



# Oregon

Tina Kotek, Governor

Department of Consumer and Business Services

Oregon Occupational Safety & Health Division (OR-OSHA)

osha.oregon.gov

DATE, 2023

ORRA MEMBER NAME AND ADDRESS REDACTED

**RE: Consultation Report #####**

Dear X,

Thank you for the opportunity to visit your workplace to conduct a Specific Health consultation on DATE, 2023. It was great meeting with EMPLOYEE NAMES REDACTED. The purpose for this consultation was to discuss the new Oregon OSHA rules on manganese and to conduct employee exposure monitoring for welding fume.

## **SUMMARY OF EMPLOYEE EXPOSURE MONITORING RESULTS**

EMPLOYEE WELDING was monitored for their exposure to welding fumes while they welded on mild steel to build two bases for the large tubs. EMPLOYEE's exposure to manganese during the sample time of 119 minutes was 0.44 milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ). If they didn't perform welding the rest of their work shift, their 8-hour time-weighted average (TWA) was  $0.11 \text{ mg}/\text{m}^3$ . The new Oregon OSHA Permissible Exposure Limit (PEL) for manganese is  $0.10 \text{ mg}/\text{m}^3$ . Therefore, the level detected was above the PEL and would require respiratory protection. EMPLOYEE's exposure to chromium, nickel, copper and total welding fume were below the respective PELs. Please see page 6 of this report for the Industrial Hygiene Sample Report for the details on the sample methodology and sample results. At the end of this report, you will find the Laboratory Analytical Reports.

## **OREGON OSHA REQUIREMENTS**

### **Employee Exposure Records**

All employee exposure sample results must be shared with the affected employees. This would include those that were monitored and those that do similar job tasks. The Laboratory Analysis Report is at the end of this report. Maintain the air monitoring sample results for at least 30 years in accordance with [Division 2, Subdivision Z \(oregon.gov\)](#).

## Reducing Employee Exposures to Welding Fume

The Oregon OSHA Welding rule requires the employer to use feasible engineering controls to reduce employee exposures, [OAR 437-002-0288\(2\)](#). Respiratory protection is the last control that should be used. Here are some ways that could reduce exposures:

1. Consider installing local exhaust ventilation such as a portable fume extractor to capture welding fumes close to the source.
2. Educate welders on how to position themselves to avoid breathing welding fume and gases.
3. Substitute the [ER70S6 Mild Steel Welding Wire](#) that contains up to 5% manganese with ones that contain lower amounts of manganese. For example, [Coreweld C6 ECO \(esab.com\)](#) only contains 1% manganese.

## Respiratory Protection

Based on this exposure monitoring, respiratory protection is required. The level detected would require a respirator with an Assigned Protection Factor (APF) of at least 10. These include half-face cartridge respirators with HEPA cartridges. If you decide to use these, you will need to ensure the welders do not do welding tasks longer than allowed in [Table Q-2](#) of the welding standard. As we discussed, you should keep a record documenting the time they spend doing these tasks each day. However, if you decide to provide Powered Air Purifying Respirators (PAPR) which have an APF of 25, your welders would be able to weld and grind as much as they need to without having to conduct employee exposure monitoring or documenting their time.

It is required that you comply with Oregon OSHA's rule on respiratory protection, [CFR 1910.134 Respiratory Protection](#). In addition to providing respiratory protection, it is also required that you develop and implement a Respiratory Protection Program, if you don't already have one. The program should include the following:

- A written Respiratory Protection Program. Here is Oregon OSHA's example of a written program you could use to develop yours: <https://osha.oregon.gov/OSHAPubs/pubform/resp-prog-req.pdf>. This one is very thorough and covers all types of respiratory protection uses. Make sure if you use this template, that you customize it to your workplace requirements.
- Designate a Program Administrator who is qualified by appropriate training or experience that understands the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness.
- Medical evaluations of employees required to use respirators. There are two options to accomplish this. Option one is to send employees to an Occupational Health Clinic where they are evaluated by a licensed healthcare practitioner. Option two is to have your employees complete the [Medical Questionnaire](#) in the Respiratory Protection Standard and have those reviewed by a licensed healthcare practitioner. There are also online medical evaluations where the employees can fill out the medical questionnaire and someone from the provider will review them. Here are three providers that offer that:
  - [Medical Evaluation | Center for Respiratory Protection | Respiratory Protection | 3M - US](#)
  - [Respirator Exam and Certification • Employee Drug Testing, Workplace Drug Testing \(ohsinc.com\)](#)
  - [Home - Get OSHA Respirator Clearance For Your Company \(respsafety.com\)](#)
- Annual respirator fit testing for tight fitting respirators. If you decide to use PAPRs that are loose fitting, annual fit tests are not required.
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations.
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators.

