

<u>CNS OPERATIONS MANUAL</u> ADMINISTRATIVE PROCEDURE 0.36.15 HEXAVALENT CHROMIUM EXPOSURE CONTROL	USE: INFORMATION QUALITY: QAPD RELATED EFFECTIVE: 4/13/08 APPROVAL: ITR-RDM OWNER: D. A. JONES DEPARTMENT: SAFETY
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REV.	DATE	CHANGES
0	4/13/08	New procedure for exposure control of Hexavalent Chromium.

1. PURPOSE

- 1.1 When possible, exposure to Hexavalent Chromium should be avoided. The purpose of this procedure is to establish controls that maintain employee exposure to Hexavalent Chromium as low as practical. The use of filler materials with high chrome content should only be used when Engineering and Work Management have determined that processes and materials which generate levels above the exposure limit must be used.
- 1.2 The purpose of this program is to establish controls to maintain employee exposure to Hexavalent Chromium as low as practical. This procedure is designed to keep exposures to qualified works < 2.5 µg/m³ calculated TWA and unqualified workers < 0.5 µg/m³ calculated TWA. The maximum exposure levels shall not exceed:
- 1.2.1 The Permissible Exposure Limit (PEL) of 5.0 µg/m³ calculated TWA for qualified workers.
- 1.2.2 The Action Level of 2.5 µg/m³ calculated TWA, but less than the PEL for no more than 29 days per calendar year for qualified workers.
- 1.2.3 The Exclusion Limit of 0.5 µg/m³ calculated TWA for unqualified workers.

2. DISCUSSION

- 2.1 Engineering controls is an effective method of controlling exposures to Cr(VI). Information in this procedure describes the minimum standard when applying engineering controls. If these prescribed controls are not able to be followed due to work site location, restricted access due to interferences, or other unforeseen issues, a JSHA must be done per Procedure 0.36.12. In these cases, respiratory protection may be required.
- 2.2 Even when not required, an employee may elect to wear approved respiratory protection at any time. This person must be medically qualified, fit tested, and trained, as applicable, to the device being worn.
- 2.3 Review Procedure 0.40 to determine which work activities requires Safety Department notification, engineering controls, or exposure time tracking.
- 2.4 Action Level - 2.5 $\mu\text{g}/\text{m}^3$ calculated TWA.
- 2.5 Exclusion Level - 0.5 $\mu\text{g}/\text{m}^3$ calculated TWA.
- 2.6 High-Efficiency Particulate Air (HEPA) Filter - A type of filter designed to capture particles at the size of 0.3 microns at an efficiency of at least 99.97%. HEPA filters are factory tested at this level.
- 2.7 Hexavalent Chromium Cr(VI) - Chromium is a metal and exists in several different forms; Divalent, Trivalent, and Hexavalent. Hexavalent Chromium is a toxic and carcinogenic substance. When inhaled, it can damage the lining of the nose and throat and irritate the lungs. When swallowed, it can upset the gastrointestinal tract and damage the liver and kidneys.
- 2.8 Permissible Exposure Limit (PEL) - 5 $\mu\text{g}/\text{m}^3$ calculated TWA.
- 2.9 Time Weighted Average (TWA) - 8 hour time weighted average.
- 2.10 Qualified Worker - For the purposes of this procedure, it is any employee who has received the CNS or equivalent Hexavalent Chromium training module.

3. RESPONSIBILITIES

NOTE – Contractor employees who work under the sole direction of CNS Supervision shall have their Action Level days tracked by CNS.

3.1 CONTRACTOR COMPANIES

- 3.1.1 Ensure compliance with 29CFR1910/1926 and CNS requirements.
- 3.1.2 Track the exposure of their employees to Hexavalent Chromium, in particular regard to the trigger level of exposure at or above the Action Level for 30 days in any calendar year.

3.2 MAINTENANCE DEPARTMENT

- 3.2.1 Conducts or coordinates air monitoring and sampling of Cr(VI) per Procedure 0.36.14.
- 3.2.2 May conduct or coordinate Cr(VI) monitoring for any work evolution.
- 3.2.3 Where the exposure determination indicates that employee exposure exceeds the PEL, as soon as possible, but not more than 5 working days after receipt of the monitoring results, Maintenance shall either post the results in an appropriate location that is accessible to all affected employees or shall notify each affected employee individually in writing of the results.

