



## CONFINED SPACE ENTRY PROCEDURES

CONFINED SPACE NAME:

Boilers

ID #

Boiler 1/ Boiler 2

LOCATION:

Gerry Brewer Building

EP #

9

DATE:

November 2012

HAZARDOUS ATMOSPHERIC RATING:

**Moderate**

### SCOPE OF WORK (From Hazard Assessment)

This Hazard Assessment (HA) refers to entry for the purpose of inspection (with flashlight), cleaning and refractory brick repair. Cleaning involves manually removing debris (soot/dust/fibres) on steel surfaces (fire side surfaces) with a wire brush and manually removing dust/fibres on refractory bricks with a HEPA filter vacuum. Refractory brick repair includes manual patchwork to cracks with a mouldable product (Inswool Moldable and Inswool-HP Blanket 8).

*Hot work and other atmospheric contaminant generating activities (e.g., high pressure water washing, painting) are not included in this Hazard Assessment.*

### SUMMARY OF POTENTIAL HAZARDS

	Hazards	Undisturbed Space	Work Tasks	Additional Comments
ATMOSPHERE	Oxygen (O <sub>2</sub> ) Deficiency	<b>Yes</b>	No	See Hazard Assessment for additional details.
	O <sub>2</sub> Enrichment	No	No	
	Chemical	<b>Yes</b>	<b>Yes</b>	
	Biological Hazards	No	No	
	Fire/Explosion	<b>Yes</b>	No	
SAFETY HAZARDS	Structural	No	No	
	Engulfment	No	No	
	Entrapment	No	No	
	Electrical	<b>Yes</b>	No	
	Access/egress	<b>Yes</b>	No	
	Fall	No	No	
	Slip/Trip	No	No	
	Visibility/Light Level	<b>Yes</b>	No	
	Baffles/internal arrangement	<b>Yes</b>	No	
	Floor openings in space	No	No	
PHYSICAL AGENTS	Noise/Vibration	No	<b>Yes</b>	
	Temperature	<b>Yes</b>	No	
	Non/Ionizing Radiation	No	No	
	Laser	No	No	
OTHERS	Ingestion/Skin Contact	No	<b>Yes</b>	
	Mechanical	No	No	
	Traffic Hazard	No	No	
	Hydraulic/ Pneumatic	No	No	


**COMPLETED BY:**

**Prepared by:** Peter Bergholz, BSc, CIH, AMEC, November 2012

**Reviewed by:** Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012

**SOURCE:** Paul Elsoff & Richard Howard


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Topics	No.	Tasks/ Equipment Required
<b>Prior to Entry</b>		
<b>Equipment Required</b>	1.	Ensure the following is available: <ul style="list-style-type: none"> <li>Pick up gas detectors (with pump). Gas detectors must be bump tested and/or calibrated prior to use and have the following sensors:               <ul style="list-style-type: none"> <li>oxygen (O<sub>2</sub>),</li> <li>flammable/combustibles (LEL),</li> <li>carbon monoxide (CO), and</li> <li>hydrogen sulphide (H<sub>2</sub>S)</li> </ul>               (City standard)             </li> <li>Provide continuous negative air ventilation with HEPA filter</li> <li>Two-way radio (for Standby Person and Entry Supervisor) – no cellular telephones</li> <li>Flashlight</li> <li>Temporary wood platform (to cover floor surface)</li> <li>HEPA filter vacuum cleaner</li> </ul>
	2.	<b>General PPE:</b> <ul style="list-style-type: none"> <li>Full-face respirator with P100 cartridges</li> <li>Disposable Tyvek coveralls</li> <li>Safety boots</li> <li>Work gloves (disposable nitrile)</li> <li>Hard hat</li> <li>Hearing protection</li> </ul>
	3.	<b>Rescue equipment:</b> <ul style="list-style-type: none"> <li>2<sup>nd</sup> gas detector</li> </ul>
<b>Entry Permit/Gas Testing Log</b>	4.	Complete and post the <b>Confined Space Entry Permit</b> at the entrance. (NOTE: Update the Permit accordingly.)
	5.	Entry Supervisor to sign Confined Space Entry Permit once all equipment is ready to be installed and observe initial entry.
<b>Space Preparation</b>	6.	Cool for a sufficient time period (e.g., 24 hours) and drain (water tubes) prior to entry.
	7.	Burner is required to be removed to gain access to boiler opening (fireside).
	8.	Place HEPA filtered negative air ventilation inside and attach to vent, relief valve or waterside inspection covers.
	9.	Wood platform is required on the floor surface for crawling inside – entrant will be required to crawl during entry.
<b>Pre-Work</b>	10.	Inspect all equipment for damage before use. Remove damaged equipment from service. Use HEPA filter vacuum to clean up any obvious debris.

