WORLD SAFETY JOURNAL

ESP - Enhanced Safety Principles

ISSN 1015-5589
Vol. XIV No.1, 2004
© copyright 2004, WSO

- Young Workers Need Protection
- Company Strategies For Modifying Driving Behaviors
- Can An Employer Afford Poor Injury Management
- Pollution Control Through The Profitable Use Of Mining Waste
- Workers Compensation Research
- Risk Management

Pictured above are a few of our Delegates that attended our 17th International Environmental Health & Safety Conference in Denver Colorado USA, November 3 - 5, 2003. From left to right: Ms. Kelley Norris, Belleville Ontario Canada; Dr. Kent Karstetter, Denver Colorado; Mr. Arthur "Shane" Cooper IV, Negros Occidental Philippines; Mr. Tony Ploughe, Denver Colorado; Dr. Elias Choueiri, Beirut Lebanon; and Dr. Peter Leggat, Queensland Australia.

WORLD SAFETY ORGANIZATION (WSO)

Profile

The WSO was founded in 1975 in Manila, The Republic of the Philippines, as a result of a gathering of over 1,000 representatives of safety professionals from all continents at the First World Safety and Accident Prevention Congress. The WSO World Management Center was established in the United States of America in 1987 to be responsible for all WSO activities, the liaison with the United Nations, the co-operation with numerous Safety Councils, professional safety/environmental (and allied areas) organizations, WSO International Chapters/Offices, Member Corporations, companies, groups, societies, etc. The WSO is a not for profit corporation, non-sectarian, non-political movement to **"Make Safety a Way of Life"**.

World Safety Organization Activities

The World Safety Organization:

- Publishes WSO Newsletters, World Safety Journal - ESP, and WSO Conference Proceedings.
- Provides a network program linking various areas of professional expertise needed in today's international community.
- Develops and accredits educational programs essential to national and international safety and establishes centers to support these programs.
- Annual awards include the World Environmental/Occupational Safety Person Award, WSO James William Award, WSO Educational Award, WSO Concerned Citizen Award, WSO Concerned Safety Professional, WSO Concerned Company/Corporation Award, WSO Concerned Organization Award, Chapter/International Office of the Year Award, WSO Award For Achievement In Scientific Research and Development and International Award.
- Provides recognition for safety publications, films, videos and other training and media materials that meet the WSO required educational standards.
- Receives proposals from professional safety groups/societies for review and if applicable, submits them to the United Nations for adoption.
- Establishes and supports divisions and committees to assist members in maintaining and updating their professional qualifications and expertise.
- Chapters and International Offices located throughout the world provide contact with local communities, educational and industrial entities.
- Organizes and provides professional support for international and national groups of experts on all continents who are available to provide expertise and immediate help in times of emergencies.

Membership Benefits

The World Safety Organization:

- Publishes the "WSO Consultants Directory" as a service to its Members and to the Professional Community. Only WSO Certified Members may be listed.
- Collects data on the professional skills, expertise and experience of its Members in the WSO Expertise Bank for a reference when a request is received for professional expertise, skill, experience.
- Provides a network system to its Members whereby professional assistance may be requested by an individual, organization, state or country on a personal basis. Members needing assistance may write to the WSO with a specific request and the WSO, through its Membership and other professional resources, will try to link the requester with a person, organization or resource which may be of assistance.
- Provides all Members with a Membership Certificate for display on their office wall and with a WSO Membership Identification Card.
- Awards a certificate of Honorary Membership to the corporations, companies and other entities paying the WSO Membership and/or WSO certification fees for their employees.
- Members receive WSO Newsletters, and other membership publications of the WSO.
- Members are entitled to reduced fees at seminars, conferences and classes, given by the WSO. This includes local, regional and international programs. When continuing Educational Units are applicable, an appropriate certificate is issued.
- Members who attend conferences, seminars and classes receive a Certificate of Attendance from the WSO. For individuals attending courses sponsored by the WSO, a Certificate of Completion is issues upon completion of each course.
- Members receive special hotel rates when attending safety programs, conferences etc., sponsored by the WSO.

Journal Editor

Dr. Janis Jansz, F.S.I.A.
Director of the WSO International Office for Australia, and Member of the WSO Board of Directors

WSO Board of Directors:

Dr. Robert M. Anderson
Mr. Edward "Skip" Chandler
Ms. Marilyn Clark-Alston
Dr. James C. Fernando
Mr. Edward E. Hogue
Dr. Glenn E. Hudson
Dr. Janis K. Jansz
Mr. Troy Johnson
Dr. Peter A. Leggat
Mr. D. "Pat" Mascioli
Mr. Mark Mattheiss
Mr. Lon S. McDaniel
Dr. Donald E. Rhodes
Mr. N. "Skip" P. Sabourin
Dr. Vlado Z. Senkovich
Mr. Daniel L. Stewart
Mr. Teh-Sheng Su
Mr. Dennis B. Vaughan
Mr. Bobby L. Wayne
Mr. Frederick F. Weidner
Mr. Timothy L. Wells

Disclaimer

Opinions expressed by contributors in articles or reproduced articles are the individual opinions of such contributors or the authors and not necessarily those of the World Safety Organization. Reproduction of articles or abstracts contained in this journal is approved providing the source is acknowledged.

Issue Dates

March
June
September
December

Table of Contents

	Page
Proceedings Of the WSO Global Safety *Roundtable* *by: Dr. Peter Leggat*	5
Company Strategies For Modifying Driving Behaviors *by: Ms. Fiona Hanrahn*	7
Pollution Control Through The Profitable use of Mining Waste *by: Ms. Catherine Druissi and Dr. Janis Jansz*	13
Risk Management, What's It all About? *by: Mr. Rob Cowan*	16
Book Review: Nurse Managers - A Guide to Practice	18
Can An Employer Afford Poor Injury Management *by: Steve Willis*	19
A Retrospective Cohort Study of Workers' Compensation Indicators (Part 3) *by: Dr. Alan Verdonk, Dr. Milos Nedved & Dr. Janis Jansz*	22
Young Workers Need Protection *by: Ms. Fiona Hanrahan*	28
Book Review: The Socioeconomic Impacts of Artisanal and Small Scale Mining In Developing Countries	33
Diary of Events	33

Editorial

By Dr. Janis Jansz

World Safety Organization recently had a very successful conference in Denver, Colorado. There were 58 exhibitors and many world class speakers. The speakers covered a wide variety of topics which included how to safely accommodate employees with disabilities, transport safety, HazMat compliance, how to prevent workplace violence, safety management programs, biological hazards and how to minimise harm from these, electrical safety, safety education and training, quality assurance, crane safety, dealing with industrial terrorism, how to reduce accident and incident rates, a showcase of international occupational safety practices and many other topics. The conference was also a chance for Safety Professionals world wide to learn from each other and to make friendships that last. I really enjoy learning from, and working with, other people who work in safety management and who research to identify ways to improve occupational safety and health. Through being part of the World Safety Organization I now have the opportunity to work with friends in a variety of countries.

From the 1st of April to the 20th of May I will be working at the Delft Technical University in the Netherlands with Professor Andrew Hale. I met Andrew when attending a conference. On the 11th of May I will be visiting the Central Institute for Labour Protection – Polish National Research Institute to work with Professor Danuta Koradecka, who is the Director of the World Safety Organization International Office for Poland. From the 21st of May to the 13th of June I will be working at both the Montanuniversitat (with Dr Michael Stibitz) and the Vienna (with Dr Frank Rattay) Universities in Austria. From the 14th of June to the 30th of June I will be working at the Safety Research Institute of the Czech Republic Ministry for Labour and Employment with Dr Milos Palecek who is the Director of the Czech Republic International Office for the World Safety Organization. Working together with Safety Professionals from different countries should increase my knowledge of international best practices in occupational safety and health. It should also allow people in a variety of countries to work together as a team to conduct research to improve occupational safety. Being part of the World Safety Organization has opened up many opportunities for my professional life.

Advertising in the World Safety Journal was very worthwhile for Karol Sapkuroski as through joining the World Safety Organization, having an article published in this journal and letting people know that she was available for employment Karol now has the employment position of Occupational Safety & Health / Rehabilitation Coordinator for the Active Foundation Inc. and really loves her work. Being part of the World Safety Organization can be very rewarding.

ARTICLE SUBMISSION

Articles for inclusion in this journal will be accepted at anytime. However there can be no guarantee that the article will appear in the following journal issue.

All articles shall be written in concise English and typed with a minimum font size of 12 point. Articles should have an abstract of not more than 200 words. Articles shall be submitted as Time New Roman print and on a 3.5" diskette with the article typed in rtf (rich text format) and presented in the form the writer wants published. On a separate page the author should supply the author's name, contact details, professional qualifications and current employment position. This should be submitted with the article.

Writers should include all references and acknowledgments. **Authors are responsible for ensuring that their works do not infringe on any copyright. Failure to do so can result in the writer being accountable for breach of copyright.** The accuracy of the references is the author's responsibility.

References:

Articles should be referenced according to the Publication Manual of the American Psychological Association 2002: For example: Books are referenced as follows

Author, (Year of publication), *Title of publication*, Place of Publication: Publisher

Articles are referenced as follows:

Author, (Year), Title of article, *Name of Journal, Volume* (Issue), Page numbers of article

Internet information

Name of author, (Year of publication), Name of article, [on-line], Available www:http:// and the rest of the Internet path address, [access date]

Submissions should be sent to:

Editor: World Safety Journal
Dr. Janis Jansz
Edith Cowan University, 100 Joondalup Drive
Joondalup, 6027, Western Australia
Or email to j.mussett@ecu.edu.au

Articles, where ever possible, must be up-to-date and relevant to the Safety Industry.

All articles are Peer Reviewed by at least two referees before being accepted for publication.

ISSUE DEADLINES

March	31 January	June	30 April
September	31 July	December	31 October

ADVERTISING IN THE JOURNAL

¼ Page Advertisement =$35 (US funds)
½ Page Advertisement = $65 (US funds)
Full page Advertisement = $100 (US funds)
Advertising in this Journal benefits your business because people world wide are able to read about what you offer. This benefits our Journal Readers because they learn about your products and/or services.

WSO International Office's and Directors

Australia:
Dr. Janis Jansz
Edith Cowan University, 100 Joondalup Drive,
Joondalup, 6027, Western Australia,
Phone: (61 8) 6304 5590 Fax: (61 8) 6304 5449
email: j.mussett@ecu.edu.au

Czech Republic:
Dr. Milos Palecek
c/o Occupational Safety Research Institute
Jenuzalemska 9, 11652 Prague 1, Czech Republic
email: palecek@vubp-praha.cz

Ghana:
Mr. Kofi M. Amponsah
c/o Amponsah Architects, PO Box 93883, Accra, Ghana
email: amponsah@africaexpress.com

Lebanon:
Dr. Elias M. Choueiri
c/o Ministry of Transportation, PO Box 401
Hazmieh, Beirut, Lebanon
email: eliasch@inco.com.lb

Macedonia:
Mr. Milan Petkovski
c/o Macedonian Occupational Safety Association
11 Oktomvri 19 1/9, Skopje, 91000 Makedonija Europe
email: milanpet@hotmail.com

Malaysia:
Dr. James C. Fernando
c/o OSHALOG Fire Safety Consultant Services SDN BHD
Lot 2331, Ground Floor, Jalan Dato Muip, Piasau
Bulatan Commercial Center, 98000 Miri,
Sarawak, East Malaysia
email: asafe@pd.jaring.my

Marianas Islands:
Mr. Marvin C. "Ike" Iseke
c/o Networld CNME, Inc., Middle Road, H.K.
Pangelianna Bldg., Chalan Laulan, PO Box 7724 SVRB
Saipan MP 96950

Philippines:
Mr. Alfredo A. De La Rosa, Jr.
20/F, Trafalgar Plaza, H.V. De La Costa Street
Salcedo Village, Makati City, Metro Manila, Philippines
email: info@wso.org.ph

Poland:
Prof. Danuta Koradecka, MD
c/o Central Institute for Labour Protection
Czerniakovska 16, 00-701 Warsaw, Poland
email: dakor@ciop.pl

Russia:
Prof. Dr. Edouard Petrossiants
c/o Research Center for Socio-Economic Studies of
OS&H, Obolenskiy per., 10 Mosco, Russia 119829 CIS
email: ohrantr@fednews.ru

Singapore:
Dr. M. Jeyaraj
c/o Dynamic Security Pte Ltd, 151 Chin Swee Road
06-15 Manhattan House, Singapore 03116
email: dynamicz@singnet.com.sg

Slovakia:
Ing. Teodor Hatina
c/o Occupational Safety Research & Educational
Institute, Trnavska Cesta 57, 814 35 Bratislava
Slovakia

Taiwan, Provence of the Republic of China:
Dr. Shuh Woei Yu
c/o Center for Industrial Safety & Health Technology
Industrial Technology Research Institute, 11F, Bldg 51
Sec 4 Chung Hsing Road, Chutnug
Hsinchu, Taiwan ROC 310
email: swyu@itri.org.tw

Ukraine:
Dr. Konstantin N. Tkachuk
Labour Safety State Committee of Ukraine, Shevechenko
Blvd 8/26 252005, Kiev - 4 Ukraine

- - - - -

WSO Membership: The World Safety Organization has members that are full time professionals, executives, directors, etc. working in the safety and accident prevention fields and include university professors, private consultants, expert witnesses, researchers, safety managers, directors of training, etc. They are employees of multinational corporations, local industries, private enterprises, governments and educational institutions. Membership in the World Safety Organization is open to all individuals and entities involved in the safety and accident prevention field, regardless of race, color, creed, ideology, religion, social status, sex or political beliefs.

Membership Categories

✓**Associate Member:** Individuals connected with safety and accident prevention in their work or interest in the safety field. This includes students, interested citizens, etc.

✓**Affiliate Membership:** Safety, hazard, risk, loss and accident prevention practitioners working as full time practitioners in the safety field. Only Affiliate Members are eligible for the WSO Certification and Registration Programs.

✓**Institutional Member:** Organizations, corporations, agencies and other entities directly or indirectly involved in safety activities and other related fields.

Annual Membership fee in United States Dollars is as follows:

Student Membership	$ 35.00	Associate Membership	$ 55.00
Affiliate Membership*)	$ 80.00	Institutional Membership**)	$185.00
Corporate Membership**)	$1,000.00		

*) For your countries fee rate, please contact our office

**)In case of Institution, agency, corporation, etc., please indicate name, title and mailing address of the authorized representative.

APPLICATION FOR WORLD SAFETY ORGANIZATION MEMBERSHIP

Please print or type:

Name (Last, first, middle): _____

Complete Mailing Address (please indicate if this is a Home or Work address): _____

_____

_____

Work Telephone Number: _____ Fax Number: _____

Home Telephone Number: _____ email: _____

For Affiliate Members only

Only FULL TIME PRACTITIONERS in the safety/environmental/accident prevention and allied fields are eligible for the WSO Affiliate Membership. Briefly describe your present employment position, or enclose your CV. _____

_____

_____

Please specify your area of professional expertise. This information will be entered into the WSO "Bank of Professional Skills" which serves as a pool of information when a request for a consultant/information/expertise in a specific area of the profession is requested.

( ) Occupational Safety & Health	( ) Fire Safety/Science	( ) Environmental Health & Safety
( ) Security/Safety	( ) Safety/Loss Control Science	( ) Public Health/Safety
( ) Construction Safety	( ) Transport Safety	( ) Industrial Hygiene
( ) Safety Research	( ) Aviation Safety	( ) Ergonomics
( ) Product Safety	( ) Risk Management	( ) Petroleum Safety
( ) Nuclear Safety	( ) HazMat Management	( ) Other _____

Please forward Application and check/money order to:

WSO, World Management Center, 106 West Young Avenue Suite G,

PO Box 518, Warrensburg, MO, 64093, USA

Proceedings Of WSO Global Safety Roundtable IX 2003

Edited by: Dr. Peter A. Leggat, MD, PhD, FAFPHM, FSIA, WSO-CSE/CSM/CSS/CSSD, Associate Professor, School of Public Health and Tropical Medicine, James Cook University, Townsville, Queensland, Australia

Abstract

Since the Inaugural Roundtable in 1995, the World Safety Organization (WSO) Global Safety Roundtable has become an annual event and an international safety "Think Tank", drawing on international representation from the WSO's annual educational meetings. The WSO Global Safety Roundtable IX 2003 was convened on the 3rd of November 2003 to assist the WSO in the formulation of specific proposals and resolutions for the United Nations (UN) and its agencies. It was convened during the WSO 17th International Environmental Health and Safety Conference and Expo, Holiday Inn Denver International Airport, Denver, Colorado, United States of America. It builds on the resolutions presented at the previous Global Safety Roundtables. The major issues arising from the "Think Tank" discussion included: development of a global emergency response pamphlet, a resource directory in emergency response, development of www-links on the WSO's own internet site, which may be in the area of global emergency response, but could also include other areas of linkage, including to national societies and other safety resources, revisiting WSO's consultant status to see how this can be used to facilitate action on global emergency response, including determining the status of our WSO Liaison Officers to various UN missions, and possibly publishing a follow-up or progress report in the WSO News-Letter.