3.3 INDUSTRIAL SAFETY

- 3.3.1 Periodically monitors workplace evolutions to ensure adequacy of administrative and engineering controls.
- 3.3.2 Recommends practices and processes to reduce workers exposure to Hexavalent Chromium to as low as practical.
- 3.3.3 Interprets this procedure and 29CFR1910.1926.

3.4 PLANNING, SCHEDULING, AND OUTAGE

- 3.4.1 Ensures work packages prepared for welding and other processes with potential for exposure to Cr(VI) contain appropriate administrative and engineering controls.

3.5 MAINTENANCE SUPERVISOR

- 3.5.1 Provides employees with pre-job briefing in regards to Cr(VI) exposure and exposure control.
- 3.5.2 Notifies Industrial Safety of work activities that could result in personnel exposure to Cr(VI) as required by this procedure.
- 3.5.3 Ensure engineering controls to control Cr(VI) are done in accordance with this procedure or job specific Job Safety Hazards Analysis (JSHA).
- 3.5.4 Tracks employee exposure days (\geq Action Level) and ensures no employee exceeds 29 days per calendar year above the Action Level. The tracking mechanism should be retrievable for audit purposes.

3.6 SITE WELDING ENGINEER

- 3.6.1 Provision of technical support regarding chromium content determinations of various materials and potential personnel exposures to Cr(VI) associated with various welding and metal removal processes.

3.7 TRAINING DEPARTMENT

3.7.1 Develops and administers Cr(VI) training.

4. PRECAUTIONS AND LIMITATIONS

- 4.1 Employees shall not be rotated to control exposure.
- 4.2 Individual employees' exposure should be kept to < 30 days/year at or above the Action Level, but less than the PEL. Individual exposure at or above the Action Level \geq 30 days/year requires a medical surveillance in accordance with 29CFR1926.1126 (i) and (k).
- 4.3 If an employee shows signs or symptoms of the adverse health effects associated with Cr(VI) exposure, then perform a medical surveillance in accordance with 20CFR1926.1126 (i) and (k).
- 4.4 Employees shall not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in areas where skin or eye contact with Cr(VI) occurs. Employees may not carry the products associated with these activities or store such products in these areas.
- 4.5 Work evolutions that require respiratory protection as the method of controlling exposure to Cr(VI) shall be demarcated with adequate postings. The postings shall contain the following information on a "Warning" - Orange and Black sign:

**Hexavalent Chromium Regulated Area
Authorized Personnel Only**

- 4.5.1 If respiratory protection is required, housekeeping should be performed to the extent practical for the work activity. Methods similar to radioactive contamination control can be applied. Examples of acceptable methods are HEPA vacuum cleaners, wet mopping, wet hand wiping. Other methods should be considered by the use of a JSHA.

5. ENGINEERING CONTROLS

CAUTION – Improper use of engineering controls may result in overexposure to Cr(VI).

- 5.1 Only approved methods, as described below and illustrated on Attachment 1 may be used. Other configurations must be approved through a JSHA per Procedure 0.36.12.
 - 5.1.1 There will be times when the prescribed methods will not be possible. The use of different methods, ducts, and distances without the use of respiratory protection may be acceptable. This will depend on the welding and metal removal process employed, chromium content of the weld filler metal and base metal, duration of the welding or metal removal activity, and other ventilation factors. Supervision, Engineering, and Industrial Safety should be contacted during the work planning process.

