International Federation of Environmental Health

Contents

View from the President	A2
What is Important for IFEH	A2
Victor Andrich - Chairman	A3
Michael Halls - Hon. Secretary	A3
Exposure to Vehicle Pollutantsfor Police Officers on Traffic Duty at Major Public Events	A4
Legionellosis and Spa Pools	A9
News In Brief	A14
Seeking the Silent Road	A14
Change Management in New Zealand	A16
Environmental Health Education: The Genesis and Factors Constraining the Training of Environmental Health Officers in Malawi	A19
Recently Published Articles in The IFEH Members' Journals	A23

IFEH MAGAZINE

The International Federation of Environmental Health, Registered Office Chadwick Court 15 Hatfields London SE1 8DJ United Kingdom

VIEW FROM THE PRESIDENT

by Kia Regner

Communication and information are vital for the International Federation of Environmental Health when it comes to networking and cooperation both between its member organisations and with others within the field of environmental health.

Over the years we have had many discussions about ways to develop and provide the best means of communication relevant to us as environmental health professionals. It has proven increasingly difficult to keep abreast with all our tasks without a forum for dialogue and exchange of professional expertise and experience.

Over the coming years we also need to develop stronger links with others within the field of environment and health protection and to highlight environmental health issues. We must actively take part in the ongoing social dialogue regarding sustainable development and emphasise the need to link environment and health issues. As professionals we need to liaise strongly with both research and educational institutions.

The launching of the Journal of Environmental Health fills me with great joy and pride. My expectations are also great and I hope is that we will all contribute in developing this journal into a strong tool that will help us care for the environment in the interest of world health.

WHAT IS IMPORTANT FOR IFEH

by Lars Olsen, President Elect IFEH

IFEH has expounded a lot of energy to build the organisation and to agree on details and formalities. In the future we must move to be something for each individual member of the member organisations - the EHOs and associated environment and health professionals. Some of the organisations that are IFEH members today, have started various forms of communication and co-operation between two or more organisations. The IFEH can be a network to facilitate such co-operation like twinning projects where officers can visit each other, crossing borders to learn and experience.

Other forms of international co-operation should be elaborated upon, for example communication between research bodies and grassroots officers. The researchers get new results, and we operate in the field, where people live, putting the new experience into practice. - Symbiosis(!)

Lobbying gaining strength (power) to act as an NGO and to be listened to. Most importantly, what will our message be when we approach governments and world wide organisations and authorities like the WHO. We represent the people working in this field, and those making important decisions, nationally and internationally, should listen to us.

IFEH must gradually turn into being an organisation that addresses those environmental issues that are important for human health. These issues are very different from country to country. In Norway, for example, because of the climate in the winter we spend a lot of time indoors, and therefore indoor air and indoor climate are very important factors for health. In warmer countries other factors like drinking water quality, food safety etc. are more important.

As communities get more and more complex/ complicated, community planning gets important and being able to foresee the health effects of this or that decision will be essential. And here I mean not only the traditional environmental health aspects, but also social factors and others causing consequences to human health. This means new roles and new rules for the people working in the environmental health fields, both on local and central government levels.

Members and others must get a chance to know the Federation and what it stands for. A presence on the Internet with our own web site will give us a face, and a chance to get known around the world.

The Internet will also be an important way of communication, not only between IFEH and member organisations, but a way for individuals/professionals working in the environmental health field all over the world to exchange information, experience and knowledge.

Recruitment will always be an important issue for an organisation like ours, we need to find new ways of reaching organisations working in this area, many of them not knowing the term environmental health, simply because it is called something else or because

these services are organised in very different ways around the world. It is a big challenge to find them, but we have to, if we are going to be considered as a truly world wide organisation.

Victor Andrich - Chairman IFEH

As from 1 January 1999, Victor (Vic) Anderich will be assuming the Chairmanship of the International Federation Council.

Vic Andrich is currently the Principal Environmental Health Officer with the Town of East Fremantle, Western Australia.

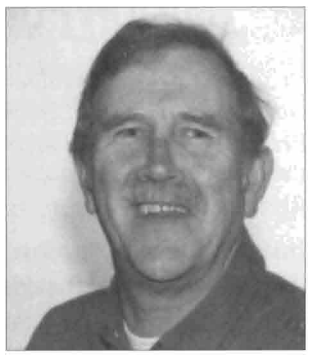
He is a Director of the Australian Institute of Environmental Health (AIEH) and a former State President of the Western Australian Division of AIEH. The Western Australian Division covers about one-third of the whole Australian continent and the area concerned is so big, no one would believe it, even if it was published.

Vic has been involved in Institute affairs for about 10 years and during that time he has taken on 'special' tasks for the Institute, including his latest task as Chairman of the WA FoodSafe Programme Committee. FoodSafe is a nationally adopted basic food handler training package for small business and has been developed and implemented with the encouragement of the Australian New Zealand Food Authority. He also co-ordinated and was the major contributor to the draft National Environmental Health Strategy currently being developed by the Australian Government.

On the International scene, Vic has been the AIEH delegate to the IFEH Council for the past 5 years and he was elected as Vice Chairman of the IFEH Council in 1997. Vic has attended several IFEH meetings including the Stockholm '96 meeting and looks forward to chairing his first meeting in Hong Kong in 1999. Vic Andrich also attended the IFEH World Congresses at Aberdeen and Stockholm and has maintained an international interest in his extensive travels abroad.

Vic is only the second Australian to achieve an Executive position on the IFEH, the first being Ron Spratt, who is still active as Vice President of the Pacific Rim area.

Michael Halls, Hon Secretary IFEH



As one who has been involved in the work of the Federation since its very earliest days, it gives me particular pleasure to contribute to this, the first edition of the new Journal. I am aware of the amount of hard work which has gone into this publication and of that which will be necessary to keep the Journal going. But I am confident that in John Stirling, Kenneth Stewart and Richard Sprenger, IFEH has three individuals who are committed to the success of the Federation and who bring to the Journal a wealth of experience in similar ventures.

They deserve the thanks of all those organisations in membership of IFEH but, more than that, they deserve the support which is so essential in making the Journal a success. So please show your support of the editorial team by sending them articles or papers for publication or by submitting your news or views on what is happening in environment and health circles in your part of the world.

Only b so doing will the Journal survive and your role in nurturing this new venture is of paramount importance. Please therefore send in your contributions or ask your colleagues to do the same. The editors can never have too much material!

I would also take this opportunity to remind any one reading this that the Federation is always anxious to hear from environment and health professionals and to serve, as best it can, the needs of those who are serving the public in so many diverse ways and in so many different countries. If there is anything that you think that IFEH can do for you or for your colleagues in the organisation which represent you, please let me know. My contact address is Michael Halls, Honorary Secretary, IFEH, Eastfield, 16 Abbotsford Road, Galashiels, TD1 3DS, Scotland, UK. Tel: 44 1896 752624, Fax: 44 1896 758089, Email M.Halls@scot.ac.uk

EXPOSURE TO VEHICLE POLLUTANTS FOR POLICE OFFICERS ON TRAFFIC DUTY AT MAJOR PUBLIC EVENTS

by Alastair Brown, Legal and Enforcement Services, Glasgow City Council, Scotland
Brian Kelly, Legal and Enforcement Services, Glasgow City Council, Scotland

Abstract

Introduction - Concerns have been expressed about the effects on the health of traffic police officers engaged on points duty due to exposure to high levels of vehicle-related pollution. In Glasgow, one of the areas of greatest concern occurs around Celtic Park football stadium on match days. The volume of traffic increases considerably due to approximately 50,000 spectators who mostly travel by cars and buses to attend the matches in what is an already busy area. Police officers are posted on points duty to assist with traffic movement.

Study Design - In order to gauge the levels of exposure to traffic pollution for police officers on points duty, monitoring of the air quality around Celtic Park was carried out on two occasions. These were at matches on a Wednesday evening and on a Saturday afternoon. Three pollutants were sampled - $N0_2$, PM_{10}, and CO. Four NO_2 personal monitors were worn by officers on points duty at junctions near to Celtic Park before and after the matches. Two other NO_2 personal monitors were worn by officers on nontraffic duty in or near to the stadium. One CO monitor measured levels beside roads around the stadium before and after the matches. A CO personal monitor was worn by the officer posted at the busiest junction. A PM_{10} monitor was also placed in the vicinity of this junction. Results of monitoring around Celtic Park on non-match days and in Glasgow city centre were available for comparison.

Results - Concentrations of all three pollutants were found to be elevated on match days when monitored at sites at which traffic officers were either on points duty or where they were posted in close proximity to traffic. In general, all pollutant levels at these sites were increased on match days in comparison to simultaneous monitoring in Glasgow city centre, and sites where officers were posted distant from traffic, and at Parkhead Cross on non-match days.

Conclusion - At no time were occupational exposure limits breached for any of the pollutants. It is likely, though, that ambient outdoor air quality standards for PM_{10} and NO_2 may be exceeded on occasion at the most polluted sites on match days. Whilst the effect on an officer's health to prolonged or frequent high pollutant levels would be detrimental, it should be remembered that the exposure period for officers on points duty on match days is relatively short. The risk to an officer's health could increase due to exposure to pollutants elsewhere and at other times, the

length of time on points duty, the frequency of placement on points duty, and the existing health status of the officer.

Introduction

Strathclyde Police initially approached Legal and Enforcement Services of Glasgow City Council following concerns expressed by some police officers engaged on traffic duty at major sporting fixtures in Glasgow. These concerns centred on the exposure to vehicle pollution of officers on traffic points duty from the large numbers of vehicles, both cars and coaches, brought to areas around sports grounds by spectators.

On discussion with Strathclyde Police it emerged that the greatest problems were believed to occur at Celtic Park, a football stadium in the east end of Glasgow, 1-2 miles from the city centre. This is partly due to the numbers of spectators who attend, around 50,000 on alternate Saturdays and occasional midweek evenings, and partly to the layout of the road system within the area. Traffic problems are exacerbated by the close proximity of the Forge Shopping Centre which itself attracts large numbers of vehicles to the area.

This report focuses on the monitoring of air pollutants and the exposure to vehicle pollution of police officers on traffic duty in the vicinity of Celtic Park. It is acknowledged, though, that many of the conclusions may apply to any well-attended public event in Glasgow or elsewhere.

Three pollutants were selected for monitoring. These were nitrogen dioxide ($N0_2$), particulate matter (in the form of PM_{10}), and carbon monoxide (CO).

NO_2 is a gas produced by the reaction of nitrogen and oxygen. The main source of NO_2 in the United Kingdom arises during the combustion of fossil fuels such as petrol and diesel in vehicle engines. It is believed that high ambient outdoor levels of NO_2 can have a detrimental effect on lung function by causing acute inflammation of the air-ways. Those with preexisting health problems, such as asthma, are believed to be most at risk. Research covering the long-term, or chronic, effect of exposure to NO_2 is less extensive and the risk to health has not been determined.

The National Air Quality Strategy, published by the United Kingdom Government in March 1997, sets

limits for NO_2 in the ambient outdoor air at 15Oppb, measured as an hourly average.

