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1. INTRODUCTION

- 1.1. This statement of work (SOW) describes the services and deliverables required for the provisions of hazardous materials abatement for the Department of National Defence.

2. PROJECT DESCRIPTION

- 2.1. Supply all materials, labour, transportation and supervision at thirteen (13) steam vaults requiring Asbestos Containing Materials (ACM's) abatement. Scope of Asbestos Containing Materials (ACM) to be abated are in Appendix A. Notes on davit arm bracket condition status are also included in Appendix A for each steam vault. The professional engineer "Davit arm mounting plates Inspection" letter report by KNACO Design & Construction Ltd, dated December 27, 2022, can be provided to the Contractor after award, upon request.
- 2.2. Steam vaults requiring asbestos abatement:
1. H11
 2. H64
 3. H124
 4. H171
 5. H178
 6. H178B
 7. H183
 8. H300
 9. H478
 10. H855
 11. H903A
 12. H918
 13. H923
- 2.3. Each vault will have varying pipe diameter sizes and types.
- 2.4. Site Plan showing locations of all steam vaults is in Appendix B – Steam Vault Locations Overview, attached. Steam Vaults in scope are circled in Red.
- 2.5. Site photos are in located in Appendix C, attached.
- 2.6. Full list of known asbestos in each steam vault are in Appendix D.
- 2.7. Designated Substance and Hazardous Materials Assessment Report located in Appendix E. If any materials that are suspected to contain asbestos are discovered and aren't clearly defined in this Statement of Work or attached Appendices, stop work and contact DCC representative.
- 2.8. Standing water may be present in the steam vaults. For small amounts of standing water like a puddle, if vacuuming is required, use HEPA-filtered wet vacuums approved for asbestos remediation.
- 2.9. For the purposes of this work, all of the steam vaults are assumed to not have more than 1 inch of any standing water. If more than 1 inch standing water is encountered,
- a. the work may be de-scoped and a credit requested via change order or;
 - b. the vault will be revisited at a later date once the standing water subsides or;
 - c. an alternate vault may be substituted via a change order or;
 - d. a CCN will be prepared for the dewatering and disposal of asbestos-contaminated water.

- 2.10. The contractor is to allow for 100 liters total in five locations of asbestos contaminated water in their tender price.

3. SECURITY

- 3.1. There are no security requirements.

4. DIVISION 1 – GENERAL REQUIREMENTS

- 4.1. Refer to General Requirements for Construction Projects in Electronic Bidding System.

5. ROLES AND RESPONSIBILITIES

- 5.1. Defence Construction 1951 Ltd (DCC) is a Crown Corporation. DCC provides infrastructure and environment support services to the Department of National Defence.
- 5.2. DCC is the Contracting Authority and is responsible for the tendering, award and management of this contract. Following award, the DCC Representative will be the Contractor's point of contact for all matters relating to the contract.
- 5.3. DND is the Owner of the facilities and Technical Authority for the Contract.

6. OPERATING HOURS

- 6.1. Work performed under this contract to be undertaken during normal working hours.
- 6.2. Normal working hours are from 0730h until 1600h Monday – Friday.
- 6.3. The Contractor must provide 48hrs notice to the DCC Representative for approval to access the site outside normal working hours.
- 6.4. Federal public holidays are listed in the DCL36 General Conditions document and shall not be considered working days for the purposes of this contract.

7. WASTE MANAGEMENT

- 7.1. Submit proof satisfactory to DCC Representative that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of authority having jurisdiction.
- 7.2. Submit to DCC Representative necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.
- 7.3. Contractor must provide 48 hrs notice to the DCC Representative before asbestos waste leaves the property.

8. ENVIRONMENTAL

- 8.1. Asbestos abatements are to be in accordance with O. Reg. 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations under the Occupational Health and Safety Act, R.S.O. 1990 and the Canada Labour Code – Canada Occupational Health and Safety Regulations SOR/86-304 (COHSR).
- 8.2. In cases where there are discrepancies between the Contractor's observations and the reported hazardous materials and/or quantities in Appendix A, the Contractor shall provide a detailed summary of the

discrepancies between what is observed.

8.3. Inspections and air monitoring for Type 2 and Type 2 Glovebag (GB) (Moderate-Risk activities) and Type 3 (High-Risk activities) will be completed by a third-party consultant provided by DCC. Precautions as defined by COHSR shall be as follows:

- a. From beginning of work until completion of clean-up operations, DCC (or their representative) will inspect the site to confirm compliance with the specifications and governing authority requirements. Deviations from these requirements that have not been approved in writing by DCC may result in a work stoppage, at no cost to DCC and/or the Department of National Defence (DND). DCC (third party environmental consultant) will inspect, both inside and outside the asbestos work area(s).
- b. No additional costs will be allowed by the Contractor for additional labour or materials required to provide specified performance level.
- c. When asbestos leakage from the asbestos work area(s) has occurred or is likely to occur, DCC may order work shutdown.
- d. Contractor to provide a minimum of 5 business days written notice to DCC of any request for scheduling abatements and milestone inspections or transportation of asbestos waste through an occupied area.
- e. The following milestone inspections by DCC (third party environmental consultant) will take place during Type 2 (Moderate-Risk) and Type 3 (High Risk Activities) precautions:
 - i. Pre-contamination enclosure set-up;
 - ii. Post-contamination visual clearance; and
 - iii. Final clearance air sampling (after the application of lockdown).
- f. Contractor is not to proceed with the next phase of work until the third party Environmental Consultant gives the approval that each of the milestones met the requirements.
- g. Contractor shall allow a minimum of 24-hours to receive results from the DCC Representative for clearance air testing results prior to enclosure tear-down (including both Type 2 and Type 3 (Moderate and High Risk Abatement) activities as defined by COHSR). Third party Environmental Consultant will confirm clearance samples were acceptable before tear down.
- h. For Type 2 -Moderate Risk and Type 3 - High Risk Abatement activities, after asbestos work area has passed visual inspection and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period has passed, final clearance air sampling will be conducted by DCC (third party environmental consultant) in accordance with Ontario Regulation 278/05 and COHSR and as follows:
 - i. Air sampling will be performed following aggressive air sampling methods as outlined in US Environmental Protection Act (EPA) "Guidance for Controlling Asbestos-Containing Materials in Buildings, Appendix M, Section M.1.5" (US EPA 560/5-85-024, published June 1985).
 - ii. Clearance air sampling will be conducted by DCC (third party environmental consultant).
 - iii. Air samples collected by DCC (third party environmental consultant) to measure airborne fibre content will be analyzed by Phase Contrast Microscopy (PCM) in accordance with NIOSH Analytical Method 7400 and will be submitted to the laboratory under 24 hour turn-around-time or faster.
 - iv. Airborne fibre levels in the asbestos work area(s) are to measure less than

0.01 f/cc.

1. If air monitoring results show fibre levels in excess of 0.01 f/cc, or there is too much debris/dust on the canister to read the sample, the Contractor is to re-clean the work area and apply another acceptable coat of lock-down agent to surfaces.

9. HEALTH AND SAFETY

- 9.1. The Contractor is responsible for the health and safety of their personnel while carrying out the requirements of this SOW. The Contractor must also comply with Canada Labour Code Part II, Provincial Health and Safety regulations, DND health and safety policy, Division 1 Section 01 70 12 – Safety Requirements, as well as any other applicable regulations, requirements, acts, etc.
- 9.2. The Contractor shall assess the work required under this contract and identify and implement appropriate safe work procedures, including enclosures that must be maintained overnight. The Contractor is required to develop a site-specific safety work plan identifying hazards, and controls that will be implemented to address the hazards. The Contractor's health and safety plan must be submitted to the DCC Representative for review and approval prior to commencing work.
- 9.3. Before work begins, the Contractor is to provide documentation indicating all safety training attained for each person who will be involved with the contract.
- 9.4. Work to be completed within the steam vaults which are considered confined space hazards. DND underground service vaults are a confined space and shall be entered with confined space precautions. Confined space entry precautions shall meet or exceed the prescribed requirements specified in O. Reg. 632/05. Notes on the davit arm bracket status for each vault are provided in Appendix A.
- 9.5. Contractor as the constructor is responsible the safety of all persons granted access to the site, including third party Environmental Consultants.
- 9.6. Contractor to submit traffic and pedestrian control plans.

10. CONTRACTORS TEAM

- 10.1. Contractor's Site Supervisor name and contact number is to be provided to the DCC Representative prior to starting work.
- 10.2. Submit proof satisfactory to DCC Representative that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- 10.3. Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by DCC Representative. Minimum of one supervisor for every ten workers.
- 10.4. Submit proof satisfactory to DCC Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

11. WORKPLAN AND SCHEDULE

- 11.1. Work Schedules are required to be submitted for review and approval to the DCC Representative within 10 business days of contract award and prior to starting work.
- 11.2. Environmental Protection Plan (Spill Response Plan, Hazardous Materials Abatement and Management Plan, and Waste Management and Disposal Plan) to be provided to the DCC Representative and approved prior to

work onsite. The Hazardous Material Abatement and Management Plan will be reviewed by third party Environmental Consultant provided by DCC. Contractor is to allow for a minimum of one week of review time. The Environmental Plans are to be in accordance with Specification Section 01 35 43 and this SOW.

11.3. DCC Representative requires 5 business days of written notice prior to abatement.

12. WORK CONSTRAINTS

12.1. Work can only occur between May 15, 2025 to September 15, 2025 when the steam is turned off.

12.2. Contractor must provide power and water at each steam vault for this asbestos abatement work.

12.3. Contractor is to accommodate and provide access into steam vaults for third party inspections and air clearance activities.

13. COMMUNICATION AND REPORTING

13.1. Direct communication between the DCC Representative on-site and members of the Contractor's team, on routine matters is encouraged to enable the discussion and prompt resolution of routine technical issues. Decisions made during these discussions, which impact on scope, function, budget or schedule, are not final until confirmed in writing by the DCC Representative.

