BenchMark Toxicology Services

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# Investigation and Assessment of Odours and Adverse Health Effects Associated with 2003/04 Tax Returns ATO Office Northbridge, Western Australia

Prepared for:

**Australian Taxation Office, Northbridge**

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## EXECUTIVE SUMMARY

1. Staff of the Australian Taxation Office (ATO) at 45 Francis Street Northbridge have reported incidences of bad odour and various irritant and possibly allergy like reactions in handling 2003/04 tax returns during the period July to December 2004. Malodours were also reported at the Penrith (NSW) ATO, but not adverse health effects.
2. There were 11 cases of adverse reactions reported ranging from mild to moderate irritation of exposed skin, eyes and upper respiratory tract, in the main. In one case, more serious reactions were reported. The staff associated the effects with working in the compactus store room, collecting tax returns or handling tax returns, both air and dust were implicated. Three of the officers affected consulted a medical practitioner.
3. ATO, as well as the building owners, have taken a number of actions to investigate and address the issue. These and a collaborative approach with the staff appear to have improved the working conditions, with a reduction in reported adverse effects after December 2004.
4. BenchMark Toxicology Services has reviewed and assessed a number of laboratory reports that investigated the paper used in the Tax Packs, indoor air and indoor surfaces at the workplace as potential sources of the causative agent(s) for the odours and adverse health effects reported.
5. No individual agent or group of agents was identified consistently in the investigations that would help explain the odours or adverse health effects reported at ATO Northbridge. The compactus store room at Northbridge was found to have inadequate ventilation which might have contributed to the odour and health problems. This has been addressed by ATO.
6. The inadequate ventilation identified in the compactus store room at ATO Northbridge would have facilitated the accumulation of chemicals emitted to air from the Tax Packs. This may, in part at least, explain why the odours were stronger and adverse health effects were reported in Northbridge ATO but not in Penrith (malodours were also reported, but no significant inadequacies in ventilation identified).
7. It is highly unlikely that the causative agent(s) for the odours and adverse health effects reported can be identified with further analytical investigations, unless there is a reoccurrence of events that led to the adverse effects in the first instance. This is unlikely given the actions taken to date.
8. BenchMark Toxicology Services considers that actions taken to date by ATO have been appropriate and have led to a reduction in risk and appropriate management of issues raised by the staff.
9. Additional steps should be taken to reduce future risks of reoccurrence through increased awareness, improved hygiene, IAQ monitoring and risk reduction, as well as continuing to support and manage appropriately staff who have reported adverse effects.
10. BenchMark Toxicology Services recommends that the ATO undertake the following additional steps:

i. Continue to heighten awareness and improve hygiene in handling of the Tax Pack 2004 paper as outlined in Appendix II. This is likely to lead to reduced worker exposure to any potential hazardous material in the paper.

ii. Provide staff with copies of the *Workplace Indoor Air Quality* form (Appendix III) to record the occurrence, frequency and persistence of any adverse event in the workplace.

iii. Monitor comfort factors and air levels of microbiological contaminants, VOC and irritant inorganic gases in the compactus store room:

- Initially, every three moths for the next twelve months
- Then review the need for, and frequency of, monitoring based on the outcome of the 12-month monitoring.
- Establish a long term monitoring strategy for these substances to be incorporated in future IAQ investigations.

iv. Undertake IAQ investigations periodically as required (Appendix IV), with comfort factors checked on a yearly basis.

v. Develop tighter specifications for the paper to be used in future to minimise the risk of any toxic emissions that might impact on the Staff's health (and other potentially exposed people). For example. the following should be included in future specifications or contractual agreements:

- The paper should not contain or release any toxic materials at concentrations that might affect the health of staff, including sensitive people, working with Tax Packs printed on the paper.
- Prior to delivering the paper for printing of the Tax Packs, the manufacturer or supplier shall demonstrate to the satisfaction of the ATO, or it appointed representative, that the paper does not pose a health risk to ATO clients and staff or the general public who might handle the paper.

vi. Continue to encourage staff who have reported "allergy like" adverse effects while handling and working with the paper or working in the compactus store room to consult their doctor and if necessary ask to be referred to a specialist physician or other medical specialist as appropriate for a thorough investigation of potential allergies and sensitisation.

## Abbreviations

| | |
|---|---|
| ADI | Acceptance Daily Intake |
| ATO | Australian Taxation Office |
| CFU | Colony forming units |
| cm | centimetre = one hundredth of a metre |
| $cm^2$ | square centimetre |
| CO | Carbon monoxide |
| $CO_2$ | Carbon dioxide |
| COPD | Chronic obstructive pulmonary disease |
| CPSU | Commonwealth Public Service Union |
| DEH | Department of Environment and Heritage |
| FAO | Food and Agriculture Organization |
| g | gram(s) |
| GC/MS | Gas Chromatography/Mass Spectroscopy |
| h | hour(s) |
| HPLC | high-pressure liquid chromatography |
| IAQ | Indoor Air Quality |
| IARC | International Agency for Research on Cancer |
| JECFA | The Joint FAO/WHO Expert Committee on Food Additives |
| m | metre |
| m/s | metre per second |
| $m^2$ | square metre |
| $m^3$ | cubic metre |
| mg | milligram = one thousandth of a gram |
| µg | microgram(s) = one millionth of a gram |
| µm | micrometre(s) = one millionth of a metre |
| MCS | multiple chemical sensitivity |
| NEPC | National Environmental Protection Council |
| NEPM | National Environmental Pollution Measure |
| NHMRC | National Health and Medical Research Council |
| NIOSH | National Institute of Occupational Safety & Health (US) |
| $NO_2$ | Nitrogen Dioxide |
| NOHSC | National Occupational Health and Safety Commission |
| $O_3$ | ozone |
| $^oC$ | Degrees Centigrade |
| $PM_n$ | particulate matter with aerodynamic diameter < *n* µm |
| ppm | parts per million |
| STEL | short term exposure limit (usually 15 min) |
| TLV | threshold limit value |
| TSP | total suspended particulates |
| TWA | time-weighted average (8-h) |
| US | United States |
| US EPA | United States Environmental Protection Agency |
| VOC | volatile organic compound |
| WHO | World Health Organization |

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**INVESTIGATION AND ASSESSMENT OF ODOURS AND ADVERSE HEALTH EFFECTS ASSOCIATED WITH 2003/04 TAX RETURNS AT ATO OFFICE NORTHBRIDGE, WESTERN AUSTRALIA**

# 1. Background

Staff of the Australian Taxation Office (ATO) at 45 Francis Street Northbridge have reported incidences of bad odour and various irritant reactions in handling 2003/04 tax returns during the period July to December 2004. The officers assess tax returns with errors, which are stored in a compactus store room until accessed for review.

The odours and irritant effects seem to have been associated with the tax returns stored in the compactus.

The odour was strongest in the compactus store room. It has been described variably as *Dead Rat, Stale, Sewage, Dirty Socks, Kitty Litter, and Barnyard* (see Peloso, 2004)[1]. A search for dead vermin in the room and ceiling did not identify any. However, the compactus store room was found to lack adequate ventilation with no connections to the building air conditioning system. Ceiling panels were removed in an interim attempt to improve air circulation in the room.

A chronology of events is provided at Appendix I.

## 1.1. Source of Paper

The ATO purchased the paper used in the Tax Packs for 2003/04 from a different supplier (Norske Skog Tasmania) than previously (PaperlinX, Wesley Vale) although the printing of the Tax Packs was the same.

Norske Skog identified that the paper in question (Tasman Paper Machine 1, 60 gsm Norbright) was manufactured during a 24 h period on 21 March 2004 (Williams, 2004)[2]. Norske Skog investigated the process of the paper manufacturing process during the period and concluded that the processes were no different than during normal manufacture of Norbright at the Tasman Mill and that the final specifications of the paper were within the normal range. Furthermore, added that no other customer has reported a bad odour from the paper but other printing processes may have been used.

