Hexavalent Chromium Exposure Control: Best Practices for Welders
Video Training Package Development & Dissemination
SHIP # 2008XH00048 HexChEC
September 2008 – October 2009

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University of Washington Field Research & Consultation Group, in collaboration with Sheet Metal Associated Contractors of North America (Western Washington), Puget Sound Shipbuilders Association, United Association of Pipefitters Local 32, Ironworkers Local 86

November 5, 2009

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Marc Beaudreau

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PART I
Final Report Narrative

Organization Profile	The University of Washington Field Research & Consultation Group (FRCG), Department of Environmental and Occupational Health Sciences, has been providing industrial hygiene consulting services to promote the health and safety of Washington workers for over 40 years. Our mission includes conducting research on workplace exposures and controls to reduce these exposures and to prevent injuries and illnesses, and serving as a source of occupational health and safety information.
Abstract	Exposure monitoring conducted by the FRCG of welders working on stainless steel indicated significant overexposures to hexavalent chromium, depending on a variety of welding parameters. Analysis of the data, combined with welders' lack of knowledge about the relative hazards of stainless steel hot work and the newly promulgated hexavalent chromium standard, identified the need for welder training on the hazards of hexavalent chromium and effective use of control measures, specifically local exhaust ventilation (LEV). To meet this need, we developed a video, training manual, and exposure assessment poster that can be used in a modular fashion to show welders and their supervisors the need for chrome 6 exposure controls and how to use them effectively. The technique of video exposure monitoring was used to visually demonstrate to viewers the effectiveness of the control measures, such as LEV.

Purpose of Project	The Hexavalent Chromium Exposure Control (HexChEC) project was proposed to develop a best practices training video and accompanying materials to raise awareness of chrome 6 hazards from welding on stainless steel, as well as to demonstrate through the use of video exposure monitoring the effective use of local exhaust ventilation. The video training package is also designed to assist employers with achieving compliance with the new standard, WAC 296-62-08003 – 08029.
Statement of the Results	The video training materials, with manual and hazard assessment poster, have been successfully developed into an attractive and user-friendly package. This was truly a collaborative effort between employers, welding supervisors and trainers, active welders, the UW FRCG, the videographer (who is also a welder by trade), as well as representatives from Washington State Department of Labor & Industries and Federal OSHA. Input from the welders and their employers helped us provide a product that is relevant to the audience, while guidance from other technical resources, including L&I, ensured that employers would be able to easily use the materials to reduce chrome 6 exposures and support compliance with the standard. The poster that accompanies the video and manual is already being used in weld shops as a guide for welders to quickly identify what controls they need (in terms of LEV and respiratory protection) depending on work process and environment.

Evidence of the results	Video exposure monitoring was a very effective tool to visually demonstrate the effective placement and use of LEV. Welders and their employers have been impressed by how well they can 'see' what local exhaust ventilation can do to reduce their exposures. Based on input from our shareholders, we included examples of 'what works' as well as 'what doesn't work'. Pre- and post-video viewing quiz results suggest that welders understand potential hazards associated with hot work on stainless (and other chromium containing metals) and the best means to control these hazards.
Project's promotion of prevention	The one and only purpose of the developed training materials is the prevention of illness by reducing work-related exposures to hexavalent chrome. The structure of the materials is modular; the modules can be viewed either independently or sequentially. The Introduction tells the viewer/reader why they should be concerned about exposure to chrome 6. Module 1 explains the hazard assessment tool (poster) that they can use to identify the appropriate exposure control. Module 2 describes basic principles of local exhaust ventilation. Module 3 demonstrates the effective use of LEV using video exposure monitoring. Module 4 discusses other exposure control methods. Lastly, Module 5 discusses some of the key aspects of the chrome 6 regulation. Once disseminated and made available (through L & I's website) to weld shops throughout Washington State, not only will awareness of potential chrome 6 exposure increase among welders, but effective use