14. DELIVERABLES

14.1. The Contractor shall provide all document deliverables as detailed in the SOW and in Division 1 General Requirements. Some of the key Contractor's deliverables are listed in the table below:

Document	Format	Timeline
Spill Response Plan	Electronic/pdf	Within 10 days of contract award
Hazardous Materials and Management Plan	Electronic/pdf	Within 10 days of contract award
Waste Management and Disposal Plan	Electronic/pdf	Within 10 days of contract award
Health and Safety Plan	Electronic/pdf	Within 10 days of contract award
Confined Spaces Rescue Plan	Electronic/pdf	Prior to work on-site
Traffic & Pedestrian Control Plan	Electronic/pdf	Prior to work on-site

15. APPENDICES

15.1. Appendix A – ACM to be abated

15.2. Appendix B – Steam Vault Locations Overview

15.3. Appendix C – Site Photos

15.4. Appendix D - All ACMs in Steam Vaults - not all to be abated

15.5. Appendix E – Designated Substances and Hazardous Materials Assessments

Appendix A

ACM Items to be Abated

Appendix A - ACM to be Abated

Steam Pit Number	Substance	Substrate Material	Substrate Colour	Substrate Condition	Substrate Accessibility, ACM description and Location	Asbestos Type and % Composition	Asbestos Friability	Quantity	Davit Arm Bracket Use Dec 2022 Davit Inspection Report	Comments
H11	Asbestos	Debris	Brown	Debris	on floor	Suspect	Friable	8 sq. m.	Safe to use: Good condition, plate checked	The manhole was flooded, and debris samples could not be collected and are assumed to be ACM.
H64	Asbestos	Canvas	White	Good	on pipe at pipe penetration	Chrysotile 1%	Friable	3 LM	Safe to use: Good condition, plate checked	Mostly metal jacketed with one exposed parged fitting in photo.
H64	Asbestos	Caulking	Grey	Good	on piping	Chrysotile 1%	Non-Friable	4 LM		
H64	Asbestos	Caulking	Red	Good	on piping	Chrysotile 5%	Non-Friable	1 LM		Described as tar by laboratory
H64	Asbestos	Tar	Black	Good	on piping	Chrysotile 4%	Friable	1 LM		
H64	Asbestos	Magblock	White	Good	on piping	Chrysotile 1%	Friable	3 LM		
H64	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 0.5%	Friable	3 sq. m.		
H124	Asbestos	Canvas	White	Poor	on pipe insulation	Chrysotile 1%	Friable	1 sq. m.	Safe to use: Good condition, plate checked	
H124	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 10%	Friable	2 sq. m.		
H124	Asbestos	Parging associated with piping	White	Good	on pipe ends	Chrysotile 0.5%	Friable	1 sq. m.		Not visually obvious in photo, probably under metal jacketing (approx. 10% total exposed / unjacketed).
H171	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 2%	Friable	4 sq. m.	Safe to use: Good condition, double vault, plate checked	
H178	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 1%	Friable	10 sq. m.	Safe to use: Concrete damages on walls, plate checked, safe	
H178B	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 1%	Friable	3 sq. m.	Safe to use: Good condition, plate checked	
H178B	Asbestos	Canvas	White	Good	on pipe insulation	Chrysotile 5%	Friable	3 LM		
H178B	Asbestos	Transite Pipe	Grey	Good	on ground	Amosite: 3% Chrysotile 5%	Non-Friable	1 LM		
H183	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 1%	Friable	16 sq. m.	Safe to use: Good condition, plate checked	
H183	Asbestos	Canvas	White	Good	on fittings	Chrysotile 2%	Friable	1 sq. m.		Location not in photos.
H183	Asbestos	Parging associated with piping	White	Good	on pipe ends	Chrysotile 3%	Friable	1 sq. m.		Location not in photos.
H300	Asbestos	Canvas	White	Good	on pipe insulation	Chrysotile 2%	Friable	4 LM	Safe to use: Surface cracks, good condition, plate checked	
H300	Asbestos	Cementitious Parge	Grey	Good	on walls, third tar layer	Chrysotile 7%	Non-Friable	12 sq. m.		
H300	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 3%	Friable	4 sq. m.		
H478	Asbestos	Debris	Brown	Debris	on floor	Amosite 3%	Friable	6 sq. m.	Safe to use: Good condition, plate checked	
H855	Asbestos	Tar Material	Black	Good	around pipe run	Chrysotile 25%	Friable	<1 sq. m.	Not safe for use: Concrete walls in very poor condition, decay and	

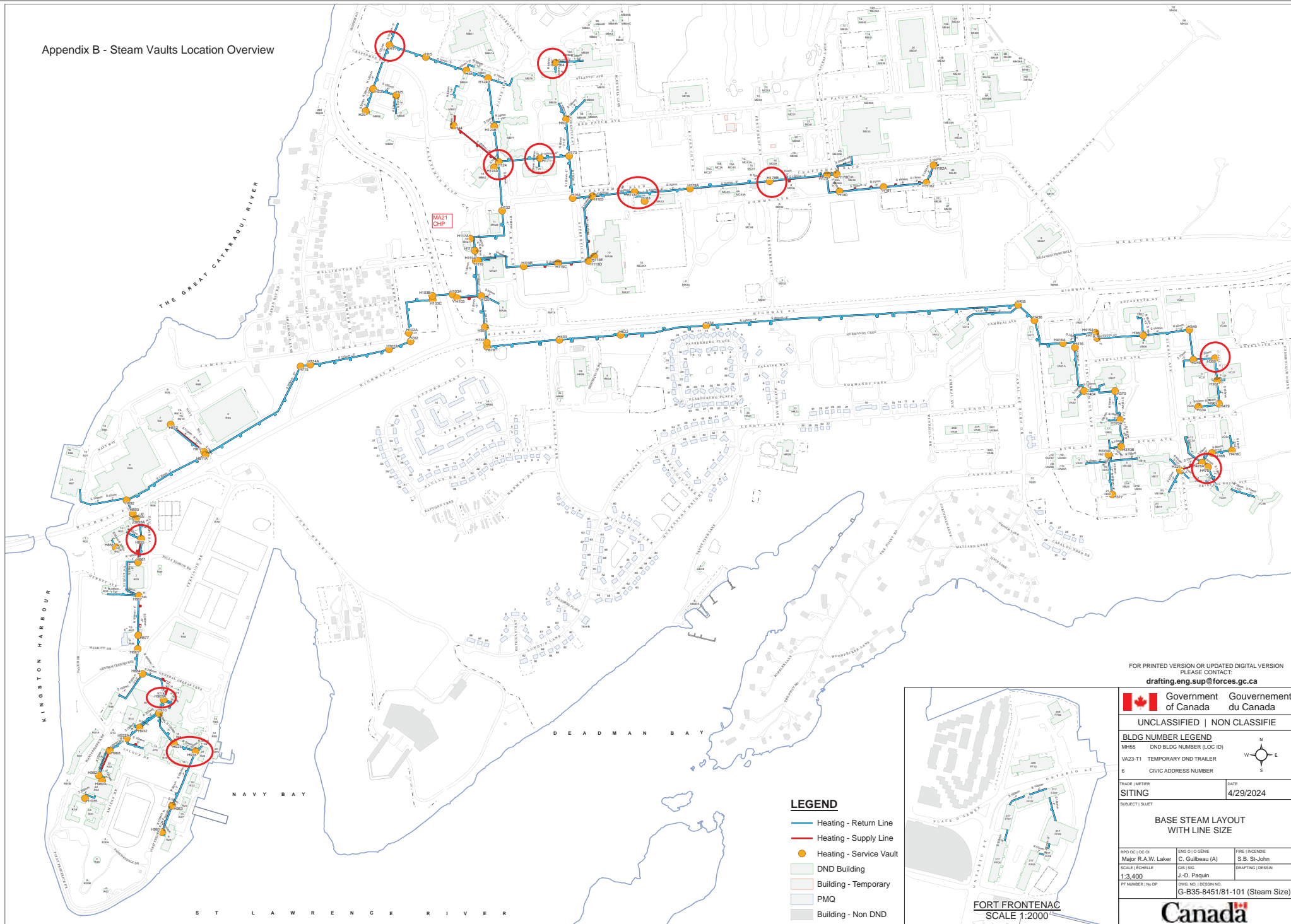
Appendix A - ACM to be Abated

H855	Asbestos	Debris	Grey/Beige/Brown/Black	Debris	debris (mixed materials)	Chrysotile 1%	Friable	10 sq. m.	delamination	
H903A	Asbestos	Debris	Grey	Poor	debris (on floor - mixed materials)	Chrysotile 0.5%	Friable		Not Safe for use: Cracks at top corners of slab, walls cracks and sign of settlement	
H903A	Asbestos	Magblock	White	Poor	pipe insulation	Suspect	Friable	1 sq. m.		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H903A	Asbestos	Pipe Wrap	Brown	Poor	pipe insulation	Suspect	Friable	<1 sq. m.		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H918	Asbestos	Parging associated with piping	Grey	Poor	pipe run	Chrysotile 4%	Friable	<1 sq. m.	Safe to use: General good condition, plate checked	
H918	Asbestos	Canvas	Beige	Poor	associated with fiberglass pipe run insulation	Chrysotile 3%	Friable	1 sq. m.		
H918	Asbestos	Debris	Brown/Grey	Debris	debris (mixed materials)	Chrysotile 1%	Friable	8 sq. m.		
H918	Asbestos	Yellow Insulation	Yellow	Poor	on pipe penetration	Chrysotile 5%	Friable	1.5 sq. m.		
H918	Asbestos	Grey Rigid Caulking	Grey	Good	on pipe run	Chrysotile 4%	Non-Friable	<1 sq. m.		
H923	Asbestos	Beige Canvas	Beige	Poor	associated with pipe run	Chrysotile 5%	Friable	<1 sq. m.	Safe to use: Hair cracks at the corners, plate checked	
H923	Asbestos	Parging associated with piping	Grey	Poor	on top of mag block insulation	Chrysotile 8% & 10%	Friable	2 fittings		
H923	Asbestos	Debris	Brown	Poor	debris (mixed materials)	Chrysotile 2%	Friable	10 sq. m.		