Results of chemical analysis of the paper are reported below (Section 3.1).

## 1.2. Reported adverse health effects

Sandra Greenway, the ITE business Leader at ATO Northbridge has compiled a summary of reported health effects and comments by staff affected during the period July to December 2004 (Greenway, 2004)[3]. These are briefly summarised in the following table.

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[1] Peloso C (2004). Tax Form odour issue. Forensic Report. Amcor Research & Technology. Memo from Chris Peloso to Colin Hinde – PaperlinX – Wesley Vale; dated 28 September 2004.

[2] Williams M (2004). Tax forms odour issue. Norske Skog. Memo from Myron Williams to Glenn Flack; dated 15 November 2004

[3] Greenway S (2004). ITE – Skin and other irritation Jul 04 Dec 04. Prepared by Sandra Greenway, ITE Business Leader, 13 December 2004

| Case | Date | Effect, Reaction Type | Organ | Comments | Medical attn |
|---|---|---|---|---|---|
| A | 25 Oct 04 | Irritation, Stinging | Hands, arms, lips | Not on weekends | No |
| B | 3 Nov 04 | Irritation: redness, rash, itchiness, welts (burning sensation on scratching) | Hands, inner forearm | Not on weekends or when off work | No |
| C | Aug 04 | Irritation: itchy skin, sore eyes; smell in compactus | Skin, eyes, nose | Not when working elsewhere | No |
| D | - | Eye redness & curst on eyelids, dry nose, skin eruptions | Skin, Eyes, nose | Reduced when not in workplace | No |
| E | 5-7 Oct 04 | Influenza, rash/prickly skin, itch eyes, teary | Forehead, eyes | Smell also at other locations | - |
| F | 10 Dec 04 | Irritation: blisters, itchiness, burning, prickly heat sensation | Forearm, tongue | | Yes |
| G | - | Irritation: itchiness, blisters; flu-like symptoms | Nose, eyes, scalp, throat | Happened after returns arrived, Dust noticed | Yes |
| H | June/ July 04 | Irritation: rashes, itchiness, smell, retching | Lips, side of face, neck, hands fingertips | Not had it previously, gone when away for > 5 days | Yes (Steroids) |
| I | Aug 04 | Irritation: itchiness, sore throat, chest infection | Eyes, forearms, hands and neck | Never before; eyes feel itchy at home; sick leave | No |
| J | - | Severe effects awaiting statement | | | |
| K | - | Eczema | | Worsened condition | |

There were 11 cases of irritant type reactions to the completed tax returns, the air in the compactus and dust arising from the returns. Reported effects occurred over the period July to December 2004, after the staff began handling tax returns for the previous financial year.

No additional cases have been formally reported in the period January to March 2005. BenchMark Toxicology Services was made aware of one possible additional case at a meeting with ATO staff on 17 March 2005. BenchMark Toxicology Services has had no additional information since that time.

ATO has encouraged all staff who have reported adverse reaction to seek medical attention and treatment for their conditions.

Staff handle manually tax returns for paper error correction in the Key Capture Centre (KCC). Returns are stored in the compactus store room until collected and assessed. A strong smell was reported in the compactus store room at various times during the period, although not by all staff affected. The room was subsequently found to be unventilated.

Effects were associated with working in the compactus store room, collecting tax returns or handling tax returns. Effects ranged from mild to moderate irritation of exposed skin, eyes and upper respiratory tract. Three of the officers consulted a medical practitioner; one was prescribed steroids for the

skin reactions – there was no indication whether or not the symptoms and signs of irritation improved with treatment. Most of the affected officers commented that the effects have not occurred before (or at least not as seriously) and seemed to get better when away from the workplace. One officer reported effects persisting when at home (itchy eyes).

## 2. Brief and Scope of works

In January 2005 the ATO retained BenchMark Toxicology Services to assess the results of analytical investigations undertaken to date and advise on the possible cause, if any, of the adverse effects reported by staff of ATO.

BenchMark Toxicology Services was additionally requested to advise the ATO on administrative procedures and management options to be implemented to prevent, or at least minimise the risk of, a recurrence of the events in the future.

BenchMark Toxicology Services has not been asked to investigate or comment on whether or not the adverse health effects reported were suffered by staff at the time. BenchMark Toxicology Services accepts as given, or at face value, that a number of staff has reported suffering adverse reactions and ill effects to varying degrees while at work at the ATO in Northbridge. The investigation and assessment that follows does not further address this issue.

### 2.1. Information provided

The ATO provided BenchMark Toxicology Services the following documents.

1. Greenway S (2004). ITE – Skin and other irritation Jul 04 Dec 04. Prepared by Sandra Greenway, ITE Business Leader, 13 December 2004.
2. Leeder Consulting (2005). Certificate of Analysis. 2004 Tax Pack. Report No M250057. Leeder Consulting, 22 February 2005.
3. Mc Geough M (2005). Chronology. 2004 Tax Returns Paper. Attachment to an email from Mary Mc Geough to BenchMark Toxicology Services on 14 March 2005 (Reproduced at Appendix I).
4. MPL Health Safety Environment (2005). Indoor Air Quality – Australian Taxation Office 45 Francis Street, Northbridge WA. Project No. H60.7092.01R1, dated 1 February 2005.
5. Noel Arnold & Associates (2004). Indoor Air Quality (IAQ) report. United KFPW, ATO Penrith. Noel Arnold & Associates, October 2004 (Report No. 36415) – not available for wide distribution a condition imposed by the owners of the Penrith building.
6. Peloso C (2004). Tax Form odour issue. Forensic Report. Amcor Research & Technology. Memo from Chris Peloso to Colin Hinde – PaperlinX – Wesley Vale; dated 28 September 2004.
7. Tranthim-Fryer D (2005). Draft report on two items (ATO, "Tax Pack" papers) in connection with an alleged odour investigation. David Tranthim-Fryer, Forensic Science Laboratory, Chemistry Centre of WA (2005)
8. Williams M (2004). Tax forms odour issue. Norske Skog. Memo from Myron Williams to Glenn Flack; dated 15 November 2004.

### 2.2. BenchMark Toxicology Services visits to ATO Northbridge

Officers and associates of BenchMark Toxicology Services visited the ATO offices in Northbridge on 9 February 2005 and visually inspected the workstations and the store room.

Additionally, officers of BenchMark Toxicology Services met with ATO staff at the Northbridge office on Thursday 17 March 2005 when most of the contents of this report were presented and discussed with the meeting. At this meeting BenchMark Toxicology Services was advised by a member of the ATO staff that an additional case of adverse reactions had been reported since December 2004. However, no documentation was presented.

## 3. Evaluation of analytical reports

### 3.1. Amcor Research & Technology

**Peloso C (2004). Tax Form odour issue. Forensic Report. Amcor Research & Technology. Memo from Chris Peloso to Colin Hinde – PaperlinX – Wesley Vale; dated 28 September 2004.**

PaperlinX commissioned Amcor Research & Technology to conduct forensic analyses of Tax Forms printed on PaperlinX paper and Norske Skog paper (Peloso, 2004). Amcor Research & Technology analysed the volatile organic compounds (VOC) profile from the two Tax Forms by solid phase micro extraction (at 50 $^{o}$C and 90 $^{o}$C) coupled with gas chromatography/mass spectrometry (GC/MS).

World Health Organization (WHO) definition of VOC includes all organic compounds (substances made up of predominantly carbon and hydrogen) with boiling point temperatures in the range of 50-260 $^{o}$C, excluding pesticides. This means that they are likely to be present as a vapour or gas at normal ambient temperatures.

Substances that are included in the VOC category include aliphatic hydrocarbons (such as hexane), aromatic hydrocarbons (such as benzene, toluene and the xylenes), and oxygenated compounds (such as acetone and similar ketones).