	of local exhaust ventilation and other controls should also be better understood. Planning committee and focus group members have received copies of the completed package and have started using it to train their welders. Welding equipment suppliers (including distributors of LEV equipment) have also had requests for the package from their customers. Many welding instructors have reported using the video not only to educate about chrome 6 but also other welding fume exposures.
Relevant processes	We cannot stress enough the importance of an active planning committee and focus group. Their involvement shaped the direction of the training message -- keeping it simple, and showing welders performing representative tasks in general industry, construction and marine settings. Welders liked that the video showed "people that look like us doing work that we do". Using focus groups with a strong interest in their own health & safety ensured a committed audience and voluntary locations for filming. The video exposure monitoring is an excellent training tool to show workers (or their coworkers) how exposures happen. Technical input from L&I, the FRCG staff, and others helped with script and manual development. Showing drafts of the video and the exposure evaluation poster/tool to our committee and focus group along the way helped us stay on message, fine tuned our visuals, and helped make sure the message remained relevant to a majority of welders.

Lessons Learned	One important lesson learned is to ensure that regular, in person meetings (weekly or more frequently as needed) are held with the videographer to ensure that the message can be made using editing and post-production techniques that they can provide. Even though multiple reviewers approved our original script, most did not have experience in video production. Consequently, several script revisions were needed to clarify and simplify the message for this particular media.
Measures to judge success	The completed video has shown to 84 welders and instructors at technical colleges and union apprenticeship programs, with the audience ranging from 1st year apprentice welders to those with decades of experience. A pre-quiz was administered before viewing the training DVD and the same quiz was given to the same group immediately after viewing. Quiz scores improved from an average of 61% correct before viewing to an average of 86% correct after viewing, suggesting increased knowledge among the viewers The video and training package was also shared with welding companies and health and safety professionals not involved in the development, and we received favorable and enthusiastic reviews from all audiences. We have received numerous requests for the training materials from local technical colleges, the Marine Chemists Association, and other welding trade associations who have heard about the video. We believe that this broad and enthusiastic response and demand for the materials suggests that we have addressed an industry-wide need for welding exposure control information.

Uses	The target industry for this product is any employer with workers who perform hot work (welding or thermal cutting) on chromium containing metals. This includes hundreds of workplaces throughout Washington state. Professional and workplace presentations conducted by the FRCG have precipitated requests for copies of the training package from outside Washington state and industries other than our original target audiences. Many of the control methods discussed in this training package are applicable to welding on other metals and other welding fume-related exposures. Some of the individual modules may be applicable for other welding processes (e.g., welding on mild steel or manganese steel) in other industry sectors. Due to the specific focus of the video, script, manual, and the exposure assessment tool on chrome 6, it would be difficult to use the entire package in other settings.
Product Dissemination	One hundred copies of the package (DVD, manual, and poster) were reproduced. An additional 200 copies will be produced and sent to L&I per their request. Of those produced half have been disseminated to our planning committee and focus group, representing welders' employers throughout Washington in general industry, construction and maritime. Union apprentice programs have also received copies, and have participated in our evaluation; these groups include the pipefitters, ironworkers, and sheet metal workers. Members of the local chapter of the American Welding Society have received copies, as have welding instructors representing vocational/technical schools and colleges around the state. Federal OSHA has

	requested that we show the video to their Region X management meeting in October of 2009. A total of two hundred and fifty (250) copies of the complete training package (and 75 additional DVDs) will have been sent to L&I SHIP program; L&I will be placing the materials in their video collection available to the public. To make the materials available to a wider group, individual files of the video modules (avi) and pdf files of the manual and hazard assessment poster have been provided to L&I for uploading onto the agency's website. The L&I webmaster and our videographer have discussed formatting and uploading requirements to facilitate this.
Feedback	We have received very positive feedback from health and safety professionals, welders, and our other stakeholders. Included with the Part III attachments is a compilation of 'testimonials' from representative viewers.

