Safety in Mines Research Advisory Committee

SIMRAC Welding
Occupational Health and Safety Resources CD and Booklet on Welding Fume

SIMRAC PROJECT SIM 02 09 06

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Executive Summary

This project is presented in a Booklet on Welding Fume and on a CD-ROM with a broad range of health and safety information for welding and allied processes. This report, therefore, provides only an executive summary, background information on welding occupational health and safety in South Africa and the contents of the Booklet and the CD.

Project SIM 02 09 06 is an extension of Project Health *605 Hazards created by fumes and UV radiation during welding/cutting*.

The booklet and CD are particularly timely as several ISO standards on the measurement of control of welding fumes, gases and vapours have recently been published.

Acknowledgements

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The author is grateful to all those who have developed health and safety information on welding and allied processes around the world and added to the Internet. This made possible the ASOSH.org *Welding page* and this Booklet and CD.

The author is particularly grateful to Bob Cunningham for the provision of the BHP Steel, Australia, *Welding Safety Bulletins* and the *Maintenance Standard Practice (MSP) Sheets*. These are not available to the general public on the Internet and provide a very comprehensive body of knowledge on welding health and safety.

One of the best collections of health and safety information on the Internet is provided by The Welding Institute (TWI), UK. Particular thanks go to TWI for permission to add their *FAQs* and *Job Knowledge* information on welding health and safety.

I should also like to express my gratitude to the American Welding Society (AWS) for permission to utilise their *Safety and Health Fact Sheets;* the Welding Technology Institute of Australia (WTIA) to include their *Fume Minimisation Guidelines*; the Health and Safety Executive, U.K., to utilise welding related free publications from their website; the National Institute of Working Life (NIWL), Sweden, to include their PIMEX video and the National Institute for Occupational Safety and Health (NIOSH), USA, for permission to add their publications, particularly their *Criteria for a Recommended Standard: Welding, Brazing, and Thermal Cutting* and their *Health Hazard Evaluations (HHEs*).

The author would like to thank the members of the Mine Occupational Health Advisory Committee (MOHAC) for their support and review of this CD and particularly Ralph McIntyre, Department of Minerals and Energy (DME).

Thanks also to the Mine Ventilation Society of South Africa (MVS) and V.J. Nundlall, DME, for permission to include on the CD his paper *Kinross Revisited* presented at the MVS Annual Conference in 2003.

This CD would not have been published without the support and encouragement of Professor Mary Ross, SIMPROSS.

Finally, my gratitude goes to Vali Yousefi, National Centre for Occupational Health (NCOH), Jim Guild and Ted Barwise SAIW, for their valuable comments and contributions.

Introduction

Origins of Booklet and CD

The SIMRAC Booklet on Welding Fume provides information on fumes, gases and vapours associated with welding and allied processes and their control.

The SIMRAC Welding Occupational Health and Safety (OHS) Resources CD provides information on the health and safety hazards in welding and allied processes and their control.

Both the Booklet and the CD have their origins in the information gathered in the preparation of the ASOSH.org Welding page, which has extensive links to welding health and safety information from around the world. This Welding page was further extended when the author was requested to review the SIMRAC Health 605 research report on welding fume. Following this review and finalisation of the Health 605 report, SIMRAC agreed that the research report should be supplemented with a Booklet on Welding Fume and Welding OHS Resources CD.

Welding Health and Safety in South Africa

Industrial regulations under various Acts have been developed in South Africa to address particularly the safety hazards of welding. Precautions for oxy-acetylene welding and metallic electrode welding were published in the Safety Code, Prevention of Accidents Committee, Transvaal and Orange Free State Chamber of Mines in 1956 and 1964. The Code focused on protection from electrical shock, eye protection, protective clothing and the prevention of fires and explosions. The need for good ventilation was stressed.

In 1986, a “gassing” fatality occurred underground from flame cutting of cadmium-plated roof bolts. This fatality was given wide spread publicity.

In 1986, an underground polyurethane fire at Kinross gold mine was initiated by a welding team conducting welding repair work. Oxy-acetylene equipment set fire to PVC pipes, rubber covered electrical cables and a foam-covered sidewall (polyurethane sealant). The fire resulted in the deaths of 177 miners, largely due to the inhalation of toxic gases from polyurethane combustion. This disaster was influential in speeding up investigations into the best systems for Self-contained Self-Rescuers and their introduction.

The South African Institute of Welding (SAIW), with the full support of the South African Bureau of Standards (SABS) and the Department of Manpower, co-ordinated the establishment of a Code of Practice on Welding and Cutting: Health and Safety. This was published as SABS 0238: 1991 Welding and thermal cutting processes - Health and safety. In parallel with this, the SAIW finalised a training course on Welding and Cutting: Health and Safety with instructors” manuals, slides, videotapes, and transparencies. SABS 0238: 1991 was withdrawn in 2002 and replaced with SABS 0238: 1998.

In 1993, a Joint International Conference "Health and Safety in Welding and Related Processes" was organised by the Occupational Hygiene Association of South Africa (OHASA) and the South African Institute of Welding (SAIW).