Introduction

The World Safety Organization (WSO) Global Safety Roundtable IX 2003 was convened on the 3rd of November 2003 to assist the WSO in the formulation of specific proposals and resolutions for the United Nations (UN) and its agencies. It was convened during the WSO 17th International Environmental Health and Safety Conference and Expo, Holiday Inn Denver International Airport, Denver, Colorado, United States of America (USA). It builds on the resolutions presented at the previous WSO Global Safety Roundtables for which proceedings have been published for Roundtables I-IV and VIII (Leggat, 1995; 1996, 1997; 1998; 2002; WSO, 1998). Present (per sign-in Registers) at Global Safety Roundtable IX 2003: Vlado Senkovich (Co-Chair), Peter Leggat (Co-Chair and Editor), Safety Herb Everett, Michael Thomas, Fritz Budde, John Singley, Ai Rigg, Jess Kraus, Jeffrey Starr, Tony Ploughe, David Robertson, Richard Lack, Henry Reynolds, Marilyn Clark Alston, Don Rhodes. There were also a number of additional observers, who did not complete the "sign in" sheet.

Background

On the 26th of September 1995, Dr Rashmi Mayur, Director of the International Institute for Sustainable Future, based in Bombay, addressed the delegates of the WSO 6th World Safety and Accident Prevention Congress in Memphis, Tennessee, USA, at the first WSO Global Safety Roundtable. The proceedings of this Roundtable have been published elsewhere (Leggat, 1995). The challenge was laid down for safety professionals to address the major issues in safety throughout the World. In addition to developing specific proposals and resolutions for the United Nations, it was proposed that a "Think Tank" forum be formed to brainstorm and develop 21st Century plans for the major United Nations agencies addressing all safety problems, whether in the factory, the home or the environment. Dr Mayur promoted a book entitled, *The Earth First Reader: Ten Years of Radical Environmentalism* (Davis, 1995), and presented a copy of this to the WSO. Dr Mayur has written a preface to this new Indian Edition/reprint.

The WSO Global Safety Roundtable became an annual event drawing on international representation from the WSO's annual educational meetings to provide the basis for this "Think Tank". In 1996, the participants of WSO Global Safety Roundtable II presented several proposed resolutions targeting five (5) key areas. These areas were:

- Road safety,
- International project funding,
- Child safety,
- Global emergency response, and
- Continuance of the global "Think Tank", as part of the work of this WSO Global Safety Roundtable (Leggat, 1996).

Subsequent WSO Global Safety Roundtables presented proposed resolutions focusing on areas such as environmental compliance and development of international safety standards (Leggat, 1998; Mussett, 1998). It further proceeded to look at avenues to help the WSO interface with the UN and its agencies in order to develop an international awareness of these issues (Mussett, 1999).

Context of the WSO Global Safety Roundtable 2003

WSO Global Safety Roundtable IX was scheduled following the morning session on the 3rd November 2003 during the open day of the WSO 17th International Environmental Health and Safety Conference and Expo, Holiday Inn Denver International Airport, Denver, Colorado, USA. This ensured a high profile for the Roundtable without interfering with the educational programs conducted during the Conference. As such, the Global Safety Roundtable has become an integral part of the annual meeting of the WSO. During the Roundtable 2003, 15 registered participants and several observers, coming mostly from the USA, met for approximately three-quarters of an hour (11:00-11:45 hours). The documented registered attendance has been given above. A variety of disciplines were

represented including safety management, environmental safety, occupational safety, health care safety, ergonomics, workers' compensation, medical science, transportation safety, and safety engineering.

Discussion

The WSO Director-General and Co-Chair of Global Safety Roundtable IX, Dr Vlado Senkovich, opened the meeting at approximately 11:00 with a brief review of the purpose of the Global Safety Roundtable and a review of last year's Proceedings (Leggat, 2003), which were distributed at the meeting. The focus of the discussion was initially on what the Global Safety Roundtable could effectively deliver on, based on past performance. It was generally agreed that the Global Safety Roundtable has been a useful forum for discussing global issues, however it has lacked resources for follow-through on various action items. It was decided that the Global Safety Roundtable IX would focus on some small achievable items, which none-the-less would require continued networking between roundtable participants, WSO World Management Center and International Offices for input and action.

The context of the discussion was related to terrorism and hazardous materials management issues. The focus of the action items was on Global Emergency Response. These included:

- A global emergency response pamphlet, which would be translated by the United Nations (UN) for use in different countries. This could take the form of a resource directory, which would be the primary task over the coming year.
- Development of www-links on the WSO's own Internet site, which may be in the area of global emergency response, but could also include other areas of linkage, including to national societies and other safety resources.
- Revisiting WSO's consultant status to see how this can be used to facilitate action on global emergency response, including determining the status of our WSO Liaison Officers to various UN missions.
- Possibly publishing a follow-up or progress report in the *WSO News-Letter*.

The former item would require a resource survey to be conducted, in order to ascertain what already existed within different agencies. It was suggested that International Offices also be surveyed to determine what their priorities were in terms of global emergency response and other issues (possibly this could be achieved by email). It was also suggested that graduate students, as part of their projects, could assist with various aspects of these types of programs. The meeting was closed at approximately 11:45 hours by the Co-Chair and WSO Director-General, Dr Vlado Senkovich.

Assisting the WSO Global Safety Roundtable

The WSO Global Safety Roundtable has become a regular feature of WSO regional and international conferences. It is hoped that all interested WSO members can continue to support the work of the WSO Global Safety Roundtable throughout the year, including the development of proposals for consideration at subsequent Roundtable discussions. WSO Members and other interested professionals should consider participating at the 10th anniversary WSO Global Safety Roundtable. WSO Members and other interested professionals who may be able to assist with the development and implementation of these proposals or resolutions or who wish to assist with the work of the WSO Global Safety Roundtable or its work with the UN should contact the WSO World Management Center at, 106 W Young Ave, Suite G, PO Box 518, Warrensburg MO 64093, USA. Tel. (660) 747 3132. Int. Tel. +1-660-747-3132. Fax. (660) 747 2647. Int. Fax. +1-660-747-2647. Visit: www.worldsafety.org ,Email: wsowmc@socket.net

Acknowledgments

The attendance and contributions of all the registered participants and observers at the WSO Global Safety Roundtable 2003 were greatly appreciated. The assistance of the WSO World Management Center and the Editorial Committee of the *World Safety Journal*, who publish these proceedings, is also gratefully acknowledged.

References

Davis J (1995) *The Earth First Reader: Ten Years of Radical Environmentalism*. Indian Edition Reprint. Salt Lake City: Peregrine Smith Books and published in India by the International Institute for Sustainable Future, 272 p.

Leggat PA. (Ed) (1995) Proceedings of a Global Safety Roundtable. *WSO Tech-Letter*. October: 1-4.

Leggat PA. (Ed) (1996) Proceedings of a Global Safety Roundtable. *WSO News-Letter*. September-October:3.

Leggat PA. (Ed) (1997) Proceedings of the WSO Global Safety Roundtable III. *WSO News-Letter*. November/December:2-3.

Leggat PA. (Ed) (1998) Proceedings of WSO Global Safety Roundtable IV. *WSO Tech-Letter*. November:1-3.

Leggat PA. (Ed) (2003) Proceedings of the WSO Global Safety Roundtable 2002. *World Safety Journal*. XI(1):8-9.

Mussett J. (1998) The 12th World Safety and Accident Prevention Educational Conference. *Australian National Safety Journal*. 6(2): 16-18.

Mussett J. (1999) The 13th World Safety and Accident Prevention Educational Conference. *Australian National Safety Journal*. 7(2): 14-16.

World Safety Organization. (1998) *Proceedings of Global Safety Roundtable I, Global Safety Roundtable II, and Global Safety Roundtable III*. Warrensburg: WSO World Management Center.

Company Strategies For Modifying Driving Behaviors

by: Ms. Fiona Hanrahan; Ms. Hanrahan is an Environmental Engineer and has completed a Masters in Occupational Health and Safety at Edith Cowan University in Western Australia. For the past eight years, Fiona has worked in Health, Safety and Environmental departments of major oil & gas companies and is currently working in California, USA. This paper is the third in a series of three papers researched to assist her company in implementing a motor vehicle safety program throughout its worldwide operations.

Abstract

A significant proportion of motor vehicle crashes (MVCs) result from unsafe human behaviors; logically then, techniques to modify and improve driver behaviors have been promoted to prevent MVCs. Human behavior however is complex and to promote even a shift to safer driver behaviors is a significant challenge let alone influence sustained improvement. Overall there are no proven methods to actually make workers "want" to drive safely, as most drivers believe they are good drivers and are unlikely to be affected by a MVC and are often overconfident of their ability to avert injury. Despite these facts, measures are used by companies to promote, support and motivate people to improve their driving behaviors, including:

- Strong company safety culture
- Focused, visible and committed management, who consistently set an example
- Enforcement; which appears effective only when people perceive a high probability of detection, and the cost more severe than the incentive to contravene
- Driver behavior observation, monitoring and feedback
- Peer and family support through reinforcement and motivational mechanisms

Introduction

Human behaviors are not only responsible for a large proportion of motor vehicle crashes (MVCs) (US Transport Research Board, 2001), but are also somewhat unpredictable. People are prone to make mistakes and therefore accidents. Logically then, techniques to modify and improve driving behaviors have been promoted to prevent MVCs. Some companies reviewed in this paper have introduced mechanisms aligned with behavioral based safety programs for motor vehicle safety. These include Amoco (Loafmann, 1999), Halliburton (Segundo & Torifio, 2002), Shell (Sarawak & Sany, 2002), Schlumberger (Jutten, Ndubisi, Regnault, & Abifarin, 2002) and Duluth Transit Authority (US Transport Research Board, 2001). Risk perceptions of motor vehicle use, behavioral based safety programs, behavioral theories, and the effectiveness and limitations of behavioral modification techniques are discussed in the following sections.

Acceptance of Risk

People asses risks and take appropriate action as a result of their individual perceptions and beliefs as well as social and cultural factors (Slovic, 1987; cited in Lark, 1991). Some individuals actually seek risks as sensation fulfilling, though they are considered to be a minority. Research, has indicated there is a consistent optimistic bias among people concerning personal risk, with people claiming they are less likely to be affected than their peers. People not only tend to believe accidents do not happen to them, but are often overconfident of their ability to avert injury (Sanders & McCormick 1992; Williams, Peak, & Lund 1995). Surveys have revealed that 75-90% of drivers believe they are above average in their driving skill (Christensen 1987, cited in Sanders & McCormick, 1992; Adams-Guppy & Guppy 1995; and Harrison, Fitzgerald, Pronk & Fildes, 1998).

With peoples' misaligned risk perception, education is thought to be an obvious technique for affecting change. As detailed in *driver education and safety communication* later in this paper, awareness of risk and correct behaviors rarely alone translate to behavioral change. The Australian Federal Office of Road safety (1989) stated that strategies including screening and modifying driver behavior (through enforcement and driver education) have been effective for modifying aggressive behavior. However, past attempts to modify driver attitudes and unsafe driving behaviors have been largely unsuccessful.

To exacerbate the challenge of enabling behavioral change, Nell (2002) details that risk taking is emotionally driven, and as emotions are irrational, the success of persuasion is also limited. Nell (2002) instead suggests that to alter unsafe behaviors requires an understanding and use of what drivers actually fear. Ironically, most people fear death and acknowledge the risk of driving, but do not perceive the real or present risk of death or injury from driving. One of the complex aspects to change subjective risk perception and thus behaviors is that the exposure to hazards and risk taking are intrinsic aspects of many daily activities.

In the writer's opinion, people accept or become blind and complacent to the risks of motor vehicle use. Therefore to change peoples' perception and behaviors requires substantial effort while the receiver may perceive little real benefit. The challenge for companies to affect behavioral change is to alter subjective risk perceptions, to emphasize the benefits of safe driving behaviors and reinforce the costs and consequences of unsafe driving.

Ownership of Risk & Work Vehicles

Research by Harrison, Fitzgerald, Pronk & Fildes (1998) indicated a correlation

between faster speeds and work-related trips, driving larger cars which were not their own and relatively high driving exposure. This is confirmed by Lynn & Lockwood (1998) whose research found that in the UK; company car drivers have 50% more crashes than private drivers, partly as a result of increased relative mileage and time pressures. This research also indicated that almost one in five company car drivers had a crash each year at rate of 0.19/year. Of which 0.10 crashes/year occurred while driving for work and 0.08/year occurred during non work driving (including to and from work). These results are of concern for companies attempting to prevent MVCs. Mechanisms to increase employees' sense of responsibility should be promoted amongst other parallel motor vehicle safety program components including management of time pressures.

When developing a motor vehicle safety system is it useful to recognize that people tend to accept a higher level of risk if the activity is voluntary and the level of risk is under their control (Slovic, 1978; Starr, 1969 cited in Sanders & McCormick, 1992). As the use of motor vehicles is seen as voluntary and under their control, company mechanisms to change behaviors and manage risks is more challenging than many other workplace hazards.

Behavioral Based Safety Programs

Behavioral based safety programs are an increasingly common element of safety programs. There is however little published research on their use for motor vehicle safety. Krause (2002) states that behavior based safety is an integrated and interdisciplinary activity. The key activities being to identify and gather data on critical behaviors, provide ongoing two-way feedback, and remove barriers to safe behavior. Krause (2002) also identifies five points which determine the success of a behavioral based safety approach, which include:

1. Appropriate focus on the worker
2. Observations are actively used to improve facilities
3. Refrained use of incident based incentives to motivate participation
4. Appropriate use of HSE professionals to identify and remediate hazards and conduct root cause analysis
5. Behavioral based safety is one component of an overall comprehensive and integrated safety system.

Behavior based safety focuses on changing "objective" behavior for which most individuals can control. As Lark (1991) suggests, behavior based safety is affective to reduce risk taking when observations and feedback are kept objective, safe behaviors are commended, unsafe behaviors are pointed out and workers respond positively to feedback. This type of program was implemented by Amoco as a motor vehicle safety initiative documented by Loafmann (1999). Two elements identified as being crucial for the success of a behavior based safety program are a company's safety culture and workers proactively taking control of hazards (Gilmore & Perdue, 2002; and Sigurd 2002).

Behavioral Change Theories

Grayson (1996) conducted an evaluation of behavioral adaptation theories including risk homeostasis, risk compensation hypothesis and the principal of behavioral adaptation. His conclusion was that while plausible, the evidence to fully support any of the theories is inconclusive. The OECD (1990) report that proposed behavioral adaptation theory, is acknowledged by Grayson (1996) as having benefits to evaluate the potential adverse behavioral consequences of initiatives. One of the most commonly referenced behavioral change theories is that of risk homeostasis discussed below.

Risk Homeostasis

Risk homeostasis has been proposed as one theory to explain driver behavior. Wilde (1994) describes risk homeostasis as that of drivers having a target level of risk per unit time. According to this theory a driver's knowledge of safety improvements in vehicles and roads are offset by the driver engaging in more risky behavior to maintain a target level of risk. This theory leads to the prediction that interventions for enhancing safety could have detrimental affects, with a lowering of perceived risk and thus adoption of more risky behavior. Risk perception is determined by a person's past experiences, assessment of accident potential and their level of confidence in their ability to avert accidents and injury. Wilde (1994) further proposes that the target level of accident risk is determined by:

- The advantages and costs of unsafe behavior alternatives; and
- The benefits and costs of safe behavior alternatives

Consequently when the advantages of unsafe behavior and costs of safe behavior are high, then a person is likely to move to a higher target level of risk.

Wilde & Murdoch (1982 cited in Sanders & McCormick, 1992) proposed that an accident prevention strategy derived from risk homeostasis would target the following:

- Decrease the perceived benefits of risk behavior (pay drivers per unit, rather than distance)
- Decrease perceived costs of cautious behavior (make safety features in vehicles cheaper and easier to use)
- Increase the perceived benefits of cautious behavior (institute incentives and rewards for accident free and violation free driving); and
- Increase the perceived costs of risky behavior (reduce financial rewards for employees who do not wear seat belts)

While behavior adaptation is affirmed, the full validity of risk homeostasis theory has been disputed by some researchers including Howarth (1987), Evans (1992; cited in Sanders & McCormick, 1992) and Grayson (1996). Howarth (1987) contends that accidents are most likely to occur to those people who feel there is less risk of an accident (i.e. the person's perception of risk is often inaccurate). Evidence also suggests that people adapt to an increase in perceived risk by taking more care and to a reduction in perceived risk by taking less care (behavioral feedback). The writer does support the plausibility of Wilde's risk homeostasis theory; however it has limits in that education to change the target level of risk, has largely been unsuccessful as discussed in the following sections.

Techniques used to change behaviors relevant to motor vehicle crash prevention

According to Goldenbeld, Levelt & Heidstra (2000) techniques from a psychological perspective used to change behaviors include informing (education), persuading and incentives (rewarding and discipline). These forms of motivation are detailed below.

Driver Education & Safety Communications

A foundation of many company motor vehicle safety initiatives is awareness and education. The awareness of risks and education of appropriate practices is seen as critical in affecting a behavior change, to support existing safety policies and hereby reduce motor vehicle crashes. Some education strategies were discussed for Shell Malaysia, (Sarawak & Sany, 2002), Halliburton (Segundo & Torifio (2002); Schlumberger (Jutten *et al* 2002) and Amoco (Loafmann, 1999). To be effective in altering the driver's behavior the modification technique should target the motivation underlying the behavior. Goldenbeld, Levelt & Heidstra (2000) describe three broad classes of driving behavior:

- Reasoned or planned-under volitional control of the driver
- Impulsive or emotional behavior-varies from impulsive panic reactions to unexpected traffic situations to aggression
- Habitual behavior-occurs mindlessly without forethought or conscious information processing

From the perspective of behavioral change techniques, Goldenbeld *et al* (2000) state that the transfer of knowledge may only be useful in changing "reasoned" driving behavior. The Insurance Institute for Highway Safety (2001), Goldenbeld, *et al* (2000), Wilde (1994) and Christie (2002) argue that education might increase drivers' knowledge, but the expanded knowledge or tactics (persuasion) usually do not support behavioral changes. As stated by Christie (2002) and Evans (1991) results of driver education and training have limited proven effectiveness, rather motivation, habit, expectancy and utility are the primary drivers of behavior.