From a description of the types of odours reported to be associated with the Norske Skog paper, Amcor Research & Technology predicted the following chemicals as potentially being responsible for the malodour associated with the Tax returns (Norske Skog paper).

| Compound | Type of Odour |
|---|---|
| Isobutyric acid | Dirty socks |
| Isovaleric acid | Musty, sewer-like, sweaty, pungent |
| Skatole, methyl indole, cresol | Faecal, sewer-like |
| 4-mercapto-methylpentan-2-one | Kitty litter |
| Aldehydes | Stale |

***Chemicals Detected***

Except for aldehydes, none of these compounds were detected in the paper. Of the detected aldehydes, heptadienal isomers were present in higher concentrations in the Norske Skog paper compared with the PaperlinX paper.

Heptadienal isomers are formed from the oxidation of linolenic acid, a reaction that can be catalysed by metal ions during the paper manufacturing process (Peloso, 2004)[4]. Further, Norske Skog identified that heptadienal isomers can be generated by bacteria and that the bacterial levels during

[4] Peloso (2004). Ibid

manufacture of the batch of paper in question may have been sufficiently high to lead to their production (Williams, 2004)[5].

Norske Skog states that it is normal practice to add starch to products destined to be printed in heat-set application and that the starch tank was topped up about 12 h before the Tax Pack paper was made. Norske Skog concludes that it is possible that the bacterial content of the starch was sufficiently high for the heptadienal isomers to be formed.

Additionally, Peloso (2004)[6] reported an unknown peak from the Norske Skog paper, which was described as "possible alkenal isomer". The term "alkenal isomers" describes a family of compounds, some of which may be irritating to the eyes, upper respiratory tract and skin at high enough concentrations (Nilsson, 2004)[7]. They are normally found in indoor air of homes and buildings and are thought to originate from biological materials or oils.

Whether or not alkenal and heptadienal isomers would have been produced in sufficient quantities in the storage room or were present in sufficient quantities in the paper to cause the reported reactions cannot be ascertained from the available information in this and other reports.

### *Odours*

Heptadienal isomers have a low odour threshold and impart a "*fishy odo*ur". This odour was confirmed by the investigator, whilst none of the other odours reported to be associated with the paper was detected by the investigator. In addition, the PaperlinX paper was said to have an odour similar to volatile fatty acids.

It is unclear why the odours reported by staff at the Northbridge ATO have not been described as *fishy*.

### *Comments*

Heptadienal isomers (trans, trans-2,4-heptadienal) are used as food colouring additives. The Joint FAO/WHO Expert Committee on Food Additives (JECFA, 2004)[8] has not established an Acceptable Daily Intake (ADI)[9] for heptadienal stating that there are

> *No safety concern at current levels of intake when used as a flavouring agent*

The Joint FAO/WHO Expert Committee on Food Additives (JECFA) is an international expert scientific committee that is administered jointly by the Food and Agriculture Organization of the United Nations (FAO) and WHO[10].

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[5] Williams M (2004). Tax forms odour issue. Norske Skog. Memo from Myron Williams to Glenn Flack; dated 15 November 2004

[6] Peloso (2004). *Ibid*.

7 Nilsson A (2004). Novel Technique for Analysing Volatile Compounds in Indoor Dust. Application of Gas Chromatography – UV Spectrometry to the Study of Building-Related Illness. Linköping University Medical Dissertations No. 856. http://www.ep.liu.se/diss/med/08/56/digest.pdf

[8] JECFA (2004). *(E,E)-2,4-HEPTADIENAL* http://www.inchem.org/documents/jecfa/jeceval/jec_832.htm (Accessed March 2005)

[9] An ADI is the amount of a substance in mg/kg/day that can be ingested over a 70 year lifetime without any appreciable risk of adverse health effects

[10] JECFA has been meeting since 1956, initially to evaluate the safety of food additives. Its work now also includes the evaluation of contaminants, naturally occurring toxicants and residues of veterinary drugs in food. To date, JECFA has evaluated more than 1500 food additives, approximately 40 contaminants and naturally occurring toxicants, and residues of approximately 90 veterinary drugs. The Committee has also developed principles for the safety assessment of

It has the responsibility *inter alia* of determining safe levels (ADI) of additives in food.

### 3.2. Chemistry Centre of Western Australia

**Tranthim-Fryer D (2005). Draft report on two items (ATO, "Tax Pack" papers) in connection with an alleged odour investigation. David Tranthim-Fryer, Forensic Science Laboratory, Chemistry Centre of WA (2005)**

Two samples comprising (a) an unused Tax Pack and (b) a page from a completed tax return were collected into "Cryovac" plastic bags by Dr Tranthim-Fryer on 5 January 2005 and taken for analysis of Volatile Organic Compounds (VOC).

VOC were analysed by gas chromatography/mass spectroscopy (GC/MS) after solid-phase micro extraction of the headspace. Samples were taken after equilibration at room temperature (25 $^{o}$C) and elevated temperature (70 $^{o}$C). Except for the temperatures at which the samples were collected, the techniques used were similar to those used by Amcor Research & Technology (Section 2.1).

#### *Chemicals Detected*

A mixture of VOC were identified from both samples of paper comprising alkene isomers, acetone (a ketone), acetic acid (a carboxylic acid) and caproic aldehyde (an aldehyde), with the alkenes being the major components of the mixture. Acetone and acetic acid have distinctive odours readily identifiable by most people because of their common use (acetone as a solvent and in the past as a nail polish remover; acetic acid is the principal component of vinegar which typically comprises about 4-5% acetic acid).

These however, were not quantified and if present in the compactus store room, their concentration is unknown.

Malodorous sulfur compounds (such as hydrogen sulfide, carbonyl sulfide, sulfur dioxide, methyl mercaptan, dimethyl sulfide and dimethyl disulphide typically sourced from the alkaline sulfate or "Kraft" Pulp Mill paper process were not detected. This was attributed to the detection limit of the analytical method being about 100 to 1000 times higher (parts per million) than the odour threshold (parts per billion) of some of the sulphurous compounds such as hydrogen sulfide. This however, does not explain the observation that the investigator identified a "*dirty sock*" smell from both samples (see below), but did not report a "*rotten egg*" type smell which is typical of hydrogen sulfide.

#### *Odours*

No odours were detected at room temperature. A "*dirty sock*" type odour was identified from both paper samples on heating (temperature not stated). Presumably the investigator undertook the odour test as he was handling the samples.

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chemicals in food that are consistent with current thinking on risk assessment and take account of recent developments in toxicology and other relevant sciences. (http://www.who.int/ipcs/food/jecfa/en/)

### 3.3. MPL Health Safety Environment

**MPL Health Safety Environment (2005). Indoor Air Quality – Australian Taxation Office 45 Francis Street, Northbridge WA. Project No. H60.7092.01R1, dated 1 February 2005**

MPL Health Safety Environment (MPL) was commissioned by the ATO to conduct an Indoor Air Quality (IAQ) investigation of level 2 of 45 Francis Street Northbridge, the ATO offices. MPL identified that the site is approximately 3,500 $m^2$ with 260 employees.

MPL collected and examined air samples (some surface samples) for a variety of contaminants, in addition to measuring comfort variables such as temperature, humidity and airflow. Contaminants investigated included:

i. Microbial contamination on surfaces and in air
ii. Chemical contamination
iii. Suspended particulates
iv. Acetic acid
v. Volatile organic compounds
vi. Formaldehyde
vii. Cleaning products

Air samples for analyses were taken at the store room (compactus room) and at 7 work stations: 2.011, 2.063, 2.068, 2.123, 2.159, 2.230 and 2.472. Samples were taken on 11 January 2005.

#### 3.3.1. Comfort factors

The investigation identified that temperature and humidity were within acceptable limits for the workplace.

However, the air measurement results were below recommended guidelines. Air movement was 0.1 m/s in the store room and ranged from 0.05 m/s to 0.12 m/s at the seven workstations tested (compared with guideline values of 0.15 – 0.4 m/s at 24 $^oC$).