- Provide annual training on the respiratory hazards, in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance.
- Procedures for regularly evaluating the effectiveness of the program.

**NEW CHANGES TO THE WELDING RULE**

Oregon OSHA recently adopted changes to the Welding Rule, [Text of Rules to Reduce Manganese Permissible Exposure Limit; Clarifies, Cross-References Welding Rules with Other Standards Including Confined Spaces \(oregon.gov\)](#). It is recommended the full rule be reviewed so that you understand all of the requirements. In this report, the changes made to manganese and confined space entry were the focus.

**Manganese:** The rule allows employers to use specific levels of respiratory protection for specific types of welding tasks within specific periods of time and other limits. The new Table OR Q-2 correlates this approach which is offered as an option, and not as a requirement. Table OR Q-2 describes levels of respiratory protection that may be relied upon, within the duration of time indicated for the specific welding-related task, to prevent exposure to manganese above the PEL. Therefore, instead of having to perform employee exposure monitoring whenever projects change that have the potential to increase employee exposures to manganese, you can rely on the respiratory protection described in Table OR Q-2 for Manganese, see below:

<b>TABLE OR Q-2 for Manganese</b>		
<b>Welding, cutting or grinding tasks</b>	<b>Minimum Assigned Protective Factor (APF) for respiratory protection when performing the task listed during a single work shift within the ranges of times shown</b>	
	<b>APF = 10</b>	<b>APF = 25</b>
Carbon Arcing	5 minutes – 60 minutes (1 hr.)	> 60 minutes
Flux Core Arc Welding (FCAW) or MIG-flux core welding	15 minutes – 120 minutes (2 hrs.)	> 120 minutes
Gas Metal Arc Welding (GMAW) or MIG-solid wire welding	30 minutes – 270 minutes (4.5 hrs.)	>270 minutes
Gas Tungsten Arc Welding (GTAW) or TIG-welding	150 minutes (2.5 hrs.) or more	N/A
Grinding Tasks directly related to the Welding process	15 minutes – 180 minutes (3 hrs.)	> 180 minutes
Hand-Held Torch Cutting	15 minutes – 150 minutes (2.5 hrs.)	> 150 minutes
Hand-Held Plasma Cutting	30 minutes – 300 minutes (5 hrs.)	> 300 minutes
Shielded Metal Arc Welding (SMAW)	10 minutes – 90 minutes (1.5 hrs.)	> 90 minutes

**NOTES for Table OR Q-2:**

- The symbol ">" means "greater than" the number of minutes that follow it.
- See descriptions in OAR 437-002-0299 of the tasks included here.
- Assigned Protective Factor (APF) is defined in 1910.134 Respiratory Protection.
- Estimated exposures to Manganese within these guidelines are calculated using a more protective exposure target of 0.02 mg/m3.

Here is Oregon OSHA's fact sheet that summarizes the requirements, [Airborne Exposure Limit for Manganese and How to Protect Workers](#).

**Welding in a Confined Space:** During our discussion, it was discovered that employees sometimes have to weld inside a confined space such as inside the garbage trucks. There are changes in the Welding Rule that apply to welding inside confined spaces if welding is the only hazard inside the space. It is recommended that you review and implement those requirements [437-002-0279 Additional Oregon Confined Space Requirements](#). If you have any questions or would like additional assistance, please contact me.