Christie (2002) also references extensive evidence from countries across the world and age groups which conclude that driver training contributes little to reduce crash risk involvement. Instead he suggests that driver training and education is used and sustained more by an assumption of effectiveness rather than proven evidence. In addition, research by Assum (1997) found that crash risk is more related to age and annual mileage driven, than driver attitude. Consequently shaping behaviors through education is limited. The writer does support this reasoning to a degree as people understand the risks of driving. Similarly people understand the risks of smoking, but awareness does not necessarily correlate to a change of behavior.

One barrier to the success of education and safety communications is the potential for adverse behavioral changes which may occur aligned with risk perceptions as detailed previously. To compensate the "risk homeostasis theory", it is important to recognize when devising safety communications that by changing people's perception of risk and potentially making them feel more secure, people's behavior may adapt.

Some recommendations for improving the effectiveness of safety communiqués and awareness strategies are:

- While it is good to promote items and behaviors that are safer, avoid advertising that risks are minimised and continue to remind people that injury is still possible-underplay the degree to which risk is reduced (Zeitlin, 1994).
- Minimise the perception of benefit gained from unsafe product use, i.e. does not save time to overwrite safety guards etc (Zeitlin, 1994).
- Make compliance with safety as easy as possible in respect to-time, effort and costs (Zeitlin, 1994).
- Acknowledge that the degree of familiarity with a product and its perceived hazardousness are potent variables affecting whether people will read warnings (Donner & Brelsfors 1986; cited in Sanders & McCormick 1992).
- Safety information campaigns can alter awareness and behavior, but often the effect is small and short-lived (Sanders & McCormick, 1992). To be effective it is suggested communications be reinforced with training, feedback and management encouragement.

In the writer's assessment, there is value in education and awareness to support motor vehicle safety initiatives; however as a single initiative they are likely to have modest improvements at best. Instead, education supported by other MVC prevention procedures, including a robust company safety culture and behavioral enhancing process will ensure greater protection from MVCs.

Persuasion

Persuasion through Shock advertising

A common form of persuasion typically deployed by governments is that of shock advertising. An example of a shock advertising scheme was deployed by the Victorian Roads & Traffic Authority in Australia. They were able to decrease road crashes and fatalities by an integrated program including graphic crash scenes. This advertising aimed to provoke drivers to change their attitudes and driving behaviors associated with speed and drunk driving. However, a study of the impacts reported by Shtifelman, Cameron & Diamantopoulou (1998) stated that shock advertising had only effective half life of 4-5 weeks.

In addition, Ben-Ari (2000) discussed the effects of death reminders on risk taking while driving. These findings illustrate that death reminders had an effect on participants, except on those for which driving was important to their self esteem (particularly relevant for young men). The study found that giving participants' feedback after mortality reminders eliminated the increase in risk taking behaviors amongst this subset. In the writer's assessment, while shock advertising and mortality reminders have an impact, their ability to sustain a change of behaviors is limited. Further, the ability to influence unsafe behaviors in the main target group (young males)

appears restricted without other behavioral change mechanisms like feedback and reinforcement.

Persuasion through personal involvement in MVCs

Rajalin and Summala (1997) undertook research on 245 surviving drivers of fatal crashes and studied their subsequent driving behavior (in quantity and quality). Overall study results indicate that car drivers if not seriously injured themselves typically return to their "normal" driving within a few months. One difference was for heavy vehicle drivers who show a tendency towards more cautious behavior. The later result is assumed to be the reinforcement and influence on behaviors at the workplace. Relying on drivers to change their behaviors following an MVC is an erroneous assumption. Further any potential change of behavior after an MVC is only likely to be short term.

Persuasion through use of passengers: Feedback and reinforcement

As discussed by Åberg (1998) traffic is a form of social system where drivers interact with each other. Drivers hereby act to reinforce or alter each others' behaviors to a general norm. To nullify potential negative impacts of other drivers, the active use of passengers may be effective.

Hutton, Sibley, Harper & Hunt (2001) illustrated the positive influence of feedback from passengers to improve targeted behaviors. Comprehensive research of collisions in Germany from 1984-1997 by Vollrath, Meilinger & Kruger (2002) illustrate a general protective effect of the presence of passengers. Findings illustrate that the mere presence of passengers, influences drivers to adopt more cautious and safer driving behaviors. The exception of these results was found for young drivers, in darkness and slow traffic. Similar results were reported by Regan & Mitsopoulos (2001).

To date, drivers have been the main focus of road safety campaigns and programs, while passengers' influence on driver's behavior has been largely overlooked (Regan & Mitsopoulos, 2001). On the basis of the above mentioned research, and that passenger safety is almost entirely controlled by the driver, the writer fully supports increased passenger education, involvement and intervention as an important protective measure. As such, companies should recognize the potential valuable role for involving families to continue to reinforce safe driving behaviors amongst family members.

Incentives

Rewards

Despite the widespread use of safety incentive schemes, they have significant limitations. As argued by Dial (1992) they are well used because they are easily implemented, however they exert little impact on behavior and do not effect social reinforcement. According to Krause (1999) they also tend to suppress honest injury reporting. The limitations of incentives were observed in a study by Hagenzieker, Bijleveld, & Davidse (1997) which identified that incentive rewards used to promote seat belt usage only had a 13.7 % effect in the long term. The subset influence of results was influenced by the original baseline use of seat belts, the type of population, and timeliness of incentives and whether incentives were based on group or individual behavior.

When incentive schemes are used by companies, they are typically more successful when:

- The incentive is proportional to the actual reduction in crash rates achieved (Jansenn 1991 cited in Haworth et al 2000)
- The time period in which the desired outcome is expected to be short and rewards are provided promptly (Jansenn 1991 cited in Haworth et al 2000).
- Provide a large incentive to a small number of eligible drivers (selected by Lottery) rather than a small incentive to all eligible drivers (Jansenn 1991 cited in Haworth et al 2000)
- Reward both the group and individual through all levels of the organization (Morisey, 1988; and Vogel, 1991; cited in Wilde, 1994).
- The reward is attractive, equitable and attainable (Karainsa,1977; Vaaje, 1991); Markus, 1990; Bacher, 1989; cited in Wilde, 1994).
- Measures are implemented to prevent accident under reporting (Fox, Hopkins and Anger, 1987; cited in Wilde, 1994).

Discipline

An alternative incentive mechanism is the use of discipline to sustain safe driving behaviors. Nell (2002) suggests that to alter unsafe behaviors requires an understanding and use of what drivers fear. According to Ben-Ari (2000) a person may choose to undertake (or not) risky behavior if the value of gain outweighs the potential loss of such a behavior; and how much attention the person pays to gains over losses. The use of discipline within the workplace, can create the perception that a potential disciplinary penalty out ways the benefits of unsafe behavior, and that the risk of detection and enforcement is high.

The Shell Malaysia motor vehicle safety scheme as detailed by Sarawak & Sany (2002) includes both incentive rewards and potential disciplinary measures. The mix of these was reported to be 75% proactive elements for individuals. While not documented in literature, the writer is aware of a couple of companies that have terminated the employment of employees who contravened motor vehicle policies.

Again discipline has it limitations. According to Krause (1999), discipline is counterproductive and is not just a function of behavioral scientist's theories. Instead in the workplace, Krause (1999) states that factors like morale, perception of fairness and workplace relations are integral, while the lack of consistent application of discipline is demotivating with respect to safety. In the writer's opinion, the use of discipline has its place, though is dependant on the company culture and should be applied fairly and consistently without exception.

Motivation

Motivation is a highly complex human characteristic for which many theories have been derived and tested. Motivation of individuals is task specific, time dependent, non static, relies on feedback

and reinforcement and is often influenced by peer pressure. As stated by Krause (1999) the motivation to change safety behavior is not driven sustainably and demonstrably from a single initiative, but rather from the intrinsic company culture. While programs may deliver modest improvements they are more successful when "motivation is based on growth needs...the ultimate reward in motivation is personal growth...Job enrichment remains the key to designing work that motivates employees" (Herzberg, 1987). Further, according to Demming (1986; cited in Krause, 1999) motivation of employees comes from their positive engagement. Motivating to change driver behavior is thus complex, and relies on the holistic company culture, peers and sustaining personal growth opportunities.

Conclusion

As detailed in this paper, peoples' behaviors are complex and for a company to influence a change of sustained improvement and even safe driving behavior is a significant challenge. People are generally complacent about their risk while driving and tend to demonstrate more unsafe behaviors in work vehicles than their own personal vehicle. While there is limited published literature on the use of company behavioral based safety programs for motor vehicle safety, the literature consistently references the benefits of reinforcement and feedback as demonstrated effective methods to improve driving behaviors. Other factors found to be critical for the success of a behavioral change initiative include the maturity of a company's safety culture and the ownership of safety at a personal level.

The ability to motivate individuals and drive a change of behaviors is very complex. It is not only individually specific, but time dependant. While the use of education, persuasion and incentives are beneficial, they also have significant limitations and are not seen as individually successful to enable the prevention of MVCs. Rather, motivational factors including peer and family feedback and support, the company safety culture and an individual's self worth and engagement in the process are seen as effective behavioral change mechanisms or influences.

Overall there are no proven methods to actually make workers "want" to drive safely, as most drivers believe they are good drivers and are unlikely to be affected by a MVC and are often overconfident of their ability to avert injury (Sanders & McCormick, 1992). Despite these facts, measures used by companies to promote, support and motivate people to improve their driving behaviors, include:

- Strong company safety culture (Haworth *et al*, 2000; Downs, Keigan, Mayock, & Grayson, 1999, Jutten *et al*, 2002)
- Focused, visible and committed management, who consistently set an example (Jutten *et al*, 2002; Halliburton, 2002)
- Enforcement; which appears effective only when people perceive a high probability of detection, and the cost more severe than the incentive to contravene policies (Wilde, 1994; Jutten, *et al*, 2002; Diamantopoulou & Cameron, 2001)
- Driver behavior observation, monitoring and feedback (Loafmann, 1999; Grayson & Rothengatter, 1996; Ben-Ari, 2000)
- Peer/ family support and reinforcement and motivational mechanisms (Haworth *et al*, 2000; Vollrath, Meilinger, & Kruger, 2002; Sarawak & Sany, 2002)

The final and very important point is that changing behaviors through motivation or any behavioral change mechanism is rarely rapid, but requires sustained effort over a long period of time.

References

Åberg, L., (1998). Traffic rules and traffic safety. *Safety Science 29*, 3, p.205-215.

Adams-Guppy, J. & Guppy, A. (1995). Speeding in relation to perception of risk, Utility and driving style by British Company Car Drivers. *Ergonomics. 38*, (12) 2525-2535.

Assum, T. (1997). Attitudes and road accident risks. *Accident analysis and prevention. 29* (2) 153-159.

Australian Federal Office of Road Safety (1989). Grey, E, Triggs; T. & Haworth, N. (Eds.). *Driver Aggression; the Role of Personality, Social characteristics, Risk and Motivation.* Author.

Ben-Ari, O.T., (2000). The effect of reminders of Death on Reckless Driving: A terror Management perspective. *Current Directions in Psychological Science, 9*, (6), 196.

Christie, R (2002). *Effectiveness of Driver Training/Education as a Road Safety Measure: Popular views, assumptions and scientific evaluation.* Keynote Address of The Australian College of Road Safety Conference on Developing Safer Drivers and Riders, Brisbane, 21-23 July 2002.

Dial, C.M. (1992, April). Incident-focused managers. *Journal of Professional Safety* 37-45.

Diamantopoulou, K., & Cameron, M., (2001). *An evaluation of the effectiveness of Overt and Covert Speed Enforcement Achieved through Mobile Radar Operations.* Monash University Accident Research Centre, Report No.187. Retrieved August 1, 2002 from www.general.monash.edu.au/muarc/rptsum/es187.htm

Downs, C.G., Keigan, M., Mayock, G. & Grayson, G.B., (1999). *The safety of fleet car drivers: a Review* (TRL Report 390). UK Transport Research Laboratory, Crowthorne.

Gilmore, M.R. & Perdue. S.R., (2002). *Behavior Based Safety-The next step in Injury Prevention.* Paper presented at the Society of Petroleum Engineers Conference on Health, Safety & Environment in Oil & Gas Exploration held in Kuala Lumpur, Malaysia, March 2002. SPE Paper 74067.

Goldenbeld, C., Levelt, P., & Heidstra, J., (2000).Psychological perspective on changing driver attitude and behavior. *Recherche-Transports-Sécurité, 67*, 65-84.

Grayson, G.B., (1996) *Behavioral*

Adaptation: A review of the Literature. (TRL Project Report 254) UK Transport Research Laboratory, Crowthorne.

Grayson, B. & Rothengatter, J.A., (1996) *Controlling speed choice. Behavioral research in road safety* vi. (TRL Report 3138/96). UK Transport Research Laboratory, Crowthorne.

Hagenzieker, Bijleveld, & Davidse (1997). Effects of incentive programs to stimulate safety belt use. a meta analysis. *Accident Analysis and Prevention, 29,* (6) 759-777.

Halliburton interview (2002) interview with Pat Cook- Director HSE.

Haworth. N., Tingvall. C., & Kowadlo. N., (2000). *Review of Best Practice Road Safety Initiatives in the Corporate and/or Business Environment.* Monash University Accident Research Centre. Report No. 166. Retrieved August 1, 2002 from www.general.monash.edu.au/muarc/rptsum/es140.htm

Harrison. W., Fitzgerald, E.S., Pronk, N.J. & Fildes, B., (1998). *An investigation of characteristics associated with driving speed.* Monash University Accident Research Centre. Report No. 140.

Herzberg, F., (1987). One more time: How do you motivate employees? *Harvard Business Review, 65* (5), 109-120.

Howarth, C. I., (1987). Perceived risk and behavioral feedback: Strategies for reducing accidents and increasing efficiency. *Work and Stress, 1*(1) 61-65.

Hutton, Sibley, Harper & Hunt (2001). Modifying driver behavior with passenger feedback. *Transportation Research Part F: Traffic Psychology and Behavior, 4*(4) 257-269.

Insurance Institute for Highway Safety (2001). What works and doesn't work to improve highway Safety. *Status Report, 36,* 5.

Jutten. J.J., Ndubisi. J.J., Regnault. P., & Abifarin. O., (2002). *Working towards Zero Automotive Accidents in the Niger Delta.* Paper presented at the Society of Petroleum Engineers Conference on Health, Safety & Environment in Oil & Gas Exploration held in Kuala Lumpur, Malaysia, March 2002. SPE Paper 74048.

Krause, T.R (1999). *Motivating Employees for Safety Success.* Paper presented at the ASSE Professional Development Conference and Exposition.

Krause, T.R., (2002, August). Cross-Functional Improvement. Behavior Based safety as a tool for organizational success. *Professional Safety,* 27-33.

Lark. J., (1991, November). Risk taking: Perspective and intervention. *Professional Safety.* 36-39.

Loafmann, B., (1999). Accelerating Safe Driving Behavior. *Occupational Health & Safety. 68*(3) 66.

Lynn. P., & Lockwood, C.R. (1998). *The accident liability of company car drivers* (TRL Project Report 317) UK Transport Research Laboratory, Crowthorne.

Nell, V., (2002). Why Young Men Drive Dangerously: Implications for Injury Prevention. *Current Directions in Psychological Science. 11*(2) 75.

OECD (1990). *Behavioral Adaptions to Changes in the Road Transport System.* Organization for Economic Cooperation and Development, Paris.

Rajalin, S., & Summala. H., (1997). What surviving drivers learn from a fatal road accident. *Accident Analysis and Prevention, 29*(3) 277-283.

Regan, M.A. & Mitsopoulos, E. (2001) *Understanding Passenger Influences on Driver Behavior: Implictaions for Road Safety & Recommendations for Countermeasure development.* Monash University Accident Research Centre-report #180. Retrieved August 8, 2002 from www.general.monash.edu.au/MUARC/rptsum/es180.htm

Sanders, M.S., & McCormick, E.J. (1992) *Human Factors in Engineering and Design.* Singapore: McGraw-Hill.

Sarawak, G.T., & Sany. M.N., (2002). *Road Transport Safety Management-A Successful Transformation Journey.* Paper presented at the Society of Petroleum Engineers Conference on Health, Safety & Environment in Oil & Gas Exploration held in Kuala Lumpur, Malaysia, March 2002. SPE Paper 74044.

Segundo J., & Torifio. S., (2002). *Journey Management in Colombia.* Paper presented at the Society of Petroleum Engineers Conference on Health, Safety & Environment in Oil & Gas Exploration held in Kuala Lumpur, Malaysia, March 2002. SPE Paper 74047.

Shtifelman, M., Cameron, M., & Diamantopoulou, K., (1998). *Measuring the half-life of advertising awareness for drink-driving, speed and concentration themes in Melbourne and country Victoria, 1989-1997.* Retrieved July 30, 2002 from Monash University Accident Research Centre. www.general.monash.edu.au/muarc/rptsum/abtr298.htm

Sigurd K.G., (2002). *Culture and HSE Management.* Paper presented at the Society of Petroleum Engineers Conference on Health, Safety & Environment in Oil & Gas Exploration held in Kuala Lumpur, Malaysia, March 2002. SPE Paper 73993.