PM_{10} are particulate matter of less than 10 microns (im) in diameter. Road transport, in particular diesel vehicles, accounts for some 25% of particles emitted to the air per annum throughout the United Kingdom. This proportion, however, may be as high as 80% in urban areas such as Glasgow. Acute adverse health effects have been noted following exposure to particulates, most notably in those with preexisting respiratory and cardiovascular disease. The long-term effects of exposure to particulate matter are not fully determined.

The standard, adopted in the National Air Quality Strategy, recommends a limit for PM_{10} of 50ig/m^3, measured as a running 24-hour average.

CO is a gas produced during combustion of fossil fuels. The main source of carbon monoxide are vehicle exhausts. The threat to health arises from a reduction in the oxygen-carrying capacity of the blood which may increase the risks to individuals with ischaemic heart disease.

The standard, adopted in the National Air Quality Strategy, recommends a limit for CO of 10ppm as a running 8 hour average.

Details of Study

Air quality monitoring of officers on traffic duty in the vicinity of Celtic Park took place on the evening of Wednesday 19 November 1997 and the afternoon of Saturday 22 November 1997. (Celtic were playing host to Rangers and Dundee United respectively). It was anticipated that around 50,000 people would attend on each occasion.

NO_2 monitoring was carried out by the use of Ogawa passive sampling badges. These are personal monitors worn on the outer garments of the person exposed. They contain pre-coated filters that are analysed using a colormetric method by UV/vis. spectrophotometer in the laboratory following exposure. Two blank filters were kept in the laboratory as analytical controls. Final NO_2 concentrations were adjusted accordingly.

Six badges were worn by police officers on each occasion. Four were worn by officers on traffic duty who were posted at the following locations: junction of Springfield Road/London Road (Springfield Cross); junction of Springfield Road/Gallowgate (Parkhead Cross); junction of Millerston Street/Gallowgate. patrolling Nuneaton Street coach parking area. These were assessed from previous visits as being the locations of probable greatest exposure to air pollutants from vehicles.

Officers would typically be on post for at least 1° hours before the match and for around 1 hour after. The remainder of the time would be spent either in a police vehicle in the surrounding area or at nearby London Road police station rest room. Badges were attached to each officer before going to their posts before the match and were handed back to a central collection point by the officer following standing down from duty after the match. Officers were instructed not to expose the monitors whilst they were in the police station or their vehicles and they were supplied with a container in which to house the badge in order to protect it whilst off points duty.

Two other NO_2 badges were worn by officers on non-traffic duties. Their posts were at, or within, the stadium. These two samples acted as controls. The two officers remained on post throughout the evening or afternoon. These badges were attached to the officers. after they were on post and were retrieved from the officers in a similar manner to the other badges.

PM_{10} monitoring was carried out by the use of a MiniVOL portable air sampler manufactured by Airmetrics of Oregon, USA. Particulates were collected on a filter which was analysed by the gravimetric method and the PM_{10} concentration derived from the differences in weight of the filter before and after exposure. Three clean filters were kept in the laboratory and acted as analytical controls. Final PM_{10} concentrations were adjusted accordingly. The sampler was located on a window ledge at first floor level overlooking the officer posted at the junction of Springfield Road/ Gallowgate (Parkhead Cross). This was the site assessed as having the greatest probable exposure, based on the layout of the roads, height of buildings and volume of traffic. Monitoring took place for around 6 hours on the Wednesday evening and 5° hours on the Saturday afternoon.

CO monitoring was carried out only on the Saturday afternoon using a MiniCO toxic gas hand held monitor and a MicroMAC toxic gas personal monitor both manufactured by MSA (Britain) Ltd. The former was used to assess background CO levels at the roadside around the stadium both before and after the match. The latter was worn by the officer posted on traffic duty at the junction of Springfield Road/Gallowgate (Parkhead Cross). Exposure time was similar to that for NO_2 indicated above. Results are obtained instantaneously by digital readout on the monitor. Additionally, in the case of the personal monitor, average concentrations during exposure can be obtained.

In addition to the foregoing it was decided to undertake

monitoring of the three pollutants on a typical day when there was no influx of traffic for a football match at Celtic Park. Background levels of the three pollutants were monitored using the same equipment for a 24-hour period between 11 am Monday 22 December 1997 and 11 am Tuesday 23 December 1997 at the junction of Springfield Road/Gallowgate (Parkhead Cross). The monitoring point was that used for PM,o monitoring described above.

Details for levels of NO_2, PM_{10}, and CO on the 19 and 22 November and the 22 and 23 December 1997 at three continuous monitoring stations in Glasgow city centre were also available and were used for comparative purposes.

To assess the degree of severity of the exposure experienced by the police officers, results can be equated to the outdoor air quality standards for the three pollutants set out in the United Kingdom National Air Quality Strategy. In addition, comparisons with the Occupational Exposures Limits (OEL) for the pollutants, set out in the United Kingdom Health and Safety document (EH40/97), can be made. As there is no OEL given for PM_{10} the limit for respirable dust, defined as particles of less than 7ìm in size, which is the nearest equivalent, is used.

Meteorological conditions for all sampling occasions were noted.

RESULTS

A. Nitrogen dioxide (NO_2)

National Air Quality Strategy outdoor air standard
= ***150 ppb***, measured as an hourly average

EH40/97 occupational guideline = ***3000 ppb*** long term (8hr TWA) reference period
= ***5000 ppb*** short term (15 mins) reference period

Table 1. Monitoring on evening of Wednesday 19th November 1997

Officer No.	Location of post	Total exposure time	NO_2 level (to nearest ppb)
1	Springfield Cross	3hr. 25mins	46 ppb
2	Parkhead Cross	3hr. 25mins	57 ppb
3	Millerston St./ Gallowgate	3hr 10 mins	123 ppb
4	Nuneaton Street	3hr. 00mins	79 ppb
5	Stadium	3hr 55mins	12 ppb
6	Stadium	3hr. 55mins	2 ppb

Table 2. Monitoring on the afternoon of Saturday 22nd November 1997

Officer No.	Location of post	Total exposure time	NO_2 level (to nearest ppb)
1	Springfield Cross	2hr 55min	75 ppb
2	Parkhead Cross	3hr 10min	38 ppb
3	Millerston St./Gallowgate	3hr 00min	133 ppb
4	Nuneaton Street	3hr 10min	62 ppb
5	Stadium	3hr 50 min	55 ppb
6	Stadium	3hr 50min	7 ppb

From Tables 1 & 2 the following can be determined:

Average NO_2 level for officers on traffic duties- (officer nos. 1 to 4) (to nearest ppb)
- on Wednesday, 19th November = ***76 ppb***
- on Saturday, 22nd November = ***77 ppb***
- overall average = ***77 ppb***

Average NO_2 level for officers on non-traffic duties- (officer nos. 5 and 6) (to nearest ppb)
- on Wednesday, 19th November = ***7 ppb***
- on Saturday, 22nd November = ***31 ppb***
- overall average = ***19 ppb***

Average NO_2 level for all officers- (to nearest ppb)
- on Wednesday, 19th November = ***53 ppb***
- on Saturday, 22nd November = ***62 ppb***
- overall average = ***57 ppb***

Background monitoring on 22nd-23rd December-

NO_2 level at Parkhead Cross = ***42 ppb*** (to nearest ppb)

Table 3. NO_2 levels in Glasgow city centre.

	19th November	22nd November	22nd-23rd December
Hope Street	36 ppb	n/a	60 ppb
St Enoch Square	29 ppb	30 ppb	27 ppb
Montrose Street	31 ppb	34 ppb	31 ppb
Average	**32 ppb**	**32 ppb**	**39 ppb**

N.B. NO_2 levels given are the average of the hourly values corresponding to periods when monitoring near Celtic Park was taking place

n/a = data not available

B. Particulate matter (PM_{10})

National Air Quality Strategy outdoor air quality standard

= ***50 $\mu g/m^3$*** (over a 24 hour period)

EH40/97 occupational guideline = ***4000 $\mu g/m^3$*** (8hr TWA) for respirable dusts

Monitoring over the evening of Wednesday, 19th November

PM_{10} level at Parkhead Cross = ***35$\mu g/m^3$***

Monitoring over the afternoon of Saturday, 22nd November

PM_{10} level at Parkhead Cross = ***77$\mu g/m^3$***

PM_{10} levels for background monitoring on 22nd-23rd December

PM_{10} level at Parkhead Cross = ***64$\mu g/m^3$***

Background monitoring on 22nd-23rd December-

CO levels at Parkhead Cross = ***< 1 ppm***

Table 5. CO levels in Glasgow city centre.

	19th November	22nd November	22nd-23rd December
Hope Street	0.8 ppm	2.1 ppm	2.2 ppm
St Enoch Square	0.6 ppm	1.1 ppm	1.0 ppm
Montrose Street	0.9 ppm	1.3 ppm	1.3 ppm
Average	**0.8 ppm**	**1.5 ppm**	**1.5 ppm**

N.B. CO levels given are the average of the hourly values corresponding to periods when monitoring near Celtic Park was taking place.

Table 4. PM_{10} levels in Glasgow city centre.

	19th November	22nd November	22nd-23rd December
Hope Street	28 $\mu g/m^3$	57 $\mu g/m^3$	54 $\mu g/m^3$
St Enoch Square	19 $\mu g/m^3$	33 $\mu g/m^3$	21 $\mu g/m^3$
Montrose Street	n/m	n/m	n/m
Average	**24 $\mu g/m^3$**	**45 $\mu g/m^3$**	**38 $\mu g/m^3$**

N.B. PM_{10} levels given are the average of the hourly values corresponding to periods when monitoring near Celtic Park was taking place.

n/m – no monitoring done

C. Carbon monoxide (CO)

National Air Quality Strategy outdoor air quality standard

= ***10 ppm*** measured as a running 8 hour average

EH40/97 occupational guideline

= ***50 ppm*** long term (8 hr TWA) reference period

= ***300 ppm*** short term (15 mins) reference period

Monitoring on the afternoon of Saturday 22nd November

(CO levels at the roadside in the vicinity of Celtic Park)

-before the match (early afternoon)

= between ***5-10 ppm***

-after the match (late afternoon)

= between ***10-20 ppm***

(along the Gallowgate and Springfield Road with excursions up to 35 ppm adjacent to the points at Parkhead Cross, Springfield Cross and Gallowgate/ Millerston Street).

CO levels from the monitor worn by police officer at Parkhead Cross

= ***1 ppm*** (this is the average level recorded by the monitor over the afternoon)

Meteorological Conditions-

On the evening of Wednesday 19th November the weather was mild (9°C) with heavy blustery showers.

On the afternoon of Saturday 22nd November the weather was colder (10°C in the early afternoon reducing to 5°C later on) , dry with a light breeze.

Over the 24 hour period 11a.m. on the 22nd December to 11a.m. on the 23rd December the weather was cold (3-7°C) with light winds and heavy rain during the night.