MPL recommended that a qualified air conditioning engineer be retained to ensure that an adequate level of fresh air and an appropriate and balanced airflow is supplied in the rooms. This is appropriate.

#### 3.3.2. Biological contamination

Potential effects of microbiological contamination include infections, allergic reactions (eg, some moulds); as well as potential intoxication from toxins produced by the contaminants.

***Sample collection and analysis***

MPL collected surface samples over a 10 $cm^2$ area using a sterile swab, moistened with sterile saline. Results were expressed as Colony Forming Units (CFU)/ 10 $cm^2$. Air samples were collect onto agar strips (incomplete description given) and results expressed as CFU/$m^3$ of air.

***Results and comments***

Surface and air samples results were within indoor surface and air guidelines values for biological contaminants.

### 3.3.3. Chemical contaminants

**$CO_2$**

Carbon dioxide ($CO_2$) is naturally present in the atmosphere at levels of approximately 0.035% (350 parts per million or ppm).

Short-term exposure to $CO_2$ at levels below 2% (20,000 ppm) has not been reported to cause harmful effects. Higher concentrations can affect respiratory function and cause excitation followed by depression of the central nervous system.

High concentrations of $CO_2$ can displace oxygen in the air, resulting in lower oxygen concentrations for breathing. Therefore, effects of oxygen deficiency may be combined with effects of $CO_2$ toxicity.

The Department of Environment and Heritage (DEH, 2004)[11] refers to a number of indoor and occupational reference values for $CO_2$. It states that the United States Environmental Protection Agency (US EPA) suggests that a peak indoor air concentration of $CO_2$ > 1,000 ppm is an indicator of under ventilation in office buildings. Further that Health Canada recommends an indoor air quality guideline of 3,500 ppm for $CO_2$ in residential premises.

For comparison, occupational exposure standards recommended by the National Occupational Health and Safety Commission – NOHSC - (Worksafe Australia) are 5,000 ppm (8-h time weighted average, TWA) and a Short Term Exposure Limit of 30,000 ppm (STEL; 15-min average).

***Sample collection and analysis***

MPL measured $CO_2$ instantaneously using a calibrated electronic meter.

***Results and comments***

The concentration of $CO_2$ in the store room was 449 ppm, whilst the concentrations at the seven workstations ranged between 520 to 680 ppm.

The levels of $CO_2$ measured in the ATO offices are well within the reference guideline values. However, $CO_2$ concentrations were higher than normally found in the atmosphere. Implementation of the recommended measures (by MPL) to improve airflow is likely to reduce the $CO_2$ concentrations in the rooms.

The $CO_2$ concentrations were also higher than those reported for the Penrith office (Section 3.4). However, they are insufficiently high to cause adverse effects or to explain the differences in reported adverse effects between the Penrith office and the Northbridge office.

**CO**

The initial symptoms of CO poisoning are similar to those of influenza (but without the fever). They include:

- Headache

[11] Department of the Environment and Heritage (DEH, 2004). Technical Report No. 9: Unflued Gas Appliances and Air Quality in Australian Homes. study funded by the Natural Heritage Trust and undertaken by AWN Consultants and Team Ferrari Environmental. Published by the Department of the Environment and Heritage June 2004 ISBN 0642 55038 7. http://www.deh.gov.au/atmosphere/airtoxics/publications/report9/discussion.html#dioxide

- Fatigue
- Shortness of breath
- Nausea
- Dizziness

CO binds preferentially to haemoglobin (displacing oxygen) leading to the formation of carboxyhaemoglobin and decreased oxygen binding. At sufficiently high concentrations CO can cause loss of consciousness and death.

The National Health and Medical Research Council (NHMRC, 1996)[12] recommend an indoor air quality goal for CO of 9 ppm (10 mg/$m^3$), as an 8-h average, not to be exceeded more than once a year.

The National Environmental Protection (Ambient Air Quality) Measure (NEPM) (NEPC, 1998)[13] also specifies a standard for carbon monoxide of 9 ppm (10 mg/$m^3$) (allowable exceedance of 1 day a year) for an 8-h averaging period.

WHO (2000)[14] recommended guideline values for a number of averaging periods, aimed at ensuring that blood carboxyhaemoglobin levels do not exceed 2.5%. These values include CO concentrations of 90 ppm (100 mg/$m^3$) for a 15-min average, 25 ppm (30 mg/$m^3$, rounded up from 27.8) for a 1-h average, and 9 ppm (10 mg/$m^3$) for an 8-h average.

### *Sample collection and analysis*

CO was measured instantaneously using a calibrated electronic meter.

### *Results and comments*

Levels of CO in the store room and the seven workstations were below the level of reporting (< 1 ppm) for the analytical method used. The level of reporting used in measuring CO is appropriate, as it is 9 times lower than the lowest guideline value of 9 ppm for an 8-h average.

### Total VOC

The chemical properties of VOC will vary widely, depending of the composition of the mixture. The health effects depend on the specific chemical composition of the VOC present, the concentration and the length of exposure.

High concentrations of some compounds that may occur when working with materials or processes that emit VOC could have serious health effects. These should be considered under the effects of the specific component.

General effects of lower concentrations include eye, nose and throat irritation; headaches; loss of coordination; nausea; and damage to the liver, kidneys and central nervous system. Some VOC can cause cancer in animals; some are suspected or known to cause cancer in humans, eg, benzene.

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[12] NHMRC (1996). Interim national indoor air quality goals recommended by the National Health and Medical Research Council. www.nhmrc.gov.au/publications/pdf/rec1-2.pdf (Accessed March, 2005)

[13] National Environment Protection Council (NEPC) (2003). Ambient Air Quality NEPM. http://www.ephc.gov.au/nepms/air/air_nepm.html (Accessed March 2005)

[14] WHO (2000). Air Quality Guidelines for Europe. Second Edition. WHO Regional Office Publications, European Series, No 91. pp75 -79.

Accumulating levels of VOC in indoor environments have been associated with 'sick building syndrome'.

The NHMRC[15] indoor air quality interim guideline for total VOC is 500 µg/m$^3$ (0.5 mg/m$^3$), with no one component exceeding 50% of the total present at any time.

### *Sample collection and analysis*

MPL collected total VOC samples using low level solid adsorption (charcoal) tubes and a calibrated air monitoring pump. Samples were extracted with organic solvent and analysed by GC-FID according to occupational health guidelines.

### *Results and comments*

Concentration of total VOC in the store room, the basement and five workstations were below the level of reporting for the analytical method (< 0.01 mg/m$^3$). Results for two workstations (2.230 and 2.063) were not available (MPL did not expand further). MPL considered it unnecessary to resample the two locations as the results for the other workstations were below the level of reporting. This is reasonable.

The level of reporting is appropriate since it is 50 times lower that the reference guideline value.

### Formaldehyde

Formaldehyde is a pungent smelling gas that can cause watery eyes; burning sensations in the eyes, nose and throat; nausea; coughing; chest tightness; wheezing; skin rashes and other irritating effects.

Formaldehyde affects people in various ways. Some people are very sensitive to formaldehyde (allergic contact dermatitis) while others may have no noticeable reaction at the same level of exposure. Sensitive people can experience symptoms at levels below 0.1 ppm (120 µg/m$^3$; 0.12 mg/m$^3$).

The WHO (2000)[16] recommends that exposure should not exceed 0.1 mg/m$^3$. The NHMRC (1996)[17] indoor air quality guideline is 0.1 ppm.

### *Sample collection and analysis*

MPL collected samples for formaldehyde analysis onto DNPH impregnated silica gel tubes and a calibrated air monitoring pump according to NIOSH 2016 method. Samples were analysed by High Pressure Liquid Chromatography (HPLC).

### *Results and comments*

Air concentrations in the store room and the seven workstations were below the level of reporting for the analytical method (<10 µg/m$^3$; <0.01 mg/m$^3$). The level of reporting used is appropriate as it is about 10 times lower than the reference guideline values.