US Transport Research Board (2001). *Highway Safety Research: A National Agenda.* Retrieved August 1, 2002 from www.trb.org/trb/publications/rtforum/safety_agenda_July_2001.pdf

Vollrath, M., Meilinger, T., & Kruger, H., (2002). *How the presence of passengers influences the risk of a collision with another vehicle. Accident Analysis and Prevention, 34* (5) 649-654.

Wilde, G.J.S. (1994) Target Risk. PDE Publications, Canada. ISBN 0-9699124-0-4. Retrieved August 9, 2002 from www.Pavlov.psyc.queensu.ca/target/

Williams, A., Peak, N., & Lund, A., (1995). Factors that Drivers say Motivate Safe Driving Practices. *Journal of Safety Research, 26*(3) 198.

Zeitlin, L.R. (1994). Failure to Follow Safety Instruction: Faulty Communication or Risky Decisions? *Human Factors. 36*(1) 172-181.

Pollution Control Through The Profitable Use of Mining Waste

by: Ms. Catherine Driussi and Dr. Janis Jansz, Edith Cowan University, 100 Joondalup Drive, Joondalup, Western Australia

Abstract

A description is provided of how Iluka Resources minimises the incidences of pollution due to waste gas steam production by producing electricity for company use. Information is also provided about how Iluka improves the safety of the work environment and increases company profits by using the waste generated by refining minerals to produce pig iron, fertilisers, soil conditioners and activated carbon for sale to the community.

Introduction

Iluka Resources Limited is an international mining and mineral processing group that operates at five sites within Australia and two in the United States of America (Florida and Virginia). Iluka Resources Limited's main business activities include the mining and processing of titanium minerals, mining and processing zircon, a coal-mining joint venture and extensive mineral exploration in many countries. Iluka Resources Limited is ranked second in global titanium minerals production in the world and first in global zircon production. It is also the world's most successful producer of synthetic rutile. Other company investments are in tin, coal, copper and quicklime.

Iluka Resources has found a cost effective way to promote environmental safety and use waste gas and heat from their mining operation to produce electricity for on site use which has reduced the amount of power purchased by the company. Other uses of mining and mineral processing waste products have been the production of pig iron from iron oxide residue, fertilisers and soil conditioners from acid effluent and activated carbon from carbonaceous waste. This article uses information published on the web by Environment Australia (2000) to describe the equipment and work processes used, problems encountered, and how these problems were overcome to turn waste products into environmental improvement and profit making ventures.

Waste heat recovery

Iluka Resources has found an innovative way to minimise waste gas production and improve environmental safety. The process uses low water consumption, generates minimal particulates, has low energy consumption, low maintenance and is cost effective.

The traditional pollution control method of dealing with a waste gas stream, which is high in both temperature and particulates, is to install a wet scrubbing system. While such a system would cool the gas and remove the particulates there are a number of environmental and economic impacts associated with this. These include:

- high water consumption with water converted to steam and released to the atmosphere resulting in loss of heat energy and water,
- generation of high particulate content, acidic liquid waste which requires removal of solids and addition of lime for pH neutralisation,
- high energy consumption resulting in consumption of non-renewable fossil fuels and generation of air emissions, including greenhouse gases, and
- high maintenance and operating costs as a result of pumping water and liquid waste, neutralisation plant, cleaning and disposal of waste solids.

Iluka Resources investigated alternatives to a wet scrubbing system in order to determine whether there was a more effective way of dealing with the waste gas stream. The company finally decided to adopt a major technology modification in the form of a waste heat power generation facility and an electrostatic precipitator for the removal of particulates. This waste heat power generation facility is considered on-site recovery as the company is recovering the heat energy in the waste gas to produce electricity which is used on site This reduces the amount of power required to be purchased by the company for work processes.

A project management team of seven Iluka staff was established. The major construction contract was awarded to Rico Pty Limited of New South Wales. Oracle Engineering provided specialist engineering design services to Rico Pty Limited. Iluka staff maintained a strong involvement with all stages of the project from conceptual design, through to detailed design, construction and commissioning. The final design consisted of a super-heater, a boiler and an economiser capable of producing about 30 tonnes per hour of steam. This super-heated steam drives a fully condensing steam turbine capable of producing about 6.5MW of electricity an hour (after allowing for power to run plant auxiliaries). As this was the first time a plant such as this had been installed on a synthetic rutile plant in Australia a number of challenges were encountered. These were addressed through the innovation, originality and dedication of the team. The challenges included the following.

Dirty waste gas

The gas leaving the kiln had a very high particulate load that could create erosion and fouling problems on the gas side of the boiler tubes. Deltec (USA), who had extensive experience in the design and manufacture of boilers for waste heat recovery plants, were engaged to design the boiler. Design features adopted to reduce erosion potential were increased tube wall thickness (from 1.2mm to 4.19mm) and reduced gas velocity through the boiler. To minimise fouling problems a three drum (one steam and two water drums) boiler design was adopted. The two water drums are at the bottom allowing the boiler tubes to be installed vertically. This reduces dust build up. A gap between the two drums allows dust to fall into dust collection hoppers during cleaning operations. There are no finned tubes in the super-heater, boiler or economiser so reducing

the build up of dust.

Minimisation of input heat variations

The gas generated by the kiln varied widely in both flow and heat over short periods of time. By incorporating an over-sized steam drum the effects of such wide variations were effectively balanced out.

Maximisation of electricity production

The waste gas contained high levels of SO_2 and SO_3 required in the kiln. This waste gas was required to be kept at a temperature of greater than 150°C to prevent these compounds condensing out of the gas as sulphuric acid. As sulphuric acid is highly corrosive it would severely damage downstream equipment such as the electrostatic precipitator, fans, dampers and the exhaust stack.

A split economiser design was adopted to prevent corrosion while maximising electrical output. The economiser ensured that the gas temperature remained above the acid dew point until it reached a condensate heater directly before the exhaust stack. The heat extracted from the gas in the condensate heater is used to preheat the condensate entering the de-aerator of the boiler, eliminating the use of steam for preheating and so providing the capacity to generate an additional 1MW of electricity. Money was saved by having the temperature of the gas immediately before discharge through the exhaust reduced so that only the stack and the condensate heater had to be made of expensive duplex stainless steel suitable for a highly corrosive environment.

Another innovative aspect of the design that promoted maximum electricity output was the boiler cleaning system. Traditional steam soot blowers were installed to clean the superheater, while an infrasonic blower was installed to clean the boiler and economiser tubes. This was the first application of infrasonic blowers for boiler cleaning in Australia. It works by generating a low frequency, high power noise to acoustically shake the dust from the tubes.

Low resistivity dust

The dust contained in the waste gas had a very low resistivity that was not ideal for removal by an electrostatic precipitator. By incorporating extra wide plate widths and higher than normal plate voltages the manufacturer was able to guarantee dust removal.

Priority of kiln output

As the core business of the Synthetic Rutile Plant was to produce products, it was important that the Waste Heat Recovery Plant did not determine kiln operation times. A waste gas bypass system was installed to allow kiln operation during maintenance shutdowns of the boiler. During bypass operation, water sprays are used to cool the waste gas from 900°C (exit temperature form the kiln) to about 200°C in order to protect the electrostatic precipitator, ducts and fans. Such cooling and the resulting thermal shock, if performed in a traditional ducting lined refractory, would result in cracking and dislodging of the lining. The alternative adopted for the quench tower was an internally insulated structure consisting of an internal shingle plate construction made from high temperature steel plates.

Quick turbine response

The fuel source for the Waste Heat Recovery Plant could not be controlled, so two operational modes had to be adopted. In "connect" mode, the turbine is controlled by the inlet pressure and electricity generation is maximised by matching the heat output of the boiler. In "island" mode, control is based on speed and steam bypass, dumping excess steam to match electricity generation with the plant load. Rather than installing the traditional stand alone electronic turbine speed controllers, the turbine controls have been incorporated into the overall digital control system (DCS) for the Waste Heat Recovery Plant. Having the two systems fully integrated allows fast response to operational changes and automatic changeover from one control mode to the other.

Safe and reliable connection to the electricity grid

Digital High Voltage protection relays were required for the connection of the system to the Western Power electricity grid. This included distance protection, generator protection, transformer protection and protection against pole slipping on the generator. The relays are linked back to the main DCS for the plant, providing extensive monitoring, status information, and allowing disconnection and reconnection with the grid as required.

Benefits of Waste Heat Recovery

The financial and environmental benefits of the project are summarised in Table 1.

Table 1. Financial and Environmental Benefits

Total investment	$20 million
Energy generated on site	Up to 6.5 MW pa
Annual energy cost savings	$1.5 million
Expected return on investment	16%
Expected payback period	8 years
Expected operating life	25 years
Annual greenhouse gas emission reductions	52,000 tonnes CO_2 equivalent
Annual water savings (compared to alternative technology)	1.2 million liters

The total cost of the Waste Heat Recovery Plant was just over $20 million and the expected rate of return on the investment was 16%. This compared favorably with the traditional wet scrubbing system that was expected to cost around $9 million

but had no financial return on investment. The power plant now generates up to 6.5MW of electricity, with an average of 5.5MW. Of this 4MW is used in the new synthetic rutile plant, 0.7 is used to run the Waste Heat Recovery Plant auxiliaries and any excess is used in other parts of the Western Australian North Capel operations. By avoiding the need to purchase electricity, and by taking into account operational costs, the company is saving over $1.5 million per annum. With a payback time of 8 years and an expected operating lifetime of over 25 years, savings will continue to accumulate well after the plant has paid back the initial cost of purchase and installation.

As electricity generation is primarily based on the burning of fossil fuels, this project significantly reduces the associated environmental impacts. The project reduces the volume of coal required to provide electricity to the site by about 25,000 tonnes per annum and reduces the greenhouse gas emissions that would result from burning the coal by about 52,000 tonnes of CO_2 per annum. Other environmental benefits include a decrease in water consumption of about 1.2 million liters per annum as opposed to if the wet scrubbing system had been installed. In addition, the electrostatic precipitator reduces particulate emissions from the plant to well below current regulation levels: The levels are also expected to be below any regulations that may be imposed in the foreseeable future.

The treatment of hot waste gas was an important consideration for a major upgrade at the North Capel Synthetic Rutile Plant in 1995. Making use of the energy contained in the waste stream was a significant area of focus with a variety of options being investigated. The main barrier to the implementation of the Waste Heat Recovery was the perceived risk of adopting a new and somewhat unknown (at least to Iluka Resources) technology. Iluka Resources had to look closely at what financial and environmental benefits the project offered and at how the company could minimise its exposure to risk. Finally, by weighing the risks against the benefits of the project, the decision was made to go ahead.

Iluka's Special Projects team, as well as looking to minimise waste gas production, actively sought alternative uses for all waste. The other initiatives that this team implemented were using acidic effluent to make fertilisers and soil conditioners, turning carbonaceous waste into activated carbon and producing pig iron from iron oxide residue.

Alternative uses for other wastes

Pig iron production from iron oxide residue

Over 300,000 tonnes a year of iron oxide residue is produced from the refining process. In the past this material had been used as land-fill but Iluka has now identified pig iron production as the most appropriate use for the residue. The company has been carrying out pilot work on smelting the iron oxide and has developed its own technology, a shaft melting process, as well as reviewing the bath melting technology of Ausmelt. The next stage will be to take the project forward to the Demonstration Project stage.

Fertilisers and soil conditioners from acidic effluent

Around 40,000 tonnes a year of acidic effluent is produced from acidic leaching of the refined mineral products. The effluent contains sulphuric acid, dissolved iron and manganese, and traces of other metals. In the past this was neutralised with lime and disposed of as cleaned water and land-fill solids. The solids are now sold for use as fertilisers and soil conditioners. The soil conditioner helps in the retention of moisture and nutrients while providing trace elements and sulphur. All products are ideal for use in the poor, sandy soils of South West Western Australia. Iluka has been selling the sulphur fertiliser as "Iron man™ Gypsum" since 1998 and is seeking approval to sell the soil conditioner in the South West and Mid West agricultural regions of Western Australia.

Activated carbon from carbonaceous waste

Around 15,000 tonnes a year of carbonaceous waste from kilns is sized and cleaned for sale as activated carbon. The activated carbon has use in cleaning gaseous emissions, for example from municipal incinerators, where the carbon absorbs chemicals such as dioxins and heavy metals.

Benefits

The Illuka special projects team is optimistic that there will be considerable cost savings from the reduction of waste that is now required to be disposed of due to their company's mining operations. While it is too early to estimate the potential benefits of pig iron production the economics appear to be favorable when considering the savings of waste disposal costs, the potential capital costs and revenue streams from selling this product. Potential pig iron production is estimated at 300,000 tonnes a year from recovered land-fill waste as well as annual waste generated. The fertiliser and soil conditioner initiative has not yet broken even but could do so and be profitable if sales volumes can be increased. Iluka Resources estimates that its carbonaceous material business could be expanded to be worth several million dollars a year.

Conclusion

Since implementing these improvements Iluka Resources have improved environmental safety by reducing the pollution produced by mining and processing minerals. While doing this they have turned the waste products generated by work processes into a cost effective, potentially profit making ventures which bring significant benefits to the company and to the community in which the company is located.

Reference

Environment Australia. (2000). *Best Practice Environmental Management in Mining - Case Studies.* Retrieved August 1, 2003 from http://www.ea.gov.au/industry/eecp/industry.html#2

Risk Management, What's It All About?

by: Mr. Rob Cowan, Undergraduate student Edith Cowan University, Western Australia

Abstract

Managing risk in the modern day is imperative to organisational survival and success. The control of hazards does not only make good financial sense, but in the occupational safety field it is required by law. This article discusses the basic principles of risk management and risk assessment in a simple and logical manner by making a conscious attempt to avoid the confusion generally associated with the subject.

Risks and Hazard's

When discussing risk management it is important that one understands the difference and association between risks and hazards. "It is generally understood that the term hazard refers to some present or potential danger in the real world (a moving machine part, a loud noise, a cloud of dust) while the term risk refers to the probability on a person succumbing to this danger" (Mathews, 1985, p.488). The association between hazard control and risk management is simple "If the hazards are controlled, the risk associated is also reduced" (Taylor, Easter and Hegney, 1997, p. 82)

What is Risk Management?

Risk management can be used in various industries for various purposes. A financial institution may use a risk management system to analyse a particular investment strategy. They may way up the potential gain or losses and then rate the probability of a situation occurring and therefore developing a rating of risk associated to a particular investment. Banks do it every time we apply for a loan. What is the likelihood that this person will be able to repay the bank the money loaned? If they loose their job can they still repay the money? Does the applicant have sufficient collateral to cover any foreseeable losses? The answers to these questions determine if we are able to get a loan and what rate of interest we pay on the loan. This is a form of risk assessment, a tool of risk management.

Risk management in the occupational safety arena applies the same principals to managing hazards therefore reducing the likelihood of causing harm to employee's, plant and equipment, the environment, organisational profit and the public. There are many definitions of risk management, Glendon and Rice (1995, p.547) explain how risk management applies to the management of occupational safety and health (OSH) "The term risk management finds applications in various fields. As far as safety and risk professionals are concerned, it is increasingly viewed as the framework within which the multi-disciplinary field of occupational health and safety is managed" where as Thevendran & Mawdesly (2003, p.23) define risk management more broadly as "a continuously monitored integrated formal process for defining objectives, identifying sources of uncertainties, analysing these uncertainties and formulating managerial responses, to produce an acceptable balance between risk and opportunities".

Thevendran and Mawdesly's definition incorporates the four core steps involved in risk management, risk identification, risk analysis, risk response and risk monitoring (Thevendran & Mawdesly, 2003). These four steps occur in one form or another through nearly all risk management systems. A more familiar system could be the one promoted by Worksafe Western Australia (2000) Spot the hazards, Assess the risk and Make the changes. Risk management is also set out in standard AS/NZS 4360.

Strategies Incorporated In Risk Management

In the OSH area, risk management is generally focused upon risk reduction and other risk management strategies can be forgotten. Generally risk management is categorised into four main groups:

1. Risk avoidance – Where organizations end their involvement in a particular operation once a particular hazard and the risk associated with it has been assessed.
2. Risk retention – Where a risk is retained within an organization with or without knowledge.
3. Risk transfer – Where the potential costs associated with a risk are transferred to another party by way of insurance or contractor employment.
4. Risk reduction – The process where an organization implements a hazard control program to reduce the level of risk. (Lee, 1998).

Risk Identification

Before any risk management strategies can be put in place it makes sense that the risk must first be identified. As mentioned earlier in this article risk management is used in a variety of different fields and therefore the methods used to identify risk would differ accordingly. In the OSH field commonly used methods for risk identification are:

1. Workplace inspections and audits (Conducted within an organization by internal or external inspectors or auditors).
2. Accident and near miss reporting (Allows reactive controls to be put in place to reduce risk).
3. Accident statistics (Useful in indicating particular jobs types that have previously caused injury such as manual handling).
4. Job safety analysis (Used by employee's to identify specific hazards related to specific jobs, before the commencement of that job).
5. Published hazard alerts (Identifies potential hazards that have caused harm recently. The information could be published from other areas within the organization or from external sources such as Worksafe)
6. History (Identifies particular or generic hazards associated with a particular task, such as working in confined spaces)
7. Job observations (Conducted by workers or staff generally through checking compliance with work procedures etc).
8. Material safety data sheets

(Information relating to the dangers associated with a particular chemical or material. Includes first aid and safe transport information).

