

Controlling Exposures to Hexavalent Chromium

MSC-PRO-31697

Revision 2

Effective Date: January 8, 2014

Topic: Safety and Health

Approved for Public Release;
Further Dissemination Unlimited

Controlling Exposures to Hexavalent Chromium

CHANGE SUMMARY

Rev. 2

Description of Change:

Editorial change to Appendix A, there is an extra “0” added to the PI column (10,000 SAR) in 2 spots, change to 1000 SAR.

Rev. 1

Descriptions of Change:

- 1) Added a requirement to complete the Hot work Permit in section 4.1.
- 2) Re-wrote Appendix A to become a guide reflecting only Respiratory Protection Recommendations.
- 3) Changed Appendix B to Requirements for Clothing Contaminated with Chromate Containing Paint Dust
- 4) The synonyms appendix (used to be Appendix C) was deleted
- 5) Current Appendix C became as guide for engineering controls that also include at tool called “Assessment Tool for Stainless Steel Welding”.
- 6) Flow chart became Appendix D.

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1.0 PURPOSE

This procedure provides direction for controlling exposures to hexavalent chromium (i.e. *Chromium VI*) in accordance with Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1126, *Chromium (VI)* and 29 CFR 1910.1026, *Chromium (VI)*.

2.0 SCOPE

This procedure (MSC-PRO-31697) applies to Hanford Mission Support Alliance, LLC (MSA) team employees, MSA subcontractor employees, and to visitors who may work in environments that may have a potential for exposure to *Chromium (VI)*. This procedure is applicable to:

- 1) Hot work activities using chromium containing materials such as; chromium-containing alloy steel, chromium-containing non-ferrous alloys or chromium containing carbon steel, chromium-containing welding rod or wire, or activities involving chromium-containing coatings.
- 2) Spray painting activities using chromate-containing paints.
- 3) Removing chromate-containing coatings by methods; such as abrasive blasting , grinding or sanding.

This procedure does NOT apply to:

- 1) Mechanical cutting, sanding, or drilling of bare/uncoated metals using band saws, abrasive cutting wheels, lathes, drill presses, belt sanders, wire wheels, flap wheels or other similar fixed, bench-mounted or hand tools which categorically are not likely to produce metal fumes.
- 2) Soldering and brazing activities.

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3.0 REQUIREMENTS

This procedure implements the requirements of:

- 29 CFR 1910.1026, *Chromium (VI)*
- 29 CFR 1926.1126, *Chromium (VI)*
- 29 CFR 1910.1200, *Hazard Communication Standard*.

4.0 PROCESS (See Appendix D for process flow chart, as needed)

4.1 Hazards Analysis

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
Line Management & Industrial Hygiene	1.	Conduct a hazards analysis of activities within the scope of this procedure in accordance with MSC-PRO-079 <i>Job Hazard Analysis</i> .
	2.	Ensure Hot Work Permit, form A-6000-895.1, is completed in accordance with MSC-RD-9900, <i>Hot Work Performance Requirements</i> , for all applicable hot work activities within the scope of this procedure.

4.2 Hazard Controls

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
S&H Personnel & Line Management	1.	<p>Engineering Controls</p> <p>Use engineering controls to reduce and maintain employee exposures below the <i>Chromium (VI)</i> action level (AL) of 2.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) as an 8-hour time-weighted average (TWA) unless:</p> <ul style="list-style-type: none"> • It is documented in the hazard analysis that such controls are not feasible, or • It is documented in the hazard analysis and initial monitoring data shows the process, task or activity does not result in exposure above the AL for more than 30 days in any 12 consecutive month periods. <p>NOTE: <i>Appendix C provides guidance criteria for local exhaust ventilation engineering controls.</i></p>
	2.	<p>Administrative Controls</p> <p>a. Review the Employee Job Task Analysis (EJTA) and update if necessary if the Chromium (VI) exposure levels</p>
Line Management		

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Actionee	Step	Action
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are above the AL of 2.5 $\mu\text{g}/\text{m}^3$.

- b. Employees will be enrolled in Medical surveillance for Chromium (VI) when:
 - Potentially exposed to Chromium (VI) above the AL for more than 30 days/year.
 - Or, Experiencing signs or symptoms of the adverse health effects that may be associated with chromium (VI) exposure;
 - Or, exposed in an emergency.
- c. It is prohibited to use rotation of employees as a method to reduce exposures below PEL.