## NEW RULES

### **Heat Illness Prevention Program 437-002-0155**

#### [Oregon Occupational Safety and Health : Heat stress : State of Oregon](#)

Oregon OSHA recently adopted a Heat Illness Prevention rule. This rule applies to all of your drivers, shop employees and anyone else that works outdoors. This rule does not apply to buildings and structures that have a mechanical ventilation system that keeps the heat index below 80<sup>0</sup> F. However, if there is a potential for the heat index to reach 80<sup>0</sup>F and higher in the building, the requirements apply.

This Oregon OSHA Fact sheet, [Heat Illness Prevention Rules Key Requirements](#), summarizes the requirements. A written plan is one of the requirements. Here is Oregon OSHA's template: [Heat Illness Prevention Plan Sample](#). Employee annual training is also required. This online course is designed to satisfy 5 of the 7 training requirements found in Oregon OSHA's rules to address heat illness prevention: [Heat Illness Prevention online course](#). You will need to train employees on the specifics of your written plan and how to adapt to working in a hot environment.

### **Wildfire Smoke 437-002-1080**

#### [Oregon Occupational Safety and Health : Wildfires : State of Oregon](#)

This rule doesn't apply to employees who work in a ventilated filtered building. It does apply to employees who are exposed to unhealthy wildfire smoke as defined as an Air Quality Index of 101 and above. Review this fact sheet to help make sure you have a plan: [Protection From Wildfire Smoke Rules Key Requirements \(oregon.gov\)](#). In summary, below are the requirements:

- (1) **Exposure assessment:** Determine and monitor employee exposure to wildfire smoke where the ambient air concentration for PM2.5 is at or above 35.5 µg/m<sup>3</sup> (AQI 101). Such assessments must be conducted at the start of each shift and as needed to identify and implement appropriate exposure controls. Here is a fact sheet with websites and phone apps that can be used to monitor the air quality index: [UsingAQItoAssessWildfireSmoke.pdf \(oregon.gov\)](#).
- (2) **Information and training:** Develop and implement wildfire smoke training for employees who may be exposed to an ambient air concentration for PM2.5 at or above 35.5 µg/m<sup>3</sup> (AQI 101). The training must be provided annually before employees are exposed in a language and vocabulary readily understood, and in a manner that facilitates employee feedback. Here is Oregon OSHA's online training that can be used: [Wildfire Smoke online course](#). Document the training with the name of each employee trained, the date of the training, and the name of the person who conducted the training. This training record must be maintained for one year until the next annual training is conducted.

- (3) **Employer two-way communication:** Before employees are exposed to ambient air concentration for PM<sub>2.5</sub> at or above 35.5 µg/m<sup>3</sup> (AQI 101), develop and implement, whenever feasible, a system to communicate wildfire smoke hazards.
- (4) **Exposure controls:**
- a. **Engineering and administrative controls:** Implement engineering or administrative controls to reduce employee PM<sub>2.5</sub> exposure to less than 35.5 µg/m<sup>3</sup> (AQI 101) unless the employer can demonstrate that such controls are not feasible.
  - b. **Control by voluntary use of respirators:** Whenever employee exposure to PM<sub>2.5</sub> is at or above 35.5 µg/m<sup>3</sup> (AQI 101), even after the implementation of engineering and administrative controls, ensure NIOSH-approved filtering facepiece respirators that effectively reduce the wearer's inhalation of PM<sub>2.5</sub>, are provided to exposed employees for voluntary use.
  - c. **Control by required use of NIOSH-approved respirators in accordance with a Wildfire Smoke Respiratory Protection Program:** Whenever employee exposure to PM<sub>2.5</sub> is at or above 200.9 µg/m<sup>3</sup> (AQI 251), even after the implementation of engineering and administrative controls, ensure employees wear NIOSH-approved filtering facepiece respirators that effectively reduce the wearer's inhalation of PM<sub>2.5</sub> when such use would not expose the wearer to a greater hazard. For such respirators used exclusively for wildfire smoke, the employer may implement and follow the Wildfire Smoke Respiratory Protection Program described in [Appendix A](#) of the standard in lieu of conducting medical evaluations and fit testing of respirators.
  - d. **Control by required use of NIOSH-approved respirators in accordance with 29 CFR 1910.134: Respiratory Protection:** Whenever employee exposure to PM<sub>2.5</sub> is at or above 500.4 µg/m<sup>3</sup> (AQI 501), even after the implementation of engineering and administrative controls, ensure employees wear NIOSH-approved respirators that effectively protect wearers from PM<sub>2.5</sub> when such use would not expose the wearer to a greater hazard. For respirators used exclusively to protect employees from wildfire smoke concentrations of PM<sub>2.5</sub> at or above 500.4 µg/m<sup>3</sup> (AQI 501), develop and implement a complete Respiratory Protection Program in accordance with 29 CFR 1910.134: Respiratory Protection. Many employers are choosing to stop work on these days so that they don't have to implement a full Respirator Protection Program.

