreement which gives citizens greater powers to access environmental information **(Case Ref no: FER0530798).**

Some local residents have expressed their concerns regarding airborne contaminant exposures from the washing down of vehicles, which in some cases takes place in close proximity to their homes. With the study reporting levels as high as 150 mg/m3 during cleaning operations (30 times the WEL), high dust levels, and the risk of contamination of other sites (*residents, businesses or schools*), as well as the lack of historical exposure data for this industry, it is in the public's interest for the 4 plants to be identified under the Aarhus Convention, and for nearby communities to be alerted to the potential hazards of substantial exposures to waste wood emissions. It is also in the interest of

employees who are exposed up to 30 times the recommended limit for wood dust, a Group 1 carcinogen since 1995, including contaminants *(mixed pollutants*).
However, the ICO informed us on **25 June 2014** that they uphold the HSL decision to only name 2 of the 4 wood recycling sites studied.

Q. Should the names of all 4 wood recycling sites be released in the interest of public health with a scarcity of data?
Q. Should the names be released to protect employees exposed to toxic wood dust 30 times greater than HSE limits?
Q. What action has the HSE taken regarding employee's excessive exposure to toxic wood dust?

6.2 HEALTH STUDY - LIVERPOOL

Research revealed an NHS study linked to panel board manufacturing using recycled waste wood, including sources from regional waste wood recycling companies.
In **2002**, Knowsley NHS undertook an investigation into health concerns of local residents in two communities in Liverpool, Northwood and Stockbridge village. A questionnaire covered questions about wearing glasses, mortgages and badly fitting windows in the home, as well as health issues and resident's concerns (64).
The report concluded that emissions from the factory were fully compliant with '*authorized statutory control* ' and there was '*no evidence of increased admissions to hospital, or increased prescribing in general practice in Northwood, since the factory has been in operation' (pg.66).*

6.3 OTHER STUDIES

Although the majority of information found relates to worker exposures to wood dust, research revealed the following studies of interest:

A **2003** study evaluated the '*health status of nearby residents of a wood treatment plant' (Dahlgren et al) who had sustained 'prolonged low-level environmental exposure to wood processing waste chemicals' (*65*).*
Due to a variety of health-related complaints by local residents in a small semi-rural location next to a wood treatment plant, dust, soil and biological sampling was undertaken on residents, their homes and properties for heavy metals. Assessments were made using a questionnaire, physical

examination, respiratory, blood and urine testing as well as neurophysiological and neuropsychological studies. Dust samples were taken from the attics of homes, which we now understand to be a good place for dust collection. Further samples were taken from soil and drainage ditch sediment.
The report stated that it was likely that chemicals from an outside source would find their way into a residential attic and migrate into living areas. The study results and conclusions were:

'RESULTS:
The exposed subjects had significantly more cancer, respiratory, skin, and neurological health problems than the controls. The subjective responses on questionnaires and by physician histories revealed that the residents had a significantly greater prevalence of mucous membrane irritation, and skin and neurological symptoms, as well as cancer. (Exposed versus unexposed, cancer 10.0% versus 2.08%, bronchitis 17.8% versus 5.8%, and asthma by history 40.5% versus 11.0%) There were significantly more neurophysiologic abnormalities in adults of reaction time, trails A and B, and visual field defects.
CONCLUSIONS:
Adverse health effects were significantly more prevalent in long-term residents near a wood treatment plant than in controls. The results of this study suggest that plant emissions from wood treatment facilities should be reduced.'

In July **2013** '*Outdoor wood dust in woodworking' (Vitelli, M.)* was published by the University of Palma in Italy (66). The '*paper*' looked at two wood production companies processing hardwood and softwood.
'Conclusions*: The external environment is contaminated with wood dust, it follows a proven exposure of the population, in particular the neighbouring resident personnel and materials handling. Further conclusion was that the 'population living in the neighborhood, is undergoing an unwitting exposure to wood dust generated by the processes described above, since it is an activity performed outdoors.'*

(Online references 60 – 66 last accessed 22 Aug 2014)

60. HSL study - Summary report Occupational Hygiene implications of recycling wood (Nov 2011)
© Crown copyright (2011)
http://www.hse.gov.uk/woodworking/recycling-report.pdf
61. ICO – Information Commissioners Office
http://ico.org.uk/
62. Aarhus Convention
http://ec.europa.eu/environment/aarhus/
63. Aarhus convention
http://en.wikipedia.org/wiki/Aarhus_Convention
64. NHS –Knowsley Primary Care trust (2002) - Investigating local concerns about the effects on health of the Sonae Chipboard factory situated on Knowlsey Industrial Park
http://www.knowsley.gov.uk/pdf/Effects%20on%20health%20report.pdf
65. Dahlgren et al (2003) 92.(2). Health effects on nearby residents of a wood treatment plant
Environ Res. 2003 Jun;92(2):92-8.
http://www.ncbi.nlm.nih.gov/pubmed/12854688

66. Vitelli, M. (2013) Outdoor wood dust in woodworking
Prevent Res, published on line 22 July 2013, P&R Public 54.
http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CDEQFjAA&url=http%3A%2F%2Fwww.preventionandresearch.com%2Fdownload.php%3Fq%3DiWtd458lxSbpEIZdvnweC_OzwYsH-A-l&ei=AViFUr3fK8uVhQfe_4DQBg&usg=AFQjCNGDOOx9_kkraNK3lBuBxDPRhfZNzQ&sig2=ippnYMonQlo7oNSy5EDYqw&bvm=bv.56343320,d.ZG4

7. EA DUST MONITORING

'We consider that research during the past >20 years has shown that many, perhaps all, dusts previously considered inert can produce serious health effects at long-term average exposures well below the British trigger values of 10 and 4mg m^3 .'
***Low-Toxicity Dusts: Current Exposure Guidelines Are Not Sufficiently Protective - Cherrie** et al*
Published by Oxford University Press on behalf of the British Occupational Hygiene Society
http://m.annhyg.oxfordjournals.org/content/57/6/685.short

The Environment Agency

'It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.' - *(Monitoring of particulate matter in ambient air around waste facilities - Technical Guidance Document (Monitoring) M17 (2004).*

The EA uses the guideline of 200mg/m2/day for the deposition of wood dust as a nuisance to residents as previously reported, despite the IARC classification as a Group 1 carcinogen in 1995 for the World Health Organisation.

In December 2011, the EA said that they 'think' the guideline comes from the 1983 handbook, '*Guide to the Handling of Dusty Materials in Ports, IMPACT, PREVENTION & CONTROL'* by BMHB, The British Materials Handling Board 1983, (Schofield and Shillito) (67).

The EA's '*Technical Guidance Document (Monitoring) M17*, *Monitoring of particulate matter in ambient air around waste facilities' (2004*)*, underwent a major re-write in July 2013. However, the 2004 version applied to the majority of research for this CSI, stating (pg.25): '*the original source data from which this guideline is drawn are not particularly robust'.* The document also stated (pg.25):

4.3.2 Criteria for use with dust gauges
'No statutory or official air quality criterion for dust annoyance has been set at a UK, European or WHO level. However, in England and Wales, a 'custom and practice' limit of 200 mg/m2/day is used for measurements with dust deposition gauges (providing results in mass per unit area per unit time).

In the absence of any other criteria, this unofficial guideline has been used widely in environmental assessments. Although the original source data from which this guideline is drawn are not particularly robust, they are similar to criteria set in other countries.'

This implies that the only existing guidance for the *'protection'* of communities from any dusts is *not* based on any evidence, therefore there is ***'no proof of no harm'.***

The 1983 first edition and 1990 second edition of the BMHB handbook were viewed at the British Library in Yorkshire. The 1983 original handbook states (pg. 67):

'with insoluble deposits, fallout rates exceeding 200 mg.m^{-2}. per day^{-1} on a monthly average will generally cause nuisance to residential properties at peak periods within that month'.

However, the BMHB update, *'Guide to the Control of Dust in Large Scale Bulk solids' (Taylor, T. 2008) (68),* references 200mg/m2/day, as the UK *'unofficial'* nuisance dust deposition rate for all particulates as a '*serious nuisance'*. It also states that dust nuisance is usually restricted to areas within 500m, although justifiable complaints for dust generation have occurred at distances of well over a 1km.

The handbook further states:

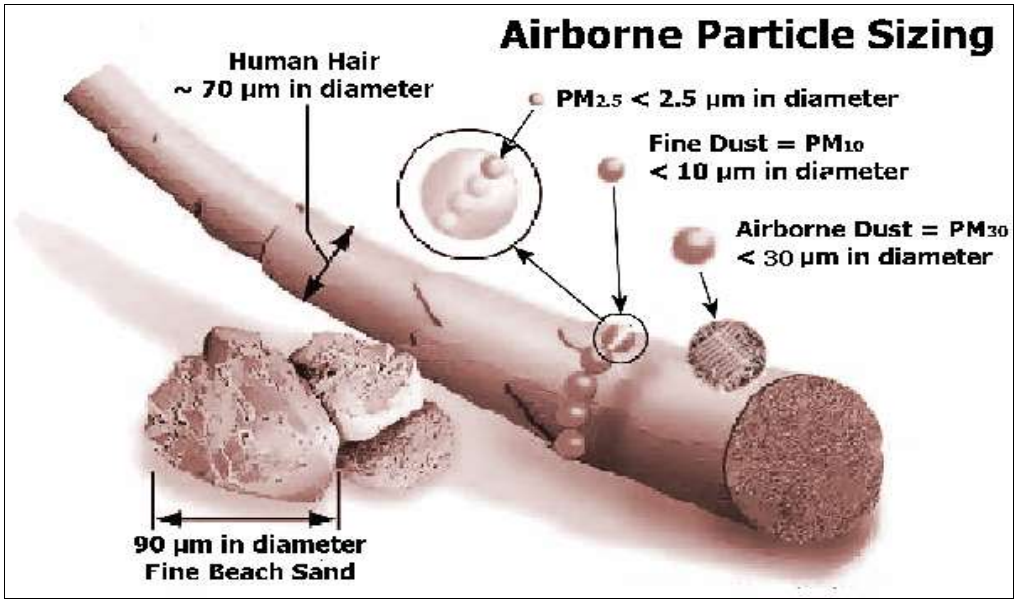
- *Dust generation processes create a dust cloud around the generated area.*
- *Coarse particles will settle out very close to source.*
- *The remaining dust will spread, influenced by wind and other air flows, with the less coarse particles depositing 'progressively' further away from source, dependant on particle size and air velocity.*
- *Very fine particles will 'remain suspended for extended periods because their settling velocity is of the same magnitude as natural air movements and Brownian diffusion'.*

BMHB recognises that organic dusts are associated with allergies and irritation and produce clinical respiratory effects listed as nasal obstruction, rhinorrhoea (runny nose), dryness, sneezing and nose bleeds, dry, sore throat and cough, plus bronchial wheezing, tightness, soreness, chest aches and pains. BMHB were asked whether the guideline of 200mg/m2/day for nuisance dust applies to wood dust, a known carcinogen and to waste wood processing emissions containing mixed pollutants, some of which are carcinogenic and endocrine disruptors. With no response to date, we have assumed that the answer is it *does not and cannot*.

EA officers monitor dust as a nuisance on the perception of a 'visual' presence of dust emissions. However, this is contradicted as the EA regulate to a particle size of PM10 which is invisible to the naked eye.

So even though an officer cannot see dust, it does not mean that it is not present. The presence of dust is more accurately asserted by residents who report eye, nose or throat irritation from fine particulates that have either blown off site from the source, or remain suspended in the air in certain weather conditions.

The EA state that a simple visual observation is '*cheap and easy to implement*' (M17/2004).



© Image EPA, Office of Research and Development

'Removing all anthropogenic ('human-made') particulate matter air pollution (measured as PM2.5) could save the UK population approximately 36.5 million life years over the next 100 years'.
***COMEAP** – The Mortality Effects of Long-term Exposure to Particulate Air pollution in the United Kingdom*
http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317137012567

Residential complaints about wood dust in the Mossley community go back to 1996, we therefore once again reference the EA's M17 technical guidance (2004), which emphasises the importance of dust particle size. It says:

- *Coarse particles will settle close to the source of release, whereas fine particles may remain airborne for longer periods and travel much greater distances*
- *Many dust suspension techniques are ineffective for finer particles*
- *Some atomised mists are not suitable for outdoor use with nozzles potentially clogging from dust and 'precipitated' mineral deposits*
- *There is limited removal of PM10 and smaller particulate fractions*
- *Distance between source and receptor (human or animal, environment) is important*
- *Aerodynamic and gravitational effects can determine the distance that particles will travel*

***The Technical Guidance Document (Monitoring) M17 – Monitoring of particulate matter in ambient air around waste facilities (2004) is held with the EA.**

A further EA monitoring document is ***'HI Annex F – Air emissions v 2.2*** **(December 2011)** (69).
We note:

- *Particulate Material (PM) can cause adverse health effects*
- *Heavy metals may have specific toxicity effects on different receptors*
- *Dispersion of PM depends on the height of release and will be affected by meteorological*

- *Factors, ie: air temperature and wind speed sensitive receptors may be exposed to short or long term releases such as any human population, schools, hospitals or neighbouring properties)*

HI Annex F 2.2 also states (pg.44):

*'In deriving EALs (Environmental Assessment Level) for long-term exposure from occupational limits, two factors need to be taken into consideration, the duration of exposure of the general population compared with the workforce and the sensitivity of the group at risk. The weekly exposure of the local population could be up to 168 hours per week (7*24 hrs) rather than the 40 hours (5*8 hrs) which might be expected for the workforce. Moreover, exposure for the general population may extend to 52 weeks compared with an average working year of 44 weeks.*
*On this basis the minimum safety factor would be 4.96 (i.e. (168/40 * 52/44). In addition, since there may be no recovery period between exposure sessions and exposure could be for a lifetime a further safety factor of 2 could be introduced giving a total safety factor of 10.*

The HI Annex further informs us:

Sensitive receptors include:

- *Any human population (e.g. schools, hospitals or neighbouring properties) and nature conservation sites if they occur within distance criteria outlined in the section 'Screening for nature conservation sites'*
- *Particulate Material can cause adverse health effects standard*
- *Assume worst case scenario if no identification (ie: benzene)*
- *Consider the effects of heavy metals, which have specific toxicity effects on different receptors*
- *Height of release impacts dispersion of emissions, also affected by meteorological conditions*
- *All receptors (ie: human, animal, environment) should be assessed for risk impact of the operation and be considered for Special Areas of Conservation, Special Protection Areas, Ramsar sites and Sites of Special Scientific Interest. Other sites such as local nature reserves or ancient woodland with protection between 2km and 10km, if substances to air are highly toxic, bio accumulative or persistent or may have an effect on sensitive receptors*

Q. How many people living near waste wood recycling plants are exposed 24/7 without Personal Protection Equipment to mixed pollutants that are carcinogenic and problematic to health according to the HPA (2010)?

The EA undertake dust sampling using ICP-OES (Inductively Coupled Plasma - Optical Emission Spectroscopy), a low powered microscope which destroys the sample after testing. Dust gauges such as the Frisbee depositional dust gauge and directional dust gauge are used for collection of dusts for sampling.