Appendix B

Steam Vault Location Overview

Appendix B - Steam Vaults Location Overview



Appendix C

Select Photographs









Photo	9	10
		
Sample ID	H918-08 A	H918-09 A
Material Description	Asbestos-containing debris in manhole H918	Asbestos-containing yellow insulation in manhole H918
Photo	11	12
		
Sample ID	H918-10 A	H923-03 A
Material Description	Asbestos-containing grey caulking in manhole H918	Asbestos-containing beige/grey canvas in manhole H923

Photo	13	14
		
Sample ID	H923-04 A	H923-09 A
Material Description	Asbestos-containing parging over pipe run insulation in manhole H923	Asbestos-containing debris in manhole H923
	15	16
		
		H903A-04 A
		Asbestos-containing debris in manhole H903A

Photo	57	
		
Sample ID	H11-11 A	
Material Description	Asbestos-containing grey caulking on pipe in manhole H11	

	106
	
	H178-09 A
	Asbestos-containing debris in manhole H178

		110
		
		H183-02 A
		Asbestos-containing canvas on pipe in manhole H183
	111	112
Photo		
Sample ID	H183-06 A	H183-07 A
Material Description	Asbestos-containing tar in manhole H183	Asbestos-containing parge on pipe in manhole H183



	113	114
	<p>Photo</p> 	
Sample ID	H183-08 A	H183-09 A
Material Description	Asbestos-containing debris in manhole H183	Asbestos-containing tar on concrete in manhole H183




Photo	121	
		
Sample ID	H171-09 A	
Material Description	Asbestos-containing debris in manhole H171	
	122	123

Photo	125	126
		
Sample ID	H178B-02 A	H178B-05 A
Material Description	Asbestos-containing canvas on pipe in manhole H178B	Asbestos-containing debris in manhole H178B




		142
		
		H64-02 A
		Asbestos-containing magblock insulation in manhole H64
	143	144
Photo		
Sample ID	H64-04 A	H64-05 A
Material Description	Asbestos-containing grey caulking in manhole H64	Asbestos-containing red caulking in manhole H64






Photo	145	146
		
Sample ID	H64-06 A	H64-09 A
Material Description	Asbestos-containing pargé on pipe in manhole H64	Asbestos-containing debris in manhole H64
Photo	147	148
		
Sample ID	H124-06 A	H124-09 A
Material Description	Asbestos-containing canvas on pipe in manhole H124	Asbestos-containing pargé on wall in manhole H124

Photo	149	150
		
Sample ID	H124-10 A	H124-12 A
Material Description	Asbestos-containing tar membrane in manhole H124	Asbestos-containing debris in manhole H124
Photo	151	
		
Sample ID	H124-13 A	
Material Description	Asbestos-containing tar membrane on manhole H124	

	154
	
	H178B-03 A
	Asbestos-containing Transite pipe in manhole H178B




	171	172
Photo		
Sample ID	H300-02 A	H300-04 A
Material Description	Asbestos-containing canvas on pipe in manhole H300	Asbestos-containing parge on wall in manhole H300

Photo	173	174
		
Sample ID	H300-08 A	H300-09 A
Material Description	Asbestos-containing tar on concrete in manhole H300	Asbestos-containing debris in manhole H300

MANHOLE H11





Photo	1
	
Description	Manhole H11: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole H11: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)

Photo	5
	
Description	Manhole H11: Full piping layout (Photo 1 of 2)
Photo	6
	
Description	Manhole H11: Full piping layout (Photo 2 of 2)

MANHOLE H64

*No harness bracket





Photo	1	
		
Description	Manhole 64: Ladder / Egress rungs	
Photo	2	
		
Description	Manhole 64: Ladder / Egress rungs (condition photo)	

Photo	3
	
Description	Manhole 64: Full piping layout (Photo 1 of 2)
Photo	4
	
Description	Manhole 64: Full piping layout (Photo 2 of 2)

MANHOLE H124



Photo	1
	
Description	Manhole 124: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 124: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)





Photo	3
	
Description	Manhole 124: Ladder / Egress rungs
Photo	4
	
Description	Manhole 124: Ladder / Egress rungs (condition photo)

Photo	5
	
Description	Manhole 124: Full piping layout (Photo 1 of 2)
Photo	6
	
Description	Manhole 124: Full piping layout (Photo 2 of 2)

MANHOLE H171



Photo	1
	
Description	Manhole 171: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 171: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)





Photo	3
	
Description	Manhole 171: Ladder / Egress rungs
Photo	4
	
Description	Manhole 171: Ladder / Egress rungs (condition photo)

Photo	5	
		
Description	Manhole 171: Full piping layout (Photo 1 of 2)	
Photo	6	
		
Description	Manhole 171: Full piping layout (Photo 2 of 2)	

MANHOLE H178B



Photo	<div style="text-align: center;">1</div> 
	<div style="text-align: center;">Description</div> <p>Manhole 178B: Harness bracket(s) mounted on exterior surface of manhole (condition photo)</p>
Photo	<div style="text-align: center;">2</div> 
	<div style="text-align: center;">Description</div> <p>Manhole 178B: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)</p>





Photo	3
	
Description	Manhole 178B: Ladder / Egress rungs
Photo	4
	
Description	Manhole 178B: Ladder / Egress rungs (condition photo)

Photo	5
	
Description	Manhole 178B: Full piping layout (Photo 1 of 2)
Photo	6
	
Description	Manhole 178B: Full piping layout (Photo 2 of 2)

MANHOLE H300



Photo	1
	
Description	Manhole 300: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 300: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)

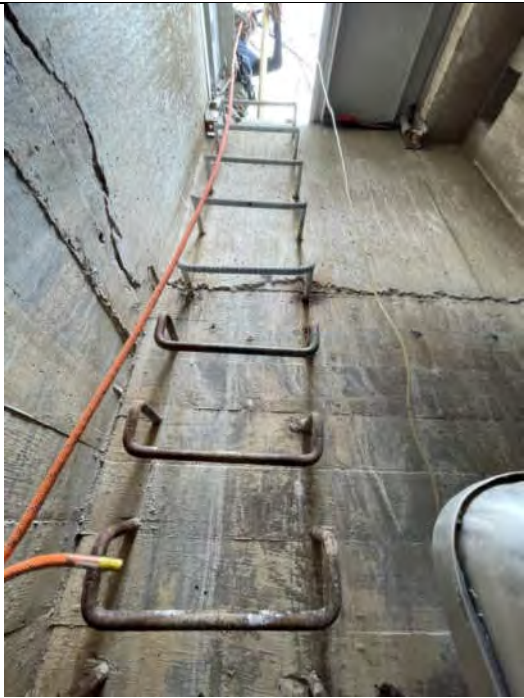





Photo	3	
		
Description	Manhole 300: Ladder / Egress rungs	
Photo	4	
		
Description	Manhole 300: Ladder / Egress rungs (condition photo)	

Photo	5
	
Description	Manhole 300: Full piping layout (Photo 1 of 2)
Photo	6
	
Description	Manhole 300: Full piping layout (Photo 2 of 2)

MANHOLE H478

Photo	1
	
Description	Manhole 478: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 478: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)
Photo	3





		
Description	Manhole 478: Ladder / Egress rungs	
Photo	4	
		
Description	Manhole 478: Ladder / Egress rungs (condition photo)	

Photo	5	
		
Description	Manhole 478: Full piping layout (Photo 1 of 2)	
Photo	6	
		
Description	Manhole 478: Full piping layout (Photo 2 of 2)	

MANHOLE H855



Photo	1
	
Description	Manhole 855: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 855: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)





Photo	3	
		
Description	Manhole 855: Ladder / Egress rungs	
Photo	4	
		
Description	Manhole 855: Ladder / Egress rungs (condition photo)	

Photo	5
	 A photograph showing a complex arrangement of industrial piping within a manhole. The pipes are primarily white with some sections wrapped in yellow insulation. Two large, rusty metal valves with handwheels are visible. A thick, orange chain hangs on the left side of the frame. The background is dark and appears to be the interior of a concrete structure.
Description	Manhole 855: Full piping layout (Photo 1 of 2)
Photo	6
	 A second photograph of the same piping system in Manhole 855, showing a different angle or a closer view of the same components. It highlights the white pipes, the yellow insulation, and the rusty valves. The orange chain is also visible on the left.
Description	Manhole 855: Full piping layout (Photo 2 of 2)

MANHOLE H903A



Photo	1
	
Description	Manhole 903A: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 903A: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)





Photo	3
	
Description	Manhole 903A: Ladder / Egress rungs
Photo	4
	
Description	Manhole 903A: Ladder / Egress rungs (condition photo)

Photo	5
	
Description	Manhole 903A: Full piping layout (Photo 1 of 2)
Photo	6
	
Description	Manhole 903A: Full piping layout (Photo 2 of 2)

MANHOLE H918



Photo	1
	
Description	Manhole 982: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 982: Harness bracket(s) mounted on exterior surface of manhole





Photo	3
	
Description	Manhole 982: Ladder / Egress rungs
Photo	4
	
Description	Manhole 982: Ladder / Egress rungs (condition photo)

Photo	5
	
Description	Manhole 982: Full piping layout (Photo 1 of 2)
Photo	6
	
Description	Manhole 982: Full piping layout (Photo 2 of 2)

MANHOLE H923





Photo	1
	
Description	Manhole 923: Harness bracket(s) mounted on exterior surface of manhole (condition photo)
Photo	2
	
Description	Manhole 923: Harness bracket(s) mounted on exterior surface of manhole (orientation photo)

Photo	3	
		
Description	Manhole 923: Ladder / Egress rungs	
Photo	4	
		
Description	Manhole 923: Ladder / Egress rungs (condition photo)	