## **INDUSTRIAL HYGIENE SAMPLING REPORT**

**Prepared for: ORRA MEMBER**

**Date of Site Visit: DATE**

**Date of Report: 14 DAYS AFTER VISIT**

### **Process**

On DATE, exposure monitoring for metals was conducted on EMPLOYEE while they constructed two bases for large garbage tubs. They performed MIG-solid wire welding on mild steel using [Lincoln ER70S6 Mild Steel Welding Wire](#) with DC current. The shielding gases included 75/25 of Argon/CO<sup>2</sup>. They wore a welding helmet, safety glasses, work boots, coveralls, leathers, and leather gloves.

### **Sampling Methods**

Air sampling in the welder's personal breathing zone was conducted for metal fumes, and total particulates using an SKC AirChek 52 medium air flow sampling pump in conjunction with matched-weight, two-piece, low ash polyvinyl chloride filter cassette. The filter cassette was placed on their collar so that it could be under the welding helmet during welding and remain in their breathing zone when the helmet was raised up.

The sampling pump was pre-calibrated to a flow rate of approximately 2.0 liters per minute (LPM). Post-calibration was conducted following the sampling period. Pre and post calibration was conducted using a TSI 4140 Calibrator. The samples were secured, sealed and shipped to Oregon OSHA's Analytical Laboratory (AIHA accredited). OSHA ID-121 method and NIOSH 0500 method (gravimetric) were used for analysis.

### **Health Effects**

Welding fumes are composed of metals, metal oxides and other compounds volatilized from the base metal, the electrode or the flux material. All welding processes produce fumes, but the quantity can vary widely depending on the process. Welding fume particles are almost all less than one micrometer in diameter so that fumes are present during welding whether a smoke plume is visible or not. Due to their small size, fumes are able to penetrate deep into the respiratory system.

The presence of certain toxic metals in the fumes may be a more important factor in determining degree of hazard than the total quantity of fumes. Such metals as manganese, chromium, nickel, cadmium, zinc and copper may be present as small fractions of the total fume, but may represent the major hazard of the job. Prolonged and repeated overexposure to these metals may potentially cause respiratory and /or neurological problems. Welding fumes have also been classified as "possibly carcinogenic" by the International Agency for Research on Cancer (IARC Group 2B).

Most fumes generated during welding contain a small percentage of manganese that when inhaled can damage the lungs, liver, kidney and central nervous system. When manganese is inhaled, it bypasses the body's normal defense mechanisms for detoxification and can bioaccumulate in vital organs, such as the brain.

### **Sample Results**

Results are shown in Table 1 below. Results **above** the Oregon OSHA exposure limits are shaded **red**. Copies of the analytical laboratory report can be found at the end of this report.



**TABLE 1  
WELDING FUME SAMPLE RESULTS  
DATE, 2023**

Employee/Job Task	Chromium mg/m <sup>3</sup>	Copper mg/m <sup>3</sup>	Manganese mg/m <sup>3</sup>	Nickel mg/m <sup>3</sup>	Total Particulates Welding Fume mg/m <sup>3</sup>
EMPLOYEE/ MIG welding two bases <sup>1</sup>	<LOQ	0.061	0.44	<LOQ	6.8
TWA <sup>2</sup>	<LOQ	0.015	0.11	<LOQ	1.7
PEL <sup>4</sup>	1.0 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup> 5.0 mg/m <sup>3</sup> Ceiling	1.0 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>