Risk Assessment

Risk assessment has two aspects: risk analysis and risk evaluation. Analysing a risk involves gathering facts about the nature of the hazard, the mechanism which can lead to injury or ill health and the risks magnitude. The importance of the risk is then evaluated taking into account factors such as people's perceptions, the certainty with which the consequences are known and the cost and practicality of reducing the risk (Bohle & Quinlan, 2000, p.367).

Bohle and Quinlan's description of risk assessments two aspects can also be defined as likelihood and impact. What is the likelihood of the incident occurring and what is the impact or consequence of the occurrence? By using a risk matrix or risk calculator a level of risk can be associated to the hazard. There is a variety of risk matrixes used in the OSH field, but all compare the likelihood and the consequence to develop a level of risk of hazards causing harm.

The difference between risk matrixes is caused by the different values or different tasks undertaken by different organizations. A combination of fields can also combine to associate an overall risk. A hazard has the potential to do harm to more then just the individual. Other consequences such as damage to the public image, environmental damage, level of financial loss and legal consequence must also be assessed to determine the true level of risk associated with a particular hazard.

Hazard Controls

At the beginning of this article the difference between hazard and risk was defined. Therefore when seeking to manage or reduce risk it is important to remember that risk can not be controlled. The hazard can be controlled to reduce or manage risk.

"The basic approach to the control of hazards can be summed up in what is called the preferred order (or the hierarchy of controls) (Taylor, Easter & Hegney, 1997, p.202). These are;

1. Elimination
1. Substitution
2. Isolation
3. Engineering
5. Administrative
6. Personal protective equipment (PPE)

These controls as far as practicable should be implemented in the above order starting at method of elimination; (can the hazard or product be removed from use?) down to the final control, PPE. What personal protective equipment can be worn by any exposed person to reduce the risk associated with the hazard?

Monitoring

Risk management does not end at the control stage. Some management strategies may appear to be completed after the control has been implemented, such as the Worksafe WA plan, spot the hazards, assess the risks and make the changes. This strategy makes no reference to another important element of risk management, monitoring. Monitoring refers to the continual assessment of the implemented controls' ability to reduce the risk associated with the hazard. The effectiveness of a particular control may be influenced by a range of factors including behavioral factors, environmental factors or simply the control may not be as efficient as first thought.

Taylor, Easter & Hegney (1996, p.203) state that "once control measures are introduced it is essential to follow them up to see if they are successful." This may involve measuring airborne contaminants, analysis of urine or blood, or other medical screening of workers – for example, vitalograph testing of lung function by a trained nurse. Taylor, Easter & Hegney (1996) demonstrates the methods used when testing controls directly related to exposure to substances and the possible negative heath effects associated. Other methods of monitoring are also available and would differ depending on the hazard and the control implemented. Using the risk or hazard identification methods can also be used to monitor controls. If a particular area at the workplace had a high level of reported near miss accidents in the car park and speed humps were implemented as an engineering control of the hazard, it would make sense that there should be a drop in the number of incident reported if the control were effective.

Monitoring controls does not just stop at testing the controls effectiveness; it must also monitor the controls potential to cause harm. It is possible that the implementation of a particular control may introduce another hazard to the workplace. The wearing of ear protection by employees may prevent them from hearing warning alarms. Therefore another hazard has been presented which must also be controlled by a method such as introducing flashing warning lights.

Conclusion

Risk management can be a confusing subject with so many terms and variables. The terms hazard and risk, while they are continually used together, refer to two totally different things dependant on each other. Adding to the confusion risk management terminology is used in many different fields of work and therefore terms and definitions in different fields mean a large variety of things. Despite this, risk management in all the fields that it is used, has the same purpose and drives at what its name suggests, managing risk. This is done by using four basic steps, Hazard identification, Risk analysis, Hazard control and Monitoring. The combination of terms and applications can at times become daunting and confusing. By applying a methodical and logical approach to hazard control and risk reduction effective risk management can be achieved.

References

Bohle, P. and Quinlan, M. (2000). *Managing occupational health and safety: A multi disciplinary approach.* Melbourne: Macmillan.

Glendon, I. and Rice, J. (1995). Risk Management. *Journal of Occupational safety and Health – Australia and New Zealand*, 11 (6), 547-549.

Mathews, J. (1985). *Health and safety at*

work: Australian trade union safety representatives handbook. Sydney, NSW: Pluto Press

Taylor, G., Hegney, R. and Easter, K. (1997). *Enhancing safety: An Australian workplace primer*. Perth, WA: Tafe Publications.

Thevendran, V. and Mawdesley, M. J. (2003) Perception of human risk factors in construction projects: an exploratory study. *International Journal of Project Management*.

Book Review

Nurse Managers - A Guide to Practice

Edited by Andrew Crothers

On the box of the book + 2 CD package is this quote "The conventional definition of management is getting work done through people, but real management is developing people through work." This quote sums up what the book is about. The publication provides nurse managers with the information required to care for and help to develop professionally the people that they work with.

Topics covered in the book include the following. The role of the Nurse Manager. Promotion and professional relationships. Managing ethically. Leading, motivating and enthusing. Working with other disciplines. Making meetings work. Counseling your staff. Dealing with unhelpful employees. Managing performance. Managing risks. Occupational health and safety. Maximising the quality factor. Writing policies and procedures. Working with job descriptions. Selecting, recruiting and retaining staff. Rostering. Budgeting. Managing information. The manager as an educator. Coping with hostility. Managing relatives concerns and evidence based management. Most of what is written in this book applies not just to Nurse Managers, but to all Managers.

The book has chapters written by 20 different authors. At the start of the book is a picture and a description of the work history and interests of each of the authors. All authors are current practitioners in the field that they wrote about. Each of the 22 chapters is very well set out with the most important points summarised by the Editor and included in a box in the text. Information on the CD was clearly spoken and summarises the most important points written by the authors. Even though I read the book I really enjoyed listening to the CD as another way of absorbing information to think about and use. According to the publishers many people are buying multiple copies of this book and the CDs to give to their coworkers and friends because the book is so useful. The book, which was published in 2004, has even been sold in the King of Prussia, which is a town in the USA.

Nurse Manager. A Guide to Practice can be purchased in 3 forms. As a book which costs $69 (Australian) + the cost of postage, as a 2 CD package, or as a book and 2 CD package combined. The third option has been the most popular. All are available in the United Kingdom from Radcliffe Medical Press Ltd, 18 Marcham Road, Abingdon, Oxon, OX14 1AA www.radcliffe-oxford.com In Canada from Login Brothers Canada, 324 Saulteaux Crescent, Winnipeg, MB R3J 3T2 www.lb.ca. In the USA from Jamco Distribution, 1550 Lakeway Drive, Lewisville, Texas, 75057, or from Martin Hill, 870 Market Street, San Francisco, California, 94102, Mphill@pacbell.net. In New Zealand from Medical Books New Zealand, 8 Park Avenue, Grafton, Auckland, New Zealand, Toll Free: 0800 463 325. In Australia from Ausmed Publications Pty Ltd, 275-277 Mt Alexander Road, Ascot Vale, Victoria, Australia, 3032. www.ausmed.com.au .

Reviewed by Dr. Janis Jansz, Lecturer, and Program Co-ordinator for, Occupational Safety and Environmental Health at Edith Cowan University.

Can An Employer Afford Poor Injury Management?

by: Mr. Steve Willis Dip OSH

Abstract

Injury Management is the effective management of work related injury and illness. The development and implementation of an effective Injury Management System should be considered an integral part of any business. Businesses are often concerned at the cost of establishing an Injury Management system, however perhaps it is more pertinent to consider the cost of not having one. This article discusses what is needed for effective injury management, the social and economic implications of poor injury management and provides information for employers on effective Injury management strategies.

Introduction

It is an unfortunate, yet realistic understanding that individuals get injured as a result of carrying out their duties at work almost everyday throughout the world. In many countries when an individual is injured it opens the door to the never ending and highly confusing workers compensation system, which often confuses and frustrates injured workers whose sole goal is usually to get back to work as soon as possible.

When an injury does occur it is vital that these individuals are guided through the system, rather than allowing the system itself to manage the outcome, which often has huge social and economic costs and leaves the worker feeling bitter about the outcome and the employer counting the huge financial costs associated with workplace injury. It is therefore important to ensure a good Injury Management process is in place. Injury management represents a co-ordinated and managed process from the time of injury, integrating medical and employment management practices with the long term focus on keeping the injured worker in the workplace.

What Is Injury Management?

Injury Management can be defined as "a workplace managed process incorporating employer and medical management from time of injury to facilitate where practicable, efficient and cost effective maintenance in or return to suitable employment" (WorkCover WA, 2002, p 4). The concept of Injury Management can be considered as a recommended framework to assist injured workers to stay at work or return to the workplace as soon as medically possible, following a work related injury. This framework rather than being legislative, focuses on co-operation of all parties to achieve a positive outcome.

What Does Injury Management Involve?

Injury Management involves the employer, the worker and their treating medical practitioner working together to assist the injured worker to stay at or return to work. The employer and the treating medical practitioner, in consultation with the worker, need to establish a mutual goal. (usually a return to work) and implement strategies to best achieve this goal. Without commitment Injury Management will fail.

Key Principles of Injury Management

- Recognition that employers and injured workers are the primary stakeholders within the Injury Management process.
- Maintenance in work or a safe return to work is the expected outcome.
- Medical practitioners and employers play a central decision making role in the return to work of injured workers.
- The focus of all services should be workplace based.
- The injury management process should be transparent, cost efficient and effective.
- Early intervention and proactive injury management is critical in achieving return to work goals.
- When vocational rehabilitation is required, all parties are involved in a process that is transparent and requires joint decision-making.

What is an Injury Management Policy?

An injury Management Policy serves a similar purpose as a Safety Policy in so far as it documents for all to see the commitment of the organization to managing injuries and associated issues within it's workplace. A good Injury Management Policy will:

- Document the companies commitment to injury management
- State the importance of early reporting
- State what the companies actions will be in the event of an injury
- State commitment to the workers return to work and to provide rehabilitation as required
- State that the company will continually consult with the injured worker and monitor their progress
- State that information in relation to the injury and medical condition will be treated with sensitivity and complete confidentiality
- State the companies commitment to reduce both social and economic costs associated with workplace injuries
- Underline the companies commitment to injured workers and reiterate their importance to the companies workforce

What is the responsibility of the injured worker?

The injured worker is one of the key parties in the process and therefore should be involved in all decisions that are made regarding the claim and their return to work. Injured workers have a responsibility to co-operate with their employer to assist in their return to work program. Workers must adhere to agreed rehabilitation requirements and are required to attend all medical appointments necessary, some of which may be arranged by the employer's insurer.

What should the medical practitioner do?

In Western Australia the injured worker has the right to choose their own medical practitioner to undertake their treatment following an injury. When an injured worker presents to a medical practitioner the practitioner should complete a Workers Compensation First Medical Certificate and forward this to the employer as soon as possible. It is also recommended that the doctor maintains a good level of communication with the employer regarding the progress of the treatment and convey information in relation to duties that the worker is fit to undertake during their recovery period. As doctors are busy they often don't initiate contact. Therefore this contact should be instigated if it is required.

What should the employer do?

The employer has a responsibility to assist in the rehabilitation of the injured worker. It is imperative that the process of injury management is managed proactively rather than reactively, meaning the employer should take an active role in the management of the injury not just allow things to happen and react to decisions that have been made by others.

What are the costs of poor Injury Management?

The costs of workers compensation as a result of poor injury management have been quoted as "The greatest unknown cost with the potential to bankrupt a business if not correctly managed" (Jim Bond, 2002). The costs associated with poor injury management are often considered as an iceberg effect. This is because the direct costs (those that can be insured against) are merely the tip of the iceberg with many more indirect costs being incurred which are generally not covered by insurance.

Direct Costs

- Increased costs of weekly payments as the worker is off work for longer
- Increased medical costs
- Higher pay outs for permanent disabilities
- Increased rehabilitation costs

Indirect Costs

- Increased costs associated with managing claims that last longer
- Costs of investigations
- Cost of processing reports
- Transportation costs
- Losses in production whilst a replacement worker is sought
- Lower production whilst temporary worker learns the role
- Operational conflict as a result of having to hold the position open until the injured worker returns to work
- Damage to the companies safety culture and caring image
- Social implications for the worker as a result of the injury
- Pain and suffering can be experienced by the employee due to the injury
- The employee may also be affected financially if off work for a considerable period of time due to the injury
- The employee may never be able to return to their pre-injury work or other activities

What is a Rehabilitation Provider?

Rehabilitation providers are specialists in managing the return to work process and are generally used in the more complex cases that require specialist intervention.

Provision of Alternate Duties

Alternate duties are those that are provided to assist the injured worker ease back into their normal duties following a work related incident. It is vital that the employer makes a concerted effort to provide these duties to maintain the injured worker at work in some capacity. To do this they may need to consider identifying alternate duties or gradually building up the number of hours the worker works per day or week. Constant contact should be kept with the doctor to ensure their agreement with the proposed duties and to determine the most suitable option. The medical practitioner should be familiar with the workplace and work processes. The alternate duties provided may be required for varying periods of time to assist the worker return to work, depending on the severity of the injury.

What are the benefits of providing Alternate Duties?

There are many benefits of providing alternate duties and these include:

- Reduction in workers compensation costs which will minimise increases in premium
- Retention of the workers skills and knowledge of the workplace
- Preventing the worker from feeling isolated from the workplace
- Improving employee morale
- Maintaining a positive company image
- Reducing the tendency of non genuine cases believing the system is a "free ride" when they are staying at home and still getting payments

What is the role of a Rehabilitation Provider?

Rehabilitation providers are specialists in managing the return to work process. They are generally used in the more complex cases that require specialist medical attention. Rehabilitation providers assist workers to help them return to suitable work. Some of the services that can be provided are:

- Work site assessments
- Job Analysis
- Functional Capacity Evaluations
- Manual Handling advice
- Job Placements

Once a rehabilitation provider has been appointed (the worker has the right to chose the provider) they will meet with the worker, and liase with the employer and the treating medical practitioner to work out the best way to help the injured worker return to work. The injured employee's rehabilitation goals should be considered when deciding the return to work plan. The employer should then be taking an active role in the decision making process of what services need to be provided. These are usually documented to all parties in the form of a Service Delivery Plan. The contents of this plan should be agreed to by all parties prior to its implementation to ensure adherence by all concerned. The rehabilitation provider will stay involved until the worker has returned to pre accident duties and hours and the treating practitioner believes that no further assistance is required.

The 10 Elements of a good Injury Management

The following components of a good system are presented based on experience rather than being strictly textbook

compliant. It is always important to remember that people are all different and the way one worker needs to be managed may be different to another.

1. Maintain a Positive Relationship

This is the most important component to any good Injury Management System. A positive relationship must be maintained with all parties especially the worker and medical practitioner. A happy worker who likes their employer will always return to work quicker than one who has been upset and slips into the workers compensation system. The financial consequences of losing a worker to the workers compensation system can be massive and the chances of successfully returning to work are greatly reduced.

BE FIRM BUT FAIR !

Ensure that positive relationship is maintained with the treating specialist also because if they don't believe the company is acting in the best interests of the worker they can place many obstacles in the way of a successful return to work.

2. Communicate

Maintain constant communication with all parties and ensure that where possible the communication is positive. Phone or visit the worker at least once each week especially during the early stages of recovery. Don't keep a focus on the injury, engage in some general and light hearted conversation to boost the worker's spirits.

3. Know the Legislation

Take the time to familiarise yourself with the legislation, particularly the Workers Compensation Act 1986 and be aware of changes. This will assist in dealing with difficult cases.

4. Always provide Alternate Duties

It is vital that alternate duties are provided to keep the worker in the workforce. Alternate duties may be totally different to the workers normal duties providing the person is capable of carrying them out and they receive any required training. The provision of these duties doesn't allow the person's routine of having to go to work change.

5. Monitor the recovery

Closely monitor the recovery of the worker. If things are not progressing don't be afraid to ask questions and provide alternatives to the treating specialist to further assist the process.

6. Establish a network of treating Medical Practitioners

To achieve the best results with injury management it is important to establish a team of treating medical practitioners who know and understand your business and the types of alternate duties that are available. Whilst the worker has the right to choose their own GP many are happy to see a GP that know the industry in which they are working. Forget the myth that it will be perceived as the company having a hidden agenda. Workers just want the best medical treatment and the quickest avenue back into the workforce. It is also important to understand that not all medical practitioners understand or want to get involved in workers compensation. A medical practitioner's lack of knowledge or enthusiasm can be very costly.

7. Don't be scared of the Workers Compensation system

Don't be scared of the workers compensation system. Understand it and use the tools the system has built in to manage the process.

8. Be Flexible

Understand that injured workers are individuals and need to be treated individually. Attempt to think outside the circle with each case to find the best possible solution.

9. Maintain constant contact with the companies Insurer

A close working relationship with a representative from the company's insurer can provide a team approach to the managing of injuries. Insurers can also provide technical support when required.

10. Maintain accurate Documentation

Document everything, including phone conversations etc., as if the injury management fails this information may be needed, particularly if there is a subsequent court case related to the employee's injury.