Appendix D

All ACM's in Steam Vaults

Appendix D - Known ACM within Steam Vaults

Steam Pit Number	Substance	Substrate Material	Substrate Colour	Substrate Condition	Substrate Accessibility, ACM description and Location	Asbestos Type and % Composition	Asbestos Friability	Quantity	Davit Arm Bracket Use Dec 2022 Davit Inspection Report	Comments
H11	Asbestos	Debris	Brown	Debris	on floor	Suspect	Friable	8 sq. m.	Safe to use: Good condition, plate checked	The manhole was flooded, and debris samples could not be collected and are assumed to be ACM.
H11	Asbestos	Exterior Tar	Black	Good	on wall	Chrysotile 5%	Non-Friable	10 sq. m.		
H11	Asbestos	Exterior Light Grey Tar	Grey	Good	on wall	Chrysotile 10%	Non-Friable	1 sq. m.		
H11	Asbestos	Caulking	Pipe	Good	around exterior pipe exhaust	Chrysotile 10%	Non-Friable	1 LM		
H11	Asbestos	Tar	Black	Good	on piping	Suspect	Friable			Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H64	Asbestos	Tar	Black	Good	On Concrete	Suspect	Non-Friable	4 sq. m.	Safe to use: Good condition, plate checked	Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H64	Asbestos	Gasket	Black	Good	on fittings	Suspect	Non-Friable	1 gasket		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H64	Asbestos	Canvas	White	Good	on pipe at pipe penetration	Chrysotile 1%	Friable	3 LM		Mostly metal jacketed with one exposed parged fitting in photo.
H64	Asbestos	Caulking	Grey	Good	on piping	Chrysotile 1%	Non-Friable	4 LM		
H64	Asbestos	Caulking	Red	Good	on piping	Chrysotile 5%	Non-Friable	1 LM		Described as tar by laboratory
H64	Asbestos	Tar	Black	Good	on piping	Chrysotile 4%	Friable	1 LM		
H64	Asbestos	Magblock	White	Good	on piping	Chrysotile 1%	Friable	3 LM		
H64	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 0.5%	Friable	3 sq. m.		
H124	Asbestos	Canvas	White	Poor	on pipe insulation	Chrysotile 1%	Friable	1 sq. m.	Safe to use: Good condition, plate checked	
H124	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 10%	Friable	2 sq. m.		
H124	Asbestos	Parging associated with piping	White	Good	on pipe ends	Chrysotile 0.5%	Friable	1 sq. m.		Not visually obvious in photo, probably under metal jacketing (approx. 10% total exposed / unjacketed).
H124	Asbestos	Tar Membrane	Black	Good	Around pipe chase	Chrysotile 5%	Non-Friable	2 sq. m.		
H124	Asbestos	Exterior Tar Membrane	Black	Poor	exterior walls of manhole	Chrysotile 5%	Non-Friable	21 sq. m.		
H124	Asbestos	Gasket	Black	Good	on fittings	Suspect	Non-Friable	3 gaskets		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H171	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 2%	Friable	4 sq. m.	Safe to use: Good condition, double vault, plate checked	
H171	Asbestos	Gasket	Black	Good	on fittings	Suspect	Non-Friable	3		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H178	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 1%	Friable	10 sq. m.	Safe to use: Concrete damages on walls, plate checked, safe	
H178B	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 1%	Friable	3 sq. m.	Safe to use: Good	
H178B	Asbestos	Gasket	Black	Good	on fittings	Suspect	Non-Friable	2 gaskets		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.

Appendix D - Known ACM within Steam Vaults

H178B	Asbestos	Canvas	White	Good	on pipe insulation	Chrysotile 5%	Friable	3 LM	condition, plate checked	
H178B	Asbestos	Transite Pipe	Grey	Good	on ground	Amosite: 3% Chrysotile 5%	Non-Friable	1 LM		
H183	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 1%	Friable	16 sq. m.	Safe to use: Good condition, plate checked	
H183	Asbestos	Canvas	White	Good	on fittings	Chrysotile 2%	Friable	1 sq. m.		Location not in photo.
H183	Asbestos	Tar	Black	Good	around pipe chase structure	Chrysotile 4%	Non-Friable	2 sq. m.		
H183	Asbestos	Parging associated with piping	White	Good	on pipe ends	Chrysotile 3%	Friable	1 sq. m.		Location not in photo.
H183	Asbestos	Tar	Black	Good	on wall, patches	Chrysotile 1%	Non-Friable	2 sq. m.		
H183	Asbestos	Gasket	Not Applicable	Good	on piping	Suspect	Non-Friable	1		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H300	Asbestos	Canvas	White	Good	on pipe insulation	Chrysotile 2%	Friable	4 LM	Safe to use: Surface cracks, good condition, plate checked	
H300	Asbestos	Cementitious Parge	Grey	Good	on walls, third tar layer	Chrysotile 7%	Non-Friable	12 sq. m.		
H300	Asbestos	Tar	Black	Good	on east pipe chase	Chrysotile 2-10%	Non-Friable	2 sq. m.		
H300	Asbestos	Tar Membrane	Black	Good	on wall	Suspect	Non-Friable	4 sq. m.		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H300	Asbestos	Debris	Brown	Debris	on floor	Chrysotile 3%	Friable	4 sq. m.		
H478	Asbestos	Gasket	Black	Good	on fittings	Suspect	Non-Friable	4 gaskets	Safe to use: Good condition, plate checked	Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H478	Asbestos	Debris	Brown	Debris	on floor	Amosite 3%	Friable	6 sq. m.		
H855	Asbestos	Tar Material	Black	Good	around pipe run	Chrysotile 25%	Friable	<1 sq. m.	Not safe for use: Concrete walls in very poor condition, decay and delamination	
H855	Asbestos	Debris	Grey/Beige/Brown/Black	Debris	debris (mixed materials)	Chrysotile 1%	Friable	10 sq. m.		
H855	Asbestos	Gasket	Not Applicable	Good	on piping	Suspect	Non-Friable	2		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H855	Asbestos	Electrical Putty	White	Good	on conduit	Suspect	Non-Friable	<1 sq. m.		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H903A	Asbestos	Debris	Grey	Poor	debris (on floor - mixed materials)	Chrysotile 0.5%	Friable		Not Safe for use: Cracks at top corners of slab, walls cracks and sign of settlement	
H903A	Asbestos	Gasket	Grey	Good	on piping	Suspect	Friable			Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H903A	Asbestos	Magblock	White	Poor	pipe insulation	Suspect	Friable	1 sq. m.		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H903A	Asbestos	Pipe Wrap	Brown	Poor	pipe insulation	Suspect	Friable	<1 sq. m.		Assumed asbestos until analytical results confirm otherwise. Not able to sample due to inaccessible location.
H918	Asbestos	Parging associated with piping	Grey	Poor	pipe run	Chrysotile 4%	Friable	<1 sq. m.		

Appendix D - Known ACM within Steam Vaults

H918	Asbestos	Canvas	Beige	Poor	associated with fiberglass pipe run insulation	Chrysotile 3%	Friable	1 sq. m.	Safe to use: General good condition, plate checked	
H918	Asbestos	Debris	Brown/Grey	Debris	debris (mixed materials)	Chrysotile 1%	Friable	8 sq. m.		
H918	Asbestos	Yellow Insulation	Yellow	Poor	on pipe penetration	Chrysotile 5%	Friable	1.5 sq. m.		
H918	Asbestos	Grey Rigid Caulking	Grey	Good	on pipe run	Chrysotile 4%	Non-Friable	<1 sq. m.		
H923	Asbestos	Beige Canvas	Beige	Poor	associated with pipe run	Chrysotile 5%	Friable	<1 sq. m.	Safe to use: Hair cracks at the corners, plate checked	
H923	Asbestos	Parging associated with piping	Grey	Poor	on top of mag block insulation	Chrysotile 8% & 10%	Friable	2 fittings		
H923	Asbestos	Debris	Brown	Poor	debris (mixed materials)	Chrysotile 2%	Friable	10 sq. m.		

Appendix E

Designated Substances and Hazardous Materials Survey, Steam Manholes

March 31, 2024

Designated Substances and Hazardous Materials Survey

Steam Manholes

CFB Kingston, Kingston, Ontario

DCC Project: KN229979

Prepared for:

Defence Construction Canada on behalf of the Department of National Defence

March 31, 2024

Englobe File No.: 02305600.000



ENGLOBE

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Englobe Corp.'s subcontractors who have carried out on-site or laboratory work are duly assessed according to the purchase procedure of our quality system. For further information, please contact your project manager."

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1.0 Introduction

Englobe Corporation (Englobe) was retained by Defence Construction Canada (DCC) on behalf of the Department of National Defence (DND) to conduct a Designated Substances and Hazardous Materials Survey (DSHMS) in support of the Steam Manholes Project, located at CFB Kingston in Kingston, Ontario.

The Designated Substances Survey (DSS) is required under the *Ontario Occupational Health and Safety Act* in order to identify designated substances that may be present within the project areas. The *Canada Labour Code* also stipulates under Part II, Section 124 that every employer shall ensure that the health and safety at work of every person employed by the employer is protected. By having a DSS conducted, the Project Manager will be able to inform his or her employees, contractors, and tenants of any designated substances that may be present and possibly disturbed throughout the project area.

2.0 Scope of Work

The survey implemented by Englobe was completed in accordance with Section 30 of the *Occupational Health and Safety Act, R.S.O. 1990, Chapter O.1*. Designated Substances, as identified under the *Ontario Occupational Health and Safety Act*, are as follows:

- Acrylonitrile
- Arsenic
- Asbestos
- Benzene
- Coke Oven Emissions
- Ethylene Oxide
- Isocyanates
- Lead
- Mercury
- Silica
- Vinyl Chloride

Other Hazardous Materials which are not classified as designated substances, but were included as part of the survey and considered pertinent due to applicable regulations, best practice guidelines, and/or potential risks to human health and/or the environment, are:

- Ozone Depleting Substances (ODSs)
- Polychlorinated Biphenyls (PCBs)
- Urea Formaldehyde Foam Insulation (UFFI)
- Mould
- Other Hazardous Materials (where deemed pertinent)

Englobe completed a visual evaluation of materials for the presence of suspected designated substances and hazardous materials from July 17th, 2023 to August 22nd, 2023. As part of the survey, select materials were sampled and submitted for laboratory analysis to confirm asbestos, arsenic, lead, mercury, and PCB content.