Discussion

From the results section the following main points may be noted:

- NO_2 exposure for police officers on traffic points duty was higher than corresponding NO_2 levels in Glasgow city centre but was within the limits set for occupational exposure. It is possible that hourly values at the most polluted site (Millerston St./Gallowgate) may exceed, on occasion, the ambient outdoor air standard of 150 ppb, measured as an hourly average.
- NO_2 exposure was markedly higher for officers on traffic duty as opposed to colleagues on non-traffic duties, with one exception. Overall, the average NO_2 level for traffic officers on match days was higher than the average city centre level and that of the background level at Parkhead Cross on non-match days. NO_2 levels for non-traffic officers on match days were lower than the city centre average and the background levels on non-match days.
- PM_{10} levels at Parkhead Cross on match days were higher than the corresponding levels for Glasgow city centre and, although within occupational exposure limits, may exceed the recommended levels for ambient outdoor air of 50 ìg/m^3 as a running 24 hour average. PM_{10} levels at Parkhead Cross on non-match days were also noted to be raised.
- CO levels in the vicinity of Celtic Park were elevated to above the corresponding city centre levels on match days and those of background monitoring at Parkhead Cross on non-match days. At no point, however, did they exceed the short term occupational exposure level nor when averaged over the course of a traffic officer's posting did they exceed the limits for ambient outdoor air or longer term occupational exposure.
- Results of the monitoring of the three pollutants increased from the Wednesday to the Saturday match day in line with the corresponding results from the continuous city centre monitoring stations. This also coincided with a change in the meteorological conditions from wet and windy to cold and dry weather.

Whilst results for $N0_2$, PM_{10}, and CO in the vicinity of Celtic Park on match days were raised, it should be noted that exposure to higher levels of these pollutants was for short periods only. It is probable, therefore, that the total average exposure to which an individual officer would be exposed will be reduced when consideration is given to exposure at other times of the day. The corresponding risk to his or her health would adjust accordingly.

All results were found to be within occupational exposure limits. There is no occupational limit for PM_{10} quoted in EH40. The limit for respirable dust, defined as particles of less than 7ìm in size, which is the nearest equivalent, is used.

The only recognised standards which may be exceeded at certain sites near Celtic Park on match days were those for ambient outdoor NO_2 and ambient outdoor PM_{10}. The latter may have been exceeded on the Saturday. Monitoring then, however, was only carried out over a 5˚ hour period. The ambient outdoor standard for PM_{10} relates to a 24 hour period. It is possible that, given a reduction in traffic at other times of the day, the average PM_{10} level may have reduced to below the limit of 50 ìg/m^3. It is also noteworthy that the National Air Quality Strategy acknowledges that occasional exceedances of the PM_{10} standard may occur and that at any monitoring station four exceedances of the standard per annum are permitted.

Exceedances of the hourly value for NO_2 of 150 ppb for ambient outdoor air may occur at the most polluted sites where traffic officers are posted.

It is observed that the concentration of PM_{10} at the Parkhead Cross site was found to be higher than corresponding levels in the city centre on non-match days as well as on match days. In fact, the excess particulate matter at Parkhead Cross compared to the city centre average was similar on both match and non-match days suggesting that the extra traffic attributed to the football spectators did not add to the total particulate burden at Parkhead Cross.

Monitoring of pollutants around Celtic Park used different types of equipment, methodology and analysis from that employed in the city centre. This may be one possible explanation for the differences in pollution levels between the city centre and Celtic Park on match days. Also the equipment monitoring near the football ground employs nonreference methodology. It should be noted, however, that in comparative trials held previously in Glasgow between the referenced city centre monitoring stations and that equipment used near Celtic Park, good correlation between results was obtained. In addition to this, there are no referenced methods for personal monitoring of pollutants nor any such equipment sufficiently portable for monitoring around Celtic Park.

Other reasons for caution in interpretation of the results include the number of samples taken being relatively low (12 x NO_2, 2 x PM_{10}, 2 x CO) and that air pollution levels can be affected by meteorological conditions. In order to reduce the possibility that these factors unduly influenced our results, a greater number of samples should be taken from around Celtic Park on match days, and in a variety of meteorological conditions.

Conclusions

Concentrations of NO_2, PM_{10}, and CO were found to be raised on match days when monitored at sites on which police traffic officers were either on points duty or were posted in close proximity to traffic. In general, pollutant levels at these sites were increased on match days in comparison to simultaneous monitoring in Glasgow city centre, and to officers posted remote from traffic, and to monitoring at Parkhead Cross on non-match days.

At no time were occupational exposure limits breached for any of the pollutants. It is likely, however, that ambient outdoor air quality standards set in the United Kingdom National Air Quality Strategy for PM_{10} and NO_2 may be exceeded on occasion at the most grossly polluted sites on match days.

Whilst the effect on officers health arising from prolonged or frequent high pollutant levels would be detrimental, it is accepted that the exposure period for officers on points duty on match days is short. The risk to officers health would also be dependent upon, and could increase due to, exposure to pollutants elsewhere and at other times, the length of time on points duty, the frequency of placement on points duty, and the existing health status of the officer.

In order to confirm the foregoing further work could be carried out. This may include increasing the number of samples taken during monitoring as well as the monitoring of pollutants at locations, events, and times of the year outwith that covered in this report. In addition to this, medical tests to monitor the health status of exposed officers and, in particular, any acute or transient health effects would be beneficial.

Acknowledgements: The authors are grateful to Lesley Yeats, Legal and Enforcement Services, Glasgow City Council for the analysis of NO_2 samples.

LEGIONELLOSIS AND SPA POOLS

by Glen Storrar, M.App.Sc.(EH), B.App.Sc(EH), MAIEH, Environmental Health Officer, Royal Australian Air Force

Abstract: Spa pools have been found to provide an ideal environment for Legionella species. Cases of Legionellosis have been attributed to both bathing and being near spa pools in homes, hotels, ships and even shopping centres. A combination of control measures are required to maintain spa pool water quality, with a level of at least 0.3 mg/l/free chorine required to control Legionella pneumophila. If the requirements of the NSW Public Swimming Pool and Spa Pool Guidelines are followed by both public and private spa pool operators, cases of legionellosis associated with spa pools should be prevented.

Introduction

Spa pools, also known as whirlpools and jacuzzis, may be defined as "shallow pools (2-5m^3) containing warm water with air injection through holes in the bottom or the wall and which are used for recreational relaxation," Groothuis et al, (1985). Spa polls are complex units which have been described by Davis, (1985), as "small but sophisticated water treatment facilities".

Many hazards have been associated with spa pools use. These hazards have been grouped into four main areas (Castle, 1985): injury or death from slips and drowning; disease transmission; possible teratogenic effects in pregnancy; and heart dysfunction for those with pre-existing cardiac problems. The majority of the literature on disease transmission associated with spa pools concerns Pseudomonas aeruginosa, which typically causes dermatitis and folliculitis.

Geldreich et (1985) observed that chemical irritants in the water, high temperatures, exposure times, friction from tight swim suits and inhalation of aerosols, may aid invasion of microbes into the body. The inhalation of aerosols containing Legionella species may cause legionellosis in susceptible individuals.

This article will discuss the link between Legionellosis and spa pools and examine the effectiveness of recommended methods for water quality control in preventing the growth of Legionella spp. in spa pools.

Legionellosis

Legionellosis is the collective term of the infections caused by Legionella species: Legionnaires' Disease and Pontiac Fever. Legionnaires' Disease is

characterised by a pneumonia resulting in a 15 to 30% fatality rate, whilst Pontiac fever is a non-pneumonic, non-fatal, febrile disease with a high attack rate. Although there are 34 species and 50 serogroups identified in the family Legionellaceae, up to 90% of infections in the northern hemisphere are attributed to Legionella pneumophila L.pneumophila is considered to be ubiquitous in the environment and has been recovered from soil, mud, showerheads, nebulisers, dehumidifiers, humidifiers, potable water, streams, lakes, evaporative considers and cooling towers, and hospital and hotel plumbing systems (Keleti * Shapiro, 1987). The metabolic products of some algae, bacteria and protozoa have been found to support the growth of L.pneumophila in the natural environment.

L.pnemophila has been recovered from the environment in conditions of between 5.7C - 63.0C; a pH level of 5.5 - 8.1; and dissolved oxygen concentration of 0.3 - 9.6 mg/l, whilst in vitro studies have shown they can multiply at between 25C - 37C, pH 5.5 - 9.2 and dissolved oxygen concentration of 6.0 - 6.7 mg/l (Muraca et al, 1988; Wadosky et al, 1985).

L.pneumophila was first discovered in 1977 following an outbreak of pneumonia at a Philadelphia hotel hosting the American Legion Convention from which there were 221 cases of pneumonia and 34 deaths (NCDC, 1997). The illness was subsequently named Legionnaires' disease. Transmission of Legionella species from the environment to susceptible individuals occurs via contaminated aerosols in the air. The risk factors associated with Legionellosis include: cigarette smoking, chronic lung disease, advanced age and immunosuppression.

In Australia Legionella species have been isolated from similar environments to those described above, however only two-thirds of the species actually identified as causing Legionellosis are L.pneumophila and the other one third most comprises L.longbeachae. Approximately 180 cases of Legionellosis are reported each year in Australia (Hedges & Roser, 1991, NCDC, 1997). Although legionellosis is a notifiable disease in Australia, the prevalence may actually be greater than those reported, for instance in the USA it is estimated that only 10% of cases are officially reported (Jernigan et al, 1996).

Legionella in Spa Pools

Spa pools provide an ideal environment for the growth of Legionella species, particularly within poorly maintained filters. Hedges & Roser (1991) in their study into Legionella in Australia, found that spa pools are maintained at temperatures ideal for the growth of Legionella species, water quality is usually poor because the ratio of bathers to pool volume is high, and the effectiveness of water treatment is limited by the high organic load, water temperature and aeration. Other studies have reported that spa pools generate aerosols which are small enough to be inhaled (0.5 to 8.0m) and large enough (2.0m) to carry Legionella species, which if present may cause infection (Geldreich, et al, 1985).

Throughout the world, including in Australia, cases of Legionellosis have been associated with bathing in spa pools and merely being in the surround areas aboard cruise ships, in motels, hotels, sporting complexes, homes or apartments, and even shopping centres (Jernigan et al, 1996; Witherell et al, 1983; Goldberg et al, 1989; Cowell & Selvey, 1995; Hershey et al, 1997). These spa pools were poorly maintained and frequently had little or no residual disinfection in the water.

Given that merely being in the area of spa pools has been associated with the disease, Environmental Health Officers and spa pool operators are exposed to some degree of risk when conducting inspections and water monitoring, and may therefore wish to take appropriate precautions.