EA dust gauges in Mossley, Tameside 22/9/12

Frisbee depositional dust gauge

BS 1747 CERL-type directional gauge

ICP-OES information supplied by the EA

Determinand:	*Description of deposit, deposit weight, loss on ignition, metals analysis (or a combination of these as required). A chemical test for lignified matter can also be carried out if this is of interest.*
Matrix:	*Dust*
Instrumentation:	*Low powered microscope. ICP OES.*
Principle:	*Dust samples are collected in the field using a suitable collection device. The deposit collected is washed into a suitable pot and transferred to the laboratory for analysis.* *The sample is filtered under suction through a pre weighed ashless filter paper. This paper is then dried at 105°C and weighed again. The difference between the two is*

	the deposit weight. The deposit is then described using a low powered microscope. *Losses at 450°C is determined by ashing the sample at 450°C for 4 hours. It is reported as a percentage of the deposit weight.* *The sample is then digested with concentrated hydrochloric acid, and then with concentrated nitric acid. The resulting solution is then submitted for metals analysis by ICP OES. These are reported as mg/kg of the deposit weight. The metals are Al, Ba, B, Ca, Fe, Li, Mn, Mg, K, Na, Sr, Cd, Cr, Cu, Pb, Ni and Zn.* *20mg deposit weight. (Deposits of <20mg will only be described: losses and metals analysis is not carried out.)*

(Online references 67 – 69 last accessed 22 Aug 2014)

67. Schofield, C. and Shillito, D. (1983) Guide to the Handling of Dusty Materials in Ports, IMPACT, PREVENTION & CONTROL, British Materials Handling Board, *Ascot, U.K.*

68. Guide to the Control of dust in Large Scale Bulk Solids Handling – 2008 prepared by Tom Taylor.
Published by British Material Handling Board, First edition 2007. © British Materials Handling Board

69. H1 Annex F – Air emissions v2.2 (Dec 2011)
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/298239/geho0410bsil-e-e.pdf

The following dust reports were obtained from the EA:

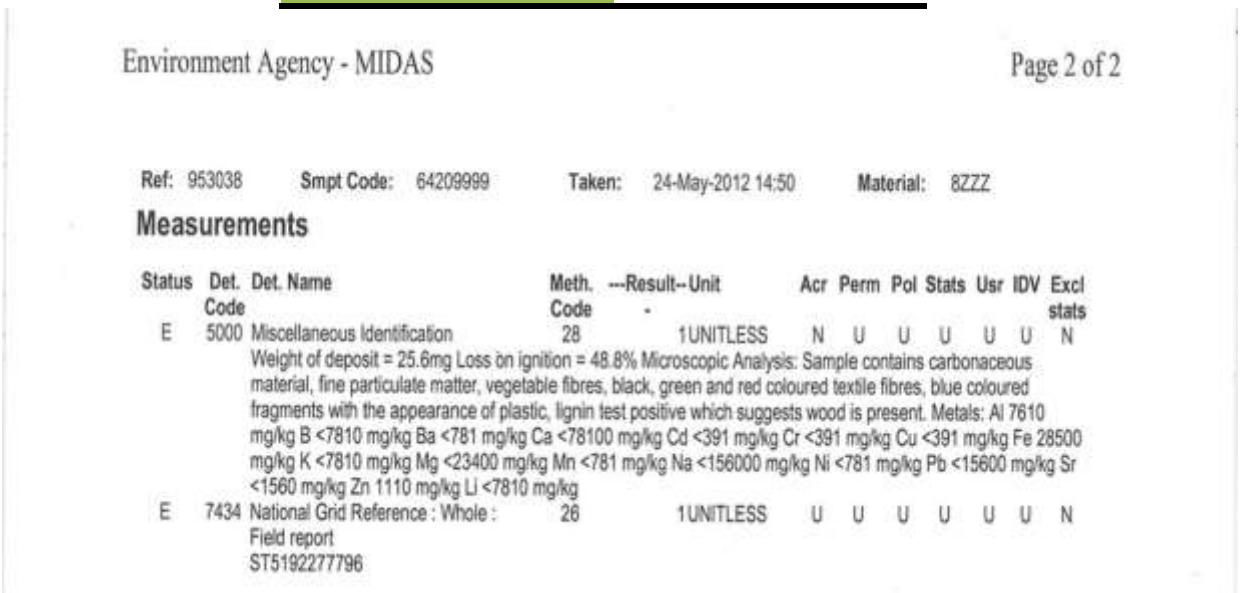
7.1 AVONMOUTH DOCKS - BRISTOL

The EA conducted dust monitoring in Poole Street between 10/5/12 – 2/8/12. The results contained:

- *Fine Particulate matter, Carbonaceous material, textile fibres (various colours) and lignin*
- *suggesting wood dust in **7 out of 7** samples*
- *Vegetable fibres in **6 out of 7** samples*
- *Plastic like material in **3 out of 7** samples*
- *Glass shard in **one** sample*

On 24/5/12, the EA sample contained the following list of metals, however appear **repetitive:**

Al - Aluminium	**7610 mg/kg**
B - Boron	<7810 mg/kg
Ba - Barium	<781 mg/kg
Ca - Calcium	<78100 mg/kg
Cd - Cadmium	<391 mg/kg
Cr - Chromium	<391 mg/kg
Cu - Copper	<391 mg/kg
Fe - Iron	28500 mg/kg
K - Potassium	<7810 mg/kg
Li - Lithium	<7810 mg/kg
Mg - Magnesium	<23400 mg/kg
Mn - Manganese	<781 mg/kg
Na - Sodium	<156000 mg/kg
Ni - Nickel	<781 mg/kg
Pb - Lead	<15600 mg/kg
Sr - Strontium	<1560 mg/kg
Zn - Zinc	<1110 mg/kg



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Ref: 953038 Smpt Code: 64209999 Taken: 24-May-2012 14:50 Material: 8ZZZ

Measurements

Status	Det. Code	Det. Name	Meth. Code	---Result--	Unit	Acr	Perm	Pol	Stats	Usr	IDV	Excl stats
E	5000	Miscellaneous Identification	28	1	UNITLESS	N	U	U	U	U	U	N
		Weight of deposit = 25.6mg Loss on ignition = 48.8% Microscopic Analysis: Sample contains carbonaceous material, fine particulate matter, vegetable fibres, black, green and red coloured textile fibres, blue coloured fragments with the appearance of plastic, lignin test positive which suggests wood is present. Metals: Al 7610 mg/kg B <7810 mg/kg Ba <781 mg/kg Ca <78100 mg/kg Cd <391 mg/kg Cr <391 mg/kg Cu <391 mg/kg Fe 28500 mg/kg K <7810 mg/kg Mg <23400 mg/kg Mn <781 mg/kg Na <156000 mg/kg Ni <781 mg/kg Pb <15600 mg/kg Sr <1560 mg/kg Zn 1110 mg/kg Li <7810 mg/kg									
E	7434	National Grid Reference : Whole : Field report ST5192277796	26	1	UNITLESS	U	U	U	U	U	U	N

http://midas.prodds.ntnl/printerfriendlysampledetails.jsp 13/11/2013

Q. What is the carbonaceous material?
Q. What are the vegetable fibres?
Q. Fine particulate matter of what?

7.2 HORWICH - LANCASHIRE

EA dust monitoring **16/9/11 to 25/11/11** included brick coloured dust, glass pieces, metal fragments, textile fibres and '*fine particulates*'.

The three locations used for dust sampling were New Chorley Road, Mansell Way and Northgate Close.

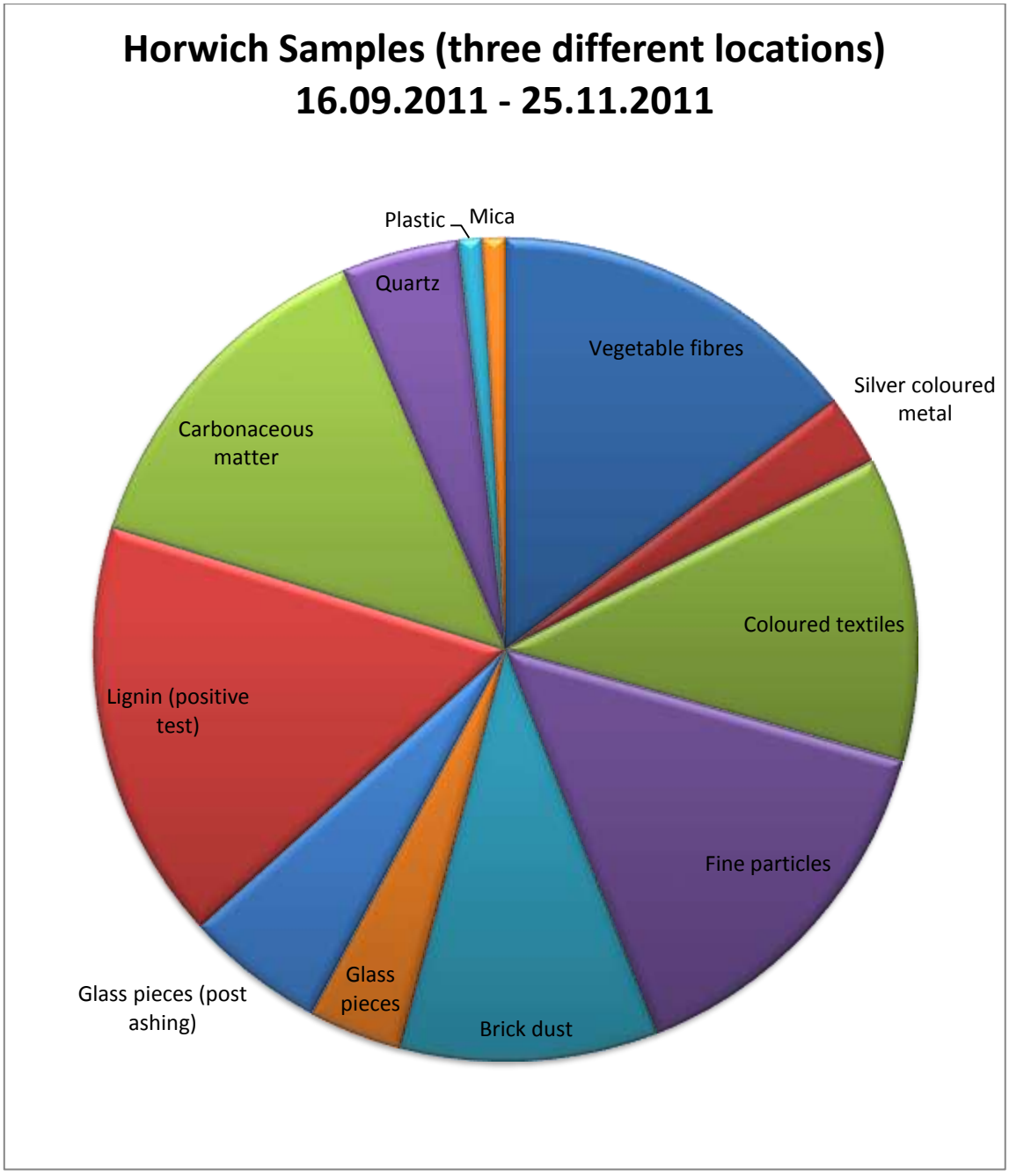
Of **18** samples taken between **16/9/11 to 25/11/11**, they contained:

*Lignin test positive in all **18***

*Fine particles in **16***

*Vegetable matter **in 16***

*Carbonaceous material in **15***



7.3 MOSSLEY - TAMESIDE

The first request for dust testing was from a garaged sports car **5/10/09,** however the results were mislaid.

A second sample taken **9/2/10** four months later contained wood fibres and *'other dust particles'.*

Miller Hey garage – fibrous & metallic dust on newly re-sprayed sports car

EA test result- garage:

Ref: 248546 Smpt Code: 88021139 Taken: 09-Feb-2010 13:05 Material: 8ZZZ

Measurements

Status	Det. Code	Det. Name	Meth. Code	---Result--	-	Unit	Perm	Pol	Stats	Usr	IDV	Excl stats
E	5000	Miscellaneous Identification	28	1		UNITLESS	U	U	U	U	U	N

The dust appears to be a mix of plant/wood fibres and other dust particles. Phloroglucinol staining and microscopic analysis indicates the presence of lignin in the fibres present. loss at 105 C 25.4% loss at 450 C 32.3%

Q. What were the OTHER dust particles?
Q. What happened to the original sample?

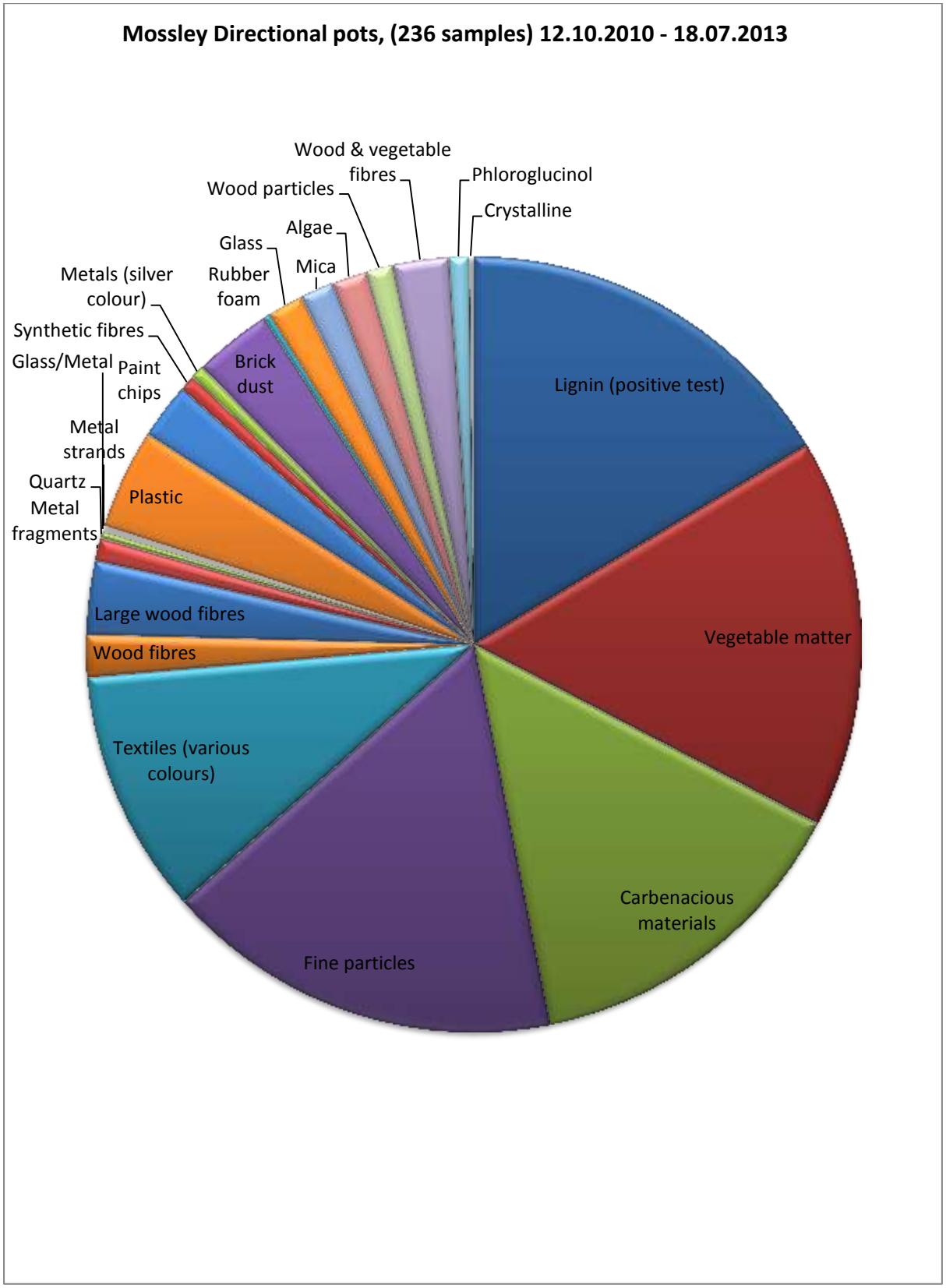
EA Dust samples were taken from the two dust gauges at Mossley between **22/10/10 to 28/8/12.**

Examples from the EA monitoring results:

From a total of **236** samples from the directional gauge:

- *Fine particles were found in **179***
- *Lignin test positive suggesting wood present in **177***
- *Vegetable matter in **175***
- *Carbonaceous material in **153***
- *Textile Fibres in **110***

