

# Electricity Industry Occupational Health Advisory Group



## Guidance Note 4.5

# Asthma in the Electricity Industry

The Occupational Health Advisory Group for the Electricity Industry (OHAG) is an independent body of senior occupational physicians. They all have a professional role to provide advice to individual companies in the electricity industry and they meet together three times a year to discuss matters of common interest and to promote good practice in occupational health across the industry. The main route for doing this is by the preparation of guidance notes on topics of interest to the industry. The remit of OHAG and its guidance covers all aspect of the industry from generation, through transmission and distribution to retail and supply.

Until now the promulgation of this OHAG guidance has largely been by means of paper copies of the documents circulating within individual companies in the electricity industry. OHAG recognises that there is a need to make these papers more widely available and is grateful for the support provided by the Energy Networks Association (ENA) in hosting these documents on their website, and the links to them from the websites of the Association of Electricity Producers (AEP) and the Energy Retail Association (ERA).

The guidance notes will be of interest to managers, employees and occupational health professionals within the industry. They give general advice which has to be interpreted in the light of local circumstances. Health professionals using the guidance, retain an individual responsibility to act in accordance with appropriate professional standards and ethics. This guidance is offered in good faith and neither the individual members of OHAG, the companies they support, the ENA, AEP or the ERA can accept any liability for actions taken as a result of using the guidance.



## **Asthma in the Electricity Industry**

### **1. Introduction**

Asthma is a chronic debilitating disorder of the lungs affecting approximately 5% of the adult population, characterised by episodes of wheezing, tightness of the chest, coughing or shortness of breath due to reversible narrowing of the airways. Whilst many cases are due to an inherited, genetic predisposition to developing the disorder and are not related to exposure to any external factors, some cases may be caused or exacerbated by exposure to substances whilst at work. Such cases are potentially preventable, avoiding ill health, loss of productivity and litigation.

### **2. Aims of this Document**

To prevent the development of occupational asthma and to reduce or prevent the exacerbation of asthma in pre-existing sufferers exposed to substances at work.

### **3. Relevant Legislation**

- Health & Safety at Work Act 1974
- The Management of Health & Safety at Work Regulations 1992
- The Personal Protective Equipment at Work Regulations 1992
- Control of Substances Hazardous to Health Regulations 2002 (COSHH)

### **4. Key Guidance**

- A guide to the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (Revised May 2008)
- Health and Safety Executive. G402 Health Surveillance for Occupational Asthma. London. HMSO
- Health and Safety Executive. P46 Health Surveillance for Occupational Asthma, supplementary advice. London. HMSO
- Health and Safety Executive. COSHH WL17 Soldering: hand held lead-based with rosin cored solders. London HMSO
- Health and Safety Executive. Preventing asthma at work: How to control respiratory sensitisers. HMSO, 1994
- Health and Safety Executive. Controlling Health Risks from Rosin (Colophony) Based Solder Fluxes. London HMSO
- Health and Safety Executive. Medical aspects of occupational asthma. London: HMSO, 1991
- Electrical Industry Occupational Health Advisory Group Guidance Note 4.3. Health Aspects of Burning Biomass in Power Generation. June 2008



## 5. Asthma in the Workplace

Asthma is a reversible narrowing of the small airways in the lungs in response to a wide variety of provoking agents which have little or no effect in normal subjects. Whilst many individuals will have a genetic pre-disposition to asthma, many asthmatics develop the condition as an allergic response (sensitisation) to an inhaled agent e.g. house dust mite, pollen etc. and subsequent exposure to even a very low level of that agent will result in an asthmatic response. However, other factors such as smoking, exercise, emotional stress, respiratory infections or inhaling irritants can also produce airways narrowing and asthmatic symptoms without an allergic response (irritable airways).

The incidence of asthma and other allergies is increasing and various environmental factors including motor vehicle exhaust fumes and even diet are the suspected causal agents.

### a. Work related Asthma

Employees who have asthma due to 'irritable airways' are particularly at risk of developing symptoms of asthma when exposed to a significant amount of dust, irritant chemicals at work (eg some jointing chemicals) or when engaged in prolonged periods of exercise, particularly during very cold weather. These symptoms, although related to occupation are described as 'work related asthma' not occupational asthma.

### b. Occupational Asthma

- Occupational Asthma is episodic, reversible airways narrowing caused by exposure to a specific substance in the workplace to which sensitisation has occurred.
- This sensitisation is the result of changes to the body's immune system which is normally protective against harmful airborne contaminants.
- Sensitisation is substance-specific with symptoms initially occurring only in response to the specific substance. In addition, not all individuals will become sensitised at any given level of exposure and it is not possible to accurately predict those who will be affected, particularly for low molecular weight compounds. Sensitisation may occur after months or years of symptomless exposure.