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[15] NHMRC (1996). *Ibid*.

[16] WHO (2000). *Ibid*. pp 87-91.

[17] NHMRC (1996). *Ibid*.

### Acetic acid

Acetic acid can cause irritation of the eyes, mucous membranes and skin. Inhalation of concentrated vapours may cause serious damage to the nose, throat, and lungs. The odour threshold is 1 ppm (2.5 mg/m$^3$). The occupational exposure limits (NOHSC, 1996)[18] are 10 ppm or 25 mg/m$^3$ for an 8-h time weighted average (TWA) and 15 ppm or 37 mg/m$^3$ (STEL) for shorter periods (15-min average).

#### *Sample collection and analysis*

MPL collected samples for acetic acid analysis onto silica gel tubes. The analytical method used for the analysis was not described, although it was stated that the samples were analysed by an external laboratory (report No 04E1036; BenchMark Toxicology Services has not sighted the report).

#### *Results and comments*

The acetic acid concentration in air in the store room was reported to be 1.4 mg/m$^3$. This is about 18 times lower than the occupational TWA guideline and about half the concentration at which it can be detected by odour by most people.

MPL considers that acetic acid is one of the chemicals released from poor quality paper and may be taken as an indicator chemical for other chemicals not measured. MPL considered that acetic acid would also enhance the degradation of the paper, as well as other paper in the room, although MPL could not predict the rate.

MPL additionally states that acetic acid may cause problems with hypersensitive individuals. However, what MPL means by "hypersensitive individuals" is not clear.

BenchMark Toxicology Services has been unable to confirm from the scientific literature that acetic acid causes sensitisation in people. Unreferenced statements about the sensitising potential of acetic acid were noted in some publications. For example, the Department of Environment and Heritage (DEH, 2004)[19] states "Persons may become sensitised to repeat exposure." (to high concentrations of acetic acid) and "Rarely, skin sensitisation has been reported." and provide a list of sourced materials at the end of the document. However, no specific reference on these effects of acetic acid could be identified.

It is highly unlikely that sensitisation to acetic acid would be the reason for the effects reported at ATO in Northbridge.

Acetic acid is found at concentrations of 4-5% in household vinegar. If any of the workers affected were to be sensitised to acetic acid and react to the levels in air in the storeroom, it is highly likely that they would have a similar reaction to vinegar in foods. Hence, symptoms may not disappear when at home or away from the office.

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[18] National Occupational Health and Safety Commission (NOHSC, 1996). Acetic acid. http://www.nohsc.gov.au/ohsinformation/databases/exposurestandards/az/acetic_acid.htm (accessed March 2005)

[19] Department of Environment and Heritage (DEH, 2004). Acetic acid (ethanoic acid). http://www.npi.gov.au/database/substance-info/profiles/2.html (Accessed April 2005).

Interestingly, apple cider vinegar is recommended as an aid to digestion in sufferers of Multiple Chemical Sensitivity – MCS (Healthy House)[20]. Sufferers of MCS appear to be highly sensitised to a variety of disparate chemicals found in the environment and in the home. As a consequence, they appear to react to concentrations of chemicals that are much lower than would affect other individuals. In addition, they appear to react to levels that are much lower than air quality guidelines or standards.

It is possible however, that acetic acid may trigger an irritant reaction in people who suffer from asthma, people with compromised respiratory systems (eg, COPD - Chronic obstructive pulmonary disease), other respiratory diseases and the elderly. MPL may be referring to these conditions when using the term "hypersensitive individuals".

**Particulates**

The terms particulate matter, particulates, particles and aerosols are used interchangeably. The terms dust, fumes, smoke, mist, fog, smog, and haze, are used often to describe physical forms of airborne particulate matter. Particulate matter refers to a variety of minute solid or liquid particles that remain suspended in the air and can be inhaled into the respiratory system.

They are normally classified by particle size, eg, $PM_{10}$ comprises particles of aerodynamic diameter of 10 µm or less (1 µm or 1 micron equals one millionth of a metre) and $PM_{2.5}$ comprises particles of aerodynamic diameter of 2.5 µm or less. The $PM_{10}$ fraction is also the respirable fraction; particles that have a small enough aerodynamic diameter to reach deep into the lungs.

The effects of particulates can vary depending on the size of the particles as well as their composition (individual chemical and physical components), mainly determined by the source or the presence of other chemicals in air. For example, irritant gases such as sulfur dioxide, nitrogen dioxide and hydrogen chloride in the air may bind to, or mix with, solid or liquid particles and alter their toxicological properties.

Acute effects are generally mucosal irritation of eyes, nose and throat and middle respiratory tract. Asthmatics, people with compromised respiratory systems (eg, COPD - Chronic obstructive pulmonary disease), other respiratory disease and the elderly may be at increased risk.

The NHMRC (1996)[21] recommended an indoor air quality guideline for Total Suspended Particulates (TSP - also known as Total Dust) of 90 µg/$m^3$. The size of the particles in the TSP fraction has been variously reported as comprising particles with aerodynamic diameters ranging from ≤ 30 µm and as high as ≤ 500 µm. In Australia, however, the TSP fraction is considered to comprise suspended particles with an aerodynamic diameter of ≤ 50 µm (NEPC, 2001)[22].

The NEPC (2003)[23] recommends an ambient air quality standard for $PM_{10}$ of 50 µg/$m^3$.

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[20] Healthy House. Multiple Chemical Sensitivity. http://www.healthy-house.co.uk/allergy/information.php?allergy_id=6

[21] NHMRC (1996). *Ibid*.

[22] NEPC (2001). National Environment Protection (Ambient Air Quality) Measure. Issues paper – The need for a $PM_{2.5}$ standard in Australia. http://www.ephc.gov.au/pdf/Air_Variation_PM25/issues_paper.pdf

[23] NEPC (2003). *Ibid*.

***Sample collection and analysis***

Instantaneous and data logging sampling was performed using a calibrated electronic aerosol monitor (Dustrak). TSP concentration was measured; however, maximum size was not stated.

***Results and comments***

Concentrations of TSP detected in the store room and at the seven workstations ranged from 12 to 25 $\mu g/m^3$. These are about a quarter of the NHMRC guideline value for indoor air quality and about half the $PM_{10}$ ambient air quality standard. Whilst it is not strictly valid to compare the concentrations of TSP to the $PM_{10}$ standard, the results indicate that even if the particulates measured comprised only particles of $PM_{10}$ size, the levels were lower than the reference standard value.

### 3.3.4. Cleaning products

MPL conducted an assessment of the Material Safety Data Sheets for the cleaning products used. These indicated that the cleaning products were unlikely to be the cause of the adverse reactions reported by the workers.

### 3.3.5. Comments

The IAQ investigation by MPL conducted in January 2005 indicates that indoor air levels of a number of common indoor air pollutants all fall within national guidelines, hence unlikely to pose risks to the health of the workers.

The VOC identified by laboratory analyses of the paper were not detected in the air in the workplace. This may be because the conditions in the workplace are different from those used to analyse the paper within the laboratory environment. In addition it may be because of the limitations in the analytical techniques used to measure the substances.

The levels of these and other pollutants in the workspace at the time that adverse effects were reported by the staff are not known. It is unlikely, therefore, that any chemicals that might have caused the effects can be identified. Although many more chemicals could have been present at the time the adverse events took place and at concentrations that could have triggered the reactions, the results of the MPL, and other investigations do not allow any judgement on which they are likely to have been.

The results of the IAQ study by MPL suggest that measures taken to date to manage the exposure of workers to potential hazards may have been effective in reducing levels of contaminants in air and, consequently, worker exposure. The measures include actions to reduce contact with the offending paper, shorter times spent in the compactus store room and a better awareness by the workers of the potential hazards. Work on the air conditioning system and on improving ventilation in the compactus store room has also subsequently been undertaken, which should further reduce worker exposure.