Q. Fine particles of what and how many?
Q. What was the particle size?
Q. Quartz and crystalline 'silica'?


Mossley Directional pots, (236 samples) 12.10.2010 - 18.07.2013
Wood & vegetable fibres
Phloroglucinol
Wood particles
Crystalline
Algae
Glass
Mica
Metals (silver colour)
Rubber foam
Synthetic fibres
Glass/Metal
Paint chips
Brick dust
Lignin (positive test)
Metal strands
Quartz
Plastic
Metal fragments
Large wood fibres
Vegetable matter
Wood fibres
Textiles (various colours)
Carbenacious materials
Fine particles

We examined EA dust results from the Frisbee gauge between **3/6/11 and 13/10/13**:

Of **83** samples:

Vegetable Fibres were found in ***70***

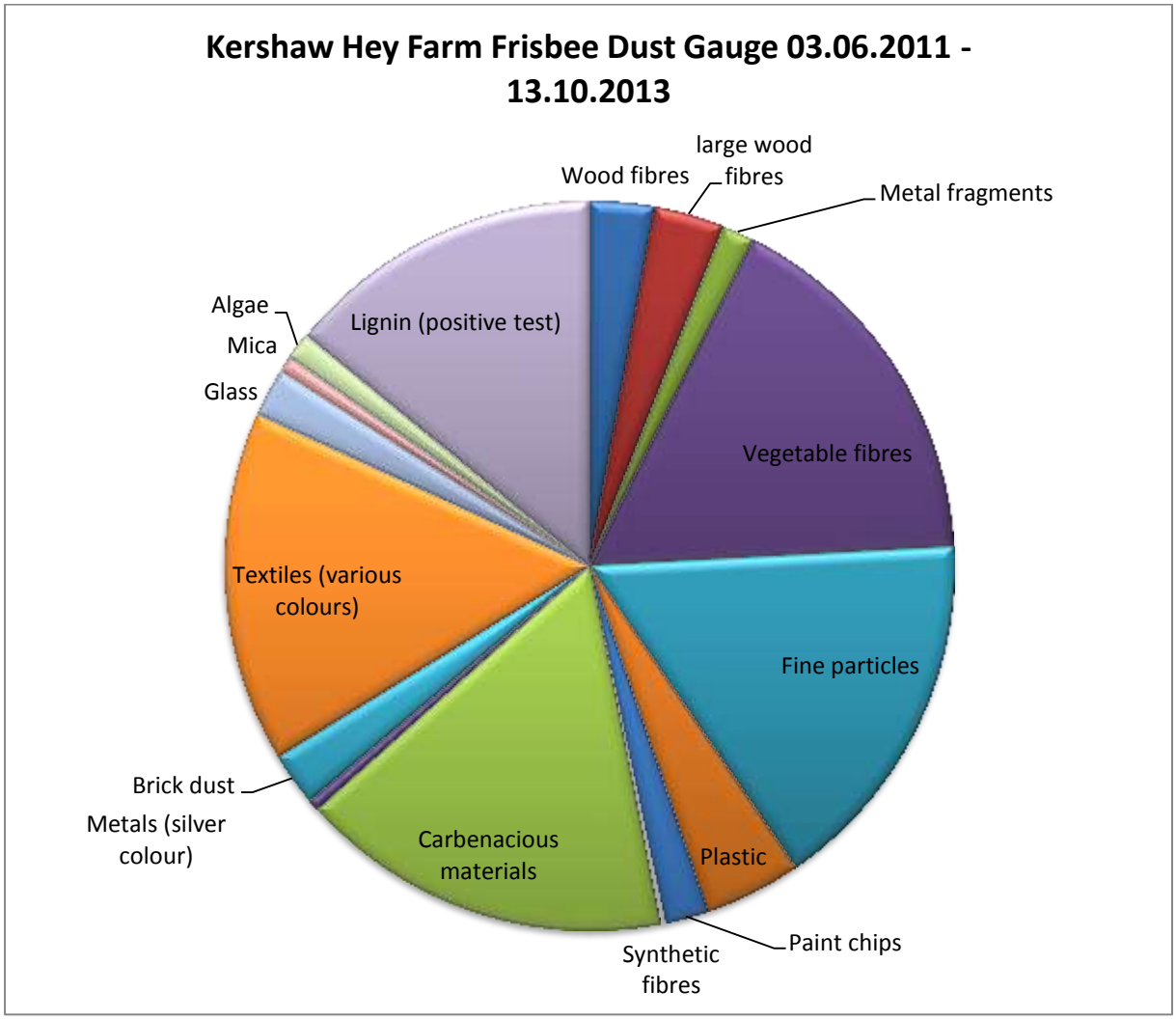
Carbonaceous material in ***69***

Fine particles in ***68***

Textile fibres in ***65***

Lignin test in ***59***

Other contaminants present included plastic, glass, Mica, brick dust, metal fragments, paint chips and synthetic fibres.



The list of metals below were recorded during the above monitoring periods. Independent expert opinion suggests the high sulphur content could be due to Gypsum board from demolition and construction waste.

Identification of metals has been added to the lists below. There is no indication that the EA tested for Arsenic.

11/10/2010

Loss on ignition 80.4%

Table to show Metals:-		
Al	*6.3 mg/kg*	*Aluminium*
B	*<17.9 mg/kg*	*Boron*
Ba	*<1.79 mg/kg*	*Barium*
Ca	*<179 mg/kg*	*Calcium*
Cd	*<0.89 mg/kg*	*Cadmium*
Cr	*2.11 mg/kg*	*Chromium*
Cu	*12.7 mg/kg*	*Copper*
Fe	*18.9 mg/kg*	*Iron*
K	*<17.9 mg/kg*	*Potassium*
Mg	*<53.6 mg/kg*	*Magnesium*
Mn	*<1.79 mg/kg*	*Manganese*
Na	*<357 mg/kg*	*Sodium*
Ni	*<1.79 mg/kg*	*Nickel*
Pb	*<35.7 mg/kg*	*Lead*
Sr	*<3.57 mg/kg*	*Strontium*
Zn	*<1.79 mg/kg*	*Zinc*
Li	*<17.9 mg/kg*	*Lithium*
SO4	*<1790mg/kg"*	*Sulphates*

14/6/12

Weight of deposit = 24.4mg
Loss on ignition = 56.1%
Microscopic Analysis:
Sample contains carbonaceous material, fine particulate matter, vegetable fibres, black, blue and red coloured textile fibres, glass fibres, numerous insects, lignin test positive which suggests wood is present.

Table to show Metals :-	
Al	4170 mg/kg
B	<8200 mg/kg
Ba	<820 mg/kg
Ca	<82000 mg/kg
Cd	<410 mg/kg
Cr	<410 mg/kg
Cu	866 mg/kg
Fe	12400 mg/kg
K	<8200 mg/kg
Mg	<24600 mg/kg
Mn	<820 mg/kg
Na	<164000 mg/kg
Ni	<820 mg/kg
Pb	<16400 mg/kg
Sr	<1640 mg/kg
Zn	948 mg/kg
Li	<8200 mg/kg

7.4 SSI – Site of Special Scientific Interest

Complaints about dust pollution in the Huddersfield Narrow Canal date back to 1996 in Mossley. The canal is classified as SSSI & SBI, a Site of Special Scientific Interest and Special Biological Interest, one of 3 canals of national importance in Greater Manchester. *http://www.gmbp.org.uk/site/images/stories/pdf/canals.pdf*. The Huddersfield Narrow Canal is also home to a scarce localised freshwater plant – '*Floating Water Plantain*' (Luronium natans) that only exists in Europe. This plant is protected under Schedule 4 of the Conservation (Natural Habitats, etc) Regulations, 1994 and Schedule 8 of the Wildlife and Countryside Act 1981. *https://www.kirklees.gov.uk/community/environment/green/greenkirklees/documents/speciesActionPlans/floatingWaterPlantain-actionPlan.pdf*. According to the Wildlife Trust, *Luronium natans* is now a rare and threatened plant which has received special protection under Appendix of the Berne Convention. *http://www.wildlifetrust.org.uk/urban/ecorecord/bap/acrobat/plantain.pdf*

An EA sample taken from the canal 14/7/10 *appeared* to contain wood fragments and fibres with lignin test positive.

EA Testing on Huddersfield Narrow Canal 14/7/10, appearance of wood dust, lignin test positive.

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Ref: 373612 Smpt Code: 88021139 Taken: 14-Jul-2010 16:30 Material: 2FZZ

Measurements

Status	Det. Code	Det. Name	Meth. Code	---Result---	Unit	Acr	Perm	Pol	Stats	Usr	IDV	Excl stats
E	5000	Miscellaneous Identification	28	1	UNITLESS	U	U	U	U	U	U	N

Sample sediment contains material which has the appearance of wood fragments and fibres. Test for lignified material is positive.

Huddersfield canal (SSSI & SBI) - dense layer appears to be wood dust (6/9/10)

Q. Has anyone investigated dust emissions in a SSI protected waterway since 1997?

Q. What impact could wood dust over many years have on the local environment?

7.5 45 DAY STUDY - MOSSLEY

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A study was undertaken by the EA for 45 days commencing on **31/3/10**.
The testing found brick dust, glass fragments, paint flakes, metal shavings, textile fibres and unidentified amorphous white flakes. Glass fibres which can be found in insulation were in several of the samples.

Q. What are unidentified amorphous white flakes likely to be?

Version 2 of the report which is the same as version 1 draft says:

'A directional dust gauge was located inside the perimeter of Willow Lake Allotment in the corner of the site on the ground. This gauge was the closest to the stockpiles, but not in line with the expected wind direction for the area. Further directional dust gauges were located on private property at Regent Fold and 40 Regents Drive, both locations are in an elevated position to the licensed area and both were in line with the expected wind direction.
The wind direction was not recorded over the sampling period. During the period the expected wind direction was south westerly. However if the wind came from other directions the valley would most likely act as a funnel, or shelter the area and create swirls and eddies'.

'The dust gauges were installed at the locations on the 31/03/10 and left for a period of 45 days in total. Every 10-11 days the pots were emptied and decanted into bottles and sent to the laboratory for analysis under a microscope. Pot 1 on all dust gauges faced the stockpile. The gauges were removed on the 14/05/10 when the last sample was collected.'

Map from EA dust monitoring report shows the 3 locations of dust monitors

©Image from EA dust report 2010

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The study concluded that wood dust was identified in every sample during an 11 day period, suggesting that large amounts of wood dust were being released.

7.6 MMF – MOBILE MONITORING FACILITY

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'Recent long-term studies are showing associations between PM and mortality at levels well below the current annual WHO air quality guideline level for PM2.5 which is 10µg/m3'.
***WHO** Global update 2005 – Who Air Quality Guidelines for Particular matter, ozone, nitrogen dioxide and sulphur oxide*
http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf

The EA undertake MMF air quality monitoring studies across the country. Extended monitoring by the EA and Bristol City Council is currently underway in Avonmouth due to persistent complaints regarding dust emissions.

Bristol City Council to test Avonmouth's air quality for the first time in eight years
http://www.bristolpost.co.uk/Bristol-City-Council-test-Avonmouth-s-air-quality/story-22719773-detail/story.html

Although reputed to be the EA's most sophisticated monitoring equipment available, MMF studies DO NOT identify or quantify emissions, therefore *no proof of no harm.*

7.7 Horwich

An MMF study was undertaken in Horwich for 131 days from **18/9/09 – 27/1/10**.
The report states that the monitoring facility (MMF2) was located in the car park of Chorley New Road Primary School.

***(Map from MMF monitoring report* -© Ordnance survey maps from EA report**

noproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoporoofofnoharmnoproofofnoharmnoproofofnohrmnoproofofnoharmno

'The prevailing wind direction was from between 80° - 130° with a wood recycling plant between 260° and 290°, indicating that the MMF monitor was downwind of the wood recycling plant for only 42% of the 131 day monitoring period.

The Executive summary states (pg.i):

'*if the monitoring period was representative of general conditions then it would be unlikely that the AQS objectives for pollutants PM10, PM2.5, SO2, NO2, and CO would be exceeded.'*
It also stated that *'The AQS objective has an annual standard for NOX of 30µg/m3, for the protection of vegetation and ecosystems. The mean NOX concentration during the monitoring period was 61.2µg/m3, which is in exceedance of the annual standard. However this standard is only relevant if the location meets certain criteria which are outlined in Appendix F. In this instance the monitoring location does not meet any of the criteria and so the standard does not apply.'*

The report conclusion was (pg.8):

'Comparison of the PM10 data with the AQS objective for the 24-hour (midnight-midnight) mean indicated that the current standard would not be exceeded at the monitoring site.
'The mean PM10 concentration over the monitoring period at the monitoring site was 16.8µg/m3. If the assumption is made that the conditions during the monitoring periods were representative of typical years, then the results would indicate that the AQS annual mean objective of 40µg/m3 would not be exceeded.
The mean PM2.5 concentration over the monitoring period was 8.8µg/m3. If the assumption is made that the conditions during the monitoring periods were representative of a typical year, then the results would indicate that the AQS annual mean objective for PM2.5 of 25µg/m3 would not be exceeded at the monitoring site.'

7.8 INDEPENDENT ANALYSIS OF HORWICH MMF STUDY

Due to the timescale of the Horwich study being almost identical to the Mossley monitoring period, that being over the colder and wetter autumn and winter months including bonfire night, plus the fact that local residents were displaying nosebleeds and other similar symptoms to Mossley residents, an independent analysis of the report was undertaken:

Patrick Sudlow – BEng. (Hons), MEng., M.I.E.T.

I notice on the particulates reading graph there are gaps, especially 3.2.1 on p.4, no readings between 31/12/09 – and 9/1/10. They also state in several places, that they are assuming the conditions to have been representative, so the AQS annual mean objectives would not be exceeded at the monitoring site. I would dispute that, and monitoring should be done during a long dry spell.

There is currently no correction factor for PM2.5 data therefore the data is not currently strictly comparable to the European Daughter Directive Limit Values. Even the PM10 data is not reliable even after using a correction factor.
Fig 3.2.2 on p.5, The PM10 24hr, there are gaps in the data for the 5/10/09 - 13/10/09; either side of 15/12/09 and between 31/12/09 - 06/1/10. Why are there gaps in the data?
They do not supply a graph for PM2.5 24hr. Is this because there is a spike of nearly 100ug/m3 around the 9/11/09 in fig. 3.2.1. There are also other spikes in the region of 40ug/m3 throughout the test period.
Fig 3.4.1 shows some very high spikes of SO2, some above 600ug/m3.
P.18 Mean NOx concentration was 61.2ug/m3, 204% above annual standard but decided this site did not have to comply; appendix F?
NO2 total uncertainty (95% confidence) of 14 ppb, what does that equate to in ug/m3?
They also state the TEOM at concentrations around 50um/m3 (I think they mean 50ug/m3), tends to under read 15 to 30% compared to the gravimetric sampler, Appendix E.
They do not supply the actual raw readings for others to interpret and check the EA's findings.

Community action groups opinion:

Horwich residents have been exposed to PM2.5 on a daily average of 8.8µg/m3 over a 131 day period.

The EA's assumption if there is no identification of emissions, is that the worst case must be assigned as per H1 Annex F - Air Emissions 2.2 (pg.6)

'The general approach for dealing with groups of similar compounds where full characterisation and composition is not known is to assign a surrogate substance to represent the entire released mass. The surrogate matter should represent a worst case (i.e. the most harmful substance).'