- 5.2 Allowed engineering control devices (all others must have a JSHA or DOP testing):
 - 5.2.1 DOP tested HEPA filter.
 - 5.2.2 DOP tested welding fume extractor.
- 5.3 The minimum size HEPA ventilation unit is 125 CFM. There is no maximum size; larger capacity and velocity will result in lower exposure.
- 5.4 The minimum capture velocity is measured at the center of the duct or hose.
 - 5.4.1 700 ft/min contact with face for vertical capture (6" to 8" duct).
 - 5.4.2 2500 ft/min contact with face for horizontal capture (6" to 8" duct).
 - 5.4.3 3000 ft/min at 1/2 of the hose diameter (1.5" to 2" hose).
- 5.5 The distance from the face of the duct/hose to the source of the welding should be kept no more than (assuming 8" duct or smaller; larger duct should be evaluated to meet the requirements of Step 5.4):
 - 5.5.1 1/2 of the duct diameter + 1" for vertical capture.
 - 5.5.2 1/2 of the duct diameter for horizontal capture.
 - 5.5.3 1 hose diameter.
- 5.6 A spark arrestor should be used for all welding operations to protect the HEPA filter.
- 5.7 A spark arrestor shall be used for plasma cutting (non-water applications).
 - 5.7.1 A spark arresting pre-filter and fire-retardant HEPA filter should be evaluated.
- 5.8 To ensure compliance, the duct distance from welding source should be measured prior to start of work and after any re-location.
- 5.9 Engineering controls shall be started prior to and shut down after the completion of welding.
- 5.10 Whenever practical, a flanged hood on the duct should be considered.
 - 5.10.1 For vertical welds, and horizontal welds with horizontal capture, a half moon may be cut in the flanged hood.
 - 5.10.2 For horizontal welds with vertical capture a flange at least 4" wider than the pipe diameter should be used.

5.11 UNIT SET UP

5.11.1 Both ventilation and weld fume extractor units should be used with one piece of ducting/hose.

5.11.1.1 If more than one section is used, capture velocity verification is required.

5.11.2 Maintain all ducts and hoses as straight as possible.

5.11.3 Bends of > 90° should be avoided.

5.11.4 Vertical ventilation should remain stationary when using a flange.

5.12 PRE-FILTERS AND DIFFERENTIAL PRESSURE (DP)

5.12.1 Frequent pre-filter change-outs may be required to ensure capture velocities are maintained.

5.12.2 Contact RP prior to pre-filter change-outs in contaminated areas or when using contaminated ventilation/weld fume extractor units.

5.12.3 Use the following chart for maximum DP gauge readings (this will maintain requirements of Step 5.4):

UNIT FLOW RATES	UNIT MAXIMUM
2000/2500 CFM	6.0" of H ₂ O
1000 (480v) CFM	4.4" of H ₂ O
700/1000 CFM	3.8" of H ₂ O
125 CFM	3.2" of H ₂ O

5.12.4 Pre-filter/bag change-outs should be completed when weld fume extractor performance begins to diminish.

5.12.5 Refer to Procedure 9.RADOP.17 for more details on ventilation units.

6. RESPIRATORY PROTECTION

6.1 Respirator protection is required:

6.1.1 Whenever required engineering controls cannot be used.

6.1.2 When an individual requests one for personal use.

6.1.3 At the discretion of Industrial Safety or Maintenance.

6.1.4 During some confined space welding.

6.2 Respiratory protection shall be used per Procedure 9.RESP.1 and 29CFR1910.134, Respiratory Protection.

7. CONFINED SPACES

- 7.1 The requirements of this section are performed in addition to the other procedure sections, as applicable.
- 7.2 All confined space Cr(VI) welding should be evaluated for Permit Required. Items to consider: size of area, type of welding being performed, and ventilation used. Refer to Procedure 0.36.3.
- 7.3 Forced make-up air is recommended whenever possible.
- 7.4 Continuous air monitoring for oxygen, carbon monoxide, and explosive gases is required.
- 7.5 Removal of ventilation to allow access/egress is prohibited. Saddle vents or other man-way style ventilation adaptors should be considered for single entry point spaces.
- 7.6 Respiratory protection for the welding activities listed in CNS procedures is required in addition to engineering controls (see Step 4.5).

8. TRAINING

- 8.1 All employees who, in the normal course of their job assignments, may reasonably be expected to have an exposure to Hexavalent Chromium must be given training.
- 8.2 Initial training must be given prior to or at the time of the initial assignment to a job involving potential exposure to Hexavalent Chromium. If an employee has had approved Hexavalent Chromium training (training met all the requirements of this program) within the last 12 months, they may take credit for that training.
- 8.3 Training must cover:
 - 8.3.1 The health hazards associated with Hexavalent Chromium exposure.
 - 8.3.2 The location, manner of use, and release of Hexavalent Chromium in the workplace, and the specific nature of operations that could result in exposure to Hexavalent Chromium, especially exposure above the PEL.
 - 8.3.3 The engineering controls and work practices.
 - 8.3.4 The purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing.
 - 8.3.5 Measures employees can take to protect themselves from exposure to Hexavalent Chromium including modification of personal hygiene and habits such as smoking.
 - 8.3.6 The purpose and a description of the Medical Surveillance Program.
 - 8.3.7 The employee's rights of access to records as described in this program.

