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## E-mail Message

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Number of pages 3

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### **MINE VENTILATION AND ENVIRONMENTAL ENGINEERING COURSES – OCTOBER 2010**

Mike Howes (RHP) is pleased to announce the 36<sup>th</sup> mine ventilation and environmental engineering course to be held at the Parmelia Hilton Hotel Perth in October 2010. If you have already attended a course or know of someone else who may be interested, it would be appreciated if you could forward this on to them.

Mike started running these courses in Australia 29 years ago in 1981 and since then has responded to the demand for them within the mining industry. The ventilation training courses have become benchmarks in practical mine ventilation education and over 450 personnel from mines, consulting companies and State Mining Inspectorates have attended. The courses started at Mount Isa in 1981 and the early courses were held in Adelaide, on the Goldcoast and in Townsville. Hobart, Cairns and Brisbane have more recently been added to the list of venues.

The first Perth course was held in 1995 and has become the main venue for the courses with the bulk of the attendees from Western Australia. Participation on the courses is not limited to Australia and personnel from New Zealand, Saudi Arabia, Indonesia and Ghana have also attended.

Mike resides in England visiting Australia three or four times a year and those wishing to attend should contact Mike Howes at RHP directly ([mjhowes@tiscali.co.uk](mailto:mjhowes@tiscali.co.uk)) and an invoice will be issued giving alternative methods of payment.

To ensure that participants can obtain maximum benefit from the workshop style of presentation, the numbers on a course are limited so the earliest response is suggested. The limit on numbers also ensures that any specific problems that a participant may have can be included and dealt with either on an individual or group basis depending on the generality of the problem.

Because Mike Howes is non-resident and not carrying on an enterprise in Australia, he does not have an Australian Business Number (ABN) and GST is not applicable. A copy of a signed statement to this effect will be issued with the invoice to allow full payment and to comply with the Australian Taxation Office.

To participate, it will normally be necessary to complete payment in advance of the course.



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## MINE VENTILATION AND ENVIRONMENTAL ENGINEERING COURSES – OCTOBER 2010

*The courses are designed for both practicing mine ventilation personnel and for those with either a planning or a statutory responsibility involving mine ventilation and environmental engineering. To obtain maximum advantage, background experience in mine ventilation is desirable but not essential. The courses follow workshop formats with information followed by application where participation results in the maximum benefit. To ensure that individual needs are satisfactorily addressed, the number of participants is normally limited however duplicate courses will be run usually immediately after the published dates if the numbers justify it.*

### The Course

The main part of the course is a six day **Core and planning section** and two day extension topics may be taken with it or separately depending on the specific interests and background of participants. The extension topics available are **Heat and refrigeration, Ionising Radiation and Noise**.

Details of the courses day by day are given below. The extension topics are independent of the core and planning section and held depending on the interest expressed.

The six day core and planning sessions will be held between October 17<sup>th</sup> and 22<sup>nd</sup> 2010. These provide both the fundamentals and background to ventilation design in general and application to detailed ventilation planning with examples.

A two day heat/refrigeration section is scheduled to be held on October 25<sup>th</sup> and 26<sup>th</sup> 2010. The approach necessary to establish heat loads and the refrigeration requirements are covered as well as methods and strategies for managing a potential heat stress problem and applying mine cooling. Mine cooling systems both large and small and refrigeration equipment and performance are critically reviewed.

Throughout the course, the development of numerical methods are emphasized that allow alternate systems to be evaluated from an effectiveness and financial standpoint. Actual mine examples are used where applicable to illustrate both methods and derivation of cost effective solutions. To obtain maximum benefit, participants will be supplied with calculators and plenty of paper.

### Course leader

The courses are led by Dr. M J Howes who has been in mine ventilation and refrigeration for over 40 years. His relevant experience includes 15 years in Canada and South African mines, 10 years lecturing and 30 years ventilation and refrigeration consultancy worldwide. This includes Australia where he has been involved with nearly all the major mining companies and projects over the last 29 years.

He is active in the professional associations involved with mine ventilation and refrigeration and has over 35 papers and publications. He has given similar courses in Canada, England, Australia, Ghana and New Zealand.

### Course venues, dates and cost

November venue is the Parmelia Hilton Perth:

Core and planning – October 17<sup>th</sup> to 22<sup>nd</sup> (6 days)  
Heat/refrigeration – October 25<sup>th</sup> and 26<sup>th</sup> (2 days)

The course fees are: 6-day core section \$ 6300 and 2-day heat/refrigeration or radiation \$ 2100 each. Costs include lunch, morning and afternoon tea/coffee, full set of notes, calculators and Environmental Engineering text book.