With lignin in 100% of the 18 EA dust samples from 16/9/11 to 25/11/11 suggesting the presence of wood, and 89% of those samples containing fine particles, the assumption is that the worst case in THIS case is fine particles of wood dust, with no known safe level of exposure to a carcinogen and no evidence of a safe level of exposure to PM below which no adverse health occur.

http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf

Residents including vulnerable young and old, are also likely to be exposed 24/7 with no recovery period and no PPE. In addition, the MMF was downwind of the source in question for only 42% of the time during the 131 day monitoring period. As $PM_{2.5}$ and PM_{10} were recorded but not identified, there is *'no proof of no harm'.*

Q. Where does 58% of dust emissions travel to?

Q. Why has full *'characterisation and composition'* not been undertaken ?

7.9 MMF - MOSSLEY

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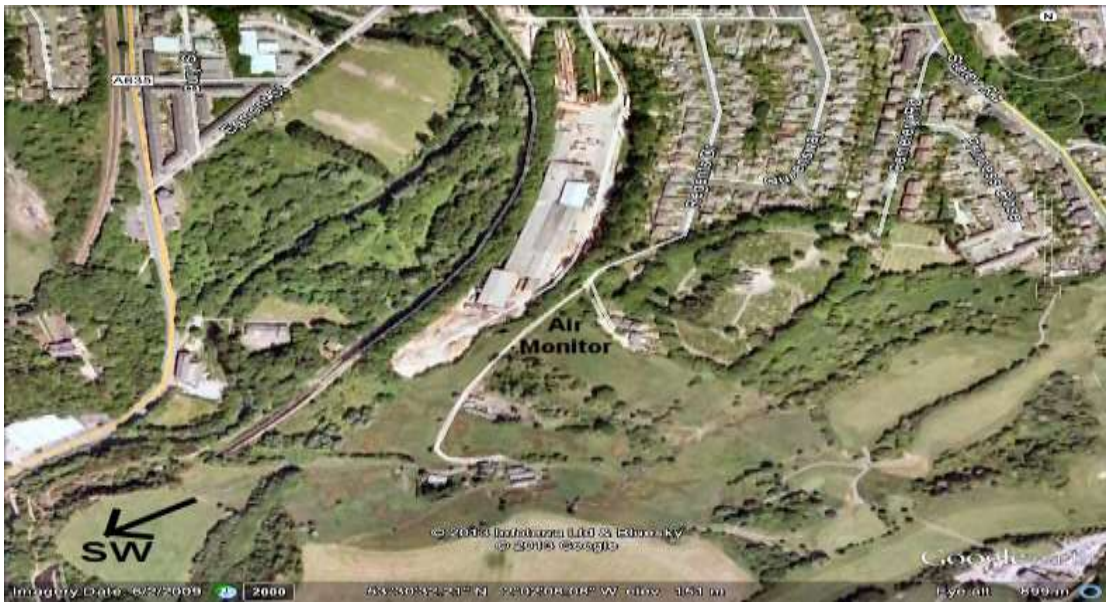
The EA commenced a 125 day MMF air monitoring study from **7/9/11 – 12/1/12**. The study took place to assess the ambient air quality at Miller Hey. The overall objective, says the report (pg.1), was to *'identify the local sources of air pollution and to quantify the environmental impact of the emissions from these sources on the surrounding area and the local community?*

***Maps shows MMF monitor location* © 2013 Infoterra Ltd & Bluesky / © Google 2013**



© Permission for use of OS Map taken from EA report

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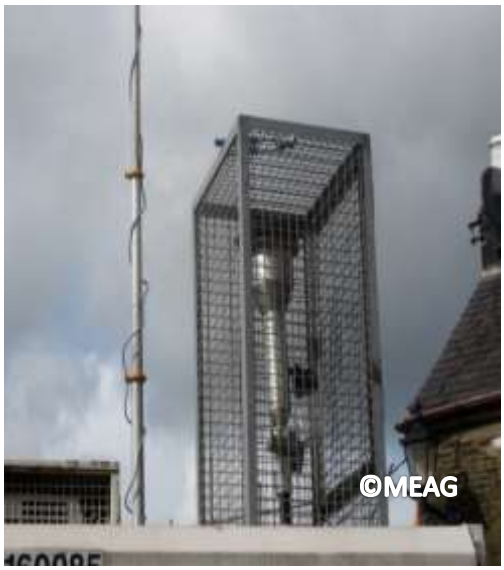
The report states that the MMF monitor should, where possible, be located *' over 100m from any buildings of greater or comparable height, so as to reduce any influence that surrounding buildings may have on the wind distribution. The MMF was placed within 20m of private residences at Miller Hey with the buildings to the north and east. The buildings may have had some influence on the data collected, but it was not thought that this would be excessive.' (pg.3)*

The MMF was placed approx 5 metres from private residences at Miller Hey cottages



The executive summary of the report says that the mobile monitoring facility (MMF5) was deployed to the **northeast** of potential sources saying it presents *'the measured levels of particulate (PM10 and PM2.5) and nitrogen dioxide (NO2) and compares these levels with the objectives of the UK Air Quality Strategy (AQS), where applicable' (pg.i).*

It was concluded that although *'the monitoring location was subject to concentrations of PM10, PM2.5* and *NO2',* the levels were *'likely to meet their respective AQS objectives'*.

The study also made several '*assumptions*' such as:
'If the assumption is made that the conditions during the monitoring period were representative of a typical year then this one exceedance can be extrapolated to represent 3 exceedances over a whole year.'

Furthermore it stated that the plot shows that wind coming from the direction of the site at (220° - 340° accounted for **24%** of the monitoring period.

7.10 INDEPENDENT ANALYSIS OF EA DUST MONITORING IN MOSSLEY

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As with the Horwich MMF study, the EA failed to identify emissions, thus offering no re-assurance to residents and ***no proof of no harm***. An independent analysis of the MMF study was subsequently undertaken.

Dust gauges in caged area in the same wind direction as the MMF

Patrick Sudlow

The first thing I would question is why, when they state the prevailing wind is from the South-West, did they place the monitoring equipment to the South-East? They also state their results are representative, even though they found the wind coming an entirely different direction? Also, if they were going to do a representative monitoring, they would have had monitoring sites placed around the site itself.

noproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoporoofofnoharmnoproofofnoharmnoproofofnohrmnoproofofnoharmno

They used TEOM instruments to collect data on PM10 and PM2.5, and as far as I am aware it is only effective for PM 10. They further state that they are having to use correction factors for PM10 as the equipment is not equivalent to reference method for particulate matter, but there is no correction factor for PM2.5. To monitor PM2.5, different equipment should have been employed, so making their readings meaningless. They appear to be too liberal with the assumption, as opposed to being conservative, to err on the side of safety. They state that the PM10 (midnight - midnight) mean concentration (50ug/m3) was exceeded once, and therefore in probability would only happen 3 times a year? Some of the hourly readings are high (above 40ug/m3 the hourly limit) and they do not show all exceedances over 40.

They are dismissing an exceedance on the 5th November as being the result of a bonfire? Were there any bonfires down-wind of the monitoring site on that night?
They also state at the beginning, that they are monitoring for NO2, but on page 12, 3.3, they talk about NOx. Are they burning the wood at recycling company, because NOx is a product of combustion at high temperatures? Also you take measurements for NO and NO2 to derive at the NOx emission equivalent. They dismiss a very high exceedance of NOx as being purely down to people warming-up their car engines on a cold morning. Does everyone leave home at the same time and drive diesel powered vehicles (NOx is emitted from diesel engines not petrol)?

On page 13, they mention that the 1-hour concentration of 200ug/m3 was never exceeded? From what I remember, it is 40ug/m3 and a 24 hour limit of 100ug/m3 but needs checking. They seem to be taking the short-term exposure limits as acceptable. I do not think they have made valid assumptions.

There are only 5 properties in the vicinity of the MMF with 6 cars, of which 3 were diesel at the time. Only one resident said he left his car running very occasionally during the winter, this car being the furthest away approx 35 metres east of the MMF.

Following the monitoring period, The EA concluded that it was likely air quality standards had been met.

Community action groups opinion:

Similar to the Horwich MMF study, Mossley residents have been exposed to PM2.5 on a daily average of 8.2µg/m3 over a 125 day period.
With lignin in 74% of the 319 EA dust samples from 22/10/10 – 13/10/13 suggesting the presence of wood, and 77% of those samples containing fine particles, the assumption is that the worst case in THIS case is also fine particles of wood dust, with no safe level of exposure to a carcinogen and no evidence of a safe level of exposure to PM below which no adverse health occur.
Residents including vulnerable young and old, are once again likely to be exposed 24/7 with no recovery period and no PPE. With no identification of emissions, there is *no proof of no harm.*
In addition, the MMF was downwind of the source in question only 24% of the time during the 125 day monitoring period. As PM2.5 and PM10 were registered but not identified, there is *No proof of No harm.*

Q. Where does the other 76% of the dust emissions travel to?

The MMF was placed in the same wind direction as the Frisbee and depositional gauges that have been in situ since 2010 in Mossley. It is assumed that they are also in the wind direction of the source in question for only 24% of the time as per the MMF report.

Q. Why does the EA's '*most sophisticated*' monitoring equipment fail to identify emissions?
Q. Without identification, how do the EA know what the impacts are?
Q. Was the wrong equipment used to monitor PM2.5?(Patrick Sudlow)
Q. Where is the backup data that the monitors placed some 5 metres from residences did not have '*excessive influence*'?
Q. Why have the studies in Horwich and Mossley been undertaken during cold and wet months when the EA are aware that dust emissions are considerably worse during long, dry spells ?
Q. Why are the EA dust gauges still in the same place 2 and a half years after the MMF revealed that this position is only 24% downwind of the source in question ?
Q. Why has the EA repeatedly ignored residents requests to move the dust gauges to a predominant downwind location?

And with the MMF monitor positioned some 5 metres from residences, it is possible that the *'important'* ultrafine or nanoparticle fraction of the dust emissions would have penetrated into the homes of residents as per the HPA (2010).

An overview of the MMF studies in Horwich and Mossley was commissioned to further assess the methods used.

A. **A. Greenough B.Sc., C.Eng., M.I.Chem.E.**

Concerning Deposition Test Reports & The MMF Reports For Horwich and Mossley

Testing from 18 Sept 2009 to 27 Jan 2010 and 7 Sept 2011 to 12 Jan 2012 Respectively

*Whilst the EA have measured the amount of particulate matter (PM) pollutants, they were not **'chemically analysed'.** As a chartered chemical engineer therefore, I have a concern that the EA cannot know the extent of the danger posed, since obviously some chemical pollutants are far more*

dangerous than others. eg wood dust is a carcinogen (a) and carries the danger of cancer. They even state in the reports that no particular chemical composition is implied.
(a) (http://www.hse.gov.uk/pubns/wis23.pdf)

I understand that the call for this investigation arose from concerns of wood dust pollution, yet the deposition reports [results in mass/area] (the only 'ongoing all year round' tests) compare the results obtained with a standard based upon a mere 'nuisance level of dust generally' not a carcinogenic threat. I further understand this standard is based upon a remit that is over 31 years old of 200mg/m2/day. By doing it this way they have not investigated the health danger concerns which have been properly raised, given the residents have pointed out The World Health Organisation's recognition of wood dust as a Class 1 carcinogen since 1995. Wood dust therefore should ***not*** *be regarded as a 'mere' nuisance.*

MMF Overview - Winter Not Summer

A serious concern is the suggested assumption that the results obtained maybe typical of a yearly average when the reality is the MMF reports [results in mass/volume] tests were done in the Autumn and Winter, whereby damp and rain will more readily suppress airborne pollution concentration, whereas Spring and certainly Summer is known to give hotter and dryer weather. In my view this is an unreasonable assumption to make under these circumstances and does not address the remit of the study which was to "identify and understand the conditions that give rise to episodes of poor air quality". So, it would appear that, there has been no measurement of the concentration [mass/volume] of the carcinogenic material to which the residents are subjected under the worst conditions, only the least threatening conditions?

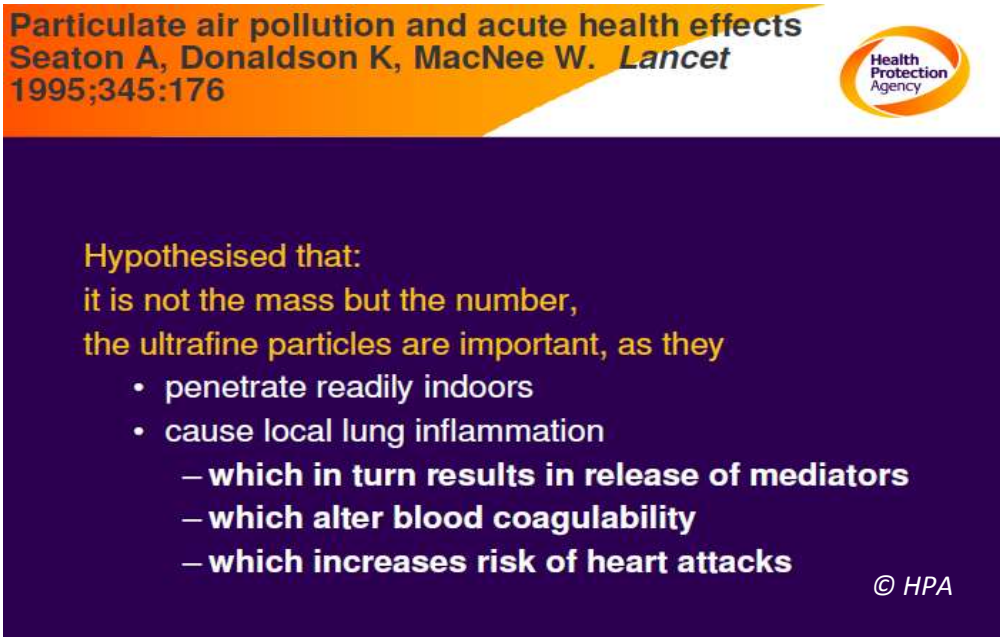
As well as this, the stated remit that The EA have, "To protect the environment", means that the regulations made in Europe shouldn't matter. They have based the study on what they CAN look for from an AQS viewpoint/dust nuisance viewpoint and indeed they did, but by doing so they missed the stated problem altogether because whilst the AQS/dust nuisance remits are, a good thing in themselves, they are ***not what this problem is about****.*

Gauges In Wrong Place?

Looking at Mossley in particular, the problem is in a valley which has eddy currents and tunnelling effects etc and the contaminated air can easily 'go around' the valley away from the monitor and then, back to the monitor, thus compromising the 'wind direction' conclusions. In my opinion gauges should be placed all around the site of interest.

Given that DeFRA have said that the majority of waste wood is contaminated and this site processes waste wood, it would appear that, the local community can legitimately conclude that the dust to which they are exposed is contaminated.

My conclusion is that The EA should be given an opportunity to answer these concerns and I would be interested to note if the answers given match the questions actually asked.'



Slide from Power Point presentation by Dr Robert Maynard
HPA 2010 - Metrology of Airborne Nanoparticles, Standardisation and Applications (MANSA)
http://www.npl.co.uk/events/measurement-network-event/8-9-jun-2010-mansa

Wood dust appears to be on bumper and inside the boot of resident's' car on regent Drive 17/5/12

8. LOCAL AUTHORITY DUST MONITORING

The following local authorities were asked which dust monitoring guidelines they use under FOI requests: Bolton MBC, Brighton & Hove City CC, Bristol CC, Cheshire West & Chester Council, Knowsley MBC, Tameside MBC
WhatDoTheyKnow - *https://www.whatdotheyknow.com/user/meag/requests*

**** The following dust monitoring results were obtained under FOI requests**

8.1 MOSSLEY - TAMESIDE MBC

Tameside Council advised that they used a range of guidelines between 1995 – 2005 whilst monitoring the site in question, including:

- *Environmental Protection Act 1990*
- *BS 1747-1:1969- Methods for the measurement of air pollution*
- *Environmental Monitoring Strategy: Ambient Air – Technical Guidance Note (Monitoring) No. M8 – EA 2000, Environment Agency Technical Guidance Note M9: Monitoring Methods for Ambient Air 2000, Technical Guidance Document (Monitoring) M17 EA 2004*

Dust monitoring reports between 2004 and 2005 indicate hazardous '*sawdust*' emissions over ***four*** times the national guideline for nuisance dust levels of 200mg/m2/day as outlined in the M17 (2004).