Water Quality Control in Spa Pools

Spa pools are different from swimming pools and should be considered as requiring specialised operating procedures. Water quality in spa pools is affected by the following factors:

1. High temperatures which are ideal for microbial growth and which dissipate halogen-based biocides;
2. High turbulence which also dissipates halogen-based biocides;
3. High organic loading from hair, oils, skin, etc, which inhibit biocides and may protect organisms from exposure to available disinfectant; and
4. Sunlight which dissipates halogen-based biocides through photolysis. common strategies for water quality control for spa pools include disinfection by chlorination/bromination and ozonation. Normal disinfection regimes need to be combined with:

- water filtration with high recirculation rates (>2 changes per hour);
- shock disinfection to control chloramines and possibly algae;
- replacing water periodically to control dissolved solids (>2000 mg/l);

- controlling the number of bathers;
- maintaining chemical water balance: a pH level of 7.2 - 7.8, and alkalinity and hardness concentrations of 100 - 200 mg/l; and
- the use of stabilising chlorine for exposed pools (Davis, 1985).

The main points of chlorination, ozonation and filtration will be discussed in the following paragraphs.

Chlorination: Considerable research has been undertaken into the effect of chlorine on Legionella species in water supplies. L.pneumophila has been found to be relative chlorine tolerant when compared with other bacteria such as Escherichia coli. This tolerance has been demonstrated by Kutcha et al (1983) who showed that in water (temperature=21oC; pH=7.6) containing 0.1mg/l chlorine, E.coli was undetectable in 1 minute, while a 99% kill of L.pneumphila required 45 minutes. This is important to note given that most microbial standards use E.coli as an indicator organism.

The dissipation of chlorine in spa pools is best illustrated by a study reported by Vogt and Witherell (1985), in which chlorine loss was measured in a spa pool occupied by four bathers. Free available chlorine declined from 3.0ppm to 0.8 ppm after 15 minutes and to 0.2 ppm after 30 minutes.

Kutcha et al (1983) reported a 99% kill of L.pneumophila was achieved within 30 minutes by a chlorine concentration of 0.1 mb/l in potable tap water at 32oC and pH 7.6. A dose response relationship between the concentration of free chlorine and the rate of inactivation of L.pneumophila was observed by Domigue et al (1988), thus higher concentrations of chlorine would be expected to provide a quicker kill. Higher concentrations of chlorine may also be needed when using cyanuric acid to stabilise chlorine in outdoor pools, because at low chlorine concentrations, increasing cyanuric acid has been found to significantly increase the time required to achieve a 99% bacterial kill (Davis, 1985).

A study in the Netherlands found that no Legionella species were detected in 23 whirlpools with a concentration of free available chlorine greater than 0.3 mg/l (Groothius et al, 1985). This finding supports an in vitro test system using artificial swimming pool water which found that 0.3 mg/l of chlorine may be sufficient to eliminate Legionella species from spa pools.

Ozonation: Ozonation is a process in which ozone, an unstable but powerful oxidising agent, is used in combination with chlorine or bromine to disinfect water. Ozonation systems are more complex than simple chlorine systems and require activated carbon filters to remove the ozone from the water before it re-enters the pool. As lower chlorine levels may be permitted, bather comfort is improved (Dadswell, 1996).

Studies into the effectiveness of ozone in controlling Legionella species have mainly focused on potable water systems, while spa pool water has not been examined. Edelstein et al (1982), demonstrated that L.pneumophila in distilled water could be killed by ozone at concentrations of less than 1 mg/l when exposed for 20 minutes. An in vitro study of a model plumbing system showed that continuous ozonation at a concentration of 1 to 2 mg/l produced a 7 log decrease from the initial L.pneumophila concentration within 3 hours at both 25 and 43oC and water turbidity did not affect the efficacy of ozone disinfection (Muraca et al, 1987). In vitro testing at 35oC, a pH level of 7.2, and ozone concentration of 0.11 to 0.15 mg/l effected at least a 99% inactivation of L.pneumophila within 5 minutes, (Domingue et al, 1988).

Despite these findings, a further study reported by Muraca et al (1988), found that ozonation of a contaminated water supply in a hospital wing resulted in decreased L.pneumophila counts initially, but failed to eradicate the organism. A major drawback of the ozonation methodology is the lack of residual protection against re-contamination, thus the process needs to be combined with chlorination or bromination to be effective.

Filtration: Legionella species isolated from spa pool filters have been identified as causing legionellosis (Cook and Leo, 1986). Spa pool filters are required to remove organic material from the circulating water. Low concentrations of halogen-based biocides combined with the warm and organically-rich environment make conditions ideal fro Legionella species. Spa pool systems need to provide adequate concentrations of disinfectant within the filter and filters require regular backwashing (Jernigan et al, 1996). Backwashing filters is the process in which the flow of water through a filter is reversed and allowed to run to waste. This is required to clean the filter by removing any pollutants and to ensure its effectiveness is maintained (Dadswell, 1996).

Adequacy of Standards

A number of standards exist for water quality control in spa pools. The two national standards are: Australian Standard AS2610 and the NH&MRC Australian Guidelines for Heated Spa Pools. These standards provide recommended levels for disinfectant, chemical

and bacterial levels for spa pool operation but they are not as comprehensive as the NSW Public Swimming Pool and Spa Pool Guidelines (NSW Health, 1996), which will be discussed in this section.

Whilst these standards relate to the operation of public spa pools, the principles can easily be applied to private spa pools.

The NSW guidelines require continuous disinfectant dosing of spa pools via a metering device. Automatic monitoring and dosing systems are preferable to maintain effective disinfectant levels during periods of high bather load. Disinfectant concentrations are to be tested and recorded before use. Further testing is required every two hours when non-automatic continuous dosing is adopted or once more throughout the day with automatic continuous dosing systems. The minimum concentration of free available chlorine that is permitted is 2.0 mg/l. This concentration well exceeds the 0.3 mg/l concentration deemed to be sufficient to control L.pneumophila in spa pools and therefore is considered adequate. The use of isocyanurates is not permitted because of their effect in decreasing kill rates and delaying initiation of kill. Given the general observation that 50 to 60% higher concentrations of bromine are required for similar results to chlorine, the minimum free bromine level of 4.5 mg/l should also be adequate.

The NSW guidelines require ozone concentrations of 1 mg/l when injected pre-filtration or 0.8 mg/l post-filtration for chlorine systems and 2 mg/l for bromine systems with a contact time

of no less than 2 minutes. The required concentrations of chlorine or bromine residual are the same as for chlorination and bromination alone. This reflects the need for residual disinfection and is appropriate given the observation that ozone efficacy against L. pneumophila has not been sufficiently proven. Ozone and chlorine systems require an activated charcoal filter to remove ozone from the water before it returns to the spa pool, whilst when bromine is used, bromide concentrations of greater than 15 mg/l are required to destroy any ozone. The ozone concentration must be tested and recorded weekly. As a precaution, a back-up disinfection system is required in case the ozone generator fails.

The guidelines also detail requirements for other common water quality practices. These include maintaining a pH level between 7.2 - 7.8, total alkalinity between 80-200 mg/l, temperature below 38oC, total dissolved solids below 3000 mg/l, and limiting bathing times to 20 minutes. As discussed in the previous section these measures help maximise disinfection power and maintain water quality.

Continuous water circulation and filtration to remove organic material from the water is required under the guidelines. As discussed previously, this must be combined with regular backwashing to remove such material from the filter and to help prevent Legionella growth. In order to minimise organic matter, the NSW guidelines recommend that "all persons should be encouraged to use closet and shower facilities before entry to pool. Persons detected with open wounds, sores and rashes, infected eyes, or wearing bandages should be requested not to swim in the pool. Pool contamination through nose blowing, spitting and spouting of water should be actively discouraged" (NSW Health, 1996, p12).

Bacteriological monitoring is required weekly in the first two months of operations and then monthly. The standards only require testing for heterotrophic plate count (<100 CFU/ml), thermotolerant conforms (Nil/100ml) and P. aeruginosa (Nil/100ml). Given the relative chlorine resistance of L.pneumophila such testing may not indicate the presence of Legionella species.

Registers are required to be kept detailing date/time of testing; disinfectant concentration; pH; total alkalinity; temperature and bathing loads. The registers, combined with the required testing regime, should be adequate to identify problems with disinfectant levels and possibly with automatic monitoring equipment, thus prompting operators into action. Education and the promotion of these requirements is essential to combat the lack of resources and lack of initiative of spa pool operators in conducting maintenance procedures, which has been observed by Vogt and Witherell (1985).

Conclusions

This review has shown that spa pools require specialised operating procedures to prevent diseases, including legionellosis which has been associated with many spa pools. If spa pools are maintained in accordance with the NSW Public Swimming Pool and Spa Pool Guidelines the risk of legionellosis is negligible.

To ensure that cases of legionellosis are minimised, all spa pool operators (of both public and private spa pools) need to be educated about the risks and the need for proper and timely control measures. Environmental Health Officers are ideally placed to develop and implement such education programs in their communities.

Given the relative chlorine resistance of L. pneumophila, Environmental Health Officers may also consider monitoring for Legionella species in spa pools as part of any microbiological testing conducted in their programs to maintain water quality in spa pools.

References

Castle, S., 1985, Public Health Implications Regarding the Epidemiology and Microbiology of Public Whirlpools, *Infection Control*, 6,10:418-419.

Cook, I.F. & Leo, L., 1996, Legionnaires' Disease Associated with Spa Use, *Communicable Diseases Intelligence,* 7 Feb 86: 8-11.

Cowell, N & Selvey, L., 1995, Heated Spa Associated with *Legionella pneumophila deaths, Communicable Disease Intelligence, 19,* 5: 116-117.

Dadswell, J.V, 1996, Managing Swimming, Spa and Other Pools to Prevent Infection, *Communicable Diseases Report,* 6, 2: R37-R40.

Davis, B., 1985, Whirlpool Operation and the Prevention of Infection, *Infection Control,* 6,10:394-395.

Domingue, E.L., Tyndall, R.L., Mayberry, W.R., & Pancorbo, O.C., 1988, Effects of Three Oxidizing Biocides *on Legionella pneumophila* Serogroup 1, *Applied and Environmental Microbiology,* 54, 3: 741-7.

Edelstein, P.H., Whittaker, R.E., Kreiling, R.I.,, & Howell, C.I.,, 1982, Efficacy of Ozone in Eradication of *Legionella pneumophila* from Hospital Plumbing Fixtures, *Applied and Environmental Microbiology,* 44, 6: 1330-1334.

Geldreich, E.E, Highsmith, A.K. & Martone, W.J., 1985, Public Whirlpools -The Epidemiology and Microbiology of Disease, *Infection Control,* 6, 10:392-393.

Goldberg, D.J., Collier, P.W, Fallon, R.J., McKay, T.M., *et al,* 1989, Lochgoilhead Fever: Outbreak of Non-Pneumonic Legionellosis due to Legionella micdadei, The Lancet, 11 Feb 89: 316-3 1 8.

Groothuis, D.G., Havelaar, A.H. & Veenendaal, H.R.. 1985, A note of Legionellas in Whirlpools, *Journal of Applied Bacteriology,.* 58:479-482.

Hedges, L.J. & Roser, D.J., 1991, Incidence of *Legionella* in the Urban Environment in Australia, *Water Research,* 25, 4:393-399.

Hershey, J., Burrus, B., Marcussen, V., Notter, J., *et al,* 1997, Legionnaires' Disease Associated with a Whirlpool Spa Display -

Virginia, September-October, 1996, MMWR, 46, 4: 83-86.