- Key:**
- mg/m<sup>3</sup>** *Milligrams of contaminant per cubic meter of air.*
  - <LOQ** *Less than the limit of quantitation*
  - <sup>1</sup> **Level** *This is the actual measured airborne concentration during the sampling period. If the employee continued to weld for the rest of their work shift, this would represent their 8-hour time-weighted average exposure.*
  - <sup>2</sup> **TWA:** *Time Weighted Average. This is an estimate of the full shift, 8-hour exposure, assuming no additional exposure to contaminant during their work shift.*
  - <sup>3</sup> **PEL:** *Permissible Exposure Limit. This is the allowable 8-hour time-weighted-average exposure limit per OAR 437-02-382., "Oregon Rules For Air Contaminants".*

Attached you will find the “Hazard Identification and Correction” work sheets which list the hazards observed during the consultation. The observations and recommendations made in this report are designated as SERIOUS (S) or OTHER THAN SERIOUS (OTS) based upon probable severity if an injury or illness were to occur. SERIOUS hazards are those situations or conditions which could result in serious illness, physical harm or death. OTHER THAN SERIOUS hazards are those situations or conditions which could result in employee injury or illness of a less serious nature. These designations are intended to help you prioritize corrective action. You should develop an action plan to ensure prompt correction of these identified hazards. Your company is exempt from a routine scheduled Oregon OSHA inspection at this location for 60 days from the date of this report. As mentioned during the consult, this does not exempt your company from enforcement action in the event of an accident investigation, a complaint, referral, or the observance of an imminent danger.

During the consultative visit, I attempted to identify all hazards. However, there may be some hazards that were not seen or identified. It remains the responsibility of the employer to ensure the safety and health of employees and to identify and correct all hazardous conditions and/or situations. This report cannot result in enforcement activity, nor can Oregon OSHA Enforcement use this report as a basis for a citation. Information provided is not a formal endorsement of any vendor or product.

Oregon OSHA values your feedback. Please take a few moments to assist us in improving consultative services. In the next few days, you will receive an email with a link to our online survey. If multiple consultations (safety, ergo, health) were completed within the same time frame, you will receive multiple emailed links. Each survey is specific to the services provided; please provide feedback that is pertinent to that particular consultation.

Consultation Report #####

Thank you for requesting our assistance to improve safety and health in your workplace. If there are any questions regarding occupational safety and health issues, please feel free to contact me.

Jennifer Ekdahl  
Senior Occupational Health Consultant  
Consultative Services Section  
1340 Tandem Avenue NE, Suite 160  
PO Box 14513  
Salem, OR 97309  
503-373-7819



# HAZARD IDENTIFICATION AND CORRECTION

## Oregon Occupational Safety and Health Division Consultation Services

**Firm Name:** ORRA MEMBER

**Report Number:** #####

**Date:** DATE/2023

<i>No</i>	<i>Item</i>	<i>Location</i>	<i>S</i>	<i>OTS</i>	<i>Recommended Action</i>	<i>Assigned To</i>	<i>Due Date</i>
1	Welding is performed indoors without the use of local exhaust ventilation.  Rule: OAR 437-002-0288(2)	Shop		X	Use local exhaust ventilation as the primary control measure for indoor workplaces when feasible.		
3	Employees who weld are exposed to manganese levels that exceed the Permissible Exposure Limit (PEL).  Rule: OAR 437-002-0281(1)	Administrative	X		Provide the welders with respiratory protection. See the body of this report for more details.		
2	You did not have a written Respiratory Protection Program for the employees who are required to wear respiratory protection.  Rule: 1910.134(c)(1)	Administrative	X		Develop and implement a written Respiratory Protection Program for all employees who are required to wear respirators. See the body of this report for details.		
4	Employees required to wear respiratory protection have not been medically evaluated and certified to wear the respirator.  Rule: 29 CFR 1910.134(e)(1)	Administrative	X		Provide medical evaluations to employees who are required to wear respiratory protection to determine the employee's ability to use a respirator. The medical evaluation and certification must be done before the employee is fit tested or required to use the respirator in the workplace.		