## 3.4. Leeder Consulting

**Leeder Consulting (2005). Certificate of Analysis. 2004 Tax Pack. Report No M250057. Leeder Consulting, 22 February 2005.**

On 19 January 2005 Leeder consulting was provided with two unopened 2004 Tax Packs and a pack of unprinted paper, of the same batch used to print the 2004 Tax Pack, to be analysed for VOC that may cause irritation of eyes and skin.

***Sample collection and analysis***

Air was drawn over the two paper samples and trapped onto thermal desorption sampling tubes. The samples were then analysed by High Resolution Capillary Gas Chromatography/Mass spectroscopy. The method is reported to be able to identify 57 different VOC (list provided).

Similarly air drawn over the paper samples was trapped onto DNPH aldehyde and ketone sampling tubes and the samples collected analysed by Liquid Chromatography with Diode Array Detection. This analytical method was said to be able to detect 15 different aldehydes and ketones (list provided).

In addition, samples of the two paper sources were reacted with acid or base to investigate the potential to generate VOC by hydrolysis. Once treated with acid or base the samples were analysed by Purge and Trap – Gas Chromatography/Mass Spectroscopy for any VOC.

Samples of the two papers sources were placed in sealed containers for 24 h and the sample space above the samples assessed for odour by human nose (3 people sniff team).

***Results and comments***

Aliphatic hydrocarbons that are normally used as solvents in printing inks were detected in the printed Tax Packs samples (n-decane – 80 µg/total, n-undecane – 90 µg /total, n-dodecane – 72 µg /total; aliphatics of 10, 11 and 12 carbon chain length, respectively). These were said to be normal levels for printed stock. The relatively long chain hydrocarbons are found also in white spirits and are less toxic that the shorter chain aliphatics.

No other VOC were identified from the unprinted or printed paper. Thus the only difference in the VOC profile between the printed and unprinted paper was the detection of solvents usually associated with printing inks.

There were no VOC formed in either paper samples treated with acid or base.

Aldehydes and ketones were not detected, except for acetone (a common solvent), of which 320 µg/sample (total amount) was detected in the printed Tax Pack paper sample. Acetone is also a normal component of printing inks, lacquers and various solvents.

Inhalation of acetone vapours in high concentrations produces dryness of the mouth and throat, dizziness, nausea, uncoordinated movement, loss of coordinated speech, drowsiness and, in extreme cases, coma.

NOHSC has established exposure limits of 500 ppm (approx 1190 mg/$m^3$) as the 8-h TWA) and 1000 ppm (approx 2380 mg/$m^3$) as a short term exposure limit (STEL, 15-min average).

No irritating nuisance odours were identified in the two samples, which were described as having a paper or cardboard type odour.

### 3.5. Noel Arnold and Associates

**Noel Arnold & Associates (2004). Indoor Air Quality (IAQ) report. United KFPW, ATO Penrith. Noel Arnold & Associates, October 2004 (Report No. 36415)**

The report presents the findings of an Indoor Air Quality (IAQ) assessment conducted at level 1 of the ATO site located in Penrith, NSW. The assessment was carried out on 29 September 2004 at the request of the National Facilities Administrator of Uniter KFPW Pty Ltd. The National Facilities Administrator has provided the document to ATO but has not authorised its release more broadly.

The assessment was undertaken following staff reporting a non-identified odour coming from the storage room at their premises and the presence of dust on their hands after handling the Tax Packs that they considered to have been a consequence of the poor quality of the recycled paper used. This was similar to concerns raised by staff at the Northbridge office, except that adverse reactions to the odours and the paper were not reported at the Penrith office.

The IAQ investigation was essentially the same as that conducted by MPL at the Northbridge offices, except that respirable dust ($PM_{10}$), ozone ($O_3$) and nitrogen dioxide ($NO_2$) were also measured.

The reference guidelines used were as for the MPL investigation. For the additional compounds monitored, the reference values were 0.09 mg/m$^3$ for Total Suspended Particulates (incorrectly referred to as the guideline value for $PM_{10}$ by the authors of the report), 0.1 ppm (210 µg/m$^3$) 1-h average for $O_3$, and 0.16 ppm (320 µg/m$^3$) 1-h average for $NO_2$ (NHMRC, 1996)[24].

***Results and comments***

Temperature humidity and microbiological contaminants (bacteria, moulds and yeasts) were all within guideline values.

All chemical contaminants were reported to be within guideline values.

$O_3$, $NO_2$, CO and formaldehyde were undetectable at 2 – 6 sampling locations.

The only VOC quantified was toluene at one of three sampling locations at 62 µg/m$^3$ *cf* guideline values for toluene of 260 µg/m$^3$ (WHO, 2000)[25] and 500 µg/m$^3$ for Total VOC. Traces of other VOC were detected; however, the concentrations were said to be "below the accuracy of the sampling and analytical method", presumably meaning below the limit of detection or limit of reporting for the analytical technique.

$CO_2$ concentrations in the storage room ranged from 182 to 188 ppm and between 208 and 323 ppm in various areas outside the storage room. CO was undetectable at all sampling points.

Total dust ranged between 58 and 62 µg/m$^3$ at six sampling locations.

The results of the IAQ investigation undertaken at the Penrith Offices of ATO were comparable to the results of the investigation at the Northbridge offices. The report referred to particulates as respirable dust ($PM_{10}$) and total dust and it was unclear which had been measured. If total dust had been measured the levels appeared to be about twice as high as the levels reported in Northbridge.

[24] NHMRC (1996). *Ibid*.

[25] WHO (2000). *Ibid*. pp 112 – 114.

## 4. Overall comments

Over the period July to December 2004, a number of staff at the ATO in Northbridge complained of odours in the compactus store room where tax returns were stored until handled. Staff also reported a number of irritant type reaction ranging from mild to moderate in severity, with three staff seeking medical attention. The reactions were associated with both exposure to air in the store room, exposure to dusts and handling of the tax returns.

Coincidentally the ATO in Penrith, NSW, also reported odours associated with the tax returns, but unlike the events in the Northbridge office, staff did not report adverse health effects. The compactus store room at Northbridge was subsequently found to have inadequate ventilation which might have contributed to the odour and health problems.

The paper used for the 2003/04 Tax Pack was sourced from a different supplier compared with previous years, although printing was the same.

A number of forensic and air quality investigations by the ATO in Penrith and Northbridge and forensic and process investigations by the paper manufacturers have so far not identified any particular agent(s) that might have been responsible for the odours or the reported adverse effects. Moreover, it is highly unlikely the responsible agent(s) will be identified by any further analytical investigations, unless there is a recurrence of the events that led to the current situation.

Given the steps taken so far to prevent the problem reoccurring and managing existing risks, this is unlikely.

Notwithstanding the lack of information to identify the potential cause(s) for the adverse health effects reported by some staff at Northbridge ATO, it is accepted that under the circumstances at the time the officers did feel ill. Individuals who still feel ill or feel that they may have been sensitised to the odours or agents that might have been present at the time, should consult their general medical practitioner and ask to be referred to a specialist physician or other appropriate medical specialist for further investigations.

Generally, there was no agreement between the results of the various analytical investigations undertaken. Part of the reason for this is that, except for the IAQ investigations of the Penrith and Northbridge offices, different investigations were undertaken and different protocols used. However, where guidelines or standards on sampling and analytical techniques used were available these were generally followed.

None of the investigations undertaken specifically tested for substances which could have been formed from reactions/interactions of the paper the printing ink and the air (probably oxidation) over time. There could be a range of products released in the air or onto the surface of the paper, but given the unknown nature of these substances it would be very difficult to identify the substances. Consequently, it is not possible to make a judgement as to whether or not they may have been responsible for the adverse effects examined.

No significant differences were identified from the results of the two IAQ investigations in the Penrith and Northbridge ATO that would explain the adverse health effects reported at the Northbridge office.