Line
Management
& Industrial
Hygiene

3. Personal Protective Equipment

a. Respiratory protection

The use of respiratory protection is required during “initial monitoring” (i.e. absence of negative exposure assessment) and/or when the Chromium (VI) airborne concentration is above the AL of 2.5 $\mu\text{g}/\text{m}^3$. The required level of protection shall be decided based on the JHA results and in accordance with DOE-0352, Hanford Site Respiratory protection Program (HSRPP).

Guidance for the level of respiratory protection during initial monitoring is provided in [Appendix A](#) of this procedure.

b. Protective clothing

Protective clothing is considered contaminated during the abrasive removal of chromate containing coatings/paints (i.e. abrasive blasting, sanding or grinding) and in the absence of engineering controls that capture the emitted dust effectively. In this case it is required to implement the controls listed in Appendix B of this Procedure.

NOTE: *Clothing worn for protection from sparks and particulates produced by welding processes or grinding on bare/uncoated metals surfaces, is NOT considered contaminated with Chromium (VI).*

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
Line Management	4.	<p>Regulated Areas</p> <p>Establish a regulated area around the work zone wherever the employee's exposure to airborne concentrations of Chromium (VI) is, or can reasonably be expected to be, in excess of the AL of 2.5 ug/m³.</p> <ol style="list-style-type: none">a. Demarcate the regulated area in a manner that adequately establishes and alerts employees of the boundaries of the regulated area.b. Ensure that the concentration of Chromium (VI) is below the AL at the boundary by conducting area air monitoring downwind and at the boundary.c. Limit access to regulated areas to:<ul style="list-style-type: none">- Persons authorized and required by work duties to be present in the regulated area, and- Person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures. <p>NOTE: <i>Regulated Areas are NOT required for construction projects.</i></p>
	5.	<p>Housekeeping</p> <p>When spray applying or abrasively removing chromate containing paints, the generated particulate are considered contaminated with Chromium (VI). Therefore, all surfaces must be maintained as free as practicable of paint dust and paint chips. Effective dust control methods must be used, which include but are not limited to:</p> <ul style="list-style-type: none">• light misting with water,• wet wiping,• HEPA vacuuming,• use of surfactants,• use of surface fixatives and encapsulants,• local exhaust ventilation. <p>Dry shoveling, dry sweeping and dry brushing may be used</p>

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
		only where HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure to chromium (VI) have been tried and found not to be effective.
		The use of compressed air to remove chromate containing dust from any surface is prohibited.
		6. Hygiene and Practices
		a) When conducting activities in a area regulated for chromate paint dust emissions, (i.e. Exposures to <i>Chromium (VI)</i> > AL) it is required to implement the controls listed in Appendix B of this Procedure.
		b) When an area is regulated for conducting hot work on chromium containing, uncoated metals, it is recommended to use good hygiene practices such as:
		- Removing work clothing before entering lunch rooms and after every shift
		- Washing face and hands at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.

4.3 Air Monitoring

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
S&H personnel	1.	For activities that are likely to present an exposure hazard to airborne hexavalent chromium initial air monitoring must be conducted.
		a. If initial air monitoring results indicate employee exposures while conducting the activity are less than the AL, no further air monitoring is required.
		b. If monitoring reveals employee exposures to be at or above the AL, the employer shall perform periodic monitoring at least every six months.
		c. If monitoring reveals employee exposures to be above the PEL, the employer shall perform periodic monitoring at least every three months.
		d. If follow up periodic monitoring indicates that employee exposures dropped below the action level, and the result is confirmed by the result of another monitoring taken at least seven days later, the

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<i>Actionee</i>	<i>Step</i>	<i>Action</i>
		<p>employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.</p> <p>e. Additional monitoring shall be performed when there is a significant change in conditions, process, equipment, personnel, work practices or controls that may results in exposures above the action limit.</p> <p>NOTE: <i>Initial air monitoring may be conducted on each employee or on a representative number of employees. When representative sampling, the IH shall sample the employee(s) expected to have the highest hexavalent chromium exposure.</i></p>
S&H personnel	2.	As an alternative to conducting air monitoring as prescribed in Step 4.3.1 , the IH may compile a written exposure determination based on any combination of air monitoring data, historical monitoring data or objective data sufficient to accurately characterize employee exposures.
	3.	Employee notification of air monitoring results shall be in accordance with to MSC-PRO-409, Appendix B.