### **c. Early Symptoms**

- Early symptoms include runny or stuffy nose and watering eyes typical of hay fever which may lead on to an asthma attack with wheezing, coughing, chest tightness and breathlessness.
- The onset of chest symptoms may be immediate or delayed for several hours following exposure, obscuring a work-related cause.

### **d. Incidence**

Within the UK the OPRA scheme (Occupational Physicians Reporting Activity) estimates 1,000 employees develop occupational asthma each year. This is a minimum estimate as it only represents reported cases.

### **e. Substances responsible for most cases of Occupational Asthma**

Two hundred or more sensitising agents have been identified, the most common include:-

- Di-Isocyanates - used in spray painting, foam manufacture, adhesives and as hardeners in resin-sand mix used to seal electric cable joints against moisture ingress.
- Flour/grain/hay - handling grain and grain products
- Soldering flux - colophony fume (pinewood resin)
- Laboratory animals
- Wood dust - e.g. Red Cedar wood
- Glues and resins - phthalic anhydride and compounds - curing epoxy resins

## **6. Respiratory Sensitisers within the Electricity Industry**

Where a respiratory sensitiser is identified during the COSHH assessment process, in all cases there should be discussions with Occupational Health staff. The combined occupational hygiene and health considerations will determine the need, if any, for control measures, the nomination of specific staff to use the agent, and the need for health surveillance.

While for certain sensitisers such as animal proteins, past medical or family history is useful in predicting susceptible individuals, this is not the case for low molecular weight agents such as di-isocyanates.

Biomass may also pose a risk to some exposed workers within the industry and further guidance on this can be found in OHAG guidance note 4.3.



### **a. Cable Jointing Within the Electricity Industry**

Cable Jointing may involve the use of a flux containing ethanolamine and colophony; both of these agents have been implicated in the causation of occupational asthma. Occupational hygiene evaluation of jointing work carried out in confined spaces has demonstrated levels of ethanolamine at or just above the Short Term Exposure Limit (STEL) for this substance. Adequate ventilation must be provided when cable jointing is carried out in confined spaces. Traditional soldering and jointing requiring the use of flux is increasingly rare and has largely been replaced by mechanical jointing methods.

Resin, sand and partially polymerised MDI is mixed in a container and poured into a joint box where it hardens. Occupational hygiene measurements of isocyanate in the breathing zone of jointers have been taken regularly under a range of adverse conditions over several years. The level of isocyanate in air during mixing has consistently been below the lowest level of detection or less than one tenth of the maximum exposure limit on all occasions as long as no heat is applied.

Over recent years, the potential for significant airborne contamination has been further reduced by the development of enclosed systems where the resin, hardener and filler are totally enclosed in a plastic bag obviating the need for mixing in a bucket. Other systems are under development using less volatile isomers of isocyanate and which are less associated with adverse health effects, than the current MDI / TDI based systems. There is likely to be a further move away from the use of isocyanate based hardeners in the future, driven by concerns regarding the potential for health problems and also by new labelling legislation to be introduced in late 2008. A number of new isocyanate free, acrylic systems have been developed (such as Gem) and are currently in use. Other technologies such as heat shrink may also become more popular despite their increased cost.

LV cable jointing using MDI has been in regular use by 15 separate distribution companies for 20 years with only sporadic cases diagnosed as "asthma" being declared. Each year an estimated 5,000 jointers complete an average of 120 LV joints each.

Risk assessment has hitherto been based on accurately obtained occupational exposure measurements well below the prescribed limits. However, isocyanates have been given a "Sen" annotation indicating the possibility of sensitisation occurring at levels of exposure well below the occupational exposure standard.



## 7. Control Measures

Fundamental to the process of effecting adequate risk control is the need to adhere strictly to the following hierarchy of control measures:

- Elimination of chemical exposure eg through mechanising processes wherever possible.
- Substitution with less hazardous chemicals.
- Use of appropriate personal protective equipment.
- Health surveillance.

## 8. Health Surveillance - In General

Regulation 11 of COSHH states that where it is appropriate for the protection of the health of employees who are, or are liable to be, exposed to substances hazardous to health, the employer shall ensure that such employees are under suitable health surveillance. Where the risk assessment and occupational hygiene assessment have revealed an occupational asthma risk which cannot be eliminated, or which is not insignificant, health surveillance of exposed employees will normally be required.