From **30/1/04** to **27/7/04** dust monitoring results reported exposure levels of **240, 432** and **843mg/m2/day.**
The Casella analyst states that in his opinion on occasions, the deposit consisted almost entirely of **very fine** particles of wood.

CASELLA GMSS

Exposure period : 30/01/04 - 27/02/04

Sample ref	Deposit (mg/m²/day)	J. Carrington's observations.
SG/7816	240	very large amount of sawdust-like particles.
SG/7817	18	small number of sawdust-like particles.
SG/7818	26	no sawdust-like particles.

These filters were sent for examination by scanning electron microscopy. At the time of writing no results were available.

Exposure period : 27/02/04 - 26/03/04

Sample ref	Deposit (mg/m²/day)	Ash content of deposit (%)	J. Carrington's observations.
SG/7835	168	16	very large amount of sawdust-like particles.
SG/7836	29	15	small number of sawdust-like particles.
SG/7837	25	24	no sawdust-like particles.

The ash content of a sample of sawdust submitted by yourself was 0.25%.

Based on the assumptions that the ash content of the sawdust was negligible and that the non-sawdust matter in the deposit had an ash content of 24% then the sawdust contents of the deposits of samples SG/7835 and SG/7836 were approximately 35% and 38% respectively.

Exposure period : 26/03/04 - 30/04/04

Sample ref :		Deposit (mg/m²/day)	J. Carrington's observations
SG/7835	7847	432	very large amount of sawdust-like particles.
SG/7836	7846	40	small number of sawdust-like particles.
SG/7837	7847	27	no sawdust-like particles.

J. Carrington's observations were based on a low-power microscopic examination of the deposit. I examined the deposit for sample SG/7835 using a high-power, polarised light microscope. In my opinion the deposit consisted almost entirely of very fine particles of wood.

CASELLA GMSS

Exposure period : 30/04/04 - 01/06/04

Sample ref :	Deposit ($mg/m^2/day$)	J. Carrington's observations.
SG/7872	843	very large amount of sawdust-like particles.
SG/7873	42	small number of sawdust-like particles.
SG/7874	66	no sawdust-like particles.

The deposit collected from sample SG/7872 was examined by me microscopically using a high power, polarised light microscope. In my opinion the deposit consisted almost entirely of very fine particles of wood. No particles of wood were detected in the deposits from the other two samples.

Exposure period : 01/06/04 - 29/06/04

Sample ref	Deposit ($mg/m^2/day$)	J. Carrington's observations.
SG/7883	208	large number of sawdust-like particles.
SG/7884	87	small number of sawdust-like particles.
SG/7885	65	no sawdust-like particles.

These filters were sent for examination by scanning electron microscopy. At the time of writing no results were available.

Exposure period : 29/06/04 - 27/07/04

Sample ref	Deposit ($mg/m^2/day$)	J. Carrington's observations.
SG/7835	143	large number of sawdust-like particles.
SG/7836	59	small number of sawdust-like particles.
SG/7837	34	no sawdust-like particles.

The deposit collected from sample SG/7835 was examined by me microscopically using a high power, polarised light microscope. In my opinion the deposit consisted almost entirely of very fine particles of wood.

If you require further information or advice on this matter please do not hestiate to contact me. Results of analysis by scanning electron microscopy will be forwarded as soon as possible.

Yours sincerely

Andrew Smith
Public Analyst

Dust monitoring between **3/11/04** and **5/4/05** report levels of **328** and **375mg/m2**.

The Heath Business & Technical Park, PO Box 13, Runcorn, Cheshire WA7 4QF
T +44 (0)1928 517 800 F +44 (0)1928 517 830 E info@casellagroup.com

CASELLA
CRE AIR

Test Report

Client: **Tameside MBC**
Environmental Safety & Hygiene Section
Housing & Environmental Health Division
Council Offices
Wellington Road
Ashton-under-Lyne
OL6 6DL
Contact: Mr S. Giblin

Date Received: 03/11/04
Date Reported: 08/11/04
Report Number: 04/5346/20C1
Job Number: 04/5346/20
Client Ref.: SG/7988-7990

Results Table 1

Sample Ref.	Lab. Ref.	Dry weight of deposit (g)	Deposit (mg/m2/day)
SG/7988	N251535	0.4007	328
SG/7989	N251536	0.0618	51
SG/7990	N251537	0.0466	38

Exposure period 01/10/04 to 01/11/04

Comments

Samples SG/7988 (N251535) contained a large number of sawdust-like particles, a small number of similar particles were present in SG/7989 (N251536) and none were observed in SG/7990 (N251537).

END OF REPORT

The Heath Business & Technical Park, PO Box 13, Runcorn, Cheshire WA7 4QF
T +44 (0)1928 517 800 F +44 (0)1928 517 830 E info@casellagroup.com

CASELLA
CRE AIR

Test Report

Client: **Tameside MBC**
Environmental Safety & Hygiene Section
Housing & Environmental Health Division
Council Offices
Wellington Road
Ashton-under-Lyne
OL6 6DL
Contact: Mr S. Giblin

Date Received: 05/04/05
Date Reported: 15/04/05
Report Number: 05/1648/20C1
Job Number: 05/1648/20
Client Ref.: SG/8037-8039

Results Table 1

Sample Ref.	Lab. Ref.	Dry weight of deposit (g)	Deposit (mg/m2/day)
SG/8037	N270958	0.4426	375
SG/8038	N270959	0.0118	10
SG/8039	N270960	0.0334	28

Exposure period 01/03/05 to 31/03/05

Comments

SG/8037 (4 Miller Hey, Mossley), the majority of particles observed had an appearance consistent with that of sawdust
SG/8038 (40 Regents Drive, Mossley), contained a small number of similar particles.
SG/8039 (14 Guildford Drive, Ashton-under-Lyne), contained no similar particles.

END OF REPORT

Q. Who investigated these levels of 'saw dust'?

Q. What action was taken?

The Environmental Protection Act (1990) states:

Section 79 of the Environmental Protection Act (1990) lists the types of nuisance in respect of which Local Authorities must take reasonable practicable steps to investigate complaints, as well as investigate their area from time to time for such nuisances. This includes, in relation to smoke nuisance:-

-Smoke emitted from premises so as to be prejudicial to health or nuisance;
-Fumes or gases emitted from premises so as to be prejudicial to health or a nuisance;
-Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance;

Legislation.gov.uk – Environmental Protection Act 1990.
http://www.legislation.gov.uk/ukpga/1990/43/section/79

8.2 SHOREHAM PORT- BRIGHTON & HOVE CITY COUNCIL

*** Full monitoring reports are held with Bristol City Council**
Ref: 4RS-JB-110116-R307952/VT-110116-R307951/ May 2011
4RS-VT-110546/R318126/7 Sept 2011

Brighton & Hove Council advised that they assess for dust emissions:

'having regard to the provisions Environmental Protection Act 199O. This includes assessment against the character, duration and frequency of the dust and how it affects a person in their home. When assessing dust that could be prejudicial to health it is usual practice to seek advice from Public Health England on likely standards and guidelines and any appropriate sampling methodology. This will have regard to the circumstances of the case and assessment of any possible receptors. No specific standards are detailed in the Act'.

Although the following dust monitoring reports were undertaken by the Shoreham Port authorities* directly and not Brighton & Hove Council, it is assumed that they have been accepted by the council as evidence, as they have been used to assess any impact. The dust testing in **May 2011** looked at the loading of Biomass at the port, worker exposure and dust samples on and off the port.
The dust samples contained:
Aluminium, calcium, carbon, oxygen, Iron, silicon and sulphur

As the date received on the following lab results WK11-5537 is **9/9/10**, it is assumed this relates to the testing from May, and not to further monitoring commencing 22/9/11- 26/9/11.

RPS Laboratories

UKAS

Test Certificate Date 10/10/2011

Client	London & Brighton Plating 100 North Street Portslade Brighton BN41 1DG	Order No.	105LBP
		Certificate No.	WK11-5537
		Issue No.	1
Contact		Date Received	09/09/2011
Description	1 bulk sample for analysis	Technique	ICP

Sample No.	664252	Bulk sample	Method
Arsenic	18 µg/g		In house(N)
Benzo(a)pyrene	<2.5ug/g µg		G6(N)
Cadmium	0.7 µg/g		In house(N)
Chloride	864 µg/g		In house(N)
Chromium	18 µg/g		In house(N)
Copper	32 µg/g		In house(N)
Cresol	<50ug/g µg		P1(U)
Fluoride	<1 µg/g		In house(N)
Formaldehyde	49 µg/g		In house(N)
Iron	1725 µg/g		In house(N)
Lead	431 µg/g		In house(N)

Page 1 of 2

RPS Laboratories Ltd. Unit 12. Waters Edge Business Park. Modwen Road. Salford. M5 3EZ
Tel: (0161) 872 2443 Fax: (0161) 877 3959

The 2nd dust testing period was 22nd 23rd & 26th September, 2011. The dust samples contained: **Aluminium, calcium, carbon, chlorine, iron, oxygen, potassium, silicon, sodium, sulphur and zinc.**

COMPARISON OF FIVE DUST SAMPLES FROM SHOREHAM PORT

Table 1 Qualitative Analysis

Date of analysis: 22nd -23rd & 26th September 2011

[illegible] Sample No.	Sample Description	Elements Detected
110546/140911/1	Brighton Bulk Terminal, Shoreham Port BN41 1WF Bio-mass Wood Chip	Carbon, oxygen, aluminium, silicon, sulphur, chlorine, potassium, calcium and iron
110546/140911/2	Silo Terminal Shoreham Port BN41 1WF - eastern side of a silo Grain	Carbon, oxygen, aluminium, silicon, sulphur, chlorine, potassium, calcium, iron and zinc
110546/140911/3	Bright & London Plating Company, North Street, Portslade, Brighton BN41 1DG Wet Dust Sample	Carbon, oxygen, aluminium, silicon, calcium and iron
110546/140911/4	Silo Terminal, Shoreham Port BN41 1WF - western side of silo office	Carbon oxygen, sodium, aluminium, silicon, chlorine, potassium, calcium and iron
110546/140911/5	Rombus Terminal, Shoreham Port BN41 1WF - south west corner perimeter fence Dust	Carbon, oxygen, aluminium, silicon, chlorine, potassium, calcium and iron

9. THE VALLEY EFFECT ON DUST EMISSIONS

Oxford Dictionary Definition:
Topography – A detailed description or representation on a map of the physical features of an area.

An internet search of the valley effect on dust emissions led to the UK's Air-quality.org website, which outlines how topography and weather conditions can play a key role in air pollution.

Topography:

- *Concentrations of pollutants can be greater in valleys than for areas of higher ground*
- *Pollutants can become trapped in low lying areas, eg: valleys, in certain conditions*
- *Pollution levels can build up due to lack of wind and dispersion on still sunny days or cold calm foggy days during the winter*
- *Wintertime smogs can occur in cities surrounded by hills*
- *Pollution may become trapped in a valley following clear cloudless nights with cold air becoming trapped by a layer of warmer air above the valley*

Weather Conditions:

- *The weather effects air pollution levels*
- *Windy weather causes dispersion, still weather allows a build up of pollution*
- *Coastal locations experience better air quality due to windy weather*
- *Wind direction also affects air pollution*
- *Sunshine can affect pollution levels, particularly on hot summer days, eg: vehicles and ozone*
- *Air pressure can affect whether pollution levels build up eg: in high pressure with still air*
- *Low pressure systems bring wet and windy weather which disperses or washes pollutants out of the atmosphere*

Clean air in the UK *http://www.air-quality.org.uk/06.php*

Another web search of *outdoor air pollution + valley* led us to a WHO report from July 2008.

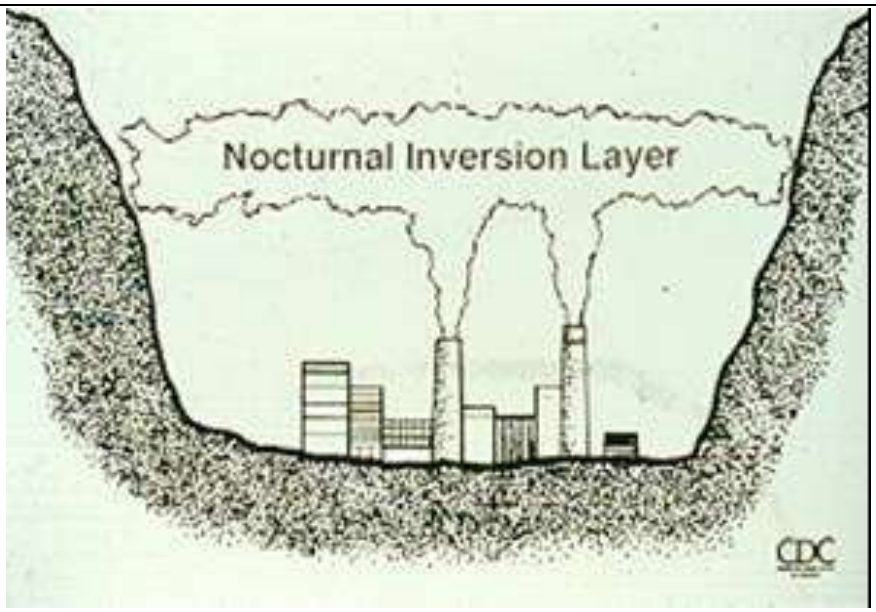
- *Air pollution levels are closely linked to climate and topography*
- *Air pollution episodes can be particularly troublesome if the affected area is situated in a valley surrounded by mountains*
- *An inversion layer prevents the mixing of warm and cold air as the warmer air rises, which traps dangerous concentrations of pollutants in the cool air below causing dense smog over urban areas.*

OUTDOOR AIR POLLUTION (2008) - Children's health and the Environment
http://www.who.int/ceh/capacity/Outdoor_air_pollution.pdf

What is an inversion layer?- An inversion layer is an area where the normal decrease in air temperature with increasing altitude is reversed. Inversion layers block atmospheric flow causing air under an inversion area to become stable, trapping pollutants at ground level instead of circulating them away.

About Education – Temperature Inversion Layers

http://geography.about.com/od/climate/a/inversionlayer.htm



CDC – image from WHO report ©

What is Katabatic flow? **-** Any flow/wind blowing down an incline in topographic terrain due to colder temperatures of the moving air mass (density) compared to the surrounding air.

http://www.geog.ubc.ca/courses/geob300/glossary/index.html

Mossley valley (image provided by local professor)

The above image of *'Bottom'* Mossley valley was emailed to the **Met Office** asking if the image depicted an inversion layer. The following response was received 15/4/14:

'It certainly appears to be a fairly classic inversion set up. What you find in valleys is that as air cools in the evening/overnight it flows downhill as it is denser (heavier). It then collects in the lowest points of the surrounding topography - the valleys. If you look at the temperature from the bottom of the valley to the top, the coldest temperatures tend to be at the base of the valley and the temperatures go up as you climb higher- this is known as an inversion (so called as the temperatures change in the opposite manner than we would normally expect with regards to height- it would normally cool).
You quite often find this cold air drainage, also known as Katabatic flow, can cause fog to form in the valleys as the air reaches its dew point (the temperature needed for gaseous water to become a liquid)- something I believe is occurring in the attached photograph in the original email.
Mention is also made of the different wind speeds that can occur with this phenomenon. Normally we would expect that these form, at least initially, in very light winds (generally accompanied by clear skies)- strong winds tend to mix the air about, destroying the inversion. However, once the inversion is set up, the wind can speed up quite dramatically below the inversion, which can lead to some quite spectacular eddy formations within the fog layer.'