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Topics	No.	Tasks/ Equipment Required
<b>Coordination</b>	11.	Standby and Entry Supervisor must have a two-way radio.
	12.	Standby must have training in monitoring duties, initiating emergency response and manual removal of injured victims.
	13.	Rescue personnel must have training in first aid and CPR.
<b>Isolation and Lockout</b>	14.	Boiler must be de-energized/isolated and locked out. <ul style="list-style-type: none"> <li>Follow space specific isolation and lockout document.</li> <li>Document must be available on-site prior to work.</li> </ul>
<b>Gas Testing</b>	15.	Persons calibrating/bump testing and operating the instrument must have appropriate training.
	16.	Test the atmosphere no more than 20 minutes prior to entry; continuously during entry and if the space is left vacant for more than 20 minutes. Record the results on the Confined Space Entry Permit every 20 minutes.
	17.	Measure gas concentrations at the front, middle and back of the space (using pump and tubing). <i>Remember there is a delay in response as air is pumped into the instrument (approx. 1 sec per foot) and there is additional sensor response time.</i>
	18.	<b>Allowable gas concentrations (before and during entry):</b>  Entry and work in the space can occur only if the following conditions are met: <ul style="list-style-type: none"> <li>O<sub>2</sub>: 19.5 – 23 %</li> <li>LEL: ≤ 10 %</li> <li>CO: ≤ 25 ppm</li> <li>H<sub>2</sub>S: ≤ 10 ppm</li> </ul> <p>If these criteria cannot be met then the space must be evacuated.  <b>NOTE:</b> The space cannot be re-entered until levels are brought within the acceptable concentrations listed above (adjust ventilation, re-calibrate gas tester etc.).</p> <p><i>If the problem persists contact Entry Supervisor for further instructions, see Entry Permit.</i></p>
	19.	The entrant must wear the atmospheric testing instrument (gas detector).
<b>Ventilation</b>	20.	Set up continuous negative air ventilation with HEPA filter attached to the vent, relief valve or waterside inspection covers. Minimum ventilation requirements are based on achieving 20 air changes per hour.
	21.	Negative air ventilation (with HEPA filter) must be operating for a minimum of 20 minutes prior to entry to allow 'clean respirable air' to circulate throughout the space.
<b>During Entry</b>		
<b>Gas Testing</b>	22.	Continuous monitoring required – as above.

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Topics	No.	Tasks/ Equipment Required
	23.	Record the gas testing results on the Confined Space Entry Permit at least every 20 minutes.
Ventilation	24.	Negative air ventilation (with HEPA filter) must be running during the entire entry.
Standby Person	25.	Standby person must remain at or near the entrance to the space during the entry.
	26.	Standby must order the evacuation of the confined space if an alarm sounds.
Personal Protective Equipment (PPE)	27.	All entrants must wear <b>General PPE</b> (see equipment required list above).
Task/Additional Requirements	28.	Flashlight required
	29.	Use HEPA filter vacuum cleaner for dust/fibre cleaning and refractory brick repair work.
Rescue Plan	30.	To activate the emergency response, Standby Person contacts 911 if first aid is required.
	31.	Standby Person contacts the Entry Supervisor using radio and advises them of the situation and Entry Supervisor will respond to the scene with a gas detector.
	32.	<b>Self-rescue</b> if possible
	33.	<b>Entry Rescue:</b> If self-rescue is not possible: <ul style="list-style-type: none"> <li>Entry Supervisor becomes Standby Person</li> <li>Standby Person become Rescuer</li> <li>Rescuer (former Standby Person) tests the air (using the 2<sup>nd</sup> gas detector) and can enter the space if the following conditions are met:               <ul style="list-style-type: none"> <li>O<sub>2</sub>: 19.5 – 23 %</li> <li>LEL: ≤ 10%</li> <li>CO: ≤ 25 ppm</li> <li>H<sub>2</sub>S: ≤ 10 ppm</li> </ul> </li> <li>Rescuer enters the space and grabs the entrant's feet/body and pulls them to the entrance.</li> <li>Rescuer and Standby Person manually remove the entrant from the space.</li> <li>If the preceding conditions cannot be met, the victim is to remain in the space until advanced help arrives.</li> </ul>
<b>After Entry Has Been Completed</b>		
Gas Testing	34.	After the entry, record the peak, TWA, STEL, occurrence of alarms on the Confined Space Entry Permit.
	35.	Entry Supervisor to return the completed Confined Space Entry Permit to the Confined

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Topics	No.	Tasks/ Equipment Required
		Space Program Administrator for filing (must be kept for 1 year).
<b>Work Coordination</b>	36.	Ensure all entrants and tools have been removed from the space and secure the opening. Use HEPA filter vacuum cleaner for decontamination of PPE and equipment after exiting space.
<b>Equipment</b>	37.	Return all equipment to its proper location.
	38.	Return gas detectors to the storage location.

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