Jernigan, D.B., Hoffinan, J. Cetron, M. S., Genese, C.A., *et al,* 1996, Outbreak of Legionnaires' disease among cruise ship passengers exposed to a contaminated whirlpool spa, *The Lancet,* 347:494-499.

Keleti, G. & Shapiro, MA., 1987, Legionella and the Environment, *CRC Critical Reviews in Environmental Control,* 17, 2:133-185.

Kutcha. J.M., States, S.J., McNamara, A. M., Wadowsky, R.M., *et al,* 1983, Susceptibility of *Legionelia pneumophila* to Chlorine in Tap Water, *Applied and Environmental Microbiology,,* 46,5: 1134-1139.

Muraca, P., Stout, J.E, & Yu, V.L., 1987, Comparative Assessment of Chlorine, Heat, Ozone, and UV Light for Killing *Legionella pneumophila* within a Model Plumbing System, *Applied and Environmental Microbiology,* 53, 2: 447-453.

Muraca, P.W., Yu, V.L. & Stout, J.E., 1988, Environmental Aspects of Legionnaires' Disease, *Journal American Water and Wastewater Association,* Feb 88:78-86.

National Centre for Disease Control, 1997, Legionellosis, *Communicable Disease Intelligence,* 21, 10:137

NSW Health, 1996, *Public Swimming Pool and Spa Pool Guidelines.* NSW Department of Health, Sydney.

Vogt, R.L. & Witherell, L.E., 1985, On Whirlpool Spa Maintenance, *American Journal of Public Health, 75,* 1: 97.

Wadowsky, R.M, Wolford, R., McNamara, A. & Yee, R.B., 1985, Effect of temperature, pH, and Oxygen Level on the Multiplication of naturally Occurring *Legionella pneumophila* in Potable Water, *Applied and Environmental Microbiology,* 49, 5:1197-1205.

Witherell, L.E., Orciari, LA., Spitalny, K.C., Pelletier, R.A., *et al,* 1983, Isolation of *Legionella pneumophila* from Recreational Whirlpool Spas, *Journal of Environmental Health,* 46, 2:77-80.

IFEH Magazine

It is intended to publish the next Magazine in the Autumn of this year.

The date for receipt of articles and reports for inclusion is the 1st September 1999.
These should be sent to:

John Stirling,
Co-ordinator IFEH Magazine,
11 Muirwood Drive
Currie,
Edinburgh
EH14 5EZ
Scotland.
E-mail: j.stirling@btinternet.com

NEWS IN BRIEF

New Associate Member

With effect from 1st January this year Underwriters Laboratories Inc, of Northbrook, Illinois, USA have been admitted to the IFEH as an Associate Member. The contact name is George A Kupfer, Underwriters Laboratories Inc, 333 Pfingsten Road, Northbrook, Illinois 50062-2096, USA.

NEHA

Tanzania Book Appeal

The Californian Conference of Directors of Environmental Health are donating 500 pounds sterling to the donation appeal. This action was approved by CCDEH's Executive Committee in December 1998, while simultaneously issuing a challenge to any organisation to match or exceed the amount of their donation.

NEHA Annual Education Conference and Exhibition

IFEH members are invited to visit the NEHA Website (www.neha.org) for information on the Conference and Exhibition to be held in on 6-9 July 1999, in Nashville, Tennessee.

Europe Group

The Europe Group of IFEH has decided to develop its own homepage, with many links to the IFEH (World) homepage. Running the site shall be in full compliance with decisions taken by the IFEH council. The development work is being undertaken by Henning Hansen (Denmark).

SEEKING THE SILENT ROAD

By David Armstrong of the Refined Bitumen Association

Road transport noise is the greatest source of noise generated outside homes in the UK. It accounts for 66 per cent of total noise, affects 13.4 million households and has wiped £33 billion off UK property values.

It is not, therefore, surprising that throughout the UK numerous groups of local residents have been campaigning vigorously to have the noise they have to live with every day reduced. Those living near to busy roads suffer the constant drone of traffic. They are unable to open their windows and unable to enjoy their gardens. To add insult to injury, as traffic volumes increase and the noise problem worsens, they have seen the value of their homes fall. Noise pollution is responsible for numerous ill effects including lack of sleep, which in turn impairs concentration and health, affecting work productivity. A National Noise Incident Study confirmed that more than half of the homes in England and Wales are subject to daytime noise levels which exceed the World Health Organisation's recommended maximum levels.

Studies conducted in a number of European countries have revealed a willingness by individuals to pay to reduce their exposure to road traffic noise. In Switzerland, research shows that people would be prepared to pay approximately £500 per annum each to minimise their exposure to this disturbance.

For the first time in the UK the Government, last year, officially acknowledged that traffic noise has become a major issue. In its Integrated Transport White Paper and Roads Review it refers to traffic noise becoming an increasing problem as traffic volumes increase. In addition, the Government has given a commitment to revising the criteria used to assess whether a particular road warrants noise reducing measures and proposes to establish a ring-fenced annual budget for noise mitigation.

In its New Deal for Trunk Roads in England the Government states that, to help reduce the impact of traffic noise on those living close to the existing network, it has decided that all future maintenance contracts where noise is a particular concern will specify quieter road surfaces.

Like any form of pollution, the most effective way to reduce traffic noise is to stop it being produced in the first place. With air pollution, the Government and environmentalists activity has logically focused on fuels, vehicle engines, and how emissions are released - how the problem is created at source. The best way to deal with traffic noise is to do the same, and that involves looking at the vehicle and the road.

In most urban areas, where traffic speeds are slow, most of the traffic noise is generated by vehicle engines. However, at speeds of more than 40 mph the most dominant traffic noise is generated by the interface between vehicle tyres and the road surface. The most effective way to reduce this is to alter the texture of the road surface rather than the tread of the tyre, according to Professor Alan Woodside of the Highway Engineering Research Centre at the University of Ulster.

"In general, variations in tyre tread pattern have small effects on the overall levels of noise. The range of noise levels for different road surfaces is considerably greater than the small differences resulting from changes in tread patterns. This is one of the reasons why it is generally accepted that there is greater scope for

reducing tyre/surface noise by redesign of the road surface," says Professor Woodside.

Professor Woodside is conducting research into the impact on traffic noise of using various modern asphalt surfaces. To date, he has shown that these surfaces reduce traffic noise by up to five decibels which is the equivalent of more than halving the volume of traffic or more than doubling the distance of the listener from the road.

Confirmation that modern asphalts can reduce traffic noise to such an extent is good news for residents suffering from the continual drone of traffic. Modern asphalts can prove extremely cost effective and can be applied quickly to existing roads with minimum disruption to traffic flow. This makes the materials attractive to road authorities who now have to incorporate road user costs, such as congestion and delays, into the overall cost of roadworks.

In addition, the acoustic benefits, coupled with the financial advantages of modern asphalts, mean that reducing traffic noise at source on existing roads by replacing the surface is becoming a more widespread practice.

In conventional road surfaces the skid resistance is achieved by having aggregate (chippings) projecting from the roads surface. While this provides grip for tyres it also causes the tyres to vibrate as they pass over the uneven surface. It is this movement that causes the majority of traffic noise. Modern, noise-reducing asphalts have a "negative" texture and skid resistance is provided with gaps in what is otherwise an even surface. This results in minimum tyre vibration and a dramatic reduction in traffic noise.

The magnitude of the noise reduction achieved by modem asphalts has been established in a number of independent research exercises. Trials by the Transport Research Laboratory have shown that, compared with hot rolled asphalt surfaces with rolled-in chippings, the most commonly used, but my no means the most noisy surface, modern asphalt is quieter by about four decibels in dry conditions and up to eight decibels in wet weather. Compared with brushed concrete surfaces the benefit increases even more: up to 11 decibels quieter in certain circumstances. A reduction of four decibels is equivalent to halving the volume of traffic or doubling the distance of the listener to the road.

On a section of the M4 in Wales, the impact of modern asphalt has been recorded for the Welsh Office by the Transport Research Laboratory to have reduced traffic noise by the equivalent of an 85 per cent reduction in traffic over the previous surface.

The research headed by Professor Woodside concludes that the level of traffic noise is reduced by modem asphalts by up to five decibels. His report recommends that careful consideration should be given to the use of noise-reducing surfaces both at the initial planning stages of roads as well as when resurfacing is carried out.

In the past, local residents were sheltered from many of the UK's noisier roads by acoustic, or sound, barriers. While these protect homes nearest a road, because they work by deflecting existing noise, they offer little protection to properties further than 300m away. Where acoustic barriers are used double glazing or other sound-reducing methods are often necessary in homes further away from the road. The limited success of other methods of traffic noise reduction and the benefits of modern asphalts have been recognised by the Government and, as such will become more important in the specification for road surfaces in the future.

Noise-reducing asphalts have been widely and successfully used in mainland Europe for many years. Initially they would be specified when noise became an important criteria due to public pressure. For example, in Austria, where most trunk roads pass through populated valleys, public lobbying of elected representatives was instrumental in the choice of a noise-reducing road surface and led it to be known as political asphalt. In the Netherlands, noise-reducing asphalt is specified for use on all trunk roads.

While the UK Government has now given a commitment to addressing the issue of traffic noise the scale of the problem means that it will still be many years before those living next to our busiest roads benefit from quieter road surfaces. And many have already suffered from the effects of traffic noise for numerous years, for example, residents living near the A27 in Hampshire.

For nearly ten years the Warblington Residents' Association has been campaigning for the A27, Havant-to-Chichester road to be resurfaced with noise-reducing asphalt. According to local resident, Roy Eames who lives just 160m from the road, traffic travelling on its ridged concrete surface creates an incessant howl which prevents people in the area from enjoying their gardens or even opening their double-glazed windows. He has been active in the association's campaign to have the road resurfaced to reduce the noise. The problem has been recognised in the past by the then Department of Transport which paid out nearly £22 million to local residents in compensation for the noise. Ironically, the 13kilometre stretch of road cost less, £20 million, to design and construct in the first place.

Throughout the UK, numerous similar campaigns are being run by residents' associations to have traffic noise reduced. However, many of the associations shy away from publicity, concerned that widespread knowledge of their problem may devalue property prices in the area.

Their method is to bombard their local councillors, MPs, local authority and, where appropriate, the Highways Agency and Government with statistical and anecdotal evidence of the problem. Many of them now see a glimmer of light at the end of the tunnel with the Government's proposal to establish a noise mitigation budget. However, Willie Hunter, chairman of the Refined Bitumen Association (RBA), which has been active in research and lobbying for the more widespread use of noise-reducing surfaces, gives the proposals a cautious welcome.

For many years we have been providing local groups of residents with information and assistance in their campaigns to improve the quality of their lives. Some of these campaigns have been active for more than ten years and the residents are still waiting for something to be done. While it is encouraging to have official recognition from the Government that traffic noise is a problem, and a problem that will increase as traffic volumes grow, unless a commitment is made to provide adequate funds little can be done to ameliorate the situation," says Hunter.