The assessment included 108 manholes. Tunnel systems were not included as they were removed from Englobe's base contract.

3.0 Background Document Review

Prior to the commencement of fieldwork, Englobe personnel reviewed the following documentation provided by DCC:

- Davit Arm Mounting Plates Inspection - CFB, Kingston, Ontario. Prepared by Knaco Design & Construction Ltd. Dated December 27, 2022.
- Master Confined Space Assessment Report - Tunnels, CFB Kingston. Prepared by Golder. Project No. 20446610. Dated March 30, 2021.
- Consulting Services - (KN179901), Related to Contemplated Change Notice (CCN) 002, Designated Substances and Hazardous Materials Services, Repair Steam and Condensate Lines - Somme and R13 Condensate Replacements, CFB Kingston, Ontario. Prepared by XCG Environmental Engineers & Scientists. XCG File No. 1-1612-89-04 & 1-1612-89-03. Dated June 25, 2020.
- Consulting Services - (KN179901), Related to Contemplated Change Notice (CCN) 001, Designated Substances and Hazardous Materials Services, Repair Steam and Condensate Lines, CFB Kingston, Ontario. Prepared by XCG Environmental Engineers & Scientists. XCG File No. 1-1612-89-02. Dated September 24, 2018.
- CFB Kingston, Hazardous Materials Abatement/Encapsulation Record, MH#811A. Dated September 26, 2017.
- CFB Kingston Hazardous Materials Abatement Record, Manhole 478. Dated August 30, 2017.
- Results of Designated Substances and Hazardous Materials Survey within Three Steam Manholes, CFB Kingston, Kingston, Ontario. Prepared by XCG Environmental

Engineers & Scientists. XCG File No. 1-1612-89-01. DCC Project: KN179901. Dated August 29, 2017.

- Results of Asbestos-Containing Materials Sampling from Three Steam Manholes, CFB Kingston, Kingston, Ontario. Prepared by XCG Environmental Engineers & Scientists. XCG File No. 1-1612-85-01. DCC Project: KN169922. Dated August 21, 2017.
- Results of Asbestos-Containing Materials Sampling from Five Steam Manholes, CFB Kingston, Kingston, Ontario. Prepared by XCG Environmental Engineers & Scientists. XCG File No. 1-1612-85-01. DCC Project: KN169922. Dated June 7, 2017.
- Designated Substances Survey, Defence Construction Canada, Project No 131-12966-05. Prepared by WSP. Dated November 26, 2015.
- Pinchin Ltd Asbestos Laboratory, Certificate of Analysis, Kepler Bell Contracting, Mackenzie Avenue, Kingston - RMC. Dated September 17, 2014.
- Pinchin Environmental Asbestos Laboratory, Certificate of Analysis, CFB Kingston Manhole Sample (MH178C). Dated January 27, 2009.

4.0 Methodology

The purpose of the survey program was to identify designated substances and hazardous materials that may be disturbed during future work operations associated with the Steam Manholes located at CFB Kingston. The project areas were defined by the following drawings:

- Steam Vault Location. Drawing No. G-B35-8451/MCS-101. Dated February 21, 2022.
- CFB Kingston, Steam Layout. Drawing No. G-B35-8451/81-101 [BASE]. Dated November 9, 2022.

The steam tunnels and steam manhole H415A were removed from the designated substances survey scope of work, as requested by DCC.

Materials suspected of containing designated substances were visually identified, based on the surveyor's knowledge of the historic composition of building/manhole products. Visual identification of materials suspected to contain asbestos was supported by the collection and analysis of a limited number of representative samples, where applicable. Materials suspected of containing designated substances or hazardous materials other than asbestos, arsenic, lead, mercury, or PCBs were identified by appearance, age, and knowledge of historic applications. No other areas or materials were included as part of the survey.

Results tables are included in Appendix A. Select photographs are included in Appendix B. Laboratory certificates of analysis are included in Appendix C. A drawing with sample locations is included in Appendix D. A Statement of Limitations is included in Appendix E.

4.1. Asbestos-Containing Material Methodology

The methodology employed for Asbestos-Containing Materials (ACMs) included identifying the presence of ACMs via the collection and analysis of suspect bulk material samples. The collection

of bulk material samples was performed in accordance with the sampling procedures outlined in Ontario Regulation (O.Reg.) 278/05, as amended. O.Reg. 278/05, as amended, Table 1, stipulates the minimum number of bulk asbestos samples that must be collected and analyzed based on the quantity, application, and friability of each material.

ACMs can be divided into two categories: friable and non-friable material. A friable ACM is a material that can be crumbled, powdered, or pulverized by hand pressure and can readily release fibres when disturbed. Common applications of friable ACMs are sprayed or trowelled surfacing materials such as sprayed fireproofing and textured coatings. Non-friable materials are materials that will generally release fibres only when cut or shaped. Common non-friable ACMs include vinyl floor products, drywall joint compound, and mortars. Some of these products may become friable with time or when disturbed.

In Ontario, a material is defined as an Asbestos-Containing Material (ACM) if the material has a minimum asbestos content of 0.5 per cent (%) by dry weight, as per O. Reg. 278/05 *Asbestos on Construction Projects and in Buildings and Repair Operations* enabled under the *Occupational Health and Safety Act (R.S.O. 1990, Chapter 0.1)*, as amended. The *Canada Labour Code, Occupational Health, and Safety Regulations (COHSR)* defines a material 1% or more asbestos by dry weight to be asbestos containing. CFB Kingston considers an asbestos-containing material to be 0.5% or more by dry weight asbestos.

As part of this survey, asbestos has been assessed to protect federal workers and contractors, and to ensure compliance with federal requirements. This survey also considers the DND Asbestos Management Directive, including assigning action levels to identify asbestos-containing materials.

Representative bulk samples of suspected ACMs were collected by Englobe during the site investigation. Samples were collected to meet the bulk sampling requirements stipulated in O.Reg. 278/05, as amended. Bulk samples were analyzed by Bureau Veritas Labs (BV Labs). BV Labs is an accredited laboratory through the National Voluntary Laboratory Accreditation Program (NVLAP) (NVLAP Lab Code: 600136-0). The bulk samples were analyzed using polarised light microscopy (PLM). All bulk asbestos samples collected by Englobe were analyzed using the regulated Ontario detection limit of 0.5%. Samples followed a stop-positive methodology, where the remaining samples in a series would not be analyzed if any one sample in the series had a concentration of asbestos greater than or equal to 0.5%.

4.2. Paint Chip and Mortar Sampling - Arsenic, Lead, Mercury, and PCBs

Paint chip samples were collected for metals analysis (arsenic, lead, and mercury) and PCBs. The samples were analyzed by BV Labs. BV Labs is accredited under the National Environmental Laboratory Accreditation Program (NELAP) to perform lead in paint sample analysis. The samples were analysed by BV Labs using Inductively Coupled Plasma - Mass Spectrometry (ICP-MS) in accordance with EPA 6010 - Digestion - ICP-MS.

Paint samples were collected of all paint colours throughout the manholes based on site observations.

Arsenic in Paint

The Federal Canada Consumer Product Safety Act's *Surface Coating Materials Regulations SOR/2016-193* does not set limits specifically for arsenic in paint. For the purposes of this survey, paints having concentrations of arsenic above the Method Detection Limit of 50-ppm are considered arsenic containing.

Lead in Paint and Mortar

In Canada, the Federal Canada Consumer Product Safety Act's *Surface Coating Materials Regulations SOR/2016-193* has lowered the allowable concentration of lead in paints for new consumer products to 0.009% lead content by weight (90 ppm), with some material and specific use exceptions. For the purposes of this survey, paints and mortars having concentrations of lead above the 90-ppm limit are considered lead-based.

Mercury in Paint

For mercury in paint, the Federal Canada Consumer Product Safety Act's *Surface Coating Materials Regulations SOR/2016-193* has set the maximum allowable concentration of mercury in paint at 10-ppm.

PCBs in Paint

In Canada, the Federal *PCB Regulations SOR/2008-273*, as amended, has set the allowable release of solid PCBs into the environment at 50-ppm.

4.3. PCB-Containing Equipment Methodology

Equipment that may contain PCBs (e.g., electrical transformers and fluorescent light ballasts) can often be identified by examining manufacturer's labels. For safety reasons, Englobe personnel do not remove the ballast shields from fluorescent light fixtures to examine the ballast codes unless the electrical circuit for the lighting had been tagged and locked out by a qualified electrician. When possible, the manufacture name and catalogue number is recorded. Where not clearly labelled as "Non-PCB", the information presented on the ballast labels can be compared with the Environment Canada document entitled "Identification of Lamp Ballasts Containing PCBs (Revised August 1991)" to confirm PCB content, or assumed to contain PCBs, as applicable.

4.4. Urea Formaldehyde Foam Insulation Methodology

Urea formaldehyde foam insulation ("UFFI") is a type of thermal insulation material applied to walls and ceilings of buildings to form a solid layer of insulation. The sale and installation of

UFFI was banned in Canada in 1980, for health-related reasons due to the occurrence of formaldehyde gas, which is produced during natural degeneration of the UFFI.

4.5. Ozone Depleting Substances (ODS) Methodology

Ozone depleting substances (“ODSs”) include chemicals containing chlorofluorocarbon (“CFC”), hydrochlorofluorocarbon (“HCFC”), halon or any other material capable of destroying ozone in the atmosphere. Ozone Depleting Substances are controlled by O.Reg. 463/10 and the Federal Halocarbons Regulation.