Conclusion

Injury Management is a process that can be managed to achieve positive outcomes for all parties concerned and with this management many of the costs associated with poor management can be reduced. It is becoming more apparent to businesses of the costs associated with poor injury management through ever increasing insurance premiums. Many companies are implementing systems with the key components that are documented in this article.

References

Workcover WA(2001). *Guidelines for Injury Management at the Workplace.* Perth, WA: Author.

Workcover WA(2000). *Small Business Guide to Injury Management & Workers Compensation.* Perth, WA: Author.

Workcover WA (2003). Workers Compensation & Injury Management – Important information for Employers. Perth, WA: Author.

Workcover WA (2003) *Partnerships in Injury Management Conference Notes: August 2003.* Perth, WA: Author.

Willis, S.E. (2001) Airlite Group Injury Management Policy. Perth

WSO Awards

Do you know of an individual, company, or corporation that has made great strides, or has had some great accomplishments in the safety field? Why not nominate them for one of the WSO Awards. The winners are awarded their awards at our annual Awards Banquet at our WSO Conference. If you would like one of our Nominations Forms, please contact the World Management Center, by email; wsowmc@socket.net, by fax (660) 747-2647, by telephone (660) 747-3132 or by mail PO Box 518, Warrensburg Missouri 64093 USA.

A Retrospective Cohort Study Of Workers Compensation Indicators (Part 3)

by: Dr. Alan Verdonk of Curtin University of Technology; Dr. Milos Nedved & Dr. Janis Jansz of Edith Cowan University

Abstract

This paper, about a retrospective cohort study of Workers Compensation indicators, is the final article, in a series of three articles, published in World Safety Journal. It describes the effects that legislation, the introduction of a Safety Professional to manage a university's occupational safety and health, the introduction of Occupational Safety and Health Representatives and a University Occupational Safety and Health Committee, Occupational Safety and Health Training and a University Risk Management Unit and Rehabilitation Coordinator had on occupational safety and health outcomes. Also identified are areas for future research.

Introduction

This paper continues with discussions on the findings from the analysis of the data and results on research that had been conducted analysing an Australian University's Workers Compensation data to identify the effect of interventions that had been implemented to reduce the occurrence of occupational injuries and work related illnesses at a university. The research study contributed to further understanding the impact of the Robens' Committee based legislation within Western Australia. Genn (1993) and Aalder and Withagen (1997) found that self-regulation of safety and health had limitations. They found that without having this topic 'forced' upon them people do not take the requirements of safety and health seriously.

The research study considered these comments along with the writing of Hersch and Netter (1990) who found safety regulations do not always achieve reductions in work injury and fatality rates. For this study, data about academic and general staff accidents from a Western Australian University were researched. The time period was 20 years, 1979 through 1998 inclusive. This work environment offered a full spectrum of workplace activities from domicile duties (student housing services) to heavy machinery work (mechanical maintenance) through to construction activity (building and operations), hazardous chemical exposure from research activities, along with contrasting types of office work activities.

An analysis of the claims history was conducted to ensure that the data was available and reliable. This research study was based on historical case study analysis using data provided by the University's insurer. Veltri (1991) conducted a study in USA of one hundred organisations, on safety strategy formulation and organisational structure during 1988 to 1990. Veltri (1991) found there was a consensus (from those that responded to the survey) that there was a requirement to modify the methods for establishing performance criteria in measuring and evaluating safety function performance. This modification should include a way to evaluate the accountability of managers and supervisory personnel for safety performance. This research followed on from these finding by analysing the executive directives, resulting from new legislative requirements, which provided resources that produced policies and procedures on occupational safety and health issues.

This study applied a quantitative analysis of workers' compensation data to measure the impact of the Western Australian occupational safety and health legislation that was introduced ten years into the study period of this research period of twenty years, 2773 workers' compensation claims were scrutinised.

Workers' Compensation Legislation in Western Australia

In 1979 the workers' compensation cover was conditional to claim for injury or disease that arose out of and in the course of employment. There were changes to the Western Australian legislation in 1993. The main parts of the Act were proclaimed on 20 December 1993, with a further proclamation on 24 December 1993, to include several additional parts of the Bill.

The most salient changes for this research study were:

- Weekly Compensation rates were changed to be based on the individual's average weekly earnings for the first 4 weeks reverting to the current award rates, thereafter, before this change it was total compensation of earnings.
- Common Law claims are only covered if the worker is more than 30% impaired or their future loss of wages exceeded $100,000. This did have an effect on common law decisions however for this study period only one claim was decided by the Magistrates Court. All other common law claims were paid out at arbitration. This meant very few (if any) claim with a common law component were not appropriately compensated.
- The definition of disability was amended so that the worker had to show that the workplace contributed to the disability to a significant degree rather than a recognisable degree. This had an effect on the way the treating doctor diagnosed the causal factor for the injury or illness and may have reduced the number of legitimate claims under the previous definition. The authors believes this would be a very small number due to the 'culture' of the management, at the University, to accept claims for the total study period.
- The maximum benefits available under the Act increased.

Hazards

An American study conducted by Emery, Delclos, Cooper, & Hardy (1998) indicated that safety programs supporting academic institutions face many challenges because of the wide variety of potential hazards present and the possibility of exposure to an array of hazardous substances in research programs. Emery et al (1998) identified

there was a consistent lack of awareness of legislative responsibilities combined with activities such as hazard identification, hazard assessment and risk control. In addition, on average a supervisor was held responsible for controlling a wide and diverse range of potential hazards. This commentary of Emery et al (1998) was confirmed in this research study with twenty-three categories of hazards reported in the study period.

Injuries

The type of injury experienced for workers' compensation can be rated chronic or acute injuries. For this study 32% of the injuries were chronic type injuries and 68% acute type injuries.

Intervention indicator 1 (1984)

This was the appointment of a Safety Professional to the University and the Introduction to the Western Australian Occupational Safety, Health and Welfare Act 1984. Statistical results are used to compare the total expenditure on Workers' Compensation Claims, compensation paid on claims, rehabilitation legal and administration costs before and after the introduction of the Safety Professional and Safety Section in 1984.

In 1984 the Occupational Health, Safety and Welfare Act was introduced in Western Australia to establish the Occupational Health, Safety and Welfare Commission. This Commission was given the task to address existing legislation and provide new legislation with Regulations to the WA government for promulgation. This was completed in 1988. In anticipation of the new legislation, the University established a Safety Section, within the Human Resources Department, and employed a full time Safety Professional. Previous sections provided a representation of the number of injuries before and after the introduction of the Safety Officer and Safety Section to the University in 1984.

Hersch & Netter (1990) and the Health Administration (OSHA)(USA) Regulations reported that most studies on the impact of Occupational Safety Regulations have resulted in little impact on workplace industrial accidents. Hersch & Netter (1990) also commented it may be that some safety regulations may be ineffective if they are not enforced or they carry inadequate penalties. It may prove that the employers are unable to access or understand information relating to the hazards and possible controls for their workplace. Workers also need to be rewarded as to their level of involvement and responsibility in the process increases.

In considering these comments the introduction of the Safety Section and Safety Officer was analysed to see what impact the allocation of dedicated resources had on workers' compensation claims for the University. This research study analysed the total number and costs of lost time claims, and common law claims. The total cost of workers' compensation claims and the cost of the compensation paid, along with the costs and number of claims incurring rehabilitation, legal costs and administrative costs were also analysed.

Whilst the number and costs were different there was no statistically reliable difference ($p = 0.05$) in the number and costs of claims with a common law pay out component. There was also not a statistically reliable difference ($p = 0.05$) in the total cost of workers' compensation paid before and after the introduction of the Safety Professional and Safety Section to the University. Of significance, there was a statistically reliable difference ($p = 0.05$) in the lost time claims costs as well as the compensation paid and the costs associated to claims incurring rehabilitation, legal defence costs and administrative costs.

There was a positive impact on the costs (they were less) of the claims that resulted in time lost, after the introduction of the Safety Professional and Safety Section to the University. There was also a positive impact on the costs of compensation paid once there was a Safety Professional and a Safety Section established at the University.

Of interest the cost associated with claims incurring rehabilitation, legal costs to defend the claims and administrative costs were higher after the introduction of the Safety Officer and Safety Section to the University. This was due to the change in practice of requesting the insurer to validate claims to ensure all claims were legitimate. This practice was not conducted before the employment of the Safety Officer, as there was no formal process in place to complete this task until this position was filled in 1984. This research study found there was a fewer number of 'severe' claims once the Safety Officer and Safety Section were introduced, however a time frame of study greater than twenty years may provide further insight into this issue.

Intervention indicator 2 (1988)

This corresponds with promulgation of the Western Australian Occupational Safety, Health and Welfare Act 1984 (as amended) and the establishment of the University Occupational Safety and Health Committees along with the Introduction of the University Occupational Safety and Health Policy.

Comparative Rates for the Years Before and After The Western Australian Occupational Safety and Health Act in 1988.

Commentators like Hevey (1998 p. 3) Jankiewicz (1997), Krause, (1997), Blewett and Shaw (1997 p. 19) argue accident statistics and comparative rates can be used as a barometer to assess safety systems. They allow for the identification of trends, comparison of like for like workplaces and comparison of performance across industry. These measures are the main measure for evaluation of performance, however Rosier (1997) and Blewett (1997) argue, to base an organisations safety performance on injury statistics alone is flawed, as this data only reflects accidents and not the components of the safety and health program. This is acknowledged by the authors and is the reason rates as well as total expenditure, and executive decisions along with policies, committees and the Health and Safety Representatives influences have been analysed in this research study.

The authors, through personal experiences of safety performance, acknowledge the indicators should measure more than accident statistics. That is, the question of impact is addressed by analysing the Western Australian occupational health and safety legislative requirements and its effect on workers' compensation claim experiences. However, the published evaluation of the effectiveness of occupational safety and health programs, as required under Western Australian legislation, indicates the main focus is on the annual workers' compensation statistical data published by the Australian State Authorities. These Authorities include WorkCover Western Australia and WorkSafe Western Australia. There is also a statistical overview of work related injury and disease published by WorkSafe Western Australia through White 1995/96 1996/97 and 1997/98.

Frequency Rates Before and After the Act

The Frequency Rate provide the number of lost time injuries or diseases occurring every one million hours worked. There was a relatively constantly increasing Frequency Rate at this University from 1979 to 1985 with the greatest frequency rate in 1985. From 1992 to 1998 (end of the study period) the trend is downward. There was a general trend downwards after 1985 in the Frequency Rates and the trend continue downwards after a rise in 1992. The rise corresponds to an increase in manual handling claims.

Total Expenditure Before and After The Act

The Western Australian Occupational Safety and Health Act required organizations to commit considerable resources to be directed to the prevention of exposure to hazards. Prior to the Act being promulgated in September 1988, this study found, there was no reliable data available at the University, on the amounts spent on safety preventative management. In the years prior to 1989 the management undertook 'an as needed' approach to safety prevention expenditure and whilst this approach by management continued for the rest of the study period, the requirements of the legislation dictated certain expenditure and hence these expenditures increased. Interestingly, the period 1989 onwards allowed a 'stream of funding' to be captured and audited that specifically addressed the requirements of the Act.

The previous article (part 2) provided the total expenditure for preventative safety management, as well as, the workers' compensation costs. Preventative safety management expenditure related directly to the executive decisions and policy direction for safety initiatives specifically to meet the requirements of the Western Australian Occupational Safety and Health Act and Regulations. The preventative safety management expenditure increased 289% over the ten years 1989 to 1998. The amount spent increased every year in safety prevention initiatives, with one exception in 1996. The total cost on workers' compensation premiums increased 106% over the years 1989 to 1998.

Statistical Results Comparing the Total Expenditure on Workers' Compensation Claims, Compensation Paid on Claims, Lost time Claims Costs, Common Law costs and Rehabilitation Legal costs and Administration costs Before and After the Promulgation of the Occupational Safety and Health Legislation in 1988

The previous article (part 2) provided the results of the comparisons of the total expenditure on workers' compensation claims, compensation paid on claims, and rehabilitation, legal costs and administration costs for the period of time before and after the promulgation of the occupational safety and health legislation in 1988.

There was a statistically reliable difference ($p = 0.05$) in the number and costs of these categories before and after the Act. Therefore one can conclude that the total expenditure on workers' compensation claims costs were greater after the Act. This also applies for the costs associated with rehabilitation, legal and administration costs as they were greater after the Act was promulgated in 1988. The amount paid for compensation was less after the Act.

The previous article (part2) provided the results of the comparisons of the costs for lost time claims and the costs paid for common law settlements for the period of time before and after the promulgation of the occupational safety and health legislation in 1988. There was a statistically reliable difference ($p = 0.05$) in the number and costs of these categories before and after the Act. This leads to the conclusion that costs where lower after the Act for the lost time claims and the costs associated to common law settlements for claims were greater after the Act.

This means the cost to pay salaries and medical services for lost time claims were less after the Act. The cost of common law payments and rehabilitation, legal costs and administration costs of the insurer were so much greater after the Act, that this resulted in the total costs for workers' compensation being greater for the ten years after the Act. This is confirmed with the total costs. The positive outcome for this result is the lost time component is less after the Act which means even though injuries did occur after the Act the length of time off work and costs required for medical treatments were less after the Act. That is, the severity of the injuries were less after the Act as confirmed by the data.

Intervention indicator 4 (1991)

This represents the introduction of the University Occupational Safety and Health Training Programs.

The previous article (part 2) provided the results of the comparisons of the number and costs for lost time claims, the number and costs paid for common law settlements, the total expenditure on workers' compensation claims, compensation paid on claims, and rehabilitation, legal costs and administration costs for the period of time before and after the introduction of the safety training programs. There was a statistically reliable difference ($p = 0.05$) in the number and costs of these categories before and after the introduction of the safety training programs.

The costs were lower after the introduction of the safety training

programs for the lost time claims and the costs associated with common law settlements for the claims was higher after the introduction of the safety training programs. The total expenditure on workers' compensation claims was greater after the introduction of the safety training programs. This was also found to be true for the costs associated with rehabilitation, legal costs and administration costs as they were greater after the introduction of the safety training programs. The costs of the compensation paid component of the claims were lower after the introduction of the safety training programs. As with the introduction of the Safety and Health Representatives this section of comparing the introduction of the safety training programs complements the findings of the before and after of the promulgation of the Western Australian occupational safety and health legislation.

Intervention indicator 5 (1993)

Intervention five represents the Introduction of the University Risk Management Unit with the Introduction of a full time Rehabilitation Coordinator.

The previous article (part 2) provided the results of the comparisons of the number and costs for lost time claims, the number and costs paid for common law settlements, the total expenditure on workers' compensation claims, compensation paid on claims, and rehabilitation, legal costs and administration costs. This comparison was for the period of time before and after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator. There was a statistically reliable difference ($p = 0.05$) in the number and costs of these categories before and after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator.

The costs were lower after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator for the lost time claims but the costs associated with common law settlements for the claims were higher after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator. The total expenditure on workers' compensation claims was greater after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator. This was also found to be true for the costs associated with rehabilitation, legal costs and administration costs as they were greater after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator. The costs of the compensation paid component of the claims were lower after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator. These findings after the introduction of the University Risk Management Unit with a full time Rehabilitation Coordinator were anticipated as the additional costs associated with the work of the Rehabilitation Coordinator were new and not part of the expenditure on costs of claims prior to the appointment of this position.

Discussion

This research study has identified how University management decisions and safety programs, relating to the Occupational Safety and Health Act 1984, affected employees and the business management of the university. The identified hazards and the injuries sustained through out the study period were also summarised.

A major preventative program was the healthy lifestyle program that, under certain conditions, allowed two hours per week off work for staff to participate in health and fitness activities. The management of the University decided to enhance the safety section in 1993. It was renamed the Risk Management Unit and the number of staffing positions and the budgetary resources were increased specifically for the occupational safety and health program.

The safety legislation in Western Australia caused considerable resources to be re-allocated to manage the requirements of the law. The blueprint of the mechanism for greater involvement in safety related decision-making was provided through the occupational safety and health representatives and committees as required by this legislation. New management directives and resources were integral in addressing occupational safety and health at the workplace and thereby providing the required duty of care to those attending the workplace.

The research study analysed the workers' compensation data from a Western Australian University to determine the impact of the occupational safety and health legislation promulgated in 1988 on workers' compensation claims. It was found from this research that the Western Australian Occupational Safety and Health Act 1984 (as amended) did have a positive impact on reducing the comparative rates of workers' compensation claims. It was found from the comparative rates when comparing before and after 1988, cost of claims per $100 of payroll, frequency, incidence, and severity rates were less after 1988.

When comparing before and after 1988, it was found there was a statistically reliable difference ($p = 0.05$) in the five categories of total costs of claims; the compensation paid out; the lost time claims; the claims with common law settlement; and the rehabilitation, legal and administration costs. It was found the total costs for claims increased after the Act and there were more common law payment costs associated for claims after the Act. The costs for rehabilitation legal costs and administration cost were higher for claims after the Act and this corresponds directly with the total costs of the claims category.

There were less costs for workers' compensation claims with 'time off' claim which can be interpreted as after 1988, whilst there were higher costs in workers' compensation, the 'time off' claims were not as expensive. This was directly due to having fewer days off work from injuries or diseases that resulted in lost-time workers' compensation claims. This is more of a positive reflection on rehabilitation services than occupational safety and health legislation but it is implied the severity of claims were less, due to the

hazardous situations being removed or better managed.

