

# The Canadian Delegate Report

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International Institute of Welding Commission  
VIII Health and Safety

**David Hisey**

This is a brief summary of the actions of IIW Commission VIII during the conference in Denver USA. Should additional information be required the specific document which is published on the IIW web site.

**INTERNATIONAL INSTITUTE OF WELDING  
COMMISSION VIII HEALTH AND SAFETY**

**ANNUAL ASSEMBLY MEETING 8 – 11 July 2012**

**Denver, USA**

**Session I - General Matters**

1. Welcome, introductions.

The chair Luca Costa welcomed everyone to the meeting started the introductions.

2. Adoption of agenda.

The agenda was adopted with revisions.

3. Approval of the minutes of the meeting in Cambridge (doc. VIII 2143-12).

The last meeting was held in Cambridge, England and the minutes were approved as distributed.

4. Matters arising from the minutes and not covered in the agenda:

- a. Standardization activities for commission VIII

There has been a change in the standardization process for documents, which should result in an improvement in quality and speed in getting documents published. There will be a new technical publication published.

- b. Update of List of welding related standards, Doc. VIII-2079r3-11 (delegates and experts are kindly requested to submit possible comments to M. Lundin)  
Send Mathias Lundin a list of pertinent standards related to welding PPE.

- c. C VIII best practice on Nitrogen Oxides (2013R3 – 12): delegates and experts are kindly requested to submit possible comments to V. Spiegel Ciobanu and W.Zschiesche  
Please review and provide input on this document for the intermediate meeting in Hamburg, Germany.

**5. National reports**

Canadian Report –

- ❖ An update was given on the workplace pregnancy study in progress by the University of Alberta.
  - The cohort which started with just the province of Alberta has been extended to include all 4 western Canadian provinces and we are now planning how to move into Ontario, Quebec and points further east, with the aim of it becoming a truly national study. Currently we have close to 500 women recruited and at last count we had 48 pregnancies reported.
  - Some of the women who were recruited quite early in the study have now completed through to the 12 month follow up.
  - There is a diverse range of women in the study. The average age is 32, with the oldest participant aged 60 at the time of completing the baseline questionnaire. More than half had had at least one pregnancy at the time they joined the study, and 33 have told us about a new pregnancy: amongst these more than a third with results from a urine analysis had at least one metal above the laboratory norms for northern Alberta.

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- One in eight of those completing the 6 month questionnaire reported an injury at work that had occurred since the baseline questionnaire, so as we continue to collect data during the coming months we should be able to identify conditions associated with injury and illness and to formulate recommendations about improving conditions at work.
- Overall worker health is being monitored and new onset asthma is indicated
- ❖ Canada's Welding safety standard CSA W117.2 update has been delayed should be forthcoming in late 2012. Some additional changes resulted from interfacing with other divisions of our standards organization, requiring us to make deletions and improvements to some sections. An example of that is the section on robotics, we decided to defer to the robotics specialists and only keep the welding portion.
- ❖ The Standards Institution of Israel (SII) wishes to adopt CSA-W 117.2, Safety in. Welding, Cutting and Allied Processes as an Israeli standard. We have approved that request. They will most likely wait until our next revision is out before taking delivery since we are very close to balloting.

David Jordan - UK

David reported on the British view of PPE, his report dealt with risk management and the hierarchy of control. PPE is way down the hierarchy list. Engineering and work practice controls should be the first items dealt with. The UK HSE summarizes PPE as only protecting the wearer, i.e. it depends on the integrity of one person to ensure compliance and degree of success. PPE is only effective if worn 100% of the time. PPE must be used in addition to local exhaust ventilation (LEV). David deferred to the Netherlands as the leader in this field as they have the most information on the subject. In the Netherlands a shop must prove that compliance is occurring based on each individual work location based on type of welding, quantity of welding. Netherlands standard for total welding fume is 1 mg/cu meter.

Mathis Lundin – Sweden Report.

Optical radiation: Sweden is doing measurements to understand the distances which people need to be from welding arc with various types of eye protection, i.e. visitors to a welding shop, how far do they need to be from the welding arc, with standard safety eyewear – where should the yellow walk lines be.