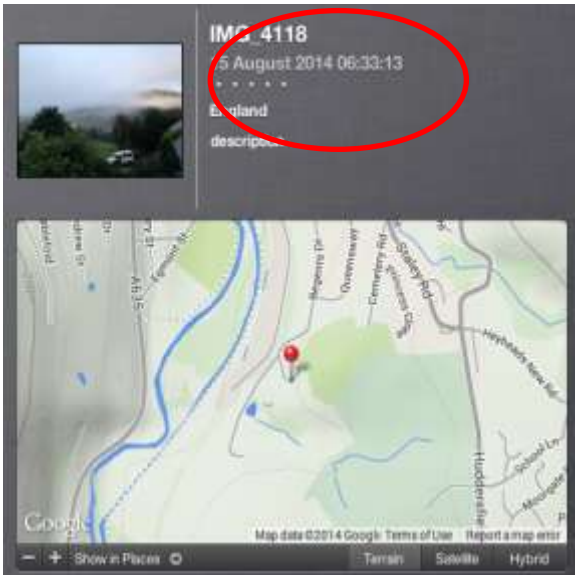
This assertion matches the EA's statement in the 45 day report in 2010 that the valley
'Would most likely act as a funnel, or shelter the area and create swirls and eddies'.

The following images were taken on 15/8/14.

Q. Do they depict an inversion layer?

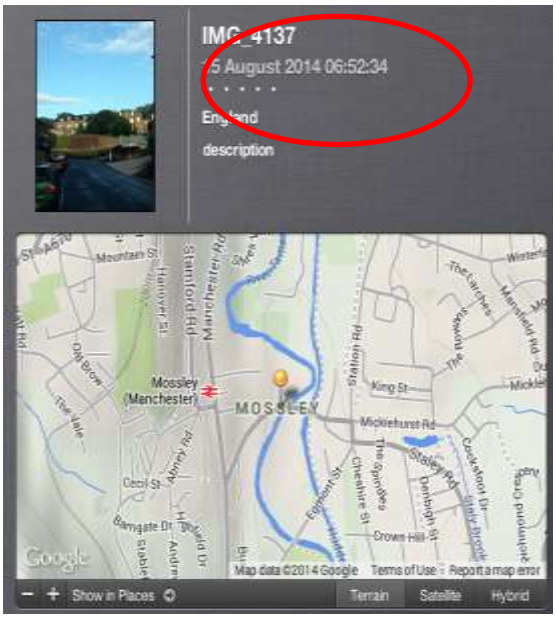
Miller Hey Cottages 06.32am

Miller Hey valley 06.33am



Regent Drive 06.48am

Waggon Road 06.52am

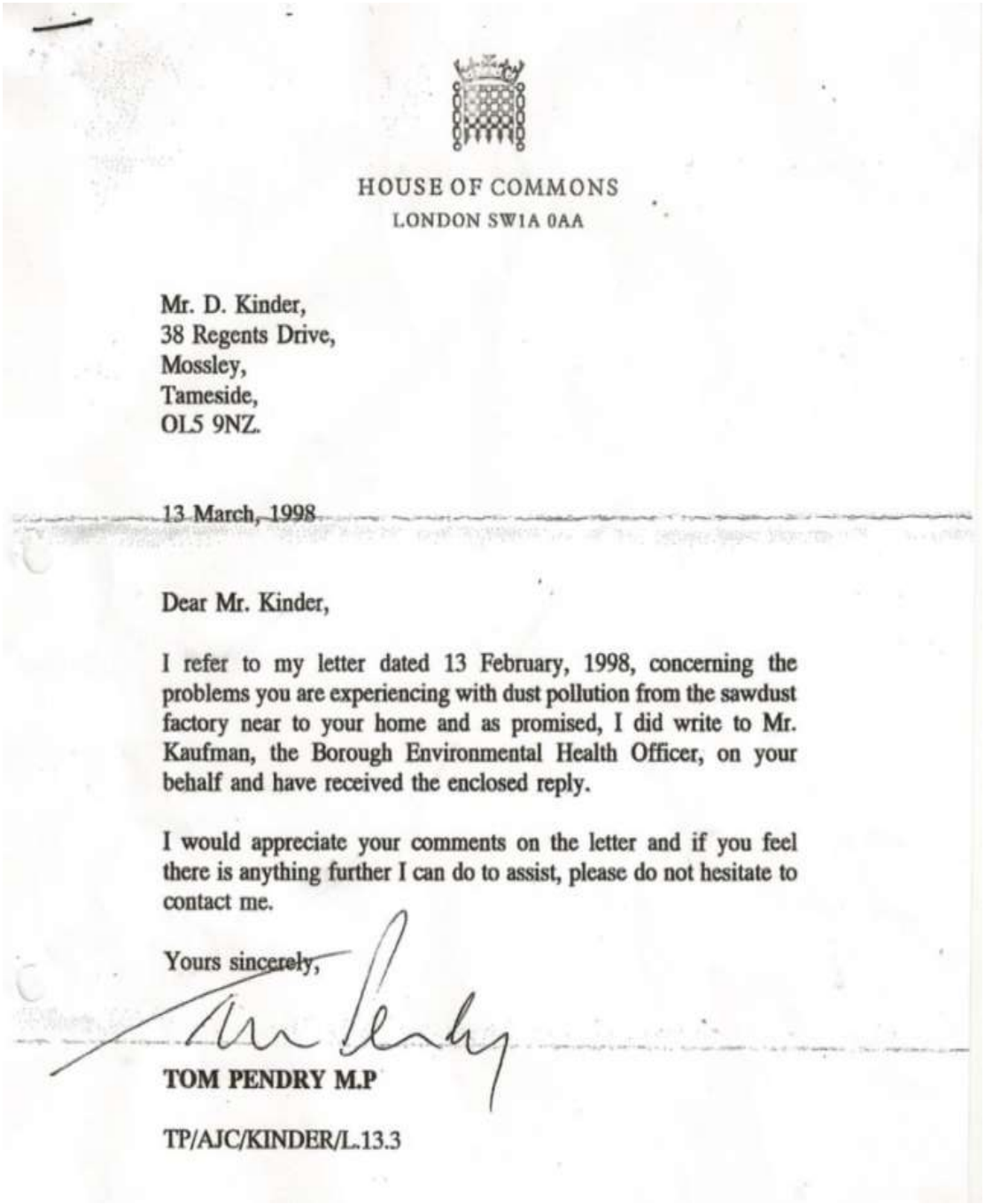


Images taken on Winterford Road 07.07 – 07.12 looking into the valley

Q. Have the authorities considered the valley effect on concentrations of dust emissions and any impact on local residents?

10. WHO HAS BEEN NOTIFIED OF COMMUNITY CONCERNS?

Communities across the country have reported their concerns about (waste) wood dust emissions to the Environment Agency, Local Authorities and MP's, to GP's, the Health Protection Agency and the PCT- Primary Care Trust, now under the umbrella of PHE (Public Health England). The earliest documented correspondence is 1998 in Tameside.



HOUSE OF COMMONS
LONDON SW1A 0AA

Mr. D. Kinder,
38 Regents Drive,
Mossley,
Tameside,
OL5 9NZ.

13 March, 1998

Dear Mr. Kinder,

I refer to my letter dated 13 February, 1998, concerning the problems you are experiencing with dust pollution from the sawdust factory near to your home and as promised, I did write to Mr. Kaufman, the Borough Environmental Health Officer, on your behalf and have received the enclosed reply.

I would appreciate your comments on the letter and if you feel there is anything further I can do to assist, please do not hesitate to contact me.

Yours sincerely,

TOM PENDRY M.P

TP/AJC/KINDER/L.13.3

This letter was emailed to DEFRA in December, 2012.

Letter to Lord de Mauley – Chairman of Defra (Amended)

Lord de Mauley
Parliamentary Under Secretary of State
Defra
Nobel House
17 Smith Square
London
SW1P 3JR

Cc: The Prime Minister, David Cameron.

28th December 2012.

Re: Wood dust – simply a nuisance or something much worse?

Dear Lord de Mauley,

Following The World Health Organisation's Asturias Pledge on the 18th March 2011, we wish to 'alert' you to potential harm from waste wood recycling and processing.
There are a number of communities across the UK reporting similar health issues which we believe are caused by dust in and around our homes from this industry. These include nosebleeds, nasal erosion, Rhinitis, breathing difficulties, chest infections, headaches, and nose and eye irritations.

We are concerned that DEFRA uses a guideline of 200mg/m2 for nuisance dust from a 1983 document for the British Coal Board to monitor dusty ports, 12 years after wood dust was classed as a Group 1 carcinogen along with asbestos by the IARC (International Agency for the Research on Cancer) in 1995. As well as being a cancer causing agent, wood dust can also cause autoimmune diseases.

Why does DEFRA class a Carcinogen as a nuisance ?
Why is the EA using 30 year old guidelines ?

We ask that the Government learn from history, as it has in relation to cigarette smoking and asbestos, and seek 'early lessons from early warnings' with wood dusts.
We ask you to review current guidelines in relation to wood dust and waste wood emissions, and we urge you to employ the Precautionary Principle and not wait for a 'body count'.

'The right to the highest attainable standard of health is a human right under International human rights law.'
There can be no Plausible Deniability.
Yours sincerely

11. RESULTS OF INDEPENDENT DUST TESTING

Mossley residents have been collecting dust samples since 2009 due to residents' health concerns, with a view to gathering evidence for future reference. The continued failure by the EA to quantify and identify dust emissions, has led to independent dust sampling across the country. These residents are asking:

Q. Where have the emissions of wood dust/heavy metals and other contaminants come from?

Q. Is this dust the cause of reported health issues?

The following organisations were used for dust analysis:
Levington Laboratories – Suffolk
SAL (Scientific Analysis Laboratories) Ltd – Manchester
WHD Microanalysis Consultants Ltd – Suffolk (on behalf of Levington Labs)

The rationale for sampling was to identify dust particles using ICP-OES to replicate EA techniques. We examined the list of metals in the EA dust results in Mossley from Nov 2010 and June 2012 and cross referenced known contaminants from the PAS 111 WRAP study of 2012. We added arsenic, formaldehyde and asbestos on occasions, but due to cost were unable to maintain the identification of these contaminants. However it is hoped that we will obtain financial backing to undertake ***full*** chemical analysis of all known contaminants associated with waste wood processing in existing and ongoing dust and soil samples from affected communities in the near future, and to continue research into the impact of the waste wood industry in general.

In addition to ICP-OES analysis, we used SEM (Scanning Electron Microscopy), which identified particles below PM10 to ascertain whether hazardous sized particles with no known safe level of exposure were present in and around resident's homes.
http://science.howstuffworks.com/scanning-electron-microscope.htm
Furthermore, where financially possible, we identified whether wood dust (lignin or cellulose) was present, as well as CCA (Copper, Chromium, Arsenate) which will still be in the waste wood stream for many years to come. We also identified heavy metals and metalloids, known contaminants within waste wood (PAS 111). It is not known whether the samples contained chromium III or VI at this stage. Ongoing tests are aimed to further distinguish this factor.

Samples were collected in a clean pot using a new brush where a minimum of 1 gramme was necessary for testing. Other samples were collected using cellotape and sealed in a clean container. Cellotape is used in forensic science to collect samples:
Unit 3: Forensic science (level 2) - *http://www.ocr.org.uk/Images/71859-unit-03-forensic-science.pdf*

Where possible a photo or video was taken to document the samples being collected at private residences.

Testing at SAL LTD for heavy metals and metalloids

Date		Aluminium	Arsenic	Asbestos	Cadmium	Chromium	Copper	Formaldehyde	Lead	Magnesium	Mercury	Sulphates (total)	Zinc
	Avonmouth Docks												
2012	313982 (O)	3100	13	**ND**	6	**NT**	91	320	390	2900	**NT**	**NT**	990
29/6/13	338847 (I)	6100	33	**NT**	37	73	240	**NT**	2500	5500	<0.1	**NT**	6200
	Frodsham	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Horwich	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Mossley												
24/3/11	312721 (O)	3600	4	**ND**	<1	49	21	10	73	2400	**NT**	0.90	350
27/2/13	319254 (I)	2400	<1	**ND**	<1	49	34	NT	13	450	**NT**	5.9	160
6/4/13	324575 (I)	4700	2	**NT**	<1	78	330	20	73	5400	<1	2.2	440
5/6/13	338848 (I)	1500	6	**NT**	6	42	150	**NT**	390	1300	<0.1	**NT**	1100
6/6/13	335297 (I)	7300	5	**NT**	2	110	230	**NT**	150	2300	<0.1	**NT**	760
27/8/13	347910 (I)	6100	4	**NT**	<1	24	160	**NT**	55	**NT**	<1	**NT**	1400
27/7/14	**Shoreham Port** (O)	4000	6	**NT**	<1	28	100	**NT**	110	4200	<1	**NT**	490

*** NT (not tested) ND (not detected) I (Indoor) O (Outdoor)**

11.1 Avonmouth Docks

proofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoporoofofnoharmnoproofofnoharmnoproofofnohrmnoproofofnoharmno

The first independent sample collected was at a residential home in Poole Street from an outside windowsill and recycling box over several weeks at the end of 2012. Chromium was omitted from the list to be detected in **error**.

noproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoproofofnoharmnoporoofofnoharmnoproofofnoharmnoproofofnohrmnoproofofnoharmno

SAL Reference: 313982
Customer Reference:

Bulk Product Analysed as Bulk Product
Miscellaneous

SAL Reference	**313982 001**
Customer Sample Reference	**DUST SAMPLE**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Asbestos Bulk ID	PLM			SU	Asbestos not detected -
Formaldehyde	HPLC	1	mg/kg	N	**320**

SAL Reference: 313982
Customer Reference:

Bulk Product Analysed as Bulk Product
Bulk Product Suite 1

SAL Reference	**313982 001**
Customer Sample Reference	**DUST SAMPLE**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**3100**
Arsenic	ICP/OES	1	mg/kg	N	**13**
Cadmium	ICP/OES	1	mg/kg	N	**6**
Copper	ICP/OES	1	mg/kg	N	**91**
Lead	ICP/OES	1	mg/kg	N	**390**
Magnesium	ICP/OES	1	mg/kg	N	**2900**
Zinc	ICP/OES	1	mg/kg	N	**990**

A second dust sample was taken from a front window **29/6/13** at nearby King Street to include Chromium.

SAL Reference:	338847
Project Site:	29/6/13 FRONT ROOM WINDOW
Customer Reference:	IAN ROBINSON, AVONMOUTH
Bulk Product	Analysed as Bulk Product
Bulk Product Suite 2	

SAL Reference	**338847 001**
Customer Sample Reference	**29/6/13 FRONT ROOM WINDOW**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**6100**
Arsenic	ICP/OES	1	mg/kg	N	**33**
Cadmium	ICP/OES	1	mg/kg	N	**37**
Chromium	ICP/OES	1	mg/kg	N	**73**
Copper	ICP/OES	1	mg/kg	N	**240**
Lead	ICP/OES	1	mg/kg	N	**2500**
Magnesium	ICP/OES	1	mg/kg	N	**5500**
Mercury	CVAFS (HF Digest)	0.1	mg/kg	N	<0.1
Zinc	ICP/OES	1	mg/kg	N	**6200**

Index to symbols used in 338847-1

Value	Description
AR	As Received
N	Analysis is not UKAS accredited

Dust in fish pond and on resident's car in Avonmouth Docks

11.2 FRODSHAM – Cheshire West & Chester Council

Further to being contacted by residents in Frodsham, advice was given to enable collection of a sample. Although on this occasion the association is not waste wood, it does relate to concerns of emissions from wood recycling/reprocessing which converts '*clean wood*' into products for composting, landscaping, animal bedding and fuel amongst other products. As wood dust is a group 1 carcinogen, with no known safe level of exposure and with reports of health symptoms similar to other communities, it was felt that we should assist the concerned residents where possible. It is

understood from Cheshire West and Chester council Environmental officers, that the company processes spruce pine.
The sample was collected on **15/5/13**. Independent advice was to bulk test for Semi- Volatile Organic Compounds:

SAL Reference: 335967
Customer Reference:

Bulk Product Analysed as Bulk Product
Miscellaneous

					SAL Reference	335967 001
					Customer Sample Reference	DON GIBSON 15/5/13 SPRUCE PINE
					Test Sample	AR
Determinand	Method	LOD	Units	Symbol		
Semi-Volatile Organic Compounds (Top 10 screen)	GC/MS	10	mg/kg	N	1R-.alpha.-Pinene	37
					Alpha-Phellandrene	23
					Para Cymene	16
					Unidentified aliphatic hydrocarbon circa C20	17
					Sitosterol	22
					2-Thujene	23
					1,3,3-trimethyltricyclo[2.2.1.0(2,6)]heptane	19
					Series of unidentified aliphatic hydrocarbon containing O circa C20	36
					Callitrisic acid	84
					Stigmast-4-en-3-one	25
					No other compounds detected above	10

Index to symbols used in 335967-1

Value	Description
AR	As Received
N	Analysis is not UKAS accredited

11.3 Kirkby

A sample was taken for SEM analysis on **4/5/12** from the front windowsill of a house in Quernmore Road on the Northwood estate.