SIMRAC project Health 605 (2002) Assessing Hazards Created by Fumes, Gases and UV Radiation during Welding/ Cutting in the South African Mining Industry looked at the types of welding being undertaken and included an airborne pollutant exposure survey.

Following the 1986 Kinross Disaster, the National Union of Mineworkers (NUM) called for a Commission of Inquiry into safety in the mining industry. The subsequent Commission of Inquiry (Leon Commission) led to a new Mine and Health and Safety Act (Act No. 29 of 1996). Occupational hygiene regulations published in 2002 under this Act include an extensive listing of occupational exposure limits for airborne pollutants including welding fume.

International Standards

In 2000/2001 international standards were published by the International Organization for Standardization (ISO) to assess employee exposures to welding fumes and gases (ISO 10882-1/2). Several additional ISO standards have been developed to determine fume emission rates and to assess fume control.

The publication of this series of ISO standards on welding fume will provide increased emphasis on the control of welding fume around the world and the improvement of working conditions for welders.

Uses of CD

It is hoped that this OHS Welding Resources CD will provide the necessary information resources for OHS practitioners and others to help to improve the health and safety of welding and related operations in South Africa.

The CD is supplemented with the ASOSH.org Quick Links and SiteSearch pages for rapidly locating, via the Internet, OHS information on any subject from around the world.

Potential for Further Development

The President of the Southern African Institute of Welding (SAIW) and the Vice President of the International Institute of Welding (IIW) have suggested that the SIMRAC OHS Welding Resources CD be presented to the IIW for possible further development by the IIW and its members for use internationally.

Content of Booklet

The content of the SIMRAC Booklet on welding fume is as below:

Content of Welding OHS Resources CD

The CD utilises the free ShellRun auto start CD software from PHD Computer Consultants Ltd. to automatically open the Cover.htm page when the CD is loaded. This Cover page includes the SIMRAC and SAIW logos and provides brief information on the CD. This links to the CD "Home" page which provides links to the CD content as below:

About	Background, Acknowledgements, Disclaimer, and Feedback. Flash File Introduction - 4 minutes. Contents - Lists CD Content Viewers - All the necessary Readers and Viewers for the CD content can be located on the CD via the Viewers page. This includes Acrobat Readers, Windows Media Players, Macromedia Flash Readers, Microsoft PowerPoint and Word Viewers, Fonts - Verdana.
Introduction	Includes several introductory articles on welding health and safety from various sources.
Topics	Links to a selection of Information covering: *Compressed Gases*, *Confined Space, Electrical Hazards*, *Ergonomics*, *Fire Prevention/ Hot Work*, *Fumes and Gases*, *Occupational Exposure Limits (OELs)*, *Air Monitoring*, *Medical Monitoring*, *Thermal Environment*, *Noise and Vibration*, *Personal Protective Equipment (PPE)*, *Radiation (EMF)*, Radiation (*UV, Visible, IR) and Radiation (Ionising).* The OELs page links to the full listing of DME OELs on one page from the saioh.org site, plus a page with OELs Relevant for Welding and Allied Processes. Pages have been created on *Air Monitoring* and *Medical Monitoring* with information from the SIMRAC Booklet on Welding Fume.
Legislation	South African Legislation (DME and DOL)
Standards	International Standards page - Listing of OHS welding standards from ISO, IEC, CEN and CENELEC. National Standards page - Listing of Australian, Canadian, Japanese, South African, UK, and USA Standards dealing with health and safety in welding.
Index	A - Z Index of CD Content
AWS	American Welding Society - *Safety and Health Fact Sheets*
BHP	BHP Steel, Australia - *Maintenance Standard Practice (MSP) Sheets* and *Welding Safety Bulletin* (2000 - 2003). Also includes Topic Index to Bulletin
CCOHS	Canadian Centre for Occupational Health and Safety - *OSH Answers - Welding*
CGA	Compressed Gas Association, USA - *Safety Posters*
HSE	Health and Safety Executive (HSE), UK - *Welding related publications* and *Contract Research Reports* related to welding
Miller	Miller Electric, USA - *Dictionary*, *History of Welding* and *OHS publications*
NIOSH	National Institute for Occupational Safety and Health - *Criteria Document on Welding* and *Health Hazard Evaluations*
NIWL	National Institute for Working Life, Sweden - *PIMEX Video on Welding Fume* (mpg file)
SIMRAC	Safety in Mines Research Advisory Committee - *Health 605 Report, Welding Fume Booklet*
TWI	The Welding Institute, UK - *FAQs* and *Job Knowledge for Welders* (OHS info)
WTIA	Welding Technology Institute of Australia - *Fume Minimisation Guidelines*
Links	? Links to the CD source information on the Internet where available. ? Welding page at ASOSH.org and mirror site at SHEAfrica.info. ? Quick Links - links to the top SHE/ EHS sites around the world. ? SiteSearch - search via Google the top SHE/ EHS websites around the world.