Recommendations

The research study found important factors that identified the measurement of safety performance within the self-regulation model as conveyed by the Robens Committee. Whilst there are hazards in the work place there will always be the potential for these hazards to cause injury. This study analysed 2,773 workers' compensation claims. It is important that there are comparisons of similar institutions around Australia and the world that are influenced by legislation based upon Robens' philosophy. This comparison should be conducted to ascertain acceptable risk indicators and number of injuries per indicator, and assist in benchmarking acceptable resource levels to manage safety. In consultation with other educational institutions this will allow for the development of specific institutional performance indicators to assess the effectiveness of their safety programs.

The Act has moved away from prescriptive to a more broad based law requiring interpretation from management and lessons from precedence established from decisions by the Safety and Health Magistrates. Within this setting are changes in the work patterns, work practices, time at work and differences in employment hours. More and more positions are being filled on a part time basis. This includes sharing of positions and short term contracts of three months to a year. This legislation provides for these changes with the premise that management are to prevent exposure to employees to the workplace hazards. As the change in employment practice continues, this will require greater emphasis on managers to ensure all staff under their supervision are informed and aware of their respective occupational safety and health responsibilities. It is therefore incumbent on managers to consider how these responsibilities are conveyed and adhered to so that the employees are aware of management interpretations of this broad based legislation. This requires formal documentation in policy and procedure format at the management level not just the organisational level.

The Western Australian occupational safety and health legislation requires Safety and Health Representatives to be kept informed and attend accredited training. For this study this was achieved through external training. This provided a co-ordinated and consistent message to be provided to the Safety and Health Representatives. Lacking under the legislation is the requirement for executives, managers, and supervisors to be formally trained with a consistent message about occupational safety and health. For the greater awareness by employers and employees to cooperate and consult on safety and health matters it is essential both parties (employers and employees) have similar knowledge of the requirements to meet this legislation. Therefore accredited training similar to that offered to Safety and Health Representatives is required for any person in a supervisory role.

The requirements to address the Robens Committee style legislation produced considerable redirection of resources financial, human and time. It is considered essential that these resources, and therefore safety and health, be given the same status of the financial sector. The audit and justification of controls as shown by financial sector should equally apply to the safety and health sector. Mandatory reporting of safety and health along with accepted measurement criteria such as workers' compensation data and executive management directives and decisions, along with time committed, should be introduced to all annual reports in the same way as the financial sector is required by statute.

Future Research

This research study analysed the impact of the occupational safety and health legislation on workers' compensation claim experience within a Western Australian University. It would be meaningful to expand this research and include other Western Australian education centres, such as TAFE, other tertiary institutions and secondary colleges. As very little literature is available on the evaluation of the effectiveness of safety and health in Australian Universities, there needs to be independent research conducted to assess the influence of safety strategies and legislation on the education sector safety and health programs. The research should involve all levels of employees within the organization, and measure the level of management commitment to safety and health. Management responsibilities, accountabilities and the processes for consultation on safety and health matters should all be considered as an essential part of the research.

The time period for this study was only 20 years. This study lends itself to be extended with an increased time period to assist in the evaluation of the impact under analysis. There were considerable resources expended on preventative safety management at the University in this study and an interesting research would be to compare this institution against others that committed different amounts of resources to help ascertain an optimum level of resources to address this topic. It is important that research is conducted to relate the measurable direct costs of accidents/ injuries, and workers' compensation premium costs to the University's total operating costs.

An important premise of the Western Australian occupational safety and health legislation was the concept of consultation and cooperation between the management and staff. This was facilitated through the safety and health representatives and these representatives were supplied accredited training opportunities. Research into the correlation of the number of representatives and workers' compensation claims over an extended period of fifteen plus years will assist in evaluating this important premise of consultation and cooperation.

This research study found that the basis to Australian legislation on safety and health has its genesis from the legislation in Great Britain. Up until this study period concluded in 1998, there was little uniformity in the various state laws relating to safety and health and workers' compensation. Now that the new

millennium is upon us and multinational corporations are becoming major employers within Australia it is imperative uniformity within Australia on safety and health laws, in particular, as well as workers' compensation legislation, is addressed by the States and Territories of Australia. Further research is required on the best model to bring uniformity to Australian workplaces. This should assist in providing consistent standards and controls not only across industries but also across governments.

Conclusions

The study is unique in that it studies the topic of occupational health and safety using workers' compensation claims from the 'micro' perspective addressing the impact of the Western Australian legislation. The hypothesis, in this research study, was the Western Australian Occupational Safety and Health Act 1984 (as amended) has a positive impact on reducing the workers' compensation claims. It was shown from this study there were positive impacts on the workers' compensation claims in a Western Australian University. Whilst costs associated with claims rose after the Act, the comparative (weighted) impact on the numbers and the impact on lost time claims were positive. The numbers decreased and the lost time claims costs were less. It was inferred from this that the additional management directives, that were directly attributed to the introduction of the occupational safety and health legislation, promulgated in Western Australia in 1988 impacted in a positive way on workers' compensation claim numbers.

References

Aalders, M and Wilthagen, T. (1997). Moving Beyond Command and Control: Reflexivity in the Regulation of Occupational Safety and Health and the Environment. *Law and Policy*, 19(4), 415-443.

Blewett, V., Shaw, A. (1997). Best Practice in OHS Management. *Good Employment Practice Series*. Sydney: CCH Australia Limited.

Blewett, V. (1997). Benchmarking Health and Safety Performance. *Workplace Health and Safety Best Practice Forum*, 50-55.

Emery, R., Delclos, G., Cooper, S. P., and Hardy, R. (1998). Evaluating the Relative Status of Health and Safety Programs for Academic and Research Institutions. *American Industrial Association Journal*, 12(29), 882-888.

Genn, H. (1993). Business Responses to the Regulation of Health and Safety in England. *Law and Policy*, 15(3), 219-231.

Hersch, P. L. and Netter, J. M. (1990). The Impact of Early Safety Legislation: The Case of the Safety Appliance Act of 1893. *International Review of Law and Economics*, 10(1), 61-75.

Hevey, K. (1998). *An Evaluation of the Effectiveness of Behavior Based Safety Programs for Local Government Services*. Claremont, Western Australia: Edith Cowan University.

Jankiewicz, B. (1997). in Hevey, K. (1998). *An Evaluation of the Effectiveness of Behavior Based Safety Programs for Local Government Services*, Claremont, Western Australia: Edith Cowan University.

Krause, T. R. (1997). *The Behavior Based Safety Process:* Managing Involvement for an Injury Free Culture. New York: Van Nostrand Reinhold.

Veltri, A. (1991). Transforming Safety Strategy and Structure. *Occupational Hazards*, 9, 149-152.

White, C. B. (ed). (1995). *State of the Work Environment: Occupational Injuries and Diseases. Western Australia.* 1994/95 No 24. Retrieved March 10, 1999 from WorkSafe Western Australia. http://www.safetyline.wa.gov.au

White, C. B. (ed). (1996). *State of the Work Environment: Occupational Injuries and Diseases. Western Australia. 1995/96 No 30.* Retrieved January 27, 2002 from WorkSafe Western Australia. http://www.safetyline.wa.gov.au

White, C. B. (Ed). (1997). *State of the Work Environment: Occupational Injuries and Diseases. Western Australia. 1996/97 No 33.* Retrieved January 27, 2002 from WorkSafe Western Australia. http://www.safetyline.wa.gov.au

White, C. B. (Ed). (1998). *State of the Work Environment: Work Related Fatalities. Western Australia.* 1997/98 No 34. WorkSafe Western Australia. Retrieved March 10, 1999 from http://www.safetyline.wa.gov.au

Mark Your Calenders Now

The World Safety Organization's, 18th International Environmental Safety & Health Conference and Expo,
will be held May 1 - 4, 2005.
At the Sheridan Denver Tech Center Hotel,
you can reach them at: 2007 S Clinton Street, Greenwood Village, Colorado 80112 USA,
or by telephone (303) 799-6200

See you in Denver

Young Workers Need Protection

by: Ms. Janine Dunwoodie, Edith Cowan University student in the Bachelor of Health Science (Safety Science and Occupational Health).

Abstract

This article describes why young people require special consideration for their safety and health when working at home and in industry. Physical, mental and emotional development of young workers is considered. Practical examples are provided to illustrate why it is necessary, and how to, improve occupational safety and health for young employees.

Introduction

Parents and guardians have a responsibility to teach their children about safety. Most take the time to ensure their child is aware of the hazards of electricity, swimming pools, fire and stranger danger. Constable Care and Safety Sam are successful safety teaching campaigns which children are encouraged to follow. Much effort has been made in the campaign to reduce head injuries while bicycle riding, with the introduction of compulsory safety helmet wearing seeing parents happily buy a helmet which they carefully choose to fit their child's head size. Likewise, with mandatory car safety seats and seat belt harnesses which parents spend sometimes large amounts of money and time choosing just the right one to fit and protect their precious cargo.

Most would put the health and safety of children at the top of their list of priorities and would never dream of causing them harm. Yet sadly, this is exactly what they are exposing children to, and often for most children, it is a daily occurrence, enthusiastically encouraged by nearly all people who are none the wiser.

Some children will get injured, some will get diseased, and some will die. They will do so, because they are young workers, paid or unpaid, earning pocket money or just helping out. There are no rule books on how to raise a child, nor how to raise them safely. Parents learn from others, or by experience. Unfortunately, most learn from mistakes.

Just over 200 years ago, decades before legislation addressed health and safety issues affecting adults, occupational health and safety legislation was first founded upon laws to protect the health and safety of children. Since then, much has changed in attitudes and understanding towards health and safety. However, where once children were the focal point, they are now barely thought of in terms of the differences and special risk factors of young people when compared to adults.

In Western Australia, there are numerous codes of practices and guidelines written about adults, but only one about children, the Code of Practice for the Safety and Health of Children and Young People in Workplaces. The information contained in this code of practice is for employers, managers, supervisors, parents and young people.

However, whilst this code of practice is easily and freely available, its existence is not widely known, especially by parents and those people who work from home. Children in Western Australia are not given this or very much of any other occupational health and safety information until they are in their 10 or 11 grade in high school and are preparing for work experience or vocational training. For most parents, but particularly for children, this is too late since typically children voluntarily, or are persuaded by their parents to, help out at the farm, home business, family shop or get a part-time job to earn some pocket money, often before they begin high school and are below 13 years of age.

Apart from the need for this code of practice to be more widely advertised and perhaps thought being given to every household receiving a copy (some children are home schooled), there should also be a generic health and safety policy developed specifically with children under 14 years of age in mind, particularly with an emphasis on risk identification and control where injury prevention is the main issue. Children are not born instinctively knowing right from wrong, safe practices from unsafe practices. These are skills that develop over time through teaching and learning experiences.

So far, health and safety policies have typically been developed by health and safety professionals or trained managers for use within a workplace environment (Health and Safety Executive, 1998). Parents, guardians and children should be afforded the same protection and opportunity where children can be helped to develop a health and safety culture that will shape the foundation of a safe and healthy working life for themselves and other people in the future. If children are taught injury prevention strategies from a young age, a future benefit would see a new generation of workers where health and safety is second nature and the incidence of occupational injuries and disease will be much less than today's alarming statistics. This can only be achieved with a clear direction with which to follow.

This article is aimed at the guardians of children, be they parents or other relatives, employers, health and safety professionals, or anyone interested in protecting young people from the risks of hazards which are highlighted variously by the special differences between children and adults as described herein.

When Children Work

Under the Western Australian Occupational Safety and Health Act, 1984, an "employee" is defined as:

a) a person by whom work is done under a contract of employment, or
b) an apprentice or industrial trainee.

A "workplace" is defined as a place, whether or not in an aircraft, ship, vehicle, building or other structure where employees or self-employed persons work or are likely to be in the course of their work. This includes backyard sheds or

workshops used by a trades person who works from home. Young people involved in unpaid work as part of a family business, such as a shop or farm, in general, are not recognised as "employees" under work safety and health laws, but, like visitors to workplaces, they are still covered by these laws. Restrictions on the employment of young people in some situations is also provided for in the Education Act, 1928, and the Child Welfare Act, 1947 (WorkSafe Western Australia, 1999). Although tasks that are done during activities of daily living are not covered by safety laws when they have no connection at all with work activity, they should still be thought of in the development of occupational health and safety policies aimed at young people. This is because many household chores require the same actions and use of tools and equipment that are used in workplaces and can be a valuable way of reinforcement as a way of making safety become second nature by way of performance.

The importance of the age of workers in determining the risk of injury and disease is a factor that should be taken into account in the implementation of preventative strategies when developing a health and safety policy. This is especially important where managing the health and safety of children or young people is concerned. Any health and safety policy that is developed with young people in mind must take into account the ability of the child to absorb occupational health and safety information at different developmental stages, differences in maturity, body development, learning styles, judgement and behaviour that is particular to a child's age.

Miniature Adult, or Too Young?

According to international law, children are defined as being under eighteen years of age. The main legal difference that divides adults from children is being able to vote, which most countries allow at the age of eighteen. The explanation for this difference is "that children do not have enough knowledge and experience, so it is believed that they would make bad decisions, could not understand some kinds of information, cannot provide for or protect themselves" (Ennew, 1996, p.5).

This is rather paradoxical, given the fact that in Australia 'children' are allowed by law to drive a motor vehicle on their own once they turn 17 years of age at speeds of up to 100km per hour, operate a tractor on rural properties at 14 years of age (Western Australian Police Department of Motor Vehicle and Drivers' Licences, personal communication, August 20, 2003), can live away from their parents or guardian on their own from the age of 16 years (Legal Aid Western Australia, personal communication, August 20, 2003), and are allowed to leave school and start full-time work for an employer at 15 years of age or younger with special permission (WorkSafe Western Australia, 1999).

Whilst there may be a fundamental difference in cognitive ability between a young child of 12 years of age and a young adult of 18 years of age, there is still the need for understanding that most young people typically leap into situations before thinking about their own safety and the safety of others and may not be capable of taking on the same work as adults. Their perception of what constitutes a hazard and methods to control risk is the reason why they require additional time, attention and different approaches from adults. The National Occupational Health and Safety Commission (2000, p.9) asserts that "international evidence is consistent; many injured teenagers have been inadequately trained and supervised – particularly in risk identification and control".

Children At Work

Throughout history, children have worked alongside their parents, gathering food, digging fields, tending animals, helping in shops, cooking, cleaning and working in craft workshops. With the development of industry, children began to work outside their home without the protection of their families, as child labourers in mines and factories. These children, some as young as four (Steemson, 1983), worked seventeen hours per day or more in ill-ventilated, filthy, humid buildings and mines with little or no regard to their health or safety. It took many years of protest and reform for the worst of this kind of exploitation to be abolished. Legislation protecting children at work first began in Britain when Sir Robert Peel pushed the Health and Morals of Apprentices Act through Parliament in 1802 which became the benchmark of future laws regarding children working.

Steemson (1983, p.5) suggested that this Factory Act and others that followed, came about largely through a change of social consciousness at the turn of the 18th and 19th Century which was a mood given voice by evangelicals, parliamentarians, writers such as Charles Dickens and political agitators like Zachary Macaulay who "learned to play upon an emotion that does not change – that of love for the child". This emotive response to the plight of children workers, especially in developing countries where children often start work at the age of six or seven, toiling in fields, mines, sweatshops and those working on the streets in unhealthy and dangerous conditions, is still today used in the mass media.

Organizations such as UNICEF and the World Health Organization, continually strive to educate and gain public support from the private sector, governments, employers and those who have control over children to bring about a change in attitude and behaviour as to the reasons and need to protect the health and safety of children in developing countries. Images of injured, diseased and exploited children are graphically and emotionally portrayed in magazines, posters, documentaries and television commercials.

These images can be seen almost daily by those in developed, richer countries, where most would be horrified to think of their own children having to live and work, suffering such conditions. They keenly support and agree with the action plan of the first World Summit for Children in September 1990 (UNICEF, 1990) and with the fifty four articles of the 1989 United Nations Convention on

the Rights of the Child (UNICEF, 1995). This convention internationally provided legally, among other conditions, that children have the right to participate in decisions made on their behalf, to form associations to represent their own interests and to express their opinions freely.

Hardly a parent in Australia would not have thought to tell their children to "think of the lives of those poor children of developing countries and be grateful for not being one of them and to be thankful that child labour has been abolished here". And yet, the truth is that in Australia, as in all societies, most children work and adults have more power than children. This means that they can pay children less than they would pay adults for the same amount of work and that children cannot complain or demand more money. Newspaper and milk delivery for example, is usually regarded as working for pocket money. Few adults would agree to be paid so little.

Children now attend compulsory schooling and learn the skills that will later benefit both themselves and the rest of society; they run errands, help to cook and clean the house and perform gardening chores such as lawn mowing in exchange for some pocket money. Many have part-time jobs at 14 years of age in supermarkets and fast-food outlets or help out in family businesses, workshops and farms at even younger ages. Having children work, is almost universally accepted as being a right of passage into adulthood where they will gain valuable experiences to prepare them for becoming full-time, self-supporting wage earners, where parents hope that they will eventually manage or own their own business, or secure a job with a prestigious company and earn a good income.

Whilst most people in Australia, particularly parents, are quick to espouse the moral ethics and frown upon the treatment and conditions of working children in less fortunate developing countries, they largely seem unaware that the jobs their own children perform in the name of 'learning to accept responsibility' often exposes them to hidden dangers, the results of some of which may not show up until decades later. For example, children who work on farms are regularly exposed to hazardous substances such as pesticides, fuel, noxious gases, known carcinogens and neurotoxins, as well as to volatile organic compounds and airborne irritants, noise and vibration.