Equipment that may contain halocarbons (e.g., air conditioning and refrigeration equipment) can often be identified by examining manufacturer’s labels. The investigation of halocarbons was performed through the identification of equipment requiring refrigerants as part of the survey process followed by an evaluation for labels on the equipment (indicating the type of refrigerant present), as applicable.

4.6. Other Designated Substances and Hazardous Materials Methodology

The methodology for the identification of other designated substances and hazardous materials followed the same visual evaluation methodology as the investigation for asbestos and lead in surface coatings. During the survey, other identified designated substances were visually identified based on the surveyor’s historical knowledge of these substances. These substances/materials were identified, and locations noted, as deemed applicable.

5.0 Findings

The following sections outline the findings of accessible designated substances and hazardous building materials that were assessed as part of the project-specific DSHMS.

5.1. Acrylonitrile

Acrylonitrile was neither observed in the building, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.2. Arsenic

5.2.1. Arsenic in Paint

Forty-one (41) samples of paint were collected by Englobe and submitted for arsenic content analysis. A summary table of current and historical bulk material samples is included in Appendix A, Table 2.

The following paints sampled within the project areas contain concentrations of arsenic greater than the Method Detection Limit of 50-ppm:

<u><200 ppm</u>	<u><57 ppm</u>	<u><420 ppm</u>
H1035 Silver (pipe)	H29 Silver (pipe)	H918 Black (exhaust pipe)
H932A Silver (pipe)		
H982 Beige (pipe)	<u><120 ppm</u>	<u><430 ppm</u>
H910 Beige (pipe)	H360 Silver (pipe)	H29 Silver (exterior)
H961 Silver (pipe)		
H903A Cream (pipe)	<u><250 ppm</u>	<u><470 ppm</u>
H903A Black (exhaust pipe)	H23 Silver (exterior)	H963 Silver (pipe)
H884 Black (pipe)		
H893A Silver (pipe)	<u><270 ppm</u>	<u><1,500 ppm</u>
H893A Green (pipe)	H300 Black (vent)	H124 Blue (pipe)
H812 Grey (pipe)		
H811A Red (pipe)	<u><290 ppm</u>	<u><2,000 ppm</u>
H715 Silver (pipe)	H861 Black (pipe)	H812 Black (pipe)
H714A Silver (pipe)		H132 Grey (wall)
H29 Red (pipe)	<u><320 ppm</u>	H702A Grey (exterior)
H119 Silver (valve)	H856 Silver (pipe)	H370C Green (wall)
H622 Red (pipe)		
H178 Red (pipe)	<u><330 ppm</u>	<u><3,000 ppm</u>
H678 Silver (exterior)	H884 Silver (pipe)	H478A Silver (pipe)
H415A Silver (pipe)	H182A Silver (pipe)	
H370C Light Green (wall)		
	<u><370 ppm</u>	
	H180 Silver (pipe)	

The method detection limit from the laboratory could not report a paint concentration below <57ppm, <120ppm, <200ppm, <250ppm, <270ppm, <290ppm, <320ppm, <330ppm, <420ppm, <430ppm, <470ppm, <1500ppm, <2000ppm, or <3000ppm for numerous samples. As such, Englobe has assumed these paints are above 50ppm, until proven otherwise.

The following paints and brick mortar sampled within the project areas contain concentrations of arsenic less than the 50-ppm:

- H856 - Green
- H370C - Brick mortar

5.3. Asbestos

The following subsections outline the consolidated asbestos findings from the DSHMS completed by Englobe. A summary table of bulk material samples collected by Englobe is included as Appendix A, Table 1. Action(s) provided for ACMs are based upon the Department of National Defence *Asbestos Condition Assessment and Response Chart*. Please refer to the CFBK Steam Manhole Asbestos Database for detailed information.

5.3.1. Asbestos-Containing Materials

Based on bulk sampling and subsequent laboratory analysis, the following materials observed within the project areas contain regulated amounts of asbestos:

Friable Materials

- Parging associated with non-asbestos containing pipe run insulation (H918, H923, H44, H103C, H120, H433, H178A, H183, H678, H124, H124A, H321, H346 and H360).
- Magblock, pipe run insulation (H812, H433 and H163).
- Yellow insulation at pipe penetrations (H910 and H918)
- Debris on manhole floors (H910, H982A, H918, H923, H903A, H855, H861, H893, H812, H811A, H715, H23, H29, H44, H132, H103C, H103, H433, H434, H622, H178, H183, H171, H60, H64, H124, H124A, H178B, H321, H478, H479, H300, H346, H301, H360 and UL50503).
- Cardboard wrap on pipe run in pipe chase (H321 and UL50503).
- Cream coloured canvas associated with non-asbestos containing pipe run insulation (H910).
- White coloured canvas associated with non-asbestos containing pipe run insulation (H867, H811A, H715, H23, H25, H877, H702A, H702, H102A, H103B, H120, H103A, H103, H433, H178A, H183, H678, H64, H124, H178B, H377, H321, H300, H346, H301, H968, H334, H15, H404 and H360).
- Silver lined canvas associated with non-asbestos containing pipe run insulation (H132).
- Blue coloured canvas associated with non-asbestos containing pipe run insulation (H702).
- Beige coloured canvas associated with non-asbestos containing pipe run insulation (H923, H918).
- Grey coloured canvas associated with non-asbestos containing pipe run insulation (H883).
- Brown coloured canvas insulation associated with non-asbestos containing pipe run insulation (H173 and H60).
- Textured insulation on piping (H812).
- Gaskets associated with piping (H932A and H377)
- Tar on walls and pipe runs (H893, H893A, H23, H132, H702A, H103C, H103B, H434, H64, H1035, H910, H855, H715, H44, H321, H349 and H301)

Non-Friable Materials

- Cementitious parge (H678, H883, H867, H893, H812, H103, H436, H300, H968)
- Tar on manhole walls, near penetrations, on concrete, on mesh, on pipe chases, etc (H29, H1035, H812, H132, H103C, H120, H433, H436, H183, H173, H300, H360, H910, H812, H44, H702A, H103A, H103, H124, H479, H301, H334 and H15)
- Tar on canvas (H1035, H883)
- Exterior tar (H11, H893A, H811, H714A, H23, H702A, H164 and H678)
- Exterior tar membrane (H29, H103C, H103B, H103A, H103, H678, H124 and H301)
- Tar on exterior piping (H11)
- Grey caulking on pipe runs (H64 and H918)
- Exterior grey caulking (H893A)
- White caulking associated with pipe runs (H23, H29 and H132)
- Transite pipe near penetration (H178A and H178B).
- Electrical putty (H855)
- Grey pipe putty (H856)

5.3.2. Assumed Asbestos-Containing Materials

The following materials observed within the project areas are assumed to contain regulated amounts of asbestos, until bulk sampling confirms otherwise. These materials could not be sampled due to accessibility constraints (inaccessible):

- Gaskets (H1035, H932, H910, H982, H903A, H884, H961, H963, H867, H877, H855, H856, H893A, H812, H714A, H25, H29, H124C, H119, H103B, H120, H178A, H183, H737, H678, H171, H173, H60, H64, H124, H124A, H124B, H178B, H180, H181, H182, H370C, H478, H349, H346, H301, H416, H15, H404, H360, H416A)
- Tar on concrete (H64 - limited access)
- Caulking (H60, H867, H892 - limited access)
- Tar cover (H102A - in pipe chase/tunnel area, limited access)
- Tar membrane (H119, H300, H416A - between walls, limited access)
- Magblock pipe run (H165, H416A, H903A - in pipe chase/tunnel area, limited access)
- Tar caulking on wall (H370, H370A - limited access)
- Tar on wall (H370B - limited access)
- Tar on pipe (H702A, H11 - pipe penetration, limited access)
- Tar on decking (H892 - inaccessible)
- Tar around pipe chase (H124B - limited access)
- Tar between wall around pipe penetration (H124C - not accessible)
- Tar paper (H892)
- Pipe wrap insulation at wall penetration (H903A - pipe penetration)
- Parge on pipe (H416A - north wall pipe penetration)
- Canvas on pipe run insulation (H433, H737, H892 - in pipe chase/tunnel area, limited access)

- Electrical putty (H855 - not accessible)
- Transite pipe in manhole (H178C - limited access)
- Debris (H11, H103B - excessive water)

5.3.3. Non-Asbestos Containing Materials

Based on bulk sampling and subsequent laboratory analysis, the following materials observed within the project areas do not contain regulated amounts of asbestos:

Thermal System Insulation

- White fibrous insulation (magblock like appearance) (H1035, H932, H910, H918, H923, H963, H883, H884, H867, H877, H855, H861, H893, H893A, H811, H811A, H715, H714A, H23, H25, H29, H892, H124C, H38, H44, H11, H119, H117, H132, H117A, H702A, H103C, H103B, H102A, H103A, H103, H120, H98, H434, H435, H436, H622, H178, H178A, H183, H737, H678, H171, H124, H124A, H124B, H178B, H178C, H179, H180, H321, H377, H334, H479, H478B, H478, H478A, H346, H301, H300, H416, H15, H349, H360, H404, H478C, H173, H60, H64, H415A)
- Patch associated with magblock insulation (H119, H117)
- Grey cement compound (H1035)
- Insulation layer under fibreglass piping (H963)
- Bluish pipe insulation (H893A, H892, H124C, H171, H124, H124B, H479, H478)
- Black pipe insulation (H479)
- Grey coloured pipe insulation (H178B)
- Pink coloured pipe insulation (H360)
- Brown canvas associated with fibreglass piping (H1035, H982, H903A, H715, H892, H103, H98, H435, H124, H179, H478)
- Beige canvas associated with piping (H923, H883, H119E, H103C, H178, H171, H124B, H178C, H180, H182A, H478A, H301, H60, H64)
- Cream canvas associated with piping (H923, H811)
- White canvas associated with piping (H910, H918, H923, H961, H25, H124C, H11, H119C, H132, H165, H164, H173, H178B, H181, H182, H377, H334, H15, H173)
- Grey canvas associated with piping (H910, H883, H855, H893, H893A, H811, H811A, H714A, H23, H29, H892, H11, H117, H117A, H103C, H120, H178, H678, H124A, H321, H479, H346, H301, H300, H349, H360, H404, H173, H60)
- Black canvas associated with piping (H961, H963, H370A, H370B)
- Off-white canvas associated with piping (H963, H856, H44, H702A, H433, H478B)
- Silver canvas associated with piping (H867, H855, H893A, H811, H23, H892, H124C, H38, H44, H119, H119A, H119B, H117, H132, H103B, H102A, H120, H434, H436, H183, H370A, H370B, H321, H60)
- Green canvas associated with piping (H893, H714A, H702A, H120)
- Parging associated with piping (H982A, H918, H29, H119C, H103, H98, H622, H178, H178C, H179, H321, H479, H478, H301)
- Exterior parging associated with magblock insulation (H120)
- Yellow insulation on fittings (H923, H171, H178C, H334, H300, H173)
- Beige coating on piping (H855)
- Brown coloured material associated with piping (H178B)
- Black coloured material associated with piping (H968)