They have continued their ongoing work in put welding educational and safety information on their website. Mathis deferred to Denmark as the standard setter as Denmark requires a minimum training requirement for safety training.

Japan Report

Japan has had regulations to mandate the wearing of breathing protection on indoor welders only. They have just introduced regulations to mandate the wearing of breathing protection on outdoor welders as well.

Dr. W. Zschiesche commented that Germany had completed testing on both indoor and outdoor welders, and both had similar exposure.

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German Report – Dr. W. Zschiesche Germany also measures optical radiation exposures for the various welding techniques. They have had reports of sunburn type exposures. They had a meeting to discuss manganese exposure; they also discussed the synergistic exposures of carcinogenic exposures. They are doing work on UFP exposures in welding fume; they are trying to define the various exposures to various welding exposures. They are doing a study on zinc oxide exposure limits; they are considering the particulate size in this study.

**Session II – Health and Safety in welding**

Presentation of the document “Welding Electrical hazard”, doc VIII-2146-12, D. Hisey

Equipment damage from stray welding current and electrical shocks to welders (personnel welding) at a mine in northern Canada led to considerable investigative work which has shown that the potential is high for serious injury, death, major equipment damage or fire. Root cause analysis of incidents established the common failure parameter as, or equivalent to, a terminal fault to earth ground on the welding power source. This was described in the first paper on this subject. Further incident investigation found that equipment damage and work stoppages cost industry millions of dollars in repair and lost production costs. Documentation of fatalities from around the world has proven that even though welding voltages are normally well below the 100 volt maximum established by mining regulators to be a “safe voltage”, welders continue to die due to contact of the welding electrode with their body. Additionally, in at least one documented case in Canada, a welder died from electrocution due to an electrical system fault created by the welder’s own stray welding current. Much of the work represented in this paper comes from the authors’ own experience augmented by supporting research of others. This paper looks at the electrical hazards of welding including high frequency/radio frequency (HF/RF), stray welding current and electrical shock occupational injuries and fatalities from the welding electrode circuit. It considers the equipment damage and loss of life through misplaced welding current and considers industry, regulatory, and employer response in preventing these occurrences.

This paper was recommended for peer review and publication in *Welding in the World* following the period of peer review.

Presentation of the document “Cause-and-effect chains of fume formation in GMAW and possibilities of fume reduction by using new welding processes”, doc. VIII-2147-12, S. Rose

This paper demonstrates the use of pulsed arc processes to reduce emission rate. Overheating of the welding droplet generates high amounts of welding fume, overheating of the weld droplet occurs during short circuit. This paper compares the various pulsed arc processes and the opportunity to use the lowest fume emission process for your welding needs. It also warns that Standard ISO 15011 is not sufficient to create reproducible data – parameter setting by experienced welders is not sufficient.

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Presentation of the document “Health and safety risks in welding activities”, doc VIII 2123R2-12, Dr. W. Zschiesche.

Welders and workers applying allied processes are subject to a wide variety of exposures such as fumes and gases that potentially pose a hazard to the welder’s health. Due to the diverse materials and processes in use, the exposures and therefore the health hazards, vary widely. This paper focuses on these health hazards and the corresponding types of welding and exposures. Potential health effects described in the literature include: lung conditions such as chronic bronchitis, asthma, loss of lung capacity, toxic pulmonary edema, infective pneumonia, pulmonary fibrosis and a small increase in the risk of lung cancer; neurological conditions related to manganese exposure; arc eye and the effects of electromagnetic radiation on medical devices. Noise, electrocution, hand transmitted vibration, poor ergonomics and thermal degradation products of organic compounds from coatings and contaminants also potentially pose a hazard to the welder. Finally, there are ongoing concerns about the potential adverse health effect of ultrafine particles. Commission VIII continues to monitor the medical and welding literature in order to support the development of state of the art reviews, checklists and other documents that may help the welding community to keep within safe working conditions.

