CONFINED SPACE HAZARD ASSESSMENT

CONFINED SPACE NAME:	ID #	LOCATION:	HA # 9
Boilers	Boiler1/ Boiler 2	Gerry Brewer Building	DATE: November 2012

Confined Space?	YES
YES ☒ NO ☐	Enclosed or partially enclosed?
YES ☒ NO ☐	Limited or restricted entry/exit?
YES ☐ NO ☒	Intended for continuous human occupancy?
YES ☒ NO ☐	Large enough that a worker can enter?

SPACE INFORMATION/DETAILS (IN OPERATION):

SPACE DESCRIPTION:
Two identical gas and oil fed hot-water boilers found in the Gerry Brewer Building. The boilers are five-pass steel boilers with flexible watertubes formed and arranged so as to direct the flow of combustible gases through the boiler. The pressure vessel consists of formed tubes, the external downcomer and the top and bottom drums to which they connect. The heated area of the pressure vessel is contained within a gas tight insulate casing that is comprised of refractory bricks and removable formed steel panels.

CONTENTS:
Watertubes, pressure vessel (external downcomer and the top and bottom drums) and refractory brick
Equipment: Burner at one end (fireside), electrical panel/devices

PROCESS/FUNCTION/USE DESCRIPTION:
For heating the Gerry Brewer Building using a hot water system.

PHYSICAL CHARACTERISTICS: Two horizontal rectangular shaped vessels – identical in size

DIMENSIONS: Approximately (feet - 'ft'): 4 ft (W) x 6 ft (L) x 6 ft (H) **VOLUME:** 144 ft^3

SPACE MATERIAL: Carbon steel with refractory brick lining and high temperature insulation

ENTRY CHARACTERISTICS:

LOCATIONS: Side entry – behind burner **SIZE:** 2 ft x 2 ft

SECURING MECHANISM: Bolted hatch style door

ADJACENT VESSELS/SPACES/PIPING:

NAME OF SPACE/PIPE	CONTENTS	TEMPERATURE	PRESSURE
Inlets (0.5" – 2" Ø)	Natural gas and oil (separate feeds)	No concern	4-5 psi
Inlet (1" Ø)	Water	No concern	No concern
Vent/relief valve (2" Ø)	Air/flue gas	No concern	No concern
Outlet (2" Ø)	Hot water	150°F - 240°F	160 psi

SCOPE OF WORK:

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).

HAZARDOUS ATMOSPHERIC RATING (LOW, MOD. HIGH)	Moderate	JUSTIFICATION: Potential for dust (including refractory ceramic fibres and silica) to exceed the applicable exposure limits.

COMPLETED BY: **Prepared by:** Peter Bergholz, BSc, CIH, AMEC, November 2012
Reviewed by: Victor Leung, MSc, CIH, ROH, CRSP, AMEC, November 2012

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

HAZARDS		UNDISTURBED SPACE POTENTIAL HAZARDS	WORK TASKS POTENTIAL HAZARDS	CONTROL MEASURES
ATMOSPHERE	**Oxygen (O_2) Deficiency**	**Yes** If shut down for a period of time	No	Monitoring for O_2. Continuous negative air ventilation with HEPA filter during entry. Place negative air ventilation with HEPA filter inside vent, relief valve or waterside inspection covers.
	O_2 Enrichment	No	No	
	Chemical	**Yes** Natural gas/oil is used for fuel. Soot /light corrosion residue may be present on steel surfaces.	**Yes** **Steel & Refractory Brick Cleaning:** Dust containing soot, light corrosion residue, silica and refractory ceramic fibres present. **Refractory Brick Repair:** Silica and refractory ceramic fibres present – MSDS reviewed for Inswool Moldable and Inswool-HP Blanket 8.	Monitoring for CO. Continuous negative air ventilation with HEPA filter during entry. Ensure natural gas/oil line is isolated and locked out prior to entry **General PPE:** Full-face respirator with P100 cartridges, disposable Tyvek coveralls, safety boots, work gloves (disposable nitrile), hard hat and hearing protection. Use HEPA filter vacuum cleaner for dust/fibre/soot cleaning and decontamination of PPE and equipment after exiting space. Moudable product is a mat-like material and not dusty during application. **Note:** respirator requirements are recommended in the absence of space-specific exposure monitoring data.
	Biological	No	No	
	Fire/Explosion	**Yes** Natural gas/oil is used for fuel.	No	Monitoring for LEL. Continuous negative air ventilation with HEPA filter during entry. Ensure natural gas/oil line is isolated and locked out prior to entry
SAFETY	**Structural Hazard**	No	No	
	Engulfment	No	No	
	Entrapment	No	No	
	Electrical	**Yes** Electrical panel/devices present as per boiler manual	No	Boiler must be isolated and locked out prior to entry.

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	Access/Egress	**Yes** Entry door is behind burner.	No	Burner is required to be removed. Work with care as crawling is required.
	Fall	No	No	
	Slip/Trip	No	No	
	Visibility/Light Level	**Yes** Insufficient lighting	No	Flashlight only required.
	Baffles/Internal Arrangement	**Yes** Watertubes present throughout space and in the floor	No	Wood platform is required on the floor surface for crawling inside.
	Floor Openings in Space	No	No	
PHYSICAL	**Noise/Vibration**	No	**Yes** HEPA filter vacuum can be loud inside the boiler	Hearing protection required (wear **General PPE**).
PHYSICAL	**Temperature**	**Yes** Boiler is hot	No	Cool for a sufficient time period and drain (watertubes) prior to entry.
PHYSICAL	**Non/Ionizing Radiation**	No	No	
PHYSICAL	**Laser**	No	No	
OTHERS	**Ingestion/Skin Contact Hazard**	No	**Yes** Potential for skin/eye irritation - MSDS reviewed for Inswool Moldable and Inswool-HP Blanket 8	Wear **General PPE**
OTHERS	**Mechanical Hazard**	No	No	
OTHERS	**Traffic Hazard**	No	No	
OTHERS	**Hydraulic/ Pneumatic Hazard**	No	No	

CONTROL MEASURES REQUIRED:	
Confined Space Permit:	Yes
Atmospheric Testing:	Gas monitor with sensors for O_2, LEL, CO & H_2S.
Ventilation Requirements:	Provide continuous negative air ventilation with HEPA filter during the entire entry. Minimum ventilation requirements are based on achieving 20 air changes per hour. Place negative air ventilation with HEPA filter inside vent, relief valve or waterside inspection covers.
PPE Requirements:	**General PPE:** Full-face respirator with P100 cartridges, disposable Tyvek coveralls, safety boots, work gloves (disposable nitrile), hard hat and hearing protection. Use HEPA filter vacuum cleaner for dust/fibre/soot cleaning and decontamination of PPE and equipment after exiting space. **Note:** respirator requirements are recommended in the absence of space-specific exposure monitoring data.
Lockout/Isolation:	Boiler must be isolated and locked out prior to entry. Ensure natural gas/oil line is isolated and locked out prior to entry.
Standby Person:	Yes, at or near entrance.

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CONTROL MEASURES REQUIRED:	
Communication Procedures:	Radio (no cellular telephone), voice
Rescue Procedures:	Standby person calls 911 and calls Entry Supervisor. Entry Supervisor will respond to scene. Self rescue (if possible) or manual removal.
Required Rescue and Safety Equipment	Two-way radio
Other:	Moudable product is a mat-like material and not dusty during application. Burner is required to be removed. Work with care as crawling is required. Flashlight only required. Wood platform is required on the floor surface for crawling inside. Cool for a sufficient time period and drain (watertubes) prior to entry.

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