4.4 Training of Employees

<i>Actionee</i>	<i>Step</i>	<i>Action</i>
Line Management	1.	<p>Provide training to employees who perform activities defined in Section 2.0 of this document or are potentially exposed to hexavalent chromium above the AL. Training is provided through the Hanford web-based training, course # 261126, Occupational Exposure to Hexavalent Chromium. This training includes:</p> <ul style="list-style-type: none"> • The contents of 29 CFR 1926.1126, 29 CFR 1910.1026, and • The purpose of and a description of the hexavalent chromium medical surveillance program.

5.0 FORMS

Hot Work Permit A-600-895.1

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6.0 RECORD IDENTIFICATION

All records are generated, processed, and maintained in accordance with MSC-PRO-10588, *Records Management Processes*. This procedure requires training and hazard analysis, how training and hazard analysis records are captured and dealt with in the parent procedures for those topics.

7.1 Source References

10 CFR 851 *Worker Safety and Health Program*
29 CFR 1910.1026, *Chromium (VI)*
29 CFR 1926.1126, *Chromium (VI)*

7.2 Working References

MSC-PRO-079, *Job Hazard Analysis*
DOE-0352, *Hanford Site Respiratory protection Program (HSRPP)*
MSC-PRO-409, *Industrial Hygiene Monitoring, Reporting, and Records Management*
MSC-RD-9900, *Hot Work Performance Requirements*

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APPENDIX A

Guide for Respiratory Protection

Table 1- A guide for selecting the level of respiratory protection while conducting initial monitoring during hot work with chromium containing material

Process	Personnel	PF
Plasma Arc Cutting, Arc Gouging, Plasma Arc Gouging, FCAW and SMAW Welding	Person performing task	1000
	Person assisting and <u>is</u> continuously within 10 feet of the work for the entire time	1000
	Person within 10 feet of the work for short periods of time (up to 1 hour in any 8-hour period)	10
GTAW, GMAW, SAW Welding	Person performing task	10
	Person assisting and is continuously within 10 feet of the work for the entire time	10
	Person within 10 feet of the work for short periods of time (up to 1 hour in any 8-hour period)	None
Torch Cutting	Person performing task	10
	Person assisting and is continuously within 10 feet of the work for the entire time	10
	Person within 10 feet of the work for short periods of time (up to 1 hour in any 8-hour period)	None
Hot work on surfaces coated with chromate paints	Person performing task	1000 (SAR)
	Person assisting and is continuously within 10 feet of the work for the entire time	1000 (SAR)

NOTE: Pay particular attention to welding rods and wires used for filler and hard surfacing used to building-up the wear edges of equipment such as scrapers, back hoe buckets, etc. This work is often performed by mechanics and other craft workers who may not always be considered as an exposed population for welding. Chromium contents of welding rods and wires can be determined by reviewing the Material Safety Data Sheet (MSDS) or the Safety Data Sheet (SDS).

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Table 2 A guide for selecting the level of respiratory protection during removing chromate containing paints and/or coatings..

Process	Personnel	PF
Spray Painting, Grinding of chromate containing paints.	Person performing task	1000
	Person assisting and is continuously within 10 feet of the work for the entire time	1000
	Person within 10 feet of the work for short periods of time (up to 1 hour in any 8-hour period)	10
Spray Painting, abrasive removal of chromate containing paints with worker located inside enclosed booths.	Person performing task	1000 (SAR)
	Person assisting and is continuously within 10 feet of the work for the entire time	1000 (SAR)

Activities involving chromium containing materials not included above - The IH shall contact this PRO's TA or designee, to discuss appropriate exposure control measures.

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Appendix B

Requirements for Clothing Contaminated with Chromate Containing Paint Dust

Implement the following controls when clothing is considered contaminated with chromate-containing paint and/or paint dust:

- Use disposable protective clothing whenever feasible.
- Ensure employees remove the contaminated protective clothing at the end of the shift or at the end of the activity involving hexavalent chromium exposure, whichever comes first.
- Employees shall not be allowed to eat, drink, smoke, chew tobacco or gum, or apply cosmetics nor carry or store the products associated with these activities while working.
- Ensure that no employee removes the contaminated protective clothing from the workplace except to launder, clean, maintain or dispose of such clothing.
- Ensure that contaminated protective clothing to be laundered or disposed of is stored or transported in sealed, impermeable bags or other closed, impermeable containers.
- Employees must not attempt to remove hexavalent chromium from the clothing by blowing, shaking or methods that disperse hexavalent chromium into the air or onto the employee's body.
- Ensure that bags or containers of contaminated protective clothing are labeled in accordance with the 29 CFR 1910.1200, *Hazard Communication Standard*.
- Provide change areas, washing facilities and eating and drinking areas that meet the following criteria:
 - 1) Change areas are equipped with separate storage facilities for protective clothing and equipment and for street clothes, and that these facilities prevent cross-contamination.
 - 2) Eating and drinking areas are maintained as free as practicable of hexavalent chromium and employees are not allowed to enter while wearing contaminated protective clothing nor bring contaminated equipment into the eating and drinking areas.

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Appendix C *Guidance for methods of control*

Local Exhaust Ventilation

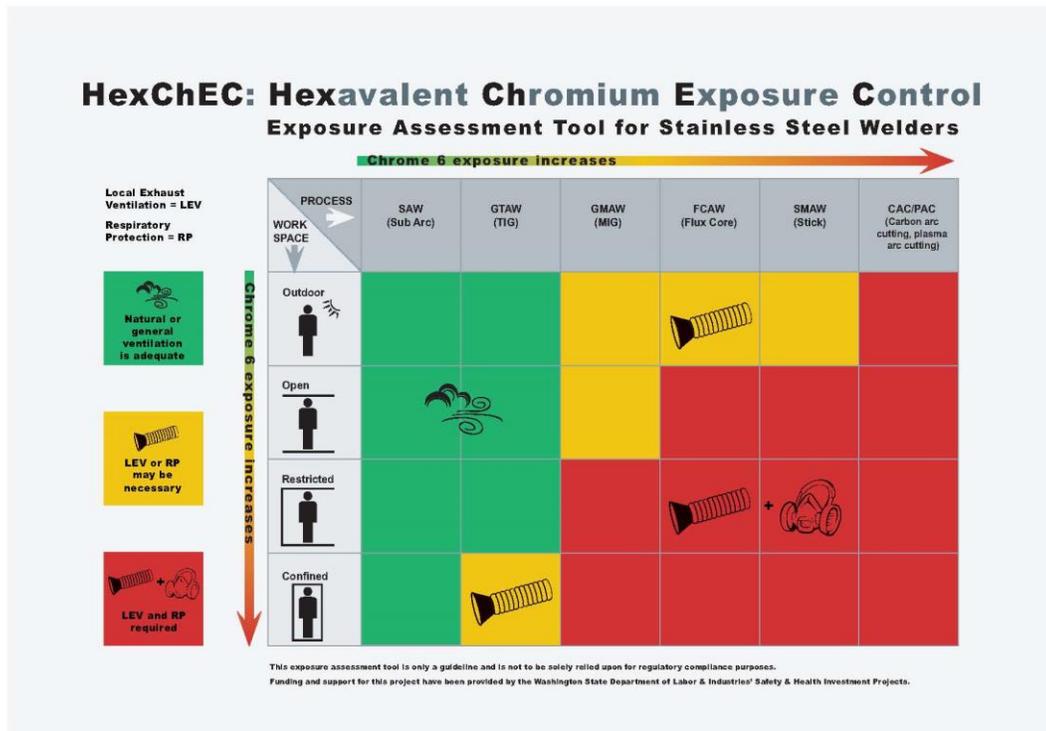
Local exhaust ventilation means the use of mechanical means to remove Chromium (VI) at the source (e.g. welding fumes, paint dust, metal dust, etc.). The ventilation control must be able to remove the generated fumes or particulate from workers breathing zone. The removed air must either be filtered with high efficiency filtration if it is to be re-circulated in the building or it must be exhausted directly outside, away from occupied areas.

As a guide for “Effective” local exhaust ventilation during welding processes it is recommended to have a capture velocity of 100 - 200 feet/minute (ft/min) at the source, or, 1000 ft/min of face velocity at the hood at a maximum distance of 6 inches from the source.

For the “Effective” removal of Chromium (VI) containing particulate, the ventilation system must be equipped with High-Efficiency Particulate Air (HEPA) filtration and have a minimum duct velocity of 3500 ft/min.

The University of Washington Field Research Group has established a Hexavalent Chromium Exposure Control Tool (i.e. HexChEC) to be used as a guide for controlling exposure with ventilation and PPE during a variety of hot work processes.

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APPENDIX D Flow Chart