**10 July 12, 08:30 to 10:30 Room CCC 710 (level 2)**

**Session III – National seminar**

*Every year C VIII organizes a seminar with presentation for experts from the host country. This seminar was managed with the kind support of Steve Hedrick (AWS).*

**Welding Process Field Controlled Comparison Studies: Exposure Levels, Production Rate, Cost, Quality; Presenter- Arlen Siert, Industrial Hygienist Xcel Energy**

This presentation not only looked at the welding fume, it looked at the cost of the various welding processes for welding 316 stainless, considering the actual welding time, not including the time at rest for each welder. SMAW is the highest total fume, GMAW is the fastest production, FCAW will outperform others in out of position welding, FCAW will provide the best quality.

This was a power point presentation dealing with decreasing lung capacity in 309 stainless welders. The study compared welders with welders using various processes i.e. SMAW, FCAW, GMAW, ACAC (short circuit, spray, pulse mode), PAC.

**FCAW wires with no manganese/manganese compounds in the core, Susan Fiore – ITW**

Manganese is typically 1% of the electrode, however due to the volatility manganese will usually make up 5 – 10% of the total welding fume. The product they created was given the nickname “Hi-C” as they felt they had to increase the carbon content. With this new designed electrode, the tested manganese level within the fume was less than 2%. The products are not low fume, they are low manganese. They also have higher nickel content than normal.

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**Canadian standard for vehicle mounted welding systems, David Hisey**

Canada has a large and vibrant oil, gas and mining industry requiring many welding units to work in remote locations. Much of the welding for these industries is provided by private owner operators equipped with self contained mobile units containing electric welding machines and fuel gas welding/cutting equipment as well as all the minor tools and equipment the welder may need in the course of his/her work day.

In a northern Canadian mine, an acetylene explosion occurred on one of these welding rigs, killing one and critically injuring a second worker. The local occupational health and safety body discovered through informal interviews that acetylene explosions with units of this type were not uncommon in the industry. The Canadian Standards Association, the occupational health and safety group of the Province of Alberta and a group of interested companies worked together to develop guidelines which were later turned into policies of various companies, local regulations and a nationwide standard. The author led the group involved in the research and development of this standard.

**10 July 12, 11:00 to 12:30, Room CCC 710 (level 2)**

**Session III – Health and safety in welding / Best practices**

6. Presentation of the document “Lung function, asthma, chronic obstructive pulmonary disease and arc welding”, doc. VIII-2136-12, M. Cosgrove

Welding fume is the condensation product of the gas and vapor formed when two pieces of metal are welded together, sometimes using a filler and is a mixture of the metal(s) being welded; the shielding gas; the consumable filler; and the products of the chemical reactions occurring as a result. Most is derived from the consumable. Components of welding fume are potentially toxic and include metals (such as iron, aluminum, chromium, nickel and manganese), inorganic compounds (such as fluorides and silicates), gases (ozone, oxides of nitrogen, argon and carbon monoxide) and coatings (paints, plastics and oils). The respiratory exposures of welders depend on the type of welding undertaken, the base metal, the constituents of the consumable, the frequency and duration of welding, whether the welding is undertaken in an open or closed environment and whether respiratory protection and/or exhaust ventilation is used.

Lung function can be measured in many different ways and for the non medical person the nomenclature can cause considerable confusion. Lung volumes change with time: they increase with age until around the age of 25 at which point they peak and then fall naturally with age.

**Asthma and welding**

There is evidence from the literature of occasional reports of asthma as a result of welding.

The apprentice welder studies by Beach (9) and El Zein (10) indicate that early exit from a career as a welder may occur as a result of welding induced asthma in a small number of apprentices, (in the order of 1-3%), but the longitudinal study by Lillienberg (11) indicated that the long term respiratory problems of established welders were due to COPD rather than asthma. Additional case reports indicate that asthma in response to welding fume may occur during employment as a welder and that this condition is not confined to apprenticeship.

This document was presented as a draft and will continue to be worked by the whole committee.

7. Presentation of the document “proposal for a C VIII document on Hot work”, doc. VIII-2145-2, L. Costa

Luca did a brief presentation on this document. This is a working document which as a committee we will continue to develop. Sweden requires all persons involved in hot work in maintenance environments to have an approved hot work training course.

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8. List of commission VIII best practice documents, doc. VIII 2098r3-12, W. Zchiesche

This is a list of documents which are or may be available on the IIW website; some of these documents are posted, some are under review and some are in progress of development.