Barling and Kelloway (1999, p.139) assert that "children may be more vulnerable to environmental toxins because they are developing rapidly and have greater exposures to toxins because of their [smaller] size, [fat distribution] and patterns of food ingestion". "Little is known about the neurophysiological, behavioural and cognitive effects of pesticides on children's development, because pesticide [and all] safety standards are predicated on the bodily size of adults (Beyer, 1994, as cited in Barling and Kelloway, 1999, p.140).

Another problem that exists is that chemicals are assessed for toxicity on a one-by-one basis, rather than examining the health effects of the total 'chemical load' to which children may be exposed through work practices and within their home environment. "Reviews commissioned by the National Health and Medical Research Council (NHMRC) have highlighted widespread ignorance of chemical hazards in the home (Billet, 2002)". This is an important issue which needs to be addressed and acted upon and more studies are needed in this area.

Unthought of Dangers

Fisher (1994) as cited in Ennew (1996, p.21) states that "when an eighteen-year old went into the hospital for an operation on a protruding disc in his back he was told the injury was due to the three years he had spent as a paper boy". Was he unlucky, or seriously under protected? Newspapers for a weekday round are bundled together for distribution and can each weigh over 16kg (West Australian Newspapers Ltd, Herdsman Printing Plant, Perth, personal communication, August 21, 2003). Young workers are at greater risk of manual handling injuries because of their smaller size and undeveloped muscles and even more so when the work is repetitive (London Hazards Centre, 1997). Even for adults, lifting items repetitiously over 16kg is not recommended and in some organizations such as Australia Post, mail bags weighing more than 16kg must be lifted by two adult persons (Australia Post Head Office, Department of Occupational Health and Safety, Perth, Western Australia, personal communication, August 21, 2003).

Children under 15 years of age are allowed by law in Western Australia to deliver newspapers (or be employed) between the hours of 6.00am and 9.30pm (WorkSafe Western Australia, 1999), but delivery is often done on bicycles before sunrise which places them at higher risk of having an accident in the darkness. Whilst the wearing of brightly coloured reflective vests could help a child to be seen more clearly, few parents would have such personal protective equipment in their homes and most, as well as their children, would not even think of taking such preventative measures on their own initiative. Simply telling children to 'be careful' as they head off out the door to earn their 'pocket money' is not enough to protect them.

In their unintentional ignorance, parents or guardians mostly leave the teaching of occupational health and safety principles and practices to other people, or unknown employers whom they expect will know and obey all laws and in doing so, will not expose their children to hazards. As statistical evidence shows, this is not always the case and all too often young people are permanently injured or die as a result. This is a significant concern since "Australian workers' compensation data indicate young workers have, overall, a higher incidence of work-related injury and illness. For example, in Western Australia in 1994-95, workers aged between 15 and 24 were 20.7% of the total employed workforce, but had 27.4% of all lost time injuries/diseases (National Occupational Health and Safety Council, 2000, p.2)".

Campbell and Burgess (1997), as cited in

National Occupational Health and Safety Council (2000, p.1), has stated that "approximately 59% of all 15 to 19 year old Australians now work either on a full-time or part-time basis". This is an alarmingly high percentage of Australia's future adult workers and leaders. Developing a health and safety conscious work psyche should become a focal point of interest to health and safety professionals and governing bodies through a concerted effort in education, training and research.

Since parents are the primary teachers and role models of children, it is important that they prepare them to effectively deal with hazards to safely transition children into the world of work. They should be aware of how to equip their children with the ability to identify and assess hazardous situations so they are better able to decide when they should not continue to attempt or perform work practices in some circumstances. By becoming more aware of occupational health and safety legislative knowledge and practices, parents can help children enhance their understanding of hazard and risk exposures and injury outcomes with a better chance that they will adopt prevention strategies, not only at work, but also at home and during leisure activities. Research such as that done by the National Occupational Health and Safety Commission in their report on Occupational Health and Safety Issues for Young Workers in the Fast-food Industry (2000), shows that in workplaces where occupational health and safety (OH&S) was integrated into all work tasks and processes of production through a comprehensive management system and policies, there was improved OH&S outcomes amongst young casual workers.

The Problems of Youth

Apart from psychological maturity having a considerable impact on risk taking, physiological immaturity puts younger workers at greater risk of sustaining an injury. For example, where manual handling injuries are concerned, size is often a contributing factor. Normal adult height and weight is reached towards the age of 20 years and growth of the lower limbs occurs before the length of the trunk. The ossification of growing bones (that is, calcification for bone strength) does not finish maturing until after puberty. For girls, this is largely complete at age 16, and for boys at age 18 years. At times of rapid bone growth, children are more prone to muscle, tendon, ligament and cartilage damage which can cause deformities in joints (Forssman & Coppee, 1984). Whilst children are resilient and mostly robust and tend to recover quickly, some of this type of damage done through, for example, the repetitive lifting of boxes (as is often performed by young workers in supermarkets and fast food outlets), may permanently weaken these areas and may not show until many years or decades later.

Growth and maturation are also not constant across organ systems. For example, although the brain approaches full adult size at about 4 years of age, the kidneys, spleen, ovaries, testes and uterus reach adult weight at about 17 years of age. "Damage to an organ or organ system, or exposure to hazardous substances, can permanently prevent normal physical maturation (Barling & Kelloway, 1999)".

There are many other concerns which particularly affect children that should also be thought of when thinking about protecting their health and safety. For example, children rarely wear sunglasses, and yet damage to eyes through long term exposure to ultra violet radiation causing degenerative changes to occur such as the development of cataracts, is well known (Billet, 2002).

As well as machinery, tools and equipment, personal protective equipment (PPE) such as goggles, gloves, masks, and respirators are modelled on adult proportions and are ergonomically and anthropometrically made to fit an average male adult. The skull and face of a child is small to begin with and changes with growth up until the age of 20 (Forssman and Coppee, 1984). This means that children wearing ill-fitting PPE are not being adequately protected from hazards. The hand size, span and strength of a child usually is smaller than an adult hand and can affect their ability to safely grasp and operate tools and equipment. Having hands that are too small wearing gloves that are too big, only adds to the risk of injury.

Children also frequently wear clothing that is not suited for working. For example, baggy clothing can get caught in machinery, as can undone shoelaces. Footwear such as the popular 'sneaker' or 'runner' type shoe, does not offer adequate protection for toes which may be crushed in an accident by falling objects or machinery. Adolescents in particular may not understand the importance of wearing PPE and may oppose wearing it on the grounds that 'it doesn't look cool'. There is a need to highlight for example, that permanent hearing loss through not wearing ear-muffs or ear-plugs in noisy places, can lead to serious consequences affecting education and employment opportunities in the future.

Changing Work Ideologies

During the past two decades, there has been considerable effort to increase the participation of girls in non-traditional (previously all male) occupations. Apart from the increased risk of sexual harassment, and the tradition of paying females less wages for the same work as males, thereby increasing negative attitudes to work performance, young females are more likely than young males to sustain injuries in these types of jobs due to body size and muscle strength. Also, in Australia, as in many other countries, girls are traditionally not given the opportunity through pre-conditioning when young, to having an exposure through toys, play and role modelling, for the skills and techniques needed for manual construction and mechanical tasks.

Another area of concern is the continuing tendency of downsizing that has taken place over the past few decades. The Youth Research Centre (1994, p.23) notes that "a cut in staff numbers has seen the reduction of numbers in apprentices who receive on the job training and skills transfer from tradespeople ... [and as well], the ratio of tradespeople to apprentices has decreased

and in some cases it appears that third and fourth year apprentices have been teaching first and second year apprentices. Incorrect and negative work practices are being passed on".

Young people have a much longer lifetime than adults with which they may have to live with permanent disabilities sustained through injury in their youth. Although it is good to give children the opportunity to work as they are developing and growing up, it is vitally important that their lives and futures are not jeopardised by these early work experiences. Injury and fatality data for young workers, particularly under the age of 15, is very limited in Australia. What data does exist does not show the true depth of the problems facing young working people where health and safety are concerned.

To date, very little is known about cumulative damage from physical and chemical hazards that children are exposed to and their effects on health in adulthood. It is possible that some adults are predisposed to sustaining occupational injury and diseases as a result of childhood experiences. If this is true, then it follows that adopting safe practices and injury prevention techniques from an early age would see a general decrease in the incidence of occupational injury and disease in the future. Overall, this could represent a substantial cost saving in terms of lives, compensation claims, lost time, burden on health services, corporate and economic losses for individuals, employers, companies and the government. This is an area where much could be gained through a concerted effort being put into research. After all, it is children who are Australia's future assets or liabilities.

Conclusion

Generally, parents (or guardians) do not consider their child as part of the workforce until after they have left school. This can take place at the age of 15 years (or sooner with special permission), but typically and increasingly, is not until the child has turned 17 years of age. Work that takes place out of school hours and during holiday breaks, is often regarded as 'just helping out', or 'earning a bit of pocket money'. For these children little is done or even thought of concerning work practices and health and safety.

Keeping safe and healthy through adopting injury prevention strategies, is something which children must be taught from a young age if safe practice is to become second nature as if by instinct. Since parents / guardians are the primary role model for children, it is important that they be given guidance on how to help children adopt health and safety aspects as a routine practice. Health and safety should be incorporated into being a routine part of learning any new skill, no matter what it is, and regardless of what age that skill is first introduced.

The successful management of occupational health and safety for the future to reduce the incidence of injury and disease, needs to start with fostering the development of safe practice skills in the formative years of childhood. This can only be achieved through guidance and education given to parents or guardians, teachers and supervisors who are best able to pass this knowledge onto children. This is not a new concept, children have worked alongside their parents since the beginning of time learning life skills to survive. Unfortunately, too many have learnt incorrect or negative practices, most often unintentionally, through ignorance.

Death, injury or severe illness suffered by a child is always an emotive issue. The greater majority of people would happily adopt methods to ensure the future safety of their children, as they have shown by their willingness to adopt previous and current safety standards and policies for the protection of children.

Many household chores require the same actions and use of tools and equipment that are used in workplaces away from the home. Developing a generic health and safety policy that can be used and adapted by adults to suit the different developmental stages of children, should become a tool that is available in every household and place where children live or visit as a way of ensuring health and safety is developed as a culture that is integrated into every aspect of day to day living. Only then will the future benefit from reduced incidences of occupational disease and injury in future workers.

References.

Barling, J., & Kelloway, E. (1999). *Young Workers: Varieties of Experience*. Washington, DC: American Psychological Association.

Billet, J. (2002). *New South Wales Public Health Bulletin, September-October, 2002.* The Identification, Assessment and Control of Environmental Carcinogens in NSW and Australia. Retrieved on August 7, 2003, from http://www.health.NSW.gov.au/public-health/phb/HTML2./identificationcarcinogens. htm

Ennew, J. (1996). *Exploitation of Children*. East Sussex, England: Wayland Publishers Ltd.

Forssman, S., & Coppee, G. (1994). *Occupational Health Problems of Young Workers* (3rd ed.). Geneva: International Labour Organization.

Health & Safety Executive. (1998). *Successful Health and Safety Management.* (2nd ed.). London, England: HMSO

London Hazards Centre. (1997). RSI Hazards Handbook: *A Worker's Guide to Repetitive Strain Injuries and How to Prevent Them.* London: London Hazards Centre Trust Ltd.

National Occupational Health and Safety Commission. (2000). *Occupational Health and Safety Issues for Young Workers in the Fast-Food Industry.* Canberra, ACT: AusInfo.

Steemson, J. (1983). Labourer's Law: *A History of Occupational Health and Safety Legislation*. Birmingham, Great Britain: The Royal Society for the Prevention of Accidents.

UNICEF. (1990). *The State of the World's Children*: 1991. London: Oxford University Press.

WorkSafe Western Australia. (1999). Code of Practice: *The Safety and Health of Children and Young People in Workplaces*. Western Australia:

Government Printers.

Youth Research Centre. (1994. Young People in Full-time Work: *Issues Affecting Apprentices*.Parkville, VIC: Youth Research Centre Institute of Education, University of Melbourne.

Book Review

The Socioeconomic Impacts of Artisanal and Small Scale Mining in Developing Countries

Edited by Gavin M. Hilson
Published in September 2003, 25 cm, ISBN: 90 580 9615 7,
Cost is EUR 199.00 / US $219.00

The purpose of this book is to examine both the positive and negative socioeconomic impacts of artisanal and small-scale mining in developing countries. In recent years, a number of governments have attempted to formalise this rudimentary sector of industry, having come to grips with its socioeconomic importance. However, the industry continues to be plagued with a wide range of problems, including environmental and health-related impacts, rampant illegal activity and illicit mineral marketing, and disease.

The book provides an up-to-date overview of the social and economic conditions in the artisanal and small-scale mining industry, integrating both theoretical assessments with case study research recently undertaken in the field. It features the following five sections: 1) Policy and Regulatory Issues in the Small-Scale Mining Industry; 2) Artisanal and Small-Scale Mining, Labour and the Community 3) African Case Studies of Artisanal and Small-Scale Mining; 4) Asian Case Studies of Artisanal and Small-Scale Mining; and 5) Latin American Case Studies of Artisanal and Small-Scale Mining. Geared toward servicing a wide-ranging audience, including academics, consultants, and government researchers, *The Socioeconomic Impacts of Artisanal and Small-Scale Mining in Developing Countries* is an invaluable tool for policy-makers at all levels.

Gavin M. Hilson, this book's Editor, is a Member of the Environmental Policy and Management Group (EPMG), Imperial College of Science, Technology and Medicine. He is the author of over 30 refereed publications on mining and mineral policy. His current research interest is environmental management and cultural development in the small-scale mining industry, and he is currently undertaking work in Ghana.

For more information, please contact: A.A.Balkema Publishers, P.O. Box 825, 2160 SZ Lisse, Netherlands. Tel.: (+31.252)435111 Fax: (+31.252) 435447 Internet: *orders@swets.nl; www.balkema.nl*

Reviewed by Dr. Janis Jansz, Lecturer, and Program Co-ordinator for, Occupational Safety and Environmental Health at Edith Cowan University.

Diary of Events

Title: 7th world Conference on Injury Prevention & Safety Promotion
Venue: Austria Convention Centre, Vienna, Austria
Date: 6 - 9th of June 2004
Cost: Euro 645.
Contact: Dr. Wim Rogmans: Email: w.rogmans@consafe.nl

Federal Association for Statutory Accident Insurance in co-operation with the European Agency for Safety & Health at Work
Title: 2nd International WORKINGONSAFETY.NET conference for the prevention of accidents & Trauma at work
Date: 31 August 2004
Contact: BG - Academy, Konigsbrucker LandstraBe 2, D-01109 Dressden, Germany, fax: +49 (0) 351 457 20 1106 email: WOS@HVBG.de Internet: www.workingonsafety.net

European Commission for Employment & Social Affairs, International Labour Organization (ILO), European Agency for Safety and Health at Work & European Foundation for the Improvement of Living & Working Conditions
Title: 6th International Congress on Work Injury Prevention, Rehabilitation & Workers Compensation
Venue: Rome, Italy
Date: 30th November - 3rd December 2004
Contact: Work Congress 6 Secretariat Tel: +39 (06) 5487 2115 / 5607 / 5608 fax: +39 (06) 5487 2019 email: secretariat@workcongress6.org Internet: www.workcongress6.org

International Labour Office (ILO) in collaboration with the Ministry of Health in China
Title: Conference on Occupational Respiratory Diseases
Venue: Beijing, China
Date: 19 - 22 April 2005
Contact: Mr. Wang Mushi tel: 86 10 68792527 fax: 86 10 68792528, email: executive@icord2005.com Internet: www.icord2005.com

World Safety Organization
Title: 18th International Environmental Safety & Health Conference & Expo
Venue: Sheridan Denver Tech Center Hotel, 2007 S Clinton Street, Greenwood Village, Colorado 80112 USA, tel: (303) 799-6200
Dates: 1 - 4 May 2005
Contact: Debbie Burgess, Tel: (660) 747-3132 fax: (660) 747-2647 email wsowmc@socket.net Internet: www.worldsafety.org

National Institute for Occupational Safety & Health
Title: Occupational & Environmental Exposure of Skin to Chemicals
Venue: Karolinska Institute, Stockholm, Sweden
Date: 12th June 2005
Contact: National Institute for Occupational Safety & Health, Internet: www.cdc.gov/niosh/topics/skin/OEESC2/ conference info.html

WSO Code of Ethics

Members of the WSO, by virtue of their acceptance of membership into the WSO, are bound to the following Code of Ethics regarding their activities associated with the WSO:

1. Members must be responsible for ethical and professional conduct in relationships with clients, employers, associates and public.

2. Members must be responsible for professional competence in performance of all their professional activities.

3. Members must be responsible for the protection of professional interest, reputation and good name of any deserving WSO member of member of other professional organization involved in safety or associated disciplines.

4. Members must be dedicated to professional development of new members in the safety profession and associated disciplines.

5. Members must be responsible for their complete sincerity in professional services in the world.

6. Members must be responsible for continuing improvement and development of professional competencies in safety and associated disciplines.

7. Members must be responsible for their professional efforts to support the WSO motto "Making Safety A Way Of Life...Worldwide".

Published by the: WSO World Management Center
106 W Young Suite G, PO Box 518
Warrensburg, Missouri, 64093 U.S.A.
Telephone (660) 747-3132 Fax (660) 747-2647
www.worldsafety.org
wowmc@socket.net

© 2004 U.S. $5.00