PART II

SAFETY AND HEALTH INVESTMENT PROJECTS
SHIP Final Expenditure Report
Budget Summary

Project Title:	**Hex Chec**		
Project # :	**2008XH00048**	**Report Date:**	10/31/09
Contact Person:	**Marc Beaudreau**	**Contact #:**	206-616-7689
Start Date:	**09/01/08**	**Project Completion Date:**	10/31/09

1.	**Total budget for the project**		**$ 158,203**
2.	**Total SHIP Grant Award**		**$ 158,203**
3.	**Total of SHIP Funds Used**		**$ 158,203**
4.	**Budget Modifications (if applicable)**		**$ 0.00**
5.	**Total In-kind contributions**		**$ 0.00**
6.	**Total Expenditures (Lines 3 + 4 + 5)**		**$ 158,203**

Instructions:

- Complete the Supplemental Schedule (Budget) form first (on the next page).
- The final report must include all expenditures from date of completion of interim report through termination date of grant
- Indicate period covered by report by specifying the inclusive dates
- Report and itemize all expenditures during specified reporting period per the attached supplemental schedules
- Forms must be signed by authorized persons (see last page)
- Forward one copy of the report to (**Name), SHIP Project Manager, PO Box 44612, Olympia, WA 98504-4612**.

SAFETY AND HEALTH INVESTMENT PROJECTS
SHIP Final Expenditure Report
Supplemental Schedules (Budget)

Project Title:	**Hex ChEC**		
Project # :	**2008XH00048**	**Report Date:**	10/31/09
Contact Person:	**Marc Beaudreau**	**Contact #:**	206-616-7689
Total Award $:	**$ 158,203.00**		

ITEMIZED BUDGET -- How were SHIP award funds used to achieve the purpose or your project?

	Budgeted for Project	Amount Paid Out	Difference
A. PERSONNEL	$96,397	$ 102,363	($ 5,966)

Explanation for Difference and other relevant information:
The difference in personnel costs is due to the slight increase in workload required to complete the project including presentations of the training package to welders and apprenticeship programs and conducting pre-post viewing quizzes. In addition, an increase in cost resulted from adjustments to the UW fringe rate used to determine benefits (fiscal yr 2008 vs. yr 2009).

	Budgeted for Project	Amount Paid Out	Difference
B. SUBCONTRACTOR	$14,400	$ 15,847	($ 1,447)

Explanation for Difference and other relevant information:
The increase is due to one of the subcontractor's costs being higher than estimated (Mike Harris $5846 vs. $4400)

	Budgeted for Project	Amount Paid Out	Difference
C. TRAVEL	$1,858	$ 176	$ 1,682

Explanation for Difference and other relevant information:
The difference is a result of eliminating mileage reimbursements to non-UW participants. In addition, the travel costs for Mike Harris were included in a one time payment that was categorized as a subcontractor expense.

	Budgeted for Project	Amount Paid Out	Difference
D. SUPPLIES	$18,106	$ 18,455	($ 349)

Explanation for Difference and other relevant information:
This difference is a result of the slight differences in final charges between budgeted costs and actual costs, including shipping and handling.

	Budgeted for Project	Amount Paid Out	Difference
E. PUBLICATIONS	$12,000	$ 6,729	$ 5,271

Explanation for Difference and other relevant information:
This difference is a result of a change in the number of DVDs and manuals produced from 1,000 to 400. In addition, the cost of manual production was less than originally estimated.

	Budgeted for Project	Amount Paid Out	Difference
F. Other	$1,060	$ 251	$ 809

Explanation for Difference and other relevant information:
This difference is because fewer stakeholder meetings than originally planned were needed and because we were able to get feedback from some stakeholders via email, rather than face to face meetings.

	Budgeted for Project	Amount Paid Out	Difference
TOTAL DIRECT COSTS	**$143,821**	$143,821	$ 0

	Budgeted for Project	Amount Paid Out	Difference
INDIRECT COSTS	**$14,382**	$ 14,382	$ 0

	Budgeted for Project	Amount Paid Out	Difference
TOTAL SHIP BUDGET	**$158,203**	$ 158,203	$ 0

	Budgeted for Project	Amount Paid Out	Difference
F. IN-KIND	$ 0.00	0.00	0.00

Explanation for Difference:
In-Kind contributions had no proposed expense

Date: 11/5/09 **Signature:** 

PART III

Attachments:

Provide resources such as written material, training packages, or video/audio tapes, curriculum information, etc produced under the grant.

Also include copies of publications, papers given at conferences, etc.

This information should also be provided on **a CD or DVD** for inclusion in the file.

REMINDER!!: All products produced, whether by the grantee or a subcontractor to the grantee, as a result of a SHIP grant are in the public domain and can not be copyrighted, patented, claimed as trade secrets, or otherwise restricted in any way.