**Employer Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**HAZARD IDENTIFICATION AND CORRECTION**  
**Oregon Occupational Safety and Health Division**  
**Consultation Services**

**Firm Name:** ORRA MEMBER                      **Report Number:** #####                      **Date:** DATE/2023

<i>No</i>	<i>Item</i>	<i>Location</i>	<i>S</i>	<i>OTS</i>	<i>Recommended Action</i>	<i>Assigned To</i>	<i>Due Date</i>
5	There was no Program Administrator for the Respiratory Protection Program.  Rule: 29 CFR 1910.134(c)(3)	Administrative	X		This person should be qualified by appropriate training or experience on your Respiratory Protection Program. This person will oversee your program and evaluate the program effectiveness.		

**Employer Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

## **LABORATORY ANALYSIS REPORTS**

**Maintain these employee exposure records for 30 years.**



**Firm Name**  
**Location/Address** ●●●●●●●●  
**Name** JENNIFER EKDAHL  
**Report Number** ●●●●●  
**Date Sampled** ●●●/2023  
**Set Number** ●●  
**Sample Type** AIR

Chain of Custody		
Received	SEC	●●●/2023
Logged In	SEC	●●●/2023
Analyst	ARH	●●●/2023
Date Reported	●●●	2023
Lab Supervisor	<i>Wayne O. Boyle</i> Wayne O. Boyle	

**THIS IS AN AMENDED REPORT**

Corrected report number

**Lab No.**

●●●●● Sample Description Employee was MIG welding on mild steel using ER70S-6 wire to build two bases for the garbage tubs.  
 Job Process MIG welding on mild steel  
 Employee Name ●●●●●●●●  
 Sample Number ●●●●●  
 Sample Media 25 mm 5.0 um LA-PVC Filter  
 Sample Condition Acceptable  
 Sampling Time 119.0 minutes  
 Air Volume 239.7 liters

Test Results	Concentration		Method
Chromium	Less than the LOQ of	6.0 ug	1001
Copper Fume (as Cu)		14 ug	0.061 mg/m3
Manganese Fume (as Mn)		100 ug	0.44 mg/m3
Nickel	Less than the LOQ of	3.0 ug	1001
Welding Fumes (as Total Particulates)		1.6 mg	6.8 mg/m3

●●●●● **FIELD BLANK**  
 Sample Description Blank  
 Job Process  
 Employee Name  
 Sample Number 230216-8  
 Sample Media 25 mm 5.0 um LA-PVC Filter  
 Sample Condition Acceptable  
 Sampling Time minutes  
 Air Volume liters

Test Results	Concentration		Method
Chromium	Less than the LOQ of	6.0 ug	1001
Copper Fume (as Cu)	Less than the LOQ of	1.0 ug	1001
Manganese Fume (as Mn)	Less than the LOQ of	2.0 ug	1001
Nickel	Less than the LOQ of	3.0 ug	1001



Welding Fumes (as Total Particulates)      Less than the LOQ of 0.03 mg      1004

Note: For samples above the LOQ, airborne results have been field blank corrected.

Chromium	SAE = 0.101	LOQ = 6.0 ug	IMIS = 0685	CAS = 7440-47-3
Copper Fume (as Cu)	SAE = 0.093	LOQ = 1.0 ug	IMIS = 0731	CAS = 7440-50-8
Manganese Fume (as Mn)	SAE = 0.098	LOQ = 2.0 ug	IMIS = 1620	CAS = 7439-96-5
Nickel	SAE = 0.094	LOQ = 3.0 ug	IMIS = 1840	CAS = 7440-02-0
Welding Fumes (as Total Particulates)	SAE = 0.082	LOQ = 0.03 mg	IMIS = 2587	CAS =



Employee	Analyte	TWA	8 hr TWA	TWA	8 hr TWA
●●●●●●	Welding Fumes (as Total)	6.8 mg/m3	1.7 mg/m3		
●●●●●●	Manganese Fume (as Mn)	0.44 mg/m3	0.11 mg/m3		
●●●●●●	Copper Fume (as Cu)	0.061 mg/m3	0.015 mg/m3		

This lab report relates only to the items tested in the samples as submitted to the lab for analysis. The analyte concentration values and the TWA report values are calculated using data outside of the lab's control.