The main, significant difference between the two ATO locations was the inadequate ventilation identified in the compactus store room at the Northbridge offices that would have facilitated the build up in the air of any

chemicals released from the tax returns stored there and could have led to increased exposure for staff working in or visiting the room.

Thus, the occurrence of adverse health effects at Northbridge and not at Penrith may be explained, in part at least, by higher concentrations of chemicals accumulated at Northbridge, as it is likely that the levels of malodorous chemicals were much higher in Northbridge than Penrith when staff were aware of the odours in the compactus store room between July and December 2004. In addition, the air levels might have been higher when the adverse effects were reported than when the samples were taken for the IAQ investigations.

As it has become aware of the reported malodour in the compactus store room and the adverse health effects reported by the staff, the ATO has taken action to investigate and address the issues.

The current indications are that the measures taken to improve conditions and reduce staff exposure to date (improved air circulation, reduced contact with the offending paper) appear to have alleviated the problem, with possibly one adverse effect events reported in the first three months of this calendar year to March 2005.

Nonetheless, additional steps should be taken to reduce the risk of a similar event reoccurring in the future and ensure that the workers generally enjoy good health at work in the longer term.

## 5. Recommendations

BenchMark Toxicology Services recommends that the following additional steps should be implemented:

- Continue to heighten awareness and improve hygiene in handling of the Tax Pack 2004 paper as outlined in Appendix II. This is likely to lead to reduced worker exposure to any potential hazardous material in the paper.
- Provide staff with copies of the *Workplace Indoor Air Quality* form (Appendix III) to record the occurrence, frequency and persistence of any adverse event in the workplace.
- Monitor comfort factors and air levels of microbiological contaminants, VOC and irritant inorganic gases in the compactus store room:
    - Initially, every three moths for the next twelve months
    - Then review the need for, and frequency of, monitoring based on the outcome of the 12-month monitoring.
    - Establish a long term monitoring strategy for these substances to be incorporated in future IAQ investigations.
- Undertake IAQ investigations periodically as required (Appendix IV), with comfort factors checked on a yearly basis.
- Develop tighter specifications for the paper to be used in future to minimise the risk of any toxic emissions that might impact on the Staff's health (and other potentially exposed people). For example. the following should be included in future specifications or contractual agreements:
    - The paper should not contain or release any toxic materials at concentrations that might affect the health of staff working with Tax Packs printed on the paper.
    - Prior to delivering the paper for printing of the Tax Packs, the manufacturer or supplier shall demonstrate to the satisfaction of the ATO, or it appointed representative, that the paper does not pose a

health risk to ATO clients, staff or the general public who might handle the paper.

- Continue to encourage staff who have reported "allergy like" adverse effects while handling and working with the paper or working in the compactus store room to consult their doctor and if necessary ask to be referred to a specialist physician or other medical specialist as appropriate for a thorough investigation of potential allergies and sensitisation.

# Appendix I

## 1. Chronology of events

| Date | Action / Comments |
|---|---|
| July/ August 04 | • Employees in NOR report foul smell in compactus containing 2004 paper returns<br>• Facilities investigate vermin/ moulds nothing found. Employees provided with gloves and masks as precautionary measure.<br>• Employees at Pen also report foul smell.<br>• Building owner arranges for IAQ testing to be undertaken<br>• Personal Tax arranges for analysis to be done of paper to determine smell |
| 22 October 04 | • Employee submits incident report advising skin irritations. OHS spoke with her and she advised it was OK but wanted us to know. |
| November 04 | • 1/11/04 IAQ report received for Penrith. No adverse finding but recommendation to institute more rigid cleaning regimes.<br>• Cleaning regime implemented in NOR 5/11/04<br>• 22/11/04 Paper analysis received by OHS – no particular element identified to explain smell. |
| December 04 | • 10/12/04 employee advises of skin irritations. Manager removes from duties with paper. Manager seeks input from other employees where it is determined that 12 employees have experienced a range of symptoms<br>• 13/12/04 OHS advised and Occupational Physician contacted to provide advice. To attend on 15/12/04.<br>• Manager implements change to work practices so that paper returns are not accessed by employees<br>• Issue advised to Operations OHS Committee<br>• 15/12/04 newspaper article in "West Australian"<br>• OP attends and examines available documents, eg report of symptoms experienced by employees, Penrith IAQ report, cleaning regime implemented, paper analysis report, and inspects work area<br>• OP advises not toxic but a sensitising effect for some. Suggested greater cleaning regime<br>• Manager sent email to all staff in area advising them of all available information and recommendations<br>• 16/12/04 union approaches ATO seeking particular actions.<br>• ATO notified Comcare (regulator) of issue<br>• Facilities implements upgraded cleaning including chemical free wet wipe and HEPA vacuuming.<br>• Personal Tax (area responsible for Tax Pack) commences investigation into paper used with view to ensuring forthcoming contract addresses these issues.<br>• 17/12/04 Asst Commissioner (People) issues email advice to all ATO employees about the Paper Returns issue<br>• Newspaper article in "West Australian"<br>• 18/12/04 newspaper article in "West Australian"<br>• 20/12/04 meeting held between ATO and unions to discuss issue<br>• Weekly meetings implemented between ATO and unions to |

| Date | Action / Comments |
|---|---|
| | enable update on information and progress<br>• 22/12/04 Decision taken to commission additional tests (IAQ and paper analysis)<br>• Commenced contacting analysts for testing to be done<br>• 23/12/04 commenced investigation into differences between NOR and other paper processing sites to determine possible contributing issues<br>• 24/12/04 extensive cleaning regime including carpets arranged to take place during close down period |
| January 05 | • 4/1/05 Chemistry Centre of WA commissioned to undertake analysis of paper<br>• 5/1/05 PMP to provide samples of paper, inks and solvents for analysis<br>• 6/01/05 MPL engaged to undertake IAQ testing<br>• 10/01/05 Chemistry Centre of WA report received. Recommended IAQ<br>• 11/01/05 IAQ testing undertaken<br>• 14/01/05 Leeder Consulting commissioned to undertake paper testing<br>• 18/1/05 products and product information supplied to Leeder Consulting<br>• Briefing of all employees on paper issue<br>• 19/1/05 newspaper article in "West Australian"<br>• Peter di Marco engaged as Toxicologist to advise on all information and future actions |
| February 05 | • 7/2/05 MPL IAQ report received. No issue identified however recommendations made re improvements to air con system<br>• 9/2/05 ATO meeting with di Marco to provide background and all available documentation<br>• 10/2/05 IAQ report provided to CPSU |
| March 03 | • 8/3/05 Leeder consulting report received<br>• Copy of report provided to CPSU<br>• 9/3/05 copy of report provided to Peter Di Marco<br>• 11/3/05 briefing for staff arranged to take place on 17/3/05 |

# Appendix II

## PROCEDURES FOR HANDLING TAX PACK 2004 RETURNS

## 1. Purpose

The purpose of this document is to provide guidance in the handling of Tax Pack Returns within the Australian Taxation Office.

## 2. Reference Documents

*Indoor Air Quality – Australian Taxation Office, 45 Francis St, Northbridge WA,* Project No. H60.7092.01R1, MPL, 1 February 2005

*Volatile Organic Compounds by GC-MS, Formation of VOCs by P&T-GC-MS, Aldehydes and Ketones by HPLC*, Report Number M250057, Leeder Consulting, 22 February 2005

## 3. Background

Air and/or surface contamination from returns are suspected to have resulted in the adverse health effects among officers. Staff handled a large volume of material from within the compactus storeroom and will need to continue to handle the forms to process late returns and for completing amendments.

Investigations into the possible causes of symptoms have been inconclusive. Proposed and completed preventative actions include:

- Use of alternate paper supplier for future returns
- Improvements to mechanical ventilation system as recommended by the indoor air quality investigation.
- Removal and storage of Returns at an alternative location.

The following non-mandatory precautions are recommended for handling Tax Pack 2004 Returns. Any person(s) who has had, or subsequently develops, symptoms following handling of Returns must use the following precautions.