In addition to the RBA many other organisations have expressed concern about traffic noise including the Noise Abatement Society and the Council for the Protection of Rural England which has published "areas of tranquillity" maps which show how traffic noise in particular has eroded the tranquillity of the countryside over recent years. Motoring organisations also recognise the problems caused by traffic noise. After all, most of us are drivers as well as residents. The RAC has been promoting the use of noise-reducing asphalts as the most effective solution to the problem of traffic noise.

One area benefiting from noise-reducing asphalt is that around the A I Gateshead Western Bypass, the busiest stretch of road in the north of England. The 3.6-kilometre stretch of road has been surfaced with a type of modern asphalt which is now becoming widely available under licence in the UK and has considerable noise-reduction benefits.

The advantage of this new surface has been recognised not only by local residents. Engineers at the Nissan European Technology Centre (NETC) began to use the newly-surfaced road at night to evaluate their vehicles' noise characteristics. They discovered that the reduced tyre noise made it easier to monitor noise emanating from the engine, gearbox and suspension. As a result, Nissan decided a similar quiet surface would aid technological development and placed a contract for the resurfacing of its test track.

While Nissan is benefiting from noise-reducing surfaces most of us will not be so lucky in the short term. As Willie Hunter explains: "despite the good intentions of John Prescott's integrated transport policy most analysts agree that traffic volumes will continue to grow significantly over the next decade. This will be accompanied with a proportional increase in traffic noise. Unfortunately, words from the Government will not be enough to drown out its drone."

CHANGE MANAGEMENT IN NEW ZEALAND

by Terence Moody (MIEH, Past President) and Isobel Stout (MIIEH, President)

Introduction

Two recent discussion documents which may have effects on the ways territorial authorities undertake work in the fields of food safety and public health have been released by the Ministries of Health (MoH) and Agriculture and Forestry (MAF). One relates to the administration of food safety in New Zealand (a joint MoH and production) the other to a review of the Health Act 1956 and structures for delivering public health regulatory services.

In the case of Food Administration the proposal is for a Food Regulatory Authority to be set up in the Ministry of Agriculture and Forestry to administer the Food Act and any food hygiene regulations, including the, at present voluntary, "food safety programmes" which if approved for premises provides that they be exempted from registration by territorial authorities under the Food Hygiene Regulations. Those with food safety programmes are required to employ independent auditors. At present there is a provision for local authorities to approve exemptions but the criteria for such exemption processes have not yet been Gazetted. The Food Regulatory Authority will purchase locally based monitoring, surveillance and enforcement activities, presumably on a competitive basis. It is understood the change from MoH control to MAF is to occur on the 1 July 1999 but there is no specific date for changing the requirement for food safety programmes from a voluntary action to one that is mandatory. The timing of the organisational changes and possible transitional arrangements could have a significant effect on future staffing arrangements for some environmental

health officers in territorial authorities. It is not possible, at this time, to determine the extent of changes that may occur in this area of work, or indeed when it might occur.

The Public Health legislation review is being undertaken on the basis of a similar model as that of the Food Administration changes. They are suggesting a Public Health Regulatory Authority being set up in the Ministry of Health. This would hold all regulatory powers and would similarly purchase locally based enforcement services. They make the point that the consultation on the form and content of the new "Public Health Act" does not seek comment on future decisions on enforcement arrangements but transition arrangements will be included in the Act. As there is little mention of local authorities, except possibly as a provider of services related to environmental health, ie water supplies, waste collection and disposal etc, and as a member of the "public" to which requirements may be applied it would appear that their role is being diminished. The timetable the Ministry is working to requires them to report to Cabinet in December 1998 with instructing Parliamentary Counsel to prepare the Bill in February 1999. It is intended that a Bill creating the new structure will be introduced into Parliament possibly in September 1999. At this stage the situation may become clearer.

Food Administration

The discussion paper, issued jointly by the Ministry of Agriculture and Forestry and the Ministry of Health is titled Assuring Food Safety An integrated approach to regulating the food sector in New Zealand. (Available http:\\www.moh.govt.nz)

According to the document the Government, in September 1997, directed the Ministry of Agriculture (now Ministry of Agriculture and Forestry) and the Ministry of Health to undertake a review of food administration in New Zealand. This was undertaken in consultation with the Treasury, State Services Commission and the Ministry of Commerce. The discussion paper reports on the conclusions of the review and invites comments on the conclusions.

The key objectives set by the Government, in 1994, to underpin the recent changes in food administration were; that it must protect and promote public, animal and plant health and safety in relation to food products and by-products; and must facilitate access to markets for food products and by-products.

The paper states that this leads to the vision that the food administration system should be an integrated regulatory system based on the optimal regulatory model, achieve the Government's objectives, maintain public confidence, and ensure clear accountabilities and consistency.

It is pointed out that a number of things remain to be done to realise this vision. Some legislative reforms are still needed to make the requirement of food safety programmes mandatory, to provide for seamless movement of food components between the food regulatory regimes of the Food, Meat and Dairy Industry Acts, providing for a single regulatory agency which administers all food law. A single piece of food legislation should be the ultimate goal.

While the paper discusses a series of options for organisational reform there is a clearly preferred option being the creation of a single agency to deal with all food regulation situated inside the Ministry of Agriculture and Forestry (MAF). They say that this will have advantages in that there will be a clear focus of resources, less duplication of work, and improved co-ordination of work.

They state that a key objective of the new agency will be the protection of public health and safety, and will work with the public health authority (that is an authority which is proposed in the Public Health Legislation Review document) in sharing information on hazard and risk surveillance including outbreak surveillance and emergency response capability.

The amendment to the Food Act in 1996 introduced the concept of individual premises having food safety programmes, based on the owner or operator identifying and assessing specific hazards and establishing control procedures to focus on prevention rather than end-point testing. Once a food safety programme is accepted, an exemption from the registration requirements of the Food Hygiene Regulations applies and territorial local authorities, in general terms, will have no further responsibility for such premises at least in regard to food hygiene or safety issues. However, staff of the local authority may be engaged by the premises as the independent auditor. The operator must have that programme audited by an approved auditor, for which they must contract for that purpose. The audit reports must be provided to the regulatory authority as part of its monitoring role. The provision for food safety programmes is, at present, voluntary but as noted above it appears the intention is for it to become mandatory sometime in the future. (further detail available http:\\www.moh.govt.nz)

They state that the establishment of a food agency is unlikely to have much impact on the functions of regulatory officers employed by territorial authorities but the impact would arise from the full implementation of risk-based management programmes under the Food

Act. The reason given for this runs along the lines that, while there is a skilled workforce for existing regulatory service providers, there will be a need for some changes in skill requirements for the new regulatory regimes. In the case of food regulation they see as necessary for the workforce to be highly trained regulators, usually with a science background, and it is likely the food agency will contract out regulatory service delivery functions.

The intention, as contained in this report, is for persons appointed as food regulatory officers to be separated from those undertaking public health regulatory duties. The latter group depends on whether a public health regulatory Agency is created under the new public health legislation review which is occurring in concert with this proposal.

The contracting out of regulatory service delivery functions by the new agency could be of interest to some territorial authorities, if that is to occur and the duties are not just given to current organisations undertaking designated duties on behalf of the Director-General of Health. It is perceived that competition could be fierce for such contracts from a wide range of organisations. The timing of the organisational changes and possible transitional arrangements could have a significant effect on future staffing arrangements for environmental health officers in territorial authorities. It is not possible, at this time, to determine the extent of changes that may occur in this area of work, or indeed when it might occur.

Public Health Legislation Review

The discussion document produced by the Ministry of Health has taken a step back to first principles in relation to legislating for "the health of the public" in what is effectively a review of the approach contained in the Health Act 1956. (available http: \\www.moh.govt.nz)

The Ministry have taken as the basis for the review the Code of Good Regulatory Practice, which also is the basis for the Food Administration review.

In a background document produced for Local Government New Zealand *[Localising Public Health - A Background Document*, Strategic Alignment and Ingrid van Aalst & Associates, July 1998] the authors, in regard to the public health sector, point to the change in public health thinking that has occurred since the early 1980s. They describe these briefly as being a *shift from a compartmentalised, technical, prescriptive approach to one which puts much greater emphasis on holistic, behavioural, enabling factors.* They see it as having important consequences for future roles for public health agencies, including local authorities. The shift to the new approach is occurring gradually, in their view, there are still inconsistencies between older and newer regulatory regimes.

The model which arises from the above is along the following lines.

* a broad obligation placed on the regulated industry, community, activity or agency requiring them to take ownership of the objective being sought; e.g. the duty of local authorities to improve, promote and protect the public health; or the responsibility of employers to identify and eliminate or minimise hazards in the workplace.

* provision for a process management approach. The transitional provisions of the new food regulations, for example, allow food businesses to opt out of the old inspection regime by preparing a satisfactory "food safety programme"' which identifies the risks, establishes procedures for managing them and monitors their regular application.

* recognition of "third party" certifiers or auditors who can certify that satisfactory plans have been prepared and are being properly implemented; e.g. building certifiers under the Building Act or auditors under the Food Act.

* enforcement agencies who record that satisfactory evidence of compliance has been provided and take action if it has not. These would normally be separate from the regulatory agency, again recognising a difference in role and accountability.

* a regulatory authority which has responsibility for the effective working of the regulatory system, including review of the regulations, and often accrediting third party certifiers and monitoring the performance of compliance and enforcement agencies.

* a policy ministry and purchasing authority, which may be separate agencies as in health, and which advises the Minister and purchases services to meet the agreed output requirements.

As there is little mention of local authorities, except possibly as a provider of services related to environmental health, ie water supplies, waste collection and disposal etc, and as a member of the "public" to which requirements may be applied it would appear that their role is being diminished. This will not become clearer until the Bill creating the new structure is introduced into Parliament possibly in September 1999.

ENVIRONMENTAL HEALTH EDUCATION: THE GENESIS AND FACTORS CONSTRAINING THE TRAINING OF ENVIRONMENTAL HEALTH OFFICERS IN MALAWI

By Kafwe C Tembo, MA, MPA, FRSH, Associate Professor of Environmental Health Education, Environmental Health Department, University of Malawi, The Polytechnic, P/B 303 Chichiri, Blantyre 3, Malawi.

Abstract

The objectives of the Environmental Health Programme in Malawi is to train Environmental Health Officers (EHOs) who have a sound body of scientific knowledge and practical skills to operate at middle and top management levels of any environmental health or environmental health related organisation. To achieve this objective student EHOs receive good self directed learning coupled with an attachment to the Ministry of Health and Population and Environmental Health Departments of Local Authorities for their practical experience. During attachment the student EHO comes to assimilate the professional behaviour of the practising EHOs thereby appreciating what the environmental health profession is all about.

Because of lack of money, some equipment essential to training of EHOs is not available, thus severely constraining the acquisition of analytical skills by students. Other constraints are lack of networking amongst training institutions and lack of continuing professional development programmes. It is being suggested that the International Faculty Forum look into the possibility of formation of regional coordination centres in the Africa Regions of West Africa and East-Southern Africa in order to coordinate information on training activities in institutions with Environmental Health Programmes.