### Payment Details

Payment in advance is normally necessary to secure participation on the courses. An invoice will be provided when the booking is acknowledged and confirmation of attendance when the fees are received.

## Session Details

Each day has four 90 minute sessions starting at 08h30, finishing at 16h30 with 30 minute coffee/tea breaks at 10h00 and 14h30 and a 60 minute lunch break at 12h00.

### Core and planning sessions

#### Day 1

1. Background/historical perspective leading to current state of technology. Introduction to fluid mechanics, fluid properties, manometry, pressure measurement.
2. Laminar and turbulent flow, dimensional analysis, steady flow energy equation and flow measurement using orifice plates, venturies and pitot static tubes.
3. Internal flow, Atkinson, Darcy-Weisbach, roughness, Colebrooke & White, application to mine airways.
4. Fluid flow over objects, drag force, pressure loss and application to mine shafts, escapeways and declines.

#### Day 2

1. Flow through airway discontinuities, shock losses, equivalent length, bends, inlets, contractions etc.
2. Biological effects and sources of gases including strata gases, blasting, mine fires and explosions.
3. Operation of diesel powered equipment, application of simple and time modified gas dilution formulae.
4. Control of gases by dilution ventilation, re-entry time after blasting and gas detection.

#### Day 3

1. Biological effects of dust, silicosis, mass/surface area, dust deposition and the respiratory system.
2. Sources of dust, ore passes, dust extraction system capture velocities, hood design, extraction systems. Dust collectors, dust measurement and assessment.
3. The solution of simple networks, series and parallel airways, introduction to compound networks.
4. Application of Kirchoffs' laws, Atkinson problem, Hardy Cross solution. Computer network simulations in general, the use of skeleton and detailed networks.

#### Day 4

1. Gas laws, psychrometry, pressure surveys, analysis of pressure surveys, measured airway resistances.
2. Axial and centrifugal fans, design principles, fan construction and fan performance curves.
3. Fan pressures, operating point, fan laws for speed and air density changes, series and parallel fan operation.
4. Fan applications, development, booster and main fans, flow measurement, monitoring, jet thrust fans.

#### Day 5

1. General mine design air quantities and introduce mine ventilation design example. Design criteria, statutory limits and future changes.
2. Ventilation design criteria: velocity, quantity, gases, dust, diesel exhaust, heat stress, radon and noise.
3. Ventilation standards to meet the design criteria for mining and development activities.
4. Long and short development. Leakage in auxiliary systems, derive ventilation design.

#### Day 6

1. Airflow and dust control in the rock handling system including induced airflows, draw points, ore passes, tips, crushers, loading stations, conveyors.
2. Airway optimisations, cost functions, general results, outline of the required ventilation system.
3. Use of a skeleton network, determination of fan duties and the main fan operating envelope. Fan selection, effect and design of fan diffuser, fan bend and water drop out if required.
4. Ventilation controls: doors, bulk heads, regulators, booster fans etc. Conclude design.

### Heat Sessions

#### Day 1

1. Fundamentals of heat & mass transfer, conduction, radiation, convection, evaporation/condensation.
2. Effect of heat on personnel: productivity, heat stress control strategy, acclimatisation, heat stroke and other heat related illnesses.
3. Sources of heat in mines, auto-compression of intake air, heat flow from the surrounding rock surfaces, broken rock and fissure water.
4. Diesel and electrical equipment and other sources of heat. Use increased mine depth in mine ventilation design example to provide numerical values and also identify the heat problems in development.

#### Day 2

1. Determination of the mine cooling load, climatic profile and ventilation/cooling optimisations.
2. Basics of refrigeration, pressure-enthalpy diagrams, vapour-compression refrigeration cycle compressor types and performance.
3. Heat transfer equipment, condensers, evaporators, cooling towers and the dominant effect of fouling on equipment performance.
4. Refrigeration system modelling, spot cooler design, refrigerants and equipment selection.

### Radiation Sessions

#### Day 1

1. Radioactive decay, activity, decay series, growth in activity and Bateman equations for radon daughters.
2. Biological effects, external and internal radiation, dose equivalent and radon daughter concentrations.
3. Epidemiology, uranium and non-uranium mines, allowable limits, Lubin relationships and relative risk.
4. Gamma radiation and radioactive dust contributions to the overall dose.

#### Day 2

1. Radon emanation, source strength, emanation rates, growth in radon daughter concentrations
2. Source control, isolation, dilution, radon and radon daughter growth in ventilated and unventilated spaces
3. Filtration and radon daughter measurement methods.
4. Radon & radon daughter dosimetry, exposure control, controlled and supervised areas.