**11 July 12, 08:30 to 10:30 Room CCC 203**

**Session IV – Development of a multilingual booklet on H&S addressed at welders**

9. Document VIII-2141-12 “Multilingual presentation for health and safety addressed at welders”:

- a. Collection of images from delegates and experts (delegates and experts are kindly requested to submit possible comments to the chairman)
- b. Discussion on the content (text, images) and continuation of the revision

This document was worked during the meeting, and requires a lot of input. This document is very short of maintenance welding pictures and instructions.

**Session V – Other matters**

10. Administrative matters for commission VIII:

- a. Election of the Chairman  
Luca Costa has been re-elected for a 3<sup>rd</sup> term as chair of VIII
- b. Operational plan (doc. VIII-2142R1-12)
- c. Satisfaction surveys were completed

11. Any other business

12. Date and places for the future meetings

- a. Intermediate meeting 2013, Hamburg (Germany)
- b. Annual assembly in Essen, September 2013.
  - Ensure rooms are booked ASAP, booking will be available after Oct. 01, 2012 or you will not be able to get accommodation.
  - The IIW Commission VIII meetings will occur Sept. 11 - 13

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**11 July 12, 11:00 to 12:30, Room CCC 203**

**Session VI – Focus on Mn in welding Fumes (joint meeting with C II)**

**13. Returns from International Symposium “Exposure to Manganese and Neurotoxicity in Welders”, M. Cosgrove**

This presentation is based on a conference on this subject which occurred within at Bochum, Germany. The purpose of this conference was to discuss the various papers linking manganese to Parkinson’s disease. German limits for manganese: Total 0.2 mg.m<sup>3</sup>; Respirable 0.02 mg.m<sup>3</sup>.

The presentation (at Bochum, Germany) provided a relationship between air concentration and blood urine content. They have also compared the levels during exposure and after the welder leaves the work place (during shift/end of shift levels). The report showed that there is a direct relationship between total manganese and respirable and about 50% was respirable. The use of a powered respirator practically removes the respirable content of manganese, without powered respirator, the required levels could not be achieved. LEV will not reduce Mn to the required levels; a powered respirator is still required.

**Various presentations on the subject were presented.**

**Parkinsonism vs Parkinson’s Disease – Brad Racette; Susan Criswell**

-Tremor, bradykinesia, rigidity and postural instability

Research tool – USPDRS3 and PD39 – measures the level of Parkinson’s Disease within people already diagnosed with PD. DR. Cosgrove was not supportive of this process by Racette and Criswell.

**Johnni Hansen presented a paper at this conference which stated**

- No evidence of PD or secondary PD in welders
- Manganese is largely respirable

**Summary**

It was Dr. Martin Cosgrove’s opinion that the majority of studies linking manganese and Parkinson’s Disease are not statistically reliable. It is hoped that the study which is being undertaken following this conference will provide reliable data. The experts in the Commission VIII meeting felt that their may be some relationship between manganese and symptoms, but that is most likely mis-diagnosed as PD.

Manganism is a disease that is caused by manganese poisoning, and is medically recognized. Manganism was not the focus of this discussion.

**11 July 12, 14:00 to 15:30, Room CCC 705**

**Session VII – Integrated management of Health, Safety and Environment (joint meeting with SC-QUAL)**

*The discussion will deal with the Integrated Management of Quality, Health and Safety in Welding based on the following documents:*

Integrated Management of Quality, Health, Safety and Environment in Welding Fabrication: International Trends and Future Development, doc. SC-Qual-176-11/VIII-2111-10



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Conclusions of presentation:

- The appropriate management ensures the higher cost effectiveness in respect of quality, OHS and environment.
- Quality of the product and safeguard of personnel and environment (i.e. sustainability) can move together in the direction of competitiveness
- The harmonization of the structures of the 3 systems implies a reduction in the Manufacturer efforts.

Conclusions of meeting:

- There is interest on safety issues
  - Have success stories in Essen
  - Go on with joint meeting VIII + SC-Qual
  - Create a simple document/table referring to basic concepts and references
-