## 4. General Precautions

The following general precautions should be considered when handling Tax Pack 2004 Returns.

i. Avoid contact with skin and eyes, wash hands before eating, drinking or smoking.
ii. Use protective clothing when handling, eg, disposable nitrile gloves.
iii. Use non-disposable elbow-length nitrile gloves if forearms are exposed and are likely to come into contact with paper.
iv. Protect desk surface or use disposable wipes to clean surface following use.

### 4.1. Removal of Large Volumes

Conduct a Job Safety Analysis before completing tasks. During removal and transfer of Tax Pack 2004 Returns to an archive location, the following precautions may be considered:

- Use of nitrile gloves
- Use of full length overalls with sleeves rolled down,
- Use of disposable Class P1 respirator.

## Appendix III

**Workplace Indoor Air Quality form**

**This form can be filled out by the building occupant or by staff.**

This form should be used if your concern is related to indoor air quality issues such as, temperature control, ventilation and air pollutants.

Your observations can help to resolve the problem as quickly as possible

Please use the form below to describe the nature of the problem and potential causes.

**Name:** _____ **Telephone Number:**_____

| Date | Department/Location in Building | Description of signs and symptoms | Task Performed | Time Started | Time Stopped |
|---|---|---|---|---|---|
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| | | | | | |

When are symptoms generally worst? _____

Do they go away? If so, when? _____

Have you sought medical attention or advice? _____

Do you have any other comments? _____

# Appendix IV

## INDOOR AIR QUALITY

## 1. Background

The provision and maintenance of acceptable indoor environments is a combination of well maintained mechanical ventilation systems, building design, interior construction materials and finishes, outdoor air quality and how well the building envelope protects against moisture. Many activities undertaken within the building will also affect indoor air quality. These can be the various activities of occupants; cleaning; building maintenance activities; pest control; renovation and remodelling; introduction of new furnishing or fixtures; increasing occupant densities; or adding heat sources, such as computers. These activities often require additional ventilation to maintain indoor air quality. In the workplace, people may also be exposed to infection risks that can be transmitted through contact with other people.

Indoor air quality is a significant occupational health issue reflecting:

- An increasing number of people spending their working lives indoors
- The construction of sealed buildings with windows which cannot be opened
- The increased use of synthetic materials and new technology
- Energy conservation measures that reduce the amount of outdoor air being circulated.

A number of studies have focused on discomfort or illnesses arising from indoor environments. Such problems include Sick Building Syndrome (SBS) and Building Related Illnesses (BRI). According to the World Health Organisation, SBS refers to a range of non-specific symptoms that can affect a significant number of building occupants. Itchy eyes, tiredness or headaches are typical of such complaints. Such symptoms have no clear causes and abate when a person is no longer inside the building.

Building Related Illnesses are those that have specific or diagnosable causes. Allergic reactions and infections such as Legionnaires' disease are examples. BRI symptoms typically persist for some time after a person has left the building.

Temperature, humidity, air movement and air contaminants may significantly influence air quality. Further description of these items is available within the MPL Report on Indoor Air Quality – Australian Taxation Office, dated 1 February 2005. An air-conditioned workplace should provide a thermally comfortable temperature range. A mechanical air-conditioning system should:

- Supply fresh air, exhaust stale air and filter recycled and outdoor air
- Provide a generally acceptable environment in terms of air temperature, humidity and air movement
- Prevent excessive accumulation of unpleasant odours
- Reduce excessive accumulation of indoor air contaminants from work activities, materials inside buildings, and external sources to acceptable levels.

## 2. Indoor Air Quality Investigation Protocol

Employees and visitors expect a healthy and comfortable environment in which to work or visit.

Indoor air quality should be investigated when:

- Complaints are reported
- Occupancy in the space changes substantially, or
- Renovations involving significant changes to the ventilation system occur.

In many cases, potential indoor air quality problems will be identified by complaints from building occupants. The purpose of this document is to create a simple and effective way to register indoor air quality complaints and determine potential sources of indoor air quality issues.

Indoor air quality investigations become difficult where there is an unknown cause of non-specific symptoms. They are further complicated by findings of multiple potential attributable causes. The complaints may be non-specific, ie, relating to feeling sick or uncomfortable or to the presence of an unusual odour, or they may be specific, ie, a particular material may be identified as the cause of discomfort or health problems.

Every complaint must be investigated to determine if a source of the problem can be identified, either within the workplace or from other causes.

Action taken should include:

- Completion of an incident report form.
- Investigation to determine whether the issue is related to building services, building materials, building contents, activities or individuals' health.
- Completion of the attached workplace Indoor Air Quality Concern Form (Appendix IV)
- Referral of persons experiencing signs and symptoms of ill health to a medical practitioner

## 2.1. Investigation and Issue Resolution

### 2.1.1. Investigation

Investigation into air quality issues must be in compliance with occupational health and safety incident investigation procedures. If there is a problem with the quality of indoor air, initial steps should focus on identifying the source of the problem. Problems may be associated with:

- Temperature
- Relative humidity
- Air flow
- Outdoor air intake
- Possible air contaminants

The Facilities Manager must be contacted to participate in the initial investigation into mechanical ventilation systems to ensure they are operating effectively and that temperature, relative humidity and air flow requirements are met. The air quality measurements include a walk through inspection of the building, a visual inspection and performance measurements of the building HVAC systems. If the issue is clearly building-related (e.g., comfort issues with heat, humidity; odours; or visible evidence of moisture problems), the issue should be referred to the Facilities Manager, who will need to report back on actions taken and determine if the issue has been successfully resolved.

Where an inspection of the area and the mechanical ventilation system does not find a cause for indoor air quality complaints then further investigation is

required to determine the source of the problem. This will require all or some of the following steps to be taken:

1. Completion of the indoor air quality concern form
2. Investigation by qualified HVAC engineer.
3. Inspection of past water damaged areas
4. Investigation of other possible sources of contamination such as polluted air being drawn into the building
5. An evaluation of the building activities and a review of previous studies and remedial actions taken to improve indoor air quality to date.
6. Atmospheric monitoring (including sampling for suspected contaminants; comparing indoor and ambient levels of pollutants with accepted guideline values)

Where building contents or activities are identified as contributing factors, external advice should be obtained to determine the need to measure exposure to specific air contaminants that are likely to be present. The sampling protocols consider air and surface sampling for particulate, volatile organic compounds, fungi and bacteria, mycotoxins, standard indoor air quality comfort measures (temperature, percent relative humidity, and carbon dioxide), or other techniques to determine the source of the problem and address concerns.

Common causes of indoor air problems are:

- Air conditioning design, operation and maintenance
- New or damaged building material
- Paint, fabric, furnishing releasing pollutants
- Mould on water damaged carpet
- Work activities, maintenance and use of chemicals
- People - body odour and perfumes
- Outdoor air pollution

If the issue appears to be health symptom-related (i.e., the complainant is experiencing symptoms of ill health, allergy or chemical reaction) the person must be encouraged to seek medical advice. The incident may be classified as a medical treatment injury.

Completion of the indoor air quality concern form will assist in developing a symptom profile. Symptom profiles are used to identify possible sources in the building (locations, tasks, materials) and exposure pathways (inhalation, ingestion or skin contact/absorption) between the source and the symptomatic individuals.

People occupying a building may exhibit a range of physical symptoms as a result of poor quality indoor air including:

- Eye, skin and respiratory tract irritation
- Infections
- Headaches
- Fatigue
- Dry skin or lips
- Unusual thirst
- Nausea
- Irritability
- Stuffy feeling
- Sinus congestion

Any indoor air quality problem can become complicated by anxiety, frustration, and distrust, delaying its resolution. It is important to

communicate with building occupations as the complaint is investigated and resolved.

Resolution of indoor air quality problems must follow the occupational health and safety issue resolution process established with the Australian Taxation Office.