9. RECORDS

- 9.1 Training records must be kept for a minimum of 3 years.
- 9.2 Exposure monitoring records (including results) must be kept for the duration of employment plus 30 years.
- 9.3 Medical Surveillance Records must be kept for the duration of employment plus 30 years.
- 9.4 Medical Removal Records are retained for at least the duration of an employee's employment.

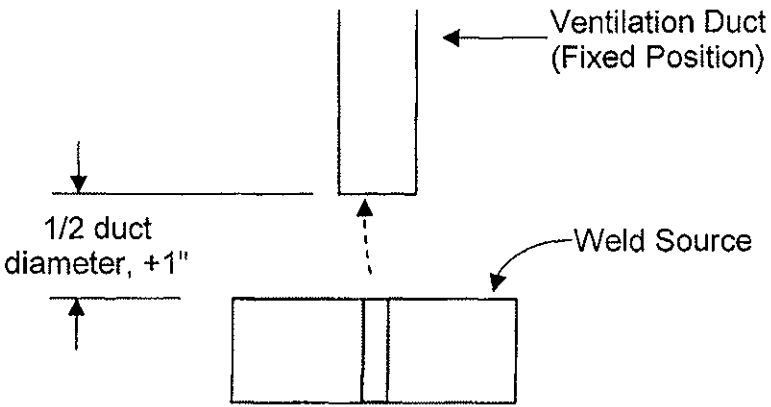
10. REFERENCES

10.1 COMMITMENTS AND OBLIGATIONS MATRIX

COMMITMENTS AND OBLIGATIONS	AFFECTED STEPS
QAPD	None

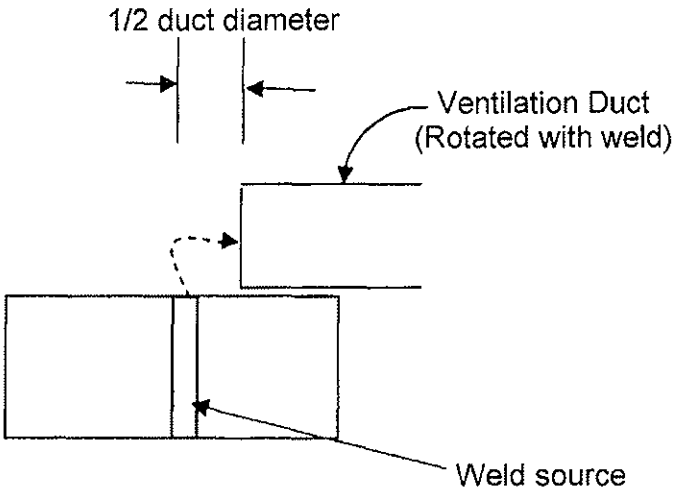
10.2 PROCEDURES

- 10.2.1 Administrative Procedure 0.36.3, Confined Space Procedure.
- 10.2.2 Administrative Procedure 0.36.12, Jobs Safety Hazards Analysis (JSHA).
- 10.2.3 Administrative Procedure 0.36.14, Hexavalent Chromium (CR VI) Air Monitoring.
- 10.2.4 Administrative Procedure 0.40, Work Control Program.
- 10.2.5 Maintenance Procedure 7.7.1, Special Process Control Maintenance Procedure.
- 10.2.6 Rad Protection Procedure 9.RADOP.17, Operation and Maintenance of HEPA Vacuum Cleaners and HEPA Ventilation Units.
- 10.2.7 Rad Protection Procedure 9.RESP.1, Respiratory Protection Program.