Introduction

The training of EHOs in Malawi started in 1965 when the University of Malawi opened its doors. This training was at Diploma level, modeled on the Royal Society of Health (UK) Diploma in Public Health curriculum as was the case in most British colonies at that time (Emeharole 1993). The Diploma course was basically designed to produce what Emeharole (1988) has called 'the polyvalent sanitarian...capable of detecting and enforcing abatement of communicable diseases and related environmental health nuisances/ hazards'. This tradition approach is more concerned with control than prevention as noted by CIEH Commission on Environmental Health (1997). Academically, this approach to training in a University may be scorned since universities traditionally have been concerned with education.

Education is being understood to be concerned with professional development not necessarily emphasising direct job-relevance, while training is any activity which deliberately attempts to improve a person's skill in a job (Chipeta, undated). The University of Malawi was commissioned to do both education and training for national development. Hence one finds being offered in the University of Malawi, academic as well as vocational programmes ranging from basic degrees in science, social science and education to vocationally-based degrees in agriculture, nursing and indeed environmental health today.

This paper, therefore, discusses the training of EHOs in the University of Malawi, specifically highlighting programme developments that have taken place, registration of EHOs and factors constraining the training of EHOs.

The Environmental Health Programme

The main objective of the Environmental Health Programme is to train EHOs who have a sound scientific knowledge and practical skills which will enable them to work as managers of programmes in the Ministry of Health and Population (MoH&P), Local Authorities, Non-Governmental Organisations (NGOs) food industries, hotels and so forth (Tembo and Jackson, 1992). Besides training EHOs for immediate employment, EHOs are also training so that they can pursue postgraduate training.

The Diploma curriculum had to be reviewed a number of times in order to address MoH&P and local authorities needs since the 1978 Alma-Ata Primary Health Care Declaration of Health for All. As a result of this development Diploma curriculum emphasized: water and sanitation, food inspection, nutrition, communicable disease control and health education (Tembo and Jackson, 1992). This approach fell short of what Emeharole (1993) recommends that curriculum for EHOs training should be articulated 'to produce a high calibre EHO endowed with skills needed to monitor the environment and interpret the implication of the results on human health and well-being'. The Malawi Diploma in Public Health for EHOs in Malawi, as in other Anglophone African countries, still lacked this academic thrust.

In 1986, a survey was conducted to find out the views of Ministries of Health in SADC member states on the possibility of starting a degree programme in Environmental Health in Malawi (Ng'ombe, 1986).

There was overwhelming support for such an initiative and it was endorsed by the SADC Council of Ministers of Health. But because of logistical problems and bureaucratic inertia the programme never started. In 1996, the University of Malawi phased out Diploma programmes. This development coupled with a renewed committed demand for graduate EHOs by the MoH&P resulted in the launching of the BSc(Env.Hlth) degree programme in 1997 in the Polytechnic of the University of Malawi.

Logistics of Curriculum Development for the Degree

In coming up with the BSc(Env Hlth) degree curriculum, careful consideration was given to needs of Malawi and SADC member states as tropical countries vis-a-vis growing demands for globalisation of environmental health spearheaded by the International Federation of Environmental Health (IFEH). The result was that the Malawi degree curriculum mirrors some aspects of the BSc(Env.Hlth) of the University of Strathclyde, UK, following contact with and advice from them. On the African scene, it also mirrors adequately the BSc(Env.Hlth) curriculum of Moi University, Kenya, and the BTech(Env.Hlth) curriculum of Pretoria Tecknikon, South Africa. This has been possible because we had access to the curriculum of the programmes of these universities, particularly that of Pretoria Tecknikon which was critically studied as it is a curriculum that has been developed for a more industrially advanced Sub-Saharan African country than Malawi. However, CIEH (1997) observed that 'environmental health professionals should be flexible in their approach, multidisciplinary in their skills and have the skill to involve the public in new forms of participation' thereby moving away from the statute led nature of much of environmental work. This is an implicit challenge for EHO training institutions to ensure that they prepare and orientate EHOs to work in the new roles identified by CIEH.

However, other vital sources of influence on the curriculum were the Diploma graduates who had received further training at overseas universities and colleges; the results of the University of Malawi Alumni Tracer Study (1992); Agenda 21 of the 1992 Rio summit and World Conventions like the Basel and Bamako Conventions and the Ottawa Charter on Health. These sources highlighted areas which have been reflected in the degree curriculum. It should be noted that academic accreditation of faculty programmes in the University of Malawi is done by the University of Malawi Senate, unlike in England and Wales where the Chartered Institute of Environmental Health (CIEH) plays a major role in accreditation of environmental health courses (Bushell, 1996).

Practical Training for Student EHOs

Practical training for student EHOs in Malawi is by visits and attachments (Tembo and Jackson, 1992). As there is no student sponsorship system by a local authority as in UK (Bushell, 1996). Student EHOs are attached to MoH&P or a Local Authority for a period of two and half months, making a total of 532 hours. These hours are obviously not enough to give the students the brick and mortar experience. In terms of remuneration, the University of Malawi pays the allowances when the student is on attachment. However, this is bound to change soon as the government will stop direct funding to the CANNOT READ THIS LINE

attachment practised in Universities in England and Wales whose students were studied by Bushell in 1996.

Professional Socialisation through Attachment

Apart from gaining practical competence in rules and procedures of doing the job, the student EHO internalises professional values and ethics of the environmental health profession as he/she observes practising EHOs exhibit a professional culture (homo environmentalis) when the conduct themselves according to professional ethics which are embodied in a code of conduct and implicit in their behaviour. This results in acculturation of the student EHO, where by his/her professional behaviour is characterised by collegiate behaviour and mutual respect. Student semi-academic professional culture and the practitioner EHO professional culture come into contact with each other when student EHOs are on attachment. During the contact moments between the student professional culture, which is the result of academic practice, and professional culture, which is the result of professional practice, a process of student acculturation takes effect, that is to say that the student vicariously learns the professional culture of the practitioner EHOs and making it his/her culture. Thus achieving the aim of EHO training that enables them to think laterally as well as technically and being on tap rather than on top (CIEH, 1997).

Registration of EHOs in Malawi

In Malawi, the EHOs carry out their duties under the authority of the Malawi Public Health Act Cap. 34.01 and they have to register under the Malawi Medical Council (MMC) Act, 1987 in the Allied Health Professions Register. This register consists of three categories: Technican Assistant with a certificate: Technical Assistant (TA) Category; Assistant Environmental Health Officer (AEHO) with a Diploma; Technical Officer (TO) Category; Environmental Health Officer (EHO) with a degree: Professional Officer (PO) Category. The Environmental Health

Officers Association of Malawi does not have control over registration of their members.

A foreign EHO's qualifications are vetted by a committee of the MMC, after which, if found qualified, he/she is issued with a MMC certificate to practice in Malawi and the name is published int he Malawi Government Gazette. The next step is to acquire a Temporary Employment Permit (TEP) for work. Registration is an area where the International Faculty Forum (IFF) can work closely with EHOAM to bring to the attention of the MMC training programmes being offered in countries of IFEH member associations so that they are approved by MMC for direct registration. This takes cognizance of the fact that overseas EHOs may be engaged by international bodies that may have a mission in Malawi.

Factors Constraining EHO Training

The practical training EHOs receive is surely not adequate to make them professionally competent over night for several reasons. Due to lack of funds, the college is unable to buy environmental equipment for practical training as advocated by Emerharole, (1993). There is also the problem of lack of books and periodicals and transport for field activities. It has been advocated that competence-based (Emerharole, 1993) or research-based-teaching (Tembo, 1994) curriculum should be adopted for teaching EHOs. But these methods, although they greatly enrich student learning, cannot be adopted because of the financial constraints. So, the lecture method, despite its pitfalls, is the order of the day, perhaps in many EHO training institutions in Africa. Regarding integration of theory and practice, Bushell (1996) quoted Parkinson (1992) that...'structured supervised work experience is essential to the synthesis of theoretical knowledge and practical application required of a competent practitioner'. This observation is very valid and needs careful consideration by EHO trainers so that students are not left on their own but work according to carefully devised achievement-oriented task schedules.

However, sometimes there is reliance on assessments by the preceptors as Bushell (1996) observed in her study of practical training of EHOs in England and Wales. In any case this does not mean that the students are entirely left unvisited. They are visited but not as many times as it should be. The visit is made only to form an opinion of the students' level of competence and to note the problems the students are facing.

There is lack of networking amongst African institutions involved in EHO training and amongst EHO Associations themselves because of differences in levels of development in communication. In some countries like Malawi advanced communication technologies are taking a foothold now. There are also frequent problems of break down of facilities due to many causes like sheer vandalism for example. The International Faculty Forum (IFF) should be aware of this important aspect of problems with communication technologies in some parts of Africa, because, if IFF administrators do not receive quick replies from some members, they should never give up but to keep on trying by telephone or fax or E.mail or by the most sure one method: the mail post!

The lack of networking means that we know little of one another. Recently Professors Koos Engelbrecht of Pretoria Tecknikon has initiated formation of an African Academy of Environmental Health. This is a grand idea. It is hoped that it will work out as planned. However, it has been observed that organisations are formed with great enthusiasm but they quickly wither away and die because of lack of resources and dedication on the part of those they serve. All volunteer officers sacrificing leisure time for organisational activities and in some cases use their own resources into making things work. Indeed networking to work demands philathrophic devotion. For record of important theoretical and practical knowledge in environmental health, a journal is a repository type of network instrument that goes a long way to influence professional attitudes and to disseminate new ideas. IFF may already be thinking of how best a journal of environmental health education journal could be established.

In Malawi, there are no continuing professional development (CPD) programmes for EHOs. CPD programmes are vital in ensuring the upgrading of knowledge and skills of EHOs. For example, Pretoria Tecknikon on South Africa, has well developed standing CPD programmes managed by an independent manageress. There is close liaison between the University and industry, and surely it is this close liaison that ensures sustainability of their CPD courses. In Malawi, a proposal is being thrashed out whereby there will be a deliberate policy by MMC demanding that a medical, paramedical or health allied professional should show evidence of having done an approved course in order to register.

This policy, although is seen as an income generating strategy, will go along way to improve the knowlede and skills of the practitioners if implemented well. Another motivating factor will be that, cumulatively, short courses will help younger mature AEHOs with diplomas who will want to pursue degree(s). It may be that the IFF will find a way of encouraging collaboration amongst trainers in areas like these through the

suggested regional coordination centres.

One crucial constraint which has also been observed by Emeharole (1993) is that staff teaching EHOs should have higher academic qualifications. The University of Malawi policy on academic staff employment is that only holders of at least masters degrees are trained as lecturers. This sounds nice, but practically the University of Malawi is failing to train junior staff to Master/PhD levels because of lack of money. The result is that you have junior staff teaching as full lecturers or where possible retirees are employed. This may be good because these people bring into the classroom the so called down-to-earth experience, but in the long run they are not as productive and useful as young people because of lack of commitment. The idea should be to have a sprinkling of them.