Dust is collected at Quernmore Road

WHD Microanalysis Consultants Ltd.

WHD Microanalysis Consultants Ltd
Iken House
8 Acer Road, Rendlesham
Woodbridge
Suffolk IP12 2GA
United Kingdom

Tel: +(0)1394 420943
Fax: +(0)1394 420951
Email: ceminfo@whd.co.uk
www.whd.co.uk

Examination of environmental dust sample by scanning electron microscopy

Client:	Levington Laboratories
WHD Sample No.	H779-036-3
WHD Report No:	1533
Report Date	27th February 2013
Client Reference:	MEAG: 7 Queenmore Road 4/5/12
Test Method	See summary below

Summary: Principal components identified

Organic material, some of which resembled wood fibre; feldspar, limestone, silica, sodium chloride and other minerals.

Background and Summary of Test Method

A sample of dust was examined to determine its composition. The dust sample was supplied attached to adhesive tape.

A specimen was prepared by cutting out a piece of the tape with adhering dust and attaching it to a specimen stub using double-sided conductive adhesive tape, a specialised tape used to prepare specimens for electron microscopy. The specimen was first examined using a stereo microscope at x30 magnification, then a scanning electron microscope (SEM).

The scanning electron microscope produces detailed black-and-white images. Additionally, either individual particles or the whole specimen can be analysed using X-ray microanalysis to indicate the particle types present on the basis of their elemental composition.

A thin conductive coating of carbon was applied to the specimen by evaporation under vacuum prior to examination in the scanning electron microscope (SEM).

Results

Stereo Microscope

Using the stereo microscope (x30), the dust adhering to the tape appeared to be composed of a mixture of organic material comprising cellulose and man-made fibres up to several millimetres in length (Figure 1). More compact, brown, particles that appeared

mainly organic were also present. Numerous mineral particles were visible, mainly less than 100µm across but occasionally larger, and scattered fragments of what appeared to be green bottle glass. No further diagnostic detail was apparent at his magnification.

Scanning electron microscopy and X-ray microanalysis

SEM images and X-ray spectra are shown in Figures 2-6.

The SEM images showed a mixture of organic and inorganic material, as shown by the stereo microscope. The cellulose fibres resembled wood. The nature of the compact brown particles (as viewed in the stereo microscope) was unclear; one possibility was that they were mostly soil. The proportion of organic to inorganic material was estimated from the SEM images to be broadly similar by volume.

In order to obtain a very approximate indication of the nature of the inorganic (mineral) material, particles were analysed individually and the mineral types inferred from their X-ray spectra. The most common mineral types were feldspar, limestone, silica, sodium chloride, and a mineral that may have been augite. Also present were particles of iron-rich material (probably mainly iron oxide), zircon, man-made fibres typical of insulation fibres, flyash, titanium (oxide or metal), aluminium oxide, potassium and sulphur, calcium sulphate, dolomite and slag.

The backscattered electron image is sensitive to the atomic number of a pure element, or the mean atomic number of a compound, comprising a particle in the specimen. For example, a particle of limestone will appear brighter than a cellulose fibre, and a particle of lead will appear brighter than one of limestone. Using this characteristic of the image, it is possible to search for particles rich in elements of high atomic number, as these appear bright in the image. Small particles only a micron or so across can be detected and then analysed. This procedure was adopted and ten individual particles were analysed.

Iron-rich particles appeared bright in the SEM image; these were numerous but were not counted, as they were not considered to be of particular interest unless they also contained sulphur. Particles containing sulphur were counted, as this was an element of interest to the client. Particles detected were: lead (1); tin (1); barium sulphate (2); tungsten, nickel and chromium (3); lanthanum and cerium (3). Most of these particles were less than 2µm across except the barium sulphate particles, which were typically less than 10µm across. Many of these particles were located on larger particles of different composition; it was unclear whether they were adhering, suggesting a common origin, or situated adventitiously.

It should be stressed that the distribution of dust on the tape supplied was uneven, with both heavily-loaded areas and blank areas. A uniform mix of particle types cannot be assumed and it is possible that other particle types may be observed in a repeat examination using dust from a different part of the tape.

Conclusion

This dust consisted of organic and inorganic material in very approximately equal proportions by volume. The organic material included fibres, some of which resembled wood fibre, and other organic particles that may have been soil but which could not be identified conclusively. The inorganic material was principally silica, limestone, feldspar, sodium chloride and a mineral that had a similar composition to augite. Other mineral types were also present.

Very small particles containing lead, lanthanum, cerium, barium and other heavier elements were also detected, but due to their small size these represented only a very small proportion of the total dust.

Figure 1 Stereo microscope image of dust on tape, showing scattered fibres, much brown material and numerous clear, white and pink mineral particles. A fragment of green glass is also visible.

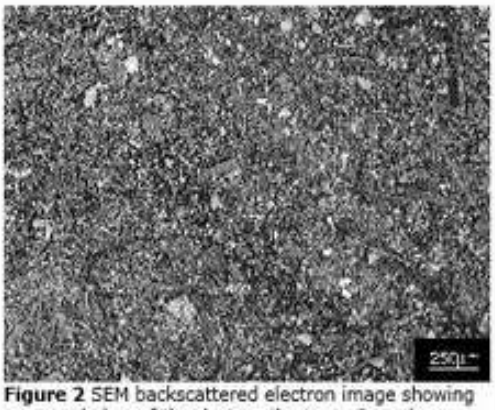


Figure 2 SEM backscattered electron image showing a general view of the dust on the tape. Organic material is dark grey; brighter features are mineral particles. Fibres are up to ~0.5mm in length.

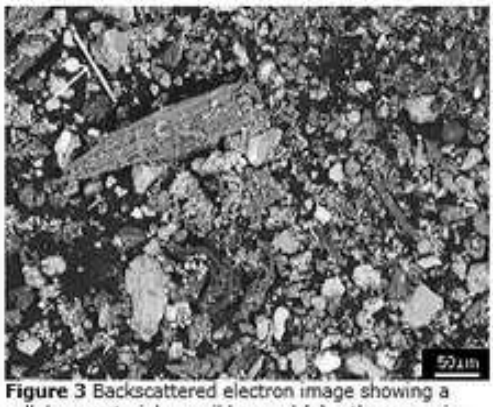


Figure 3 Backscattered electron image showing a cellulose material, possibly wood (c), other organic particles (dark grey), a man-made mineral fibre (arrowed) and numerous mineral particles (light grey/white).

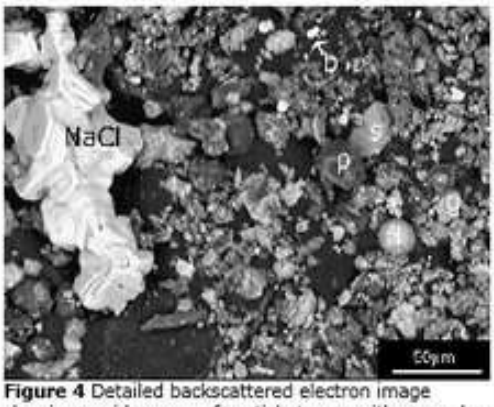


Figure 4 Detailed backscattered electron image showing a wide range of particle types, with examples labelled: a large particle composed of sodium chloride (NaCl), a pollen grain (p), flyash (fl), gypsum (g), barium sulphate (b), silica (s).

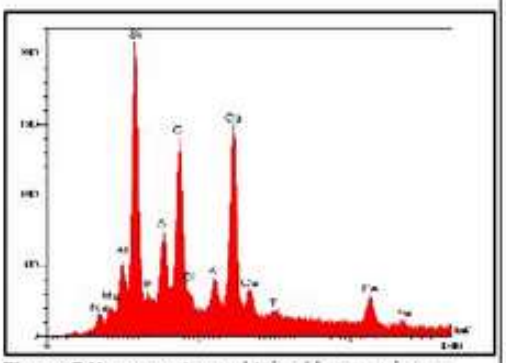


Figure 5 X-ray spectrum obtained by scanning an area of the specimen. The principal elements indicated are silicon, chlorine and calcium. Weaker peaks are due to aluminium, sulphur, phosphorus, magnesium, sodium, potassium, titanium and iron.

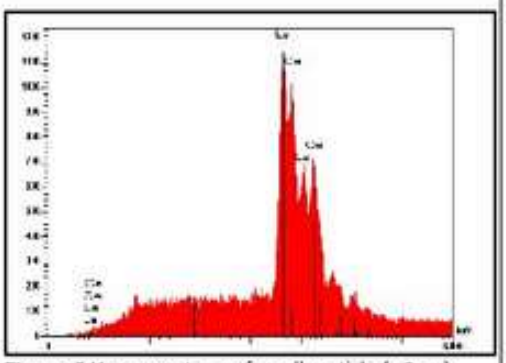


Figure 6 X-ray spectrum of small particle (~2μm) containing lanthanum and cerium.

11.4 Mossley

A sample was taken from a side window sill on 28/4/10.

Window sill 28/4/10

LEVINGTON LABORATORIES

Incorporating Suffolk Soils

Iken House, 8 Acer Road
Rendlesham, Woodbridge
Suffolk, IP12 2GA

☎ 01394 421128 | 01394 420951 | 07784 314592 | rongreen@levington.com

Mossley Environmental Action Group
5 Miller Hey
Mossley
Lancashire
OL5 9PP

REPORT: H779050 **PROJECT:** 779

TITLE: Bulk Dust Sample – 38 Regent Drive.

DETAILS: A sample of dust, reportedly collected from 38 Regent Drive, was received at our laboratory on the 05 February 2013. The dust sample was examined briefly by optical microscopy and was then submitted for ICP-OES analysis. The results of the examination and analysis are given below.

SAMPLE: The following sample was received in a small plastic screw top container:

Lab Ref: H779-036-1 Bulk Dust labelled 38 Regent 28/4/10 @ 2.35pm

The sample was initially examined using 30x stereo optical microscopy.

The sample was found to contain fibrous material together with silica sand and other particulate material.

A small bundle of the fibres was placed on a glass microcope slide in RI 1.55 solution.

The fibre bundle was examined using Polarised Light Microscopy (PLM) (cross polars 1st order red tint) at 125x magnification.

The fibres observed had the characteristics of organic (cellulose) fibres.

Figure 1: Initial examination of sample by Optical Microscopy.

METHOD: The sample was digested into mineral acids and concentrations in the extract were measured by ICP-OES.

RESULTS: The results of the ICP-OES analysis are given in Table 1.

Table 1: ICP-OES Results

Lab Ref No		H779-036-1
Sample		38 Regent
Aluminium as Al	µg/g	4640
Arsenic as As	µg/g	<50
Cadmium as Cd	µg/g	<2
Chromium as Cr	µg/g	24
Copper as Cu	µg/g	147
Lead as Pb	µg/g	239
Magnesium as Mg	µg/g	5240
Sulphur as S	µg/g	38800

NOTES:

(i) ICP-OES analysis was sub-contracted to a UKAS accreditted laboratory

(ii) The total weight of sample received was 0.1462g

(iii) Results are reported as total extractable concentrations for each element in the sample as received

(iv) Limits of detection were elevated due to the small amount of sample received

(v) µg/g is equivalent to parts per million (ppm)

(vi) < = less than

COMMENT: No information was given as to how the sample was collected and therefore the results of the ICP-OES analysis have been reported only as total concentrations within the sample.

It is not known how representative the sample was of the accumulated dust at the time of the sampling (Sample dated 28/4/10).

The analytical method used was destructive and due to the small amount of sample received, it was not possible to retain any of the sample.

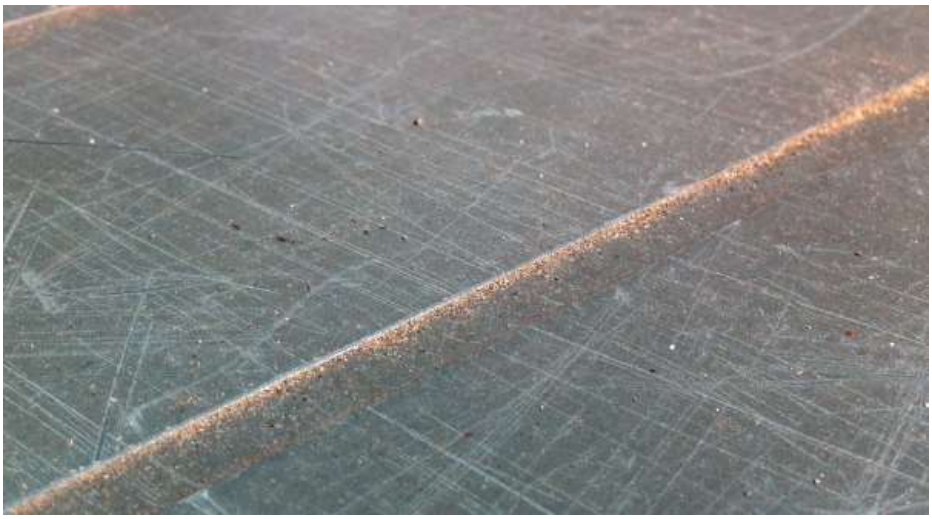
Report Prepared By:
R. O. Green MSc MRSC
Levington Laboratories

Date:
19 February 2013

SAL (Scientific Analysis Laboratories)

Numerous Mossley samples have been analysed by SAL Ltd in Manchester, using ICP-OES to replicate EA testing.

A dust sample was taken from a rear garden table on 24/3/11**.** A sample taken simultaneously with the EA at the Miller Hey garage on 9/2/10 was insufficient for analysis.



Dust on garden furniture:

SAL Reference: 312721
Customer Reference:

Bulk Product — Analysed as Bulk Product
Miscellaneous

					SAL Reference	312721 001	312721 002
					Customer Sample Reference	MARK'S CAR	40 REGENT
					Test Sample	AR	AR
Determinand	Method	LOD	Units	Symbol			
Asbestos Bulk ID	PLM			SU	Asbestos not detected -	Asbestos not detected -	
Formaldehyde	HPLC	1	mg/kg	N	-	10	

SAL Reference: 312721
Customer Reference:

Bulk Product — Analysed as Bulk Product
Bulk Product Suite 1

					SAL Reference	312721 002
					Customer Sample Reference	40 REGENT
					Test Sample	AR
Determinand	Method	LOD	Units	Symbol		
Aluminium	ICP/OES	1	mg/kg	N		3600
Arsenic	ICP/OES	1	mg/kg	N		4
Cadmium	ICP/OES	1	mg/kg	N		<1
Chromium	ICP/OES	1	mg/kg	N		49
Copper	ICP/OES	1	mg/kg	N		21
Lead	ICP/OES	1	mg/kg	N		73
Magnesium	ICP/OES	1	mg/kg	N		2400
Sulphate (Total)	ICP/OES	0.01	%	N		0.90
Zinc	ICP/OES	1	mg/kg	N		350

Index to symbols used in 312721-1

Value	Description
AR	As Received
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

A sample was taken from the main bedroom of a house on Staley Road **27/2/13.**

SAL Reference: 319254
Customer Reference:

Bulk Product — Analysed as Bulk Product
Miscellaneous

SAL Reference	319254 001
Customer Sample Reference	PHIL R STALEY RD 27/2/13
Test Sample	AR

Determinand	Method	LOD	Units	Symbol	
Asbestos Bulk ID	PLM			SU	Asbestos not detected

SAL Reference: 319254
Customer Reference:

Bulk Product — Analysed as Bulk Product
Bulk Product Suite 1

SAL Reference	**319254 001**
Customer Sample Reference	**PHIL R STALEY RD 27/2/13**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**2400**
Arsenic	ICP/OES	1	mg/kg	N	<1
Cadmium	ICP/OES	1	mg/kg	N	<1
Chromium	ICP/OES	1	mg/kg	N	**49**
Copper	ICP/OES	1	mg/kg	N	**34**
Lead	ICP/OES	1	mg/kg	N	**13**
Magnesium	ICP/OES	1	mg/kg	N	**450**
Sulphate (Total)	ICP/OES	0.01	%	N	**5.9**
Zinc	ICP/OES	1	mg/kg	N	**160**

Index to symbols used in 319254-1

Value	Description
AR	As Received
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

A dust sample was taken at Miller Hey on **6/4/13** off the TV stand in the living room.