In deciding for any particular substance whether health surveillance is required and what the exact nature of the surveillance should be, liaison with Occupational Health staff is crucial. Depending on the risk assessment various levels of health surveillance can be identified:-

- i. Where there is only low risk of exposure a low level of health surveillance may be appropriate, consisting of a pre-employment enquiry about present or past history of asthma and the provision of information to staff about symptoms to watch for, advising them to report such symptoms to identified responsible persons.
- ii. Where there is more positive evidence of risk an appropriate respiratory health questionnaire should be administered at regular intervals by a responsible person who has been trained in accordance with the instructions of the Occupational Health staff. Current guidance from the HSE suggests that for new employees, health surveillance should take place at the pre-employment stage and then at 6 weeks and 6 months, before subsequently having annual checks. Experience within the industry suggests that in practice, cases of occupational asthma in at risk groups occur only after prolonged exposure of several years casting doubt on the value of more intensive surveillance early in employment. In all cases, occupational health staff should be involved in setting up the surveillance system.

- iii. Where there is strong evidence of a risk, i.e. published studies showing an



increased prevalence of asthma in exposed subjects, and it is not possible to conclude there is insignificant risk from the circumstances of work then a higher level of surveillance will be necessary. This may include the measures already identified as well as lung function testing as appropriate and medical examination by Occupational Health staff

Health surveillance is not a substitute for preventing or adequately controlling exposure but is an additional requirement to protect the employees' health. The surveillance will need to include the maintenance of a health record for each exposed individual. This health record is distinct from the confidential medical record, which is held by occupational health staff and contains clinical information.

## **9. Health Surveillance for Cable Jointing in the Electricity Industry**

Whilst MDI is a known respiratory sensitiser, previous hygiene assessments show very low levels of airborne MDI during jointing procedures. In addition, recent changes in technology have further reduced the potential for significant exposure to both MDI and other possible sensitisers. On this basis the OHAG recommends a medium level of health surveillance for cable jointing modelled on HSE guidelines:

- Jointing operatives complete a medical questionnaire before employment on jointing work. If there are any concerns, a medical examination is arranged.
- Operatives are given a lung function test at the start of jointing activities.
- Cable jointers complete an annual respiratory questionnaire to be returned to and reviewed by OH personnel. It should be noted that lung function testing is a relatively insensitive screening tool for identifying early cases of occupational asthma and the emphasis should be on symptom notification and recording through the use of appropriate questionnaires.

If any changes suggestive of asthma are detected, a medical examination, lung function and serial peak flow testing both at work and away from work are arranged as appropriate.

## **10. Health Surveillance for Biomass Exposed Workers**

As per the guidance detailed in OHAG 4.3, it is recommended that health surveillance is performed on all employees who work with biomass including maintenance staff and plant cleaners. It should be performed prior to beginning work with biomass, after 6 weeks, then after 12 weeks and, thereafter, annually unless there are clinical indications for more frequent assessments. It should be carried out by a qualified Occupational Health Nurse who is in a position to refer individuals to an Occupational Physician.



## **11. Management of Asthma in the Workplace**

A thorough risk assessment of the work process should be carried out and appropriate control measures instituted. These may include:

- appropriate training and information
- use of ventilation in confined spaces
- use of personal protective equipment
- health surveillance

If the employee's asthma symptoms persist consideration should be given by the Company Medical Adviser to redeployment of that individual away from exposure or to a job which minimises exposure to the causal agent, whether that is irritant fumes or inclement, cold outdoor work. However if occupational asthma is suspected in jointing staff, the employee should be completely removed from potential exposure to the suspected agent and considered for alternative duties.

## **12. Recommendations**

Managers should be aware of the possibility of occupational asthma occurring in exposed employees and provide appropriate information and training as required under the COSHH Regulations.

With specific reference to cable jointing in the Electricity Industry:

- i. A respiratory health surveillance programme should be started where this is indicated following an appropriate risk and COSHH assessment and with consultation with occupational health advisors
- ii. Health surveillance programmes for workers thought to be at highest risk should include the pre-employment completion of a respiratory health questionnaire as well as baseline lung function tests. An annual health questionnaire should subsequently be completed and reviewed by Occupational Health.
- iii. When a case of occupational asthma is confirmed, then redeployment away from exposure is necessary.
- iv. Data collected from surveys of exposed workers in separate UK companies should be analysed in order to quantify the risk of exposed workers developing occupational asthma





### **13. Summary**

Occupational asthma is a serious condition which some groups of workers such as cable jointers may be at risk of developing through their exposure to substances at work,. The risks associated with exposure to various materials used in the jointing process or in the joint itself including colophony, isocyanates and ethanolamines is well known. Control measures introduced over the past 10 years have progressively eliminated or reduced exposure to these materials and consequently reduced the risk of developing occupational asthma. Potential exposure to some of the above materials may still occur in the maintenance and servicing of older style joints however. Health surveillance may therefore still be required for workers with greatest exposure. The most effective way of identifying early cases of the condition is annual assessment of the development of respiratory symptoms by the use of a respiratory questionnaire.

### **14. References**

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