Parge & Mortars

- Parge cement (wall and/or ceiling) (H1035, H932, H910, H918, H982, H961, H963, H903A, H883, H877, H855, H861, H856, H893A, H811, H811A, H715, H714A, H23, H38, H44, H11, H119A, H117, H119D, H119E, H132, H117A, H702A, H103C, H102A, H103A, H120, H98, H433, H435, H622, H178, H178A, H165, H183, H737, H678, H171, H173, H124, H178B, H178C, H179, H180, H191, H182A, H321, H370C, H377, H334, H479, H478B, H478, H346, H301, H15, H349, H404, H60, H415A, UL50503)
- Parge cements associated with ladder (H103)
- Parge associated with pipe chase (H178C, H404)
- Exterior parge (H893A, H811, H714A, H23, H25, H29, H892, H103, H120, H98, H435, H124, H124A, H321)
- Brick mortar (H1035, H23, H29)
- Concrete block mortar (H11)
- Black concrete block mortar (H370C)

Caulking, Putty and Mastic

- Grey caulking associated with piping (H932, H918, H961, H963, H856, H811, H811A, H25, H124C, H38, H44, H119A, H119B, H119C, H434, H435, H436, H171, H124, H124B, H178C, H180, H181, H182, H370, H370B, H321, H370C, H334, H478B, H478, H478A, H346, H301, H300, H968, H416, H416A, H15, H349, H360, H404, H478C, H173, H415A)
- Silver caulking associated with piping (H910, H883, H867, H855, H861, H893A, H715, H714A, H124C, H38, H119D, H119E, H132, H98, H433, H678, H171, H179)
- Cream caulking associated with piping (H963)
- Red caulking associated with piping (H867)
- White caulking associated with piping (H44, H737)
- Black caulking associated with manhole walls (H119A, H415A)
- Beige caulking associated with piping (H103, H173)
- Brown caulking associated with piping (H622)
- Tar caulking (H334, H346)
- Exterior black caulking (H856, H182)
- Exterior white caulking (H120, H179, H370C)
- Exterior grey caulking (H178A, H181)
- Exterior clear caulking (H182)
- Exterior electrical caulking (H182A)
- Exterior black mastic (H903A)
- Putty block, associated with pipe chase at wall corners (H119)
- Brown putty associated with foundation (H119)
- Green putty associated with foundation (H119)
- Black putty associated with manhole wall (H119A)
- Green putty associated with pipe chase (H119A)
- Grey putty associated with piping (H124B, H479, H478)
- Tar putty associated with piping (H478B, H478A)
- Electric putty (H404)
- Exterior black putty (H178A)

Debris

- Debris - loose material collected from the floor of each manhole (H932A, H982, H963, H883, H884, H867, H877, H856, H893, H811, H714A, H25, H892, H124C, H38, H119, H117, H117A, H702, H102A, H103A, H120, H98, H178A, H164, H124B, H178C, H179, H180, H181, H182A, H370, H370A, H370B, H370C, H334, H968, H416A, H349, H360, H404, H173, H415A)

Tars

- Tar associated with wall (H1035, H855, H811, H119D, H119E, H178, H165, H124, H180, H182A, H478B, H478A, H349, H415A)
- Tar paper/canvas on piping (H932A, H23, H25, H478B, H478A, H301, H300)
- Tar paper/cover/membrane on pipe and pipe penetrations (H918, H961, H963, H867, H715, H714A, H23, H25, H29, H124C, H38, H11, H117, H702, H103A, H103, H120, H98, H433, H434, H435, H436, H178, H164, H183, H171, H124, H124B, H178B, H178C, H182, H370, H370A, H321, H334, H478, H478A, H346, H968, H416, H416A, H15, H478C, H173, H60, H64, H415A)
- Tar over foam on piping (H961, H903A)
- Tar caulking on drainage (H370, H478B, H478A)
- Tar on wood (H884)
- Tar around manhole entrance (H877)
- Tar membrane (H877, H119, H370B, H370C, H377)
- Tar component associated with floor (H117A)
- Tar associated with ceiling of manhole (H103C, H181)
- Tar associated with ladder (H120)
- Tar associated with pipe chase (H165, H171)
- Exterior tar membrane (H124C, H164)
- Exterior tar material on wall (H120, H478C)

Other

- Shingle (H932A, H963, H893, H811, H811A, H11, H103C, H64, H124, H370C, H416A, H60)
- Gasket (H812, H179)
- Brown foam associated with piping (H982)
- Coating cream (cream coloured caulking material) associated with pipe penetration (H982)
- Red vinyl sheet flooring (H903A)
- Exterior expansion joint (H132)
- Black membrane (H855)
- Exterior vent (H180)
- Felt (black) associated with ducting (H1035)
- Exterior tar felt (H982)
- Stucco block (UL50503)

5.4. Benzene

Benzene was neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.5. Coke Oven Emissions

Coke oven emissions were neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.6. Ethylene Oxide

Ethylene oxide was neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.7. Isocyanates

Isocyanates were neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.8. Lead

5.8.1. Lead in Paint and Mortar

Forty-one (41) samples of paint and four (4) samples of mortar were collected by Englobe and submitted for lead content analysis. A summary table of current and historical bulk material samples is included in Appendix A, Table 2.

The following paints sampled within the project areas contain concentrations of lead greater than the Federal Canada Consumer Product Safety Act's limit of 90-ppm:

- H1035 - Silver (pipe)
- H932A - Silver (pipe)
- H884 - Silver (pipe)
- H856 - Green (metal board)
- H23 - Silver (exterior)
- H25 - Silver (exterior)
- H29 - Silver (pipe)
- H29 - Red (pipe)
- H29 - Exterior Silver
- H119 - Silver (valve)
- H702A - Exterior Grey (panel)
- H622 - Red (pipe)
- H180 - Silver (pipe)
- H182A - Silver (pipe)
- H370C - Light Green (wall)
- H370C - Green (wall)
- H370C - Brick Mortar
- H478A - Silver (pipe)
- H300 - Black (vent)
- H360 - Silver

The method detection limit from the laboratory could not report a paint concentration below <150 ppm for the silver paint from H478A. As such, Englobe has assumed this paint is above 90ppm but below 150ppm, until proven otherwise.

The following paints and mortars sampled within the project areas contain concentrations of lead less than the Federal Canada Consumer Product Safety Act's limit of 90-ppm:

- H1035 - Mortar
- H982 - Beige (pipe)
- H918 - Black (exhaust pipe)
- H910 - Beige (pipe)
- H963 - Silver (pipe)
- H961 - Silver (pipe)
- H903A - Cream (pipe)
- H903A - Black (pipe)
- H884 - Black (pipe)
- H861 - Black (pipe)
- H856 - Silver (pipe)
- H893A - Silver (pipe)
- H893A - Green (pipe)
- H812 - Black (pipe)
- H812 - Grey (pipe)
- H811A - Red (pipe)
- H715 - Silver (pipe)
- H714A - Silver (pipe)
- H23 - Brick Mortar
- H29 - Brick Mortar
- H132 - Grey (wall)
- H178 - Red (pipe)
- H678 - Silver (exterior exhaust)
- H124 - Blue (pipe)
- H415A - Silver (pipe)
- UL50503 - Mortar

5.8.2. Lead-Containing Materials

Lead is also assumed to be present in the following materials:

- Solder associated with the copper piping.

5.8.3. Suspect Lead-Containing Materials

Lead is assumed to be present in the following paints, from various manholes. These paints could not be sampled due to sample size (inadequate quantity of paint present for sampling and analysis).

- H932 - black paint
- H910 - black paint
- H884 - red paint
- H855 - orange & black paint
- H856 - orange paint
- H892 - silver and orange paint
- H11 - orange paint
- H132 - silver paint
- H103B - silver paint
- H120 - silver and orange paint
- H434 - silver paint
- H164 - silver paint
- H171 - silver and blue paint
- H173 - silver, orange & blue paint
- H64 - silver and red paint
- H124 - green paint
- H124A - green paint
- H181 - silver and orange paint
- H182 - orange paint
- H370A - silver and orange paint
- H370C - grey paint
- H370B - silver and orange paint
- H321 - silver and orange paint
- H15 - silver paint
- H117 - orange paint
- H117A - silver paint
- H182A - orange paint
- H478A - orange paint
- H478C - silver and orange paint

5.9. Mercury

5.9.1. Mercury in Paint

Forty-one (41) samples of paint were collected by Englobe and submitted for mercury content analysis. A summary table of current and historical bulk material samples is included in Appendix A, Table 2.

All paints sampled within the project areas contain concentrations of mercury less than the Federal Canada Consumer Product Safety Act's limit of 10ppm.