TV stand 27/1/13

Kitchen window after rain 24/12/10

SAL Reference: 324575
Customer Reference:

Bulk Product Analysed as Bulk Product
Miscellaneous

SAL Reference	**324575 001**
Customer Sample Reference	**5 MILLER HEY 6/4/13**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Asbestos Bulk ID	PLM			SU	Asbestos not detected -
Formaldehyde	HPLC	1	mg/kg	N	**20**

SAL Reference: 324575
Customer Reference:

Bulk Product Analysed as Bulk Product
Bulk Product Suite 1

SAL Reference	**324575 001**
Customer Sample Reference	**5 MILLER HEY 6/4/13**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**4700**
Arsenic	ICP/OES	1	mg/kg	N	**2**
Cadmium	ICP/OES	1	mg/kg	N	<1
Chromium	ICP/OES	1	mg/kg	N	**78**
Copper	ICP/OES	1	mg/kg	N	**330**
Lead	ICP/OES	1	mg/kg	N	**73**
Magnesium	ICP/OES	1	mg/kg	N	**5400**
Mercury	ICP/OES	1	mg/kg	N	<1
Sulphate (Total)	ICP/OES	0.01	%	N	**2.2**
Zinc	ICP/OES	1	mg/kg	N	**440**

Index to symbols used in 324575-1

Value	Description
AR	As Received
S	Analysis was subcontracted
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Another sample was taken indoors on Regent Drive from a rear bedroom/office 5/6/13.

SAL Reference: 338848
Customer Reference: 40 REGENT DRIVE, BACK BEDROOM / OFFICE 5/6/13

Bulk Product Analysed as Bulk Product
Bulk Product Suite 2

SAL Reference	**338848 001**
Customer Sample Reference	**40 REGENT DRIVE, BACK BEDROOM / OFFICE 5/6/13**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**1500**
Arsenic	ICP/OES	1	mg/kg	N	**6**
Cadmium	ICP/OES	1	mg/kg	N	**6**
Chromium	ICP/OES	1	mg/kg	N	**42**
Copper	ICP/OES	1	mg/kg	N	**150**
Lead	ICP/OES	1	mg/kg	N	**390**
Magnesium	ICP/OES	1	mg/kg	N	**1300**
Mercury	CVAFS (HF Digest)	0.1	mg/kg	N	<0.1
Zinc	ICP/OES	1	mg/kg	N	**1100**

Index to symbols used in 338848-1

Value	Description
AR	As Received
N	Analysis is not UKAS accredited

An indoor sample was taken from main bedroom on Regent Drive 6**/6/13**.

SAL Reference: 335297
Customer Reference:

Bulk Product Analysed as Bulk Product
Bulk Product Suite 2

SAL Reference	**335297 003**
Customer Sample Reference	**SAMPLE 4 - 8 REAGENT DRIVE**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**7300**
Arsenic	ICP/OES	1	mg/kg	N	**5**
Cadmium	ICP/OES	1	mg/kg	N	**2**
Chromium	ICP/OES	1	mg/kg	N	**110**
Copper	ICP/OES	1	mg/kg	N	**230**
Lead	ICP/OES	1	mg/kg	N	**150**
Magnesium	ICP/OES	1	mg/kg	N	**2300**
Mercury	CVAFS (HF Digest)	0.1	mg/kg	N	<0.1
Zinc	ICP/OES	1	mg/kg	N	**760**

Index to symbols used in Supplement to 335297-1

Value	Description
AR	As Received
N	Analysis is not UKAS accredited

Notes

Supplemental report issued to report sample 003 only, at the customer's request.

A sample was taken **27/8/13** from living room lights and TV stand.

SAL Reference: 347010
Customer Reference:

Bulk Product Analysed as Bulk Product
Bulk Product Suite 1

SAL Reference	**347910 001**
Customer Sample Reference	**DOLAN 1 REGENT**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**6100**
Arsenic	ICP/OES	1	mg/kg	N	**4**
Cadmium	ICP/OES	1	mg/kg	N	**<1**
Chromium	ICP/OES	1	mg/kg	N	**24**
Copper	ICP/OES	1	mg/kg	N	**160**
Lead	ICP/OES	1	mg/kg	N	**55**
Mercury	ICP/OES	1	mg/kg	N	**<1**
Zinc	ICP/OES	1	mg/kg	N	**1400**

Index to symbols used in 347910-1

Value	Description
AR	As Received
N	Analysis is not UKAS accredited

Indoor sample taken Regent Drive 29/6/13

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Incorporating Suffolk Soils
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Mossley Environmental Action Group
5 Miller Hey
Mossley
Lancashire
OL5 9PP

REPORT: H779206 **PROJECT:** 779

TITLE: Bulk Dust Sample – 42 Regent Drive.

DETAILS: A sample of dust, reportedly collected from 42 Regent Drive, was received at our laboratory on the 04 July 2013. The dust sample was examined briefly by optical microscopy and was then submitted for ICP-OES analysis. The results of the examination and analysis are given below.

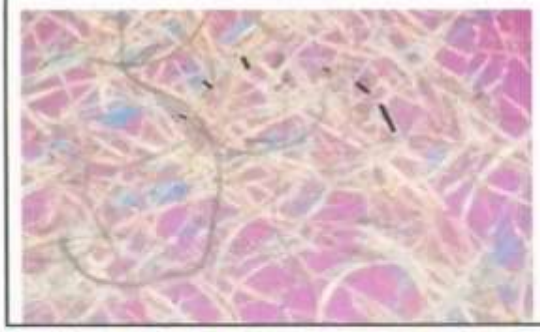
SAMPLE: The following sample was received:

Lab Ref: H779-185-1 Bulk Dust labelled 42 Regent Drive, Back Bedroom and dated 29/06/13.

The sample was initially examined using 30x stereo optical microscopy.

The sample was found to contain fibrous material together with other particulate material.

A small sub-sample was placed on a glass microscope slide in RI 1.55 solution.



The fibres were examined using Polarised Light Microscopy (PLM) (cross polars 1st order red tint) at 125x magnification.

The sample contained numerous individual fibres such as paper, cotton or linen and other manufactured or regenerated cellulose fibres.

Figure 1: Initial examination of sample by Optical Microscopy.

METHOD: The sample was digested into mineral acids and concentrations in the extract were measured by ICP-OES.

RESULTS: The results of the ICP-OES analysis are given in Table 1.

Table 1: ICP-OES Results

Lab Ref No		H779-185-1
Sample		42 Regent Drive
Aluminium as Al	µg/g	3974
Arsenic as As	µg/g	<50
Cadmium as Cd	µg/g	<10
Chromium as Cr	µg/g	18
Copper as Cu	µg/g	528
Lead as Pb	µg/g	127
Magnesium as Mg	µg/g	1000
Sulphur as S	µg/g	5166

NOTES:

(i) ICP-OES analysis was sub-contracted to a UKAS accreditted laboratory

(ii) The total weight of sample received was 0.0338g

(iii) Results are reported as total extractable concentrations for each element in the sample as received

(iv) Limits of detection were elevated due to the small amount of sample received

(v) µg/g is equivalent to parts per million (ppm)

(vi) < = less than

COMMENT: No information was given as to how the sample was collected and therefore the results of the ICP-OES analysis have been reported only as total concentrations within the sample.

It is not known how representative the sample was of the accumulated dust at the time of the sampling (Sample dated 29/06/13).

This sample differed from the previous sample, namely H779-036-1, Bulk Dust labelled 38 Regent Drive, Report H779050, in that the fibres were individual, rather than bundles and did not have the characteristics of wood fragments.

The analytical method used was destructive and due to the small amount of sample received, it was not possible to retain any of the sample.

Report Prepared By:
R. O. Green MSc MRSC
Levington Laboratories

Date:
25 July 2013

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11.5 SHOREHAM PORT

Independent dust sampling was instigated by a local business with concerns about the dust (poor quality). The results contained:

Arsenic, cadmium, chlorine, chromium, copper, formaldehyde, flouride, lead, Iron and zinc. (NB: Wood dust was not tested for).

CHEMICAL ANALYSIS OF BIOMASS SAMPLE FROM SHOREHAM PORT

04/10/2012

Table 1: Results of Analysis

4RS Sample Ref. No.	110755/171111/1	RPS Laboratories Results	Units
Parameter			
Arsenic (total)	7.0	18.0*	mg/kg
Cadmium (total)	0.8	0.7*	mg/kg
Chromium (total)	22	18*	mg/kg
Copper (total)	59	32*	mg/kg
Lead (total)	1289	431*	mg/kg
Iron (total)	5807	1725*	mg/kg
Zinc (total)	560	-	mg/kg
Fluoride (soluble)	< 10	< 1	mg/l
Chloride (soluble)	240	664	mg/l
Total Organic Carbon	23.2	-	%
Loss on Ignition at 500 °C	89.0	-	%
Moisture Content at 35 °C	13.3	-	%
Moisture Content at 105 °C	21.5	-	%
Cresol	<0.1	< 50*	mg/kg
Formaldehyde	< 2.5	49*	mg/kg

* RPS results were expressed as µg/g which is equivalent to mg/kg

Table 2: Results of Speciated TPH and Speciated PAH Analysis

04/10/2012

4RS Sample Ref. No.	110755/171111/ 1	
Parameter		
Petroleum Hydrocarbons - speciated		
PRO (Petroleum Range Organics) C_6 to C_{10}	1392	µg/kg
DRO (Diesel Range Organics) C_{10} to C_{25}	251	mg/kg
MRO (Mineral oil Range Organics) C_{25} to C_{40}	1720	mg/kg
Poly Aromatic Hydrocarbons - speciated		
Naphthalene	0.3	mg/kg
Acenaphthylene	< 0.1	mg/kg
Acenaphthene	0.3	mg/kg
Fluorene	0.1	mg/kg
Phenanthrene	1.1	mg/kg
Anthracene	0.3	mg/kg
Fluoranthene	1.3	mg/kg
Pyrene	1.0	mg/kg
Benz(a)anthracene *	0.4	mg/kg
Chrysene *	0.5	mg/kg
Benzo(b)fluoranthene * And Benzo(j)fluoranthene *	0.4	mg/kg
Benzo(k)fluoranthene *	0.3	mg/kg
Benzo(a)pyrene *	0.3	mg/kg
Indeno(1,2,3-c,d)pyrene *	0.1	mg/kg
Dibenzo(a,h)anthracene *	< 0.1	mg/kg
Benzo(g,h,i)perylene *	< 0.1	mg/kg
Total of Carcinogenic PAHs	**< 2.2**	***mg/kg***

* Carcinogenic PAHs

An outdoor sample was taken on 27/07/14 from sediment in a bird bath in a front residential garden.

SAL Reference: 413775
Project Site: Shoreham Port, Portslade
Customer Reference:

Bulk Product Analysed as Bulk Product
Bulk Product Suite 1

SAL Reference	**413775 001**
Customer Sample Reference	**SHOREHAM PORT PORTSLADE**
Test Sample	**AR**

Determinand	Method	LOD	Units	Symbol	
Aluminium	ICP/OES	1	mg/kg	N	**4000**
Arsenic	ICP/OES	1	mg/kg	N	**6**
Cadmium	ICP/OES	1	mg/kg	N	**<1**
Chromium	ICP/OES	1	mg/kg	N	**28**
Copper	ICP/OES	1	mg/kg	N	**100**
Lead	ICP/OES	1	mg/kg	N	**110**
Magnesium	ICP/OES	1	mg/kg	N	**4200**
Mercury	ICP/OES	1	mg/kg	N	**<1**
Nickel	ICP/OES	1	mg/kg	N	**19**
Zinc	ICP/OES	1	mg/kg	N	**490**

Index to symbols used in 413775-1

Value	Description
AR	As Received
N	Analysis is not UKAS accredited

12. WHAT DID WE FIND IN THIS CSI?

Observations:

- Wood dust is a group 1 carcinogen not a nuisance.
- Waste wood contains a cocktail of toxins including silica.
- There is no safe level below which there is no effect from Particulate Matter.
- The HSL have raised concerns about the levels of dust at wood recycling plants.
- Course particles stay trapped in the nasal passage and can cause cancer.
- Fine particles can cause disease, urgent research required on mixed pollutants.
- Fine particles enter the home.
- THE HPA state that more research is required for mixed pollutants.
- Residents are exposed to dust 4.96 times greater than workers without PPE.
- The EA does not chemically analyse emissions.
- DEFRA states that the majority of waste wood is contaminated and likely contains CCA for years to come.
- Waste wood has been used in the production of animal bedding.
- MMF reports were not in the prevailing wind directions with missing data?

Findings:

Evidence suggests that there is a lack of adequate enforcement by industry regulators to mitigate waste wood emissions in communities, in what is perceived to be a '*heavily regulated* industry'. Residents exposed to dust emissions in a valley, could experience greater concentrations of pollutants due to climatic conditions creating a 'lid' or shelter, which could result in fine dust particles that are hazardous to health staying suspended for a considerable time, particularly overnight.

The HSL study highlights the need for more stringent regulations in the waste wood processing industry to protect employees, which exhibits a lack of historical data and COSHH regulations. Furthermore, the generation of substantial airborne wood dust must be controlled effectively to protect local communities and environments as well as employees. For the regulations to be effective, they must be adequately enforced for the protection of employees and communities across the UK.

Investigation into the frequency of waste wood processing fires is needed to assess community impact and financial strain on the UK's fire service and to ascertain the risks to firefighters from toxic wood dust and other contaminants.
Whilst the health authorities acknowledge that 'mixed pollutants' are a problem and urgent research is required, they have failed to provide peer reviewed evidence to substantiate their claims that there is no connection between waste wood emissions and the health issues reported by local communities and recognised by the HSE for wood workers.

Current regulations for the waste wood processing industry are inadequate, out of date, arbitrary and without medical rationale. Without full chemical analysis and quantification of emissions there is ***No Proof of No harm.***

We call for

- A public inquiry into inadequate regulation of the waste wood processing industry for the protection of communities, employees and local environments.
- A moratorium on new processing plants until a full and conclusive public health investigation on the impacts of the industry on communities has been carried out.
- Adequate COSHH risk assessments to be implemented forthwith, for the protection of employees.

Recommendations

- Full enclosure for storage of waste wood in a '*heavily regulated*' setting for the protection of receptors, ie: local residents, businesses, schools and environments.
- Reduction in waste wood stacks to minimise airborne wood dust.
- Compulsory dust mitigation with stringent enforcement actions and tougher prosecution to minimise emissions.

Actions

- Ask the Secretary of State to exercise his powers under the Environmental Protection Act 1990 (amended to 2008), to address current legislation which classes emissions of wood dust as a nuisance to residents when it is has been a Group 1 carcinogen since 1995.
- Request funding for further independent research and monitoring of affected communities and worker exposures.
- Liaise with unions to continue research of the waste wood processing industry to 'bridge the gap' in data, for the protection of employees as well as communities and the environment.