On staff development, it would be useful if IFF can form a volunteer corps of EHO trainers who could be tapped to help teach in African universities while their member of staff is away on training or participate as external examiners. The other problem is that degrees in Environmental Health in Africa are still in their infancy stage of establishing themselves in terms of academic credibility and relevance so that there are few environmental health specific postgraduate programmes. However, a positive example is Pretoria Technikon in South Africa which offers a Masters in Technology (Environmetnal Health). A solution to this problem is to have a highly educated multidisciplinary team teaching the degree but on, qualifying one should go through a professional programme in order to become an EHO. This seems to be the practice in Scotland with the Royal Environmental Health Institute of Scotland (REHIS). The environmental health fraternity is aware of the multidisciplinary nature of the field of health and environment but this should not blur enviornmental health practititoners to the fact there will always be many players in the field of health and environment but a few professionals to be in the driving seat.

Conclusion

In conclusion, this paper has given the background of the genesis of EHO training in Malawi by showing that training of EHOs started with a Diploma in Public Health Inspection and that today there is a degree in enviornmental health. The objective of the training is to produce an EHO who has sound scientific knowledge and practical skills. The training of EHOs has taken into account Agenda 21 and the conventions on the environment like the Basel and Bamako and the Ottawa Charter on Health and whenever possible dovetailing these to local needs and circumstances.

The EHOs degree in Malawi is open to SADC member states and its inception was partly initiated by SADC Ministers of Health. The students doing this programme acquire practical insight into the enviornmental health profession by being attached to the Ministry of Helath and Population and Local Authorities. The students learn professional mannerisms through interactions with practicing EHOs.

The law requires that EHOs should register with the Malawi Medical Council in the Allied Helth Professions Register. Foreigh EHOs have their qualifications vetted by the MMC before they can seek a Temporary Employment Permit (TEP) to work.

There are several factors constraining the quality of EHO training. There is a lack of money to buy equipment, chemicals, books and periodicals. There is a lack of money to obtain high calibre academic staff teaching environmental health. Ancillary to these problems are lack of networking amongst trainers in Africa and poor communication facilities.

Continuing Professional Development should be encouraged and institutionalised. In view of shortage of staff, a multidisciplinary approach to training EHOs should be encouraged for in depth coverage of some specialised subject matter. However, the graduate EHOs should undergo a professional orientation programme before they are registered.

Recommendations

1. The International Faculty Forum may consider to develop a mechanism for acquisition of equipment, books and periodicals in order to strengthen EHO training in African Universities.

2. Continuing Professional Development (CPD) should be an on-going professional concern for all practicing EHOs. Therefore EHO training institutions should take leading role to reach out to practicing EHOs.

3. Networking amongst EHO Training Institutions should be intensified by creating regional coordination centres for West Africa Region, East Africa Region and Southern Africa Region (ie SADC).

4. The International Faculty Forum should come up with a policy on the level of education of those involved in training EHOs. There is need for highly trained and specialised professionals (PhDs) in order to give depth to the teaching and learning. IFF should form a volunteer corps of EHO trainers to assist in the training of EHO Trainers in African Universities.

5. Publication of an Environmental Health Education Journal should be seriously considered.

Acknowledgment

I thank Birgit Haglund for her fax of May 12 1998 without which I could not have written this paper at all. The reason being that she could not reach me because our E.mail was out of service. Most importantly I thank Jeanette Nordin-Groth for accommodating and feeding me for free during this conference. I sincerely thank President Kia Regner and her Committee(s) for all the arrangements and the waver of conference fees and many more favourable considerations. Finally, I thank my Principal and the University fo Malawi for funding my trip and allowing me to attend this important conference.

This paper is dedicated to my daughter Yakosa Tembo and my two grandchildren, Zenga Tembo and Tiyezge Tembo who joyfully cheered me up when I was writing this humble paper.

References

Bushell, F (1996). Practical Training for environmental health students: call for consistency. Environmental Health, February. pp 49-52.

Chartered Institute of Environmental Health (1997). Agenda for Change. Chadwick House Group Ltd, Chadwick Court, 15 Hatfields, London, England.

Chipeta, J E (undated). Course evaluation: a case study. Paper presented at Polytechnic Committee on University Teaching and Learning, Polytechnic, pp 1-7.

Emeharole, P O (1993). Training of environmental health officers in Anglphone West Africa: how adequate for environmental monitoring? J Roy, Soc. Helath, 113(1):17-23.

Tembo, K C and Jackson, M H (1992). Education for a career in public health . Environmental Scotland, 4(1):2-3, April/May.

Tembo, K C (1993). Research-Based Training: a model for teaching environmental health protection issues. J Roy, Soc. Health, 113(4):211-212.

University of Malawi Tracer Study (1992). University Office, PO Box 280, Zomba, Malawi, Unpublished Report.

RECENTLY PUBLISHED ARTICLES IN THE IFEH MEMBERS' JOURNALS

The International Federation of Environmental Health receives copies of member our sister organisations' journals. The following is a list of recently published articles. Should any member wish to view any of these articles please contact me at the REHIS office +44 0(1)31 225 6999.

John R Stirling
Editor

Assessment of Blood-Splash Exposures of Medical-Waste Treatment Workers by Keith E Leese, REHS, Eugene C Cole, DrPH and Paul A Jensen, PhD, PE, CIH

The authors estimate that more than 10,000 workers process more than 3.5 million tons of medical waste in the United States each year, both on site at health care establishments and off site at commercial treatment facilities. As part of a study recently conducted to assess engineering controls and to define bioaerosol, chemical, and safety hazards to workers, this report discusses potential exposure to bloodborne pathogens from blood splashes. Potential exposure to blood splashes was assessed during the manual dumping of medical waste at three commercial facilities where waste is handled extensively.

At each facility, tubs of biohazardous waste 32 gallons or smaller were manually dumped into larger containers for subsequent treatment. All workers involved in dumping containers of loose and bagged waste wore cotton pads in special holders pinned to the front and back of the upper torso. At the end of each shift the pads were visually assessed. A sensitive and rapid detection method, performed on site, was used to test for haemoglobin. At two of the facilities, wipes were also taken of face shields or goggles, as well as of various surfaces with which workers typically would come into contact. Samples were extracted in sterile buffer and were tested for haemoglobin. This method yielded semiquantitative results.

Splashes were evaluated over two days at each facility. Blood splashes were confirmed on 11 of 128 upper-torso samples (eight percent), 4 of 18 eye or face protectors (22 percent), and 61 of 96 process area surfaces (64 percent). The authors stress the importance of adherence to all requirements of the OSHA Bloodborne Pathogens Standard, engineering controls to minimize manual waste dumping, and enforcement of the use of proper protective clothing and face shields. ***Journal of Environmental Health: The Journal of the National Environmental Health Association (USA) Volume 61, No 6, January/February 1999***

Rodent Controls in Urban Areas An Interdisciplinary Approach by A Soula Lambropoulos, MS, Joshua B Fine, Amy Perbeck, Donald Torres, Gregory E Glass, PhD, Patrick McHugh, Elias A Doresey, MPH.

In 1992, Baltimore Mayor Kurt L Schmoke created the Rodent Control Committee to combat the increasing Norway rat population in Baltimore City. Following a pilot project, programmes were conducted in two sections of the city from which high numbers of rat

complaints had been reported. These three-month programmes attacked the rodent problem via an integrated pest management approach that emphasized public education by trained community leaders and health department workers, increased community cleanup projects coordinated by the Bureau of Solid Waste, and intensified baiting by the city's Rat Rubout Programme. Direct intervention eliminated up to 90 percent of rat burrows present in the target neighbourhoods. Follow-up surveys, however, showed that in neighbourhoods with environmental factors favouring rat populations, reinfestations achieved preintervention levels within six months. Attempts to modify the behaviour of residents, which is vital in reducing and eliminating rodent infestation, were generally unsuccessful. ***Journal of Environmental Health: The Journal of the National Environmental Health Association (USA) Volume 61, No 6, January/ February 1999***

Soil Ingestion A Concern for Acute Toxicity in Children by Edward J Calabrese, Edward J Stanek, Robert C James, Stephen M Roberts.

Several soil ingestion studies have indicated that some children ingest substantial amounts of soil on given days. Although the US Environmental Protection Agency (US EPA) has assumed that 95 percent of children ingest 200 mg of soil per day or less for exposure assessment purposes, some children have been observed to ingest up to 25 to 60 g of soil during a single day. In light of the potential for children to ingest such large amounts of soil, an assessment was made of the possibility for soil pica episodes to result in acute intoxication from contaminant concentrations US EPA regards as representing conservation screening values (ie, US EPA soil screening levels and US EPA Region III risk-based concentrations for residential soils). For a set of 13 chemicals included in the analysis, contaminant doses resulting from a one-time soil pica episode (5 to 50g of soil ingested) were compared with acute dosages shown to produce toxicity in humans in clinical studies or case reports. For four of these chemicals, a soil pica episode was found to result in a contaminant dose approximating or exceeding the acute human lethal dose. For five of the remaining chemicals, the contaminant dose from a soil pica episode was well within the reported dose range in humans for toxicity other than lethality. Because both the exposure episodes and the toxicological response information are derived from observations in humans, these findings are regarded as particularly relevant for human health risk assessment. They suggest that, for some chemicals, ostensibly conservative soil criteria based on chronic exposure using current US EPA methodology may not be protective of children during acute soil pica episodes. ***Journal of Environmental Health: The Journal of the National Environmental Health Association (USA) Volume 61, No 6, January/February 1999.***

Environmental Influences Dysfunctionally Affecting Official Compliance in Regulatory Enforcement by Eve Richards.

Former Chief Health Surveyor, Hobart City Council. PhD in Administration (University of Tasmania) focusing on the administration of food hygiene law. Current research project is in the area of parliamentary control over subordinate legislation. Also engaged in researching and writing material for several law subjects offered by TAFE Tasmania as well as teaching in those areas. Assists two prominent Tasmanian political scientists with their research and writing projects.

This article makes a contribution to regulatory enforcement theory by drawing attention to the notion of official compliance as a vital variable in regulatory enforcement. This article introduces the notion of a law enforcement sequential dependency chain and links this chain to the enforcement pyramid, a negative sanctions model. The article demonstrates that there are environmental influences which may affect the behaviour and decisions of officers resulting in their non-compliance wit the law or which impede the escalation of sanctions within the pyramid. ***Environmental Health Review - Australia Volume 27 Issue 3 September 1998.***

Quarantine Wars by Cathy Savage.

The consultation period on changes to the quarantine laws has just come to an end, but the pace of change may be forced ahead by an imminent court case challenging the status quo. ***Environmental Health Journal Volume 107/01January 1999.***

Mad Cows in Court by Martin Steiger QC and Anthony Crean.

BSE is a highly emotive subject at the best of times. But when coupled with criminal culpability it attracts high public interest - and puts pressure on local authorities to "get it right" if they are contemplating prosecution.

Martin Steiger QC and Anthony Crean, fresh from prosecuting the first offences under the statutory instrument which seeks to govern the spread of BSE-infected material, offer their advice on taking proceedings. ***Environmental Health Journal Volume 107/01 January 1999.***