Detail for horizontal weld, vertical ventilation

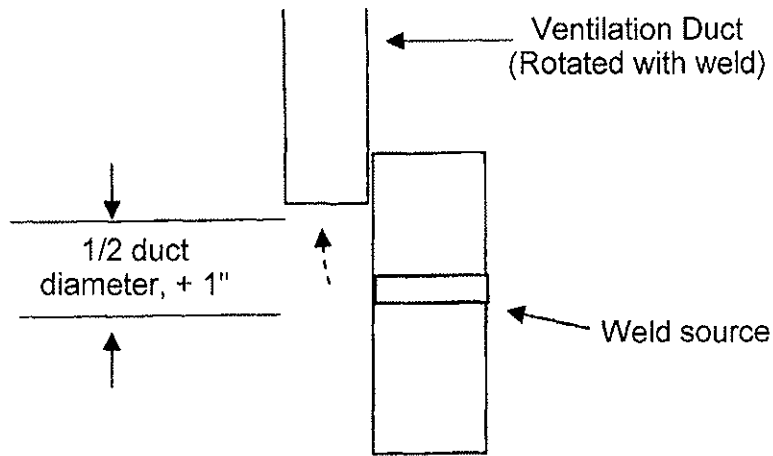
Figure 1



Detail for horizontal weld, horizontal ventilation

0-36-15B

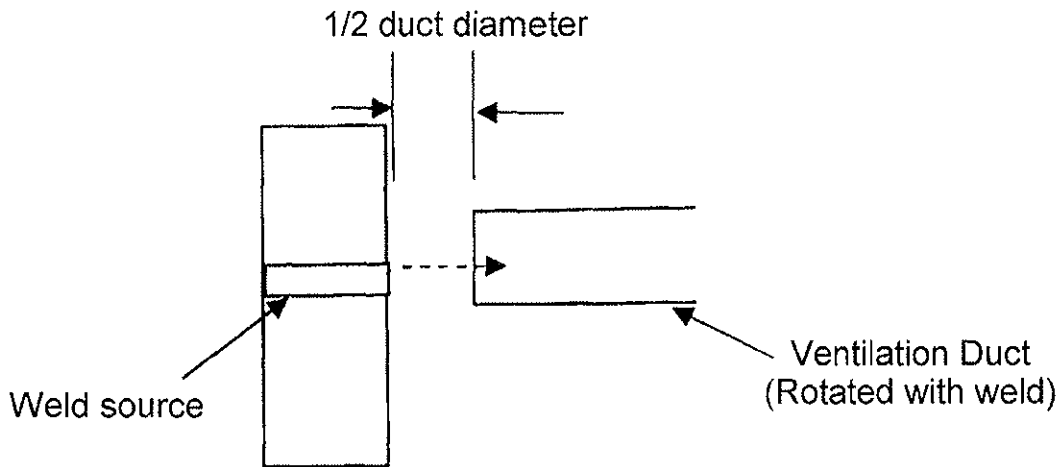
Figure 2



Detail for vertical weld, vertical ventilation

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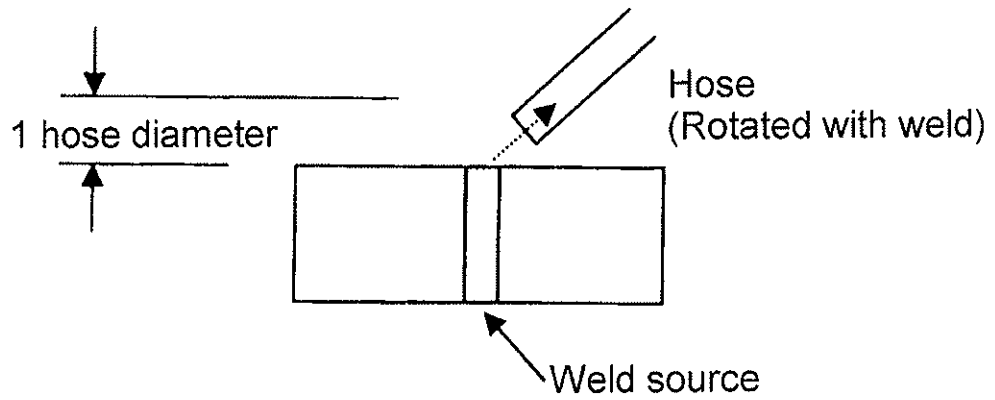
Figure 3



Detail for vertical weld, horizontal ventilation

0-36-15D

Figure 4



**Detail for weld fume extractor (vacuum style) usage.
Apply at ~ 45 degrees from weld at any weld source orientation**

Figure 5