5.10. Silica

Based on the historical composition of building materials, silica is assumed to be present in the following materials:

- Concrete and cement building elements
- Brick and Mortar
- Parging materials

5.11. Vinyl Chloride

Vinyl chloride was neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.12. Halocarbons

Halocarbon were neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.13. Polychlorinated Biphenyls (PCBs)

5.13.1. PCBs in Paint

Thirty-four (34) samples of paint were collected by Englobe and submitted for PCB content analysis. Several paint samples collected could not be analyzed for PCB content due to the limited amount of sample matrix available. These samples are listed as NV in Table 2. A summary table of bulk material samples is included in Appendix A, Table 2.

All paints sampled within the project areas contain concentrations of PCBs less than the Federal PCB Regulations limit of 50-ppm.

5.13.2. PCB-Containing Materials

No other PCB-containing materials were observed, nor suspected of being present, in forms or quantities that would impact future work or pose risks to human health or the environment.

5.14. Urea Formaldehyde Foam Insulation (UFFI)

UFFI was neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

5.15. Mould

Mould was neither observed in the manholes, nor suspected of being present, in forms or quantities that would either impact future work or pose risks to human health or the environment.

6.0 Conclusions & Recommendations

Englobe was retained by DCC to conduct a DSHMS in support of the Steam Manholes Project, located at CFB Kingston in Kingston, Ontario.

The DSHMS scope of work included an assessment for the presence of the eleven (11) Designated Substances, as identified in the *Occupational Health and Safety Act*, as well as PCBs, ODSs, UFFI, mould, and other miscellaneous hazardous materials or chemicals.

Based on the site investigation, sampling, and analysis, the following designated substances and hazardous materials are present in forms and quantities in the project area:

- Arsenic
- Asbestos
- Lead
- Silica

Englobe's recommendations for each material, which are based upon both regulatory compliance and best practice guidelines, are included in the following sections below.

6.1. Arsenic

If paint containing elevated levels of arsenic is to be disturbed, precautions should be taken by the contractor to protect workers against exposure to arsenic. The risk of exposure can be mitigated through the application of proper worker health and safety precautions (i.e., work and dust control procedures that reduce dust generation, utilization of PPE and implement a worker hygiene program).

Disturbance of surface coatings with elevated arsenic concentrations should follow similar procedures to those of lead as outlined within Ontario MLTSD *Guideline: Lead on Construction Projects*.

The disposal of construction waste containing arsenic is governed by O. Reg. 347/90, as amended. The transport of the waste to the disposal site is controlled by the *federal TDGA* and the *Ontario Dangerous Goods Transportation Act*.

6.2. Asbestos

The disturbance of ACMs on construction and demolition projects is governed by the *Canada Occupational Health and Safety Regulations*, the *Canada Labour Code (R.S.C., 1985, c. L-2)*, the *DND Asbestos Management Directive*, and in the province of Ontario is governed by O.Reg. 278/05, as amended. These regulations classify all asbestos disturbances as Low Risk (Type 1), Moderate Risk (Type 2), or High Risk (Type 3), each of which has defined precautionary measures. All asbestos materials are subject to specific handling and disposal precautions and must be removed prior to demolition. In the event of conflict between regulations, the more stringent procedures apply.

Identified friable ACMs require a minimum of Moderate Risk abatement procedures when removing or disturbing one (1) square metre or less of the material. Should demolition, disturbance, or repair be required of more than one (1) square metre of friable ACM, High-Risk abatement procedures are required.

For work on friable and non-friable ACM that is done with power tools that are not attached to dust-collecting devices equipped with HEPA filters, an enclosure of polyethylene or other suitable material must be constructed. The entrances and exits to the enclosure must be fitted with curtains made of polyethylene or other suitable material that is impervious to asbestos. These requirements apply to work done outdoors and indoors.

The removal of non-friable materials can be completed using Low-Risk procedures, provided only non-powered hand tools are used and the material is wetted during removal. If these conditions cannot be met, then more stringent (Moderate-Risk or High-Risk) procedures are required.

The breaking, cutting, drilling, abrading, grinding, sanding, or vibrating of non-friable asbestos-containing materials if the work is done by means of a power tool that is attached to a dust-collecting device equipped with HEPA filters, can be performed using Moderate-Risk asbestos work procedures. The breaking, cutting, drilling, abrading, grinding, sanding, or vibrating of non-

friable asbestos-containing materials, if the work is done by means of a power tool that is not attached to a dust-collecting device equipped with HEPA filters, requires High-Risk asbestos work procedures.

The transport and disposal of asbestos waste is governed by O. Reg. 347/90 - *General - Waste Management*, as amended. This regulation requires that asbestos waste be sealed in appropriately labelled, double containers resistant to puncture and tears. The waste must be disposed at a licensed waste disposal site.

The time weight average exposure limit (TWAEEL) for airborne asbestos is prescribed by O.Reg. 490/09 *Designated Substances*, as amended, and the *Canada Labour Code, Occupational Health, and Safety Regulations*. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne asbestos levels that exceed this TWAEEL.

The following recommendations apply to ACMs and suspected ACMs:

- Appropriate work procedures and precautionary measures must be used, as outlined in O.Reg. 278/05, as amended, the *DND Asbestos Management Directive*, and the *Canada Occupational Health and Safety Regulations*, as amended, when performing work that may disturb ACMs or suspected ACMs, including prior to building demolition.
- Disturbance and/or removal of ACMs must be appropriately recorded as part of the building's Asbestos Management Plan.
- Before undertaking any work activity that involves asbestos-containing materials, an Asbestos Exposure Control Plan shall be developed, in accordance with the requirements of the *Canada Occupational Health and Safety Regulations*, which includes classification of asbestos specific work activities, onsite labelling of ACMs, and education/training of applicable federal employees specific to ACMs.
- Disposal of asbestos waste is controlled by the *Ontario Environmental Protection Act*, O.Reg. 347/90, *General - Waste Management*, as amended. This regulation requires that asbestos waste be sealed in double containers resistant to puncture and tears, and appropriately labelled. The waste must be disposed at a licensed waste disposal site. Proper notification must be issued to the site representative prior to transportation of waste. The transport of the waste to the disposal site is controlled by the federal *Transportation of Dangerous Goods Act, 1992* (TDGA) and *Ontario Dangerous Goods Transportation Act*.
- If ACMs or suspected ACMs become damaged and worker exposure to the material is likely to occur, the damaged material must be repaired or removed following work procedures outlined in O. Reg. 278/05, as amended, the *DND Asbestos Management Directive*, and *Canada Labour Code, Occupational Health, and Safety Regulations*, as amended.

Englobe made the attempt to evaluate the project areas to identify hazardous materials present. In spite of these efforts, some ACMs may be concealed and not observed at the time of the survey. As such, should any previously unidentified suspect ACMs be encountered as part of future work, these materials are to be treated as ACMs and handled accordingly, unless sampling proves

otherwise. Materials that have not been analyzed but are visibly similar to other materials identified as asbestos-containing, must be considered asbestos-containing unless proven otherwise by laboratory analysis.

6.3. Lead

The Occupational Health and Safety Branch (OHS) of the Ontario Ministry of Labour, Immigration, Training and Skills Development (MLITSD) have published *Guideline: Lead on Construction Projects*. This document classifies all lead disturbances as Type 1, Type 2a, Type 2b, Type 3a or Type 3b work, and assigns different levels of respiratory protection and work procedures for each classification. Disturbance of lead-containing coatings shall follow the procedures of this guideline document.

Paints and other surface coatings containing elevated concentrations of lead can pose a health risk to humans if ingested or inhaled. Such lead-containing surface coatings are also a risk to the environment with the potential to contaminate soil and groundwater. Surface coatings with elevated lead content can also pose a health risk to workers while completing renovations within the building.

Although the Canada Consumer Product Safety Act's *Surface Coating Materials Regulations SOR/2016-193*, as amended, has set a limit of 90 parts per million (ppm) for surface coating materials, there may be a potential for exposure to high levels of airborne lead depending on the work activities performed that disturb the lead-containing materials, even at low lead content concentrations. Conducting a risk assessment to assess the potential for exposure to lead should be performed to determine the need to follow work procedures such as those in the MLITSD guideline referenced above.

In the event of conflict between lead precautionary measures and other precautionary measures (e.g., asbestos, silica), the more stringent procedures shall apply.

The time weighted average exposure limit (TWAEL) for airborne lead is prescribed by O.Reg. 490/09 *Designated Substances*, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne lead levels that exceed this TWAEL.

The disposal of construction waste containing lead is governed by O. Reg. 347/90 - *General - Waste Management*, as amended. The transport of the waste to the disposal site is controlled by the federal TDGA and the *Ontario Dangerous Goods Transportation Act*.

Prior to or during renovation work, the following procedures should be performed for lead-containing materials that are anticipated to be disturbed:

- Assumed lead joints associated with copper piping can be cut a small distance (e.g., 50 mm) from the soldered joints to avoid direct disturbance of the lead material

6.4. Silica

The Occupational Health and Safety Branch of the Ontario MLITSD has published *Guideline: Silica on Construction Projects*. This document classifies all silica disturbances as Type 1, Type 2, or Type 3 work, and assigns different levels of respiratory protection and work procedures for each classification. This guideline should be followed during disturbance of silica-containing materials. It is preferable to use more stringent dust suppression techniques and engineering controls as opposed to relying on respiratory protection to control worker exposure. Respiratory protection should only be relied on as a last resort when dust suppression techniques and engineering controls fail to control worker exposure.

The TWAEEL for airborne silica is prescribed by O.Reg. 490/09 *Designated Substances*, as amended. Work procedures and personal protective equipment must be used to ensure that workers are not exposed to airborne silica levels that exceed this exposure limit.

7.0 Closure

A Statement of Limitations, which forms an integral part of this report, is included in Appendix E.

We trust that the information contained herein meets your needs. Should you have any questions or comments, please do not hesitate to contact us.