Appendix G PRE-DEMOLITION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Pre-Demolition Hazardous Building Materials Assessment

T-Dock Outfitting Pier,
Seaspan Vancouver Shipyards,
50 Pemberton Avenue,
North Vancouver, BC

October 5, 2020

Prepared for:

Seaspan Vancouver Shipyards
50 Pemberton Avenue,
North Vancouver, BC

Prepared by:

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Project Number: 115619249.100.103

Limitations and Sign-off

This document entitled Pre-Demolition Hazardous Building Materials Assessment was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Seaspan Vancouver Shipyards (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Personnel conducting site work and documentation reviews for this project, as indicated below, have appropriate knowledge and experience in the management and control of asbestos hazards to be considered "qualified persons" by WorkSafeBC as it pertains to the provision of consultation in relation to asbestos and other hazardous building materials in buildings and structures.

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Executive Summary

Stantec Consulting Ltd. (Stantec) was commissioned by Seaspan Vancouver Shipyards (the Client) to conduct a pre-demo hazardous building materials assessment of the T-Dock Outfitting Pier located at 50 Pemberton Avenue, North Vancouver, British Columbia (subject structure), which was reportedly originally constructed in 1967 and widened/extended in 1980.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with applicable provincial regulations and the May 2016 Port of Vancouver *Project & Environmental Review Guidelines – Demolition*, prior to planned demolition activities.

The work was carried out in accordance with the requirements of British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97).

The hazardous building materials considered during this assessment included the following:

- asbestos-containing materials (ACMs)
- lead including lead-containing paints (LCPs)
- polychlorinated biphenyls (PCBs)
- mould-impacted materials
- equipment with elemental mercury
- equipment with ozone-depleting substances (ODSs)
- building materials that may contain silica
- stored hazardous materials such as heavy metals, toxic, flammable, explosive or controlled products
- needles and sharps
- animal droppings and carcasses

Based on Stantec's visual assessment and the laboratory analyses performed on the samples collected, limited hazardous building materials were identified to be present.

A summary of our findings is presented in Table ES.1, below. Recommendations pertaining to the handling, removal, transportation and disposal of identified hazardous building materials are provided in the body of this report.

Table ES.1 Summary of Findings

Building Materials	Comments
Asbestos	ACMs were not identified through this assessment.
Lead	The following LCPs were identified through this assessment: • yellow coloured paint on metal railings • white coloured paint on concrete rope anchor tie-offs The following paints, which represent limited overall applications, should be presumed to be LCPs, as they are of similar application and vintage to the yellow LCP present on metal railings: • light blue paint on metal pipes • orange paint on metal pipes • green paint on metal pipes • off-white paint on metal pipes • yellow paint on metal pipes Unless otherwise noted above, identified LCPs were observed to be in good condition. Bulk sampling of building materials coated with the above-noted LCPs was not conducted to evaluate for leachable lead content of potential waste materials, as sampling of such materials was not practical, and as the painted materials themselves are expected to be recycled, re-used, or otherwise NOT destined for landfill disposal.
Polychlorinated biphenyls (PCBs)	No suspected PCB-containing electrical equipment was observed.
Mould	As the subject structure is an outdoor structure constructed over water, some moisture impacted materials are expected to be present. No specific mould issues that would impact demolition procedures were observed.
Mercury	Mercury vapour is present in the light tubes/bulbs in the one fluorescent light fixture observed.
Ozone-depleting substance (ODS)	Building related cooling and refrigeration equipment suspected to be ODS-containing was not observed.
Silica	Silica is expected to be present in the concrete rope tie anchors, which were observed in various locations throughout.
Stored hazardous materials	Stored hazardous materials were not observed.
Needles and sharps	Needles and sharps were not observed.
Animal droppings and carcasses	Rodent droppings were observed in the south wood electrical shed on top of the electrical box.

The statements made in this Executive Summary text are subject to the same limitations included in this report and are to be read in conjunction with the remainder of this report.

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Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos-containing material
AIHA	American Industrial Hygiene Association
AMP	Asbestos Management Plan
BC	British Columbia
ELLAP	Environmental Lead Laboratory Approval Program
EMSL	EMSL Canada Inc.
HUD	Housing and Urban Development
HVAC	heating, ventilation and air conditioning
LCP	lead-containing paint
NVLAP	National Voluntary Laboratory Accreditation Program
ODS	ozone-depleting substance
OEL	occupational exposure limit
PCB	polychlorinated biphenyl
PLM	polarized light microscopy
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was commissioned by Seaspan Vancouver Shipyards (the Client) to conduct a pre-demo hazardous building materials assessment of the T-Dock Outfitting Pier located at 50 Pemberton Avenue, North Vancouver, British Columbia (subject structure).

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with applicable provincial regulations and the May 2016 Port of Vancouver *Project & Environmental Review Guidelines - Demolition*, prior to planned demolition activities.

The work was carried out in accordance with the requirements of British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97).

The hazardous building materials considered during this assessment included the following:

- asbestos-containing materials (ACMs)
- lead including lead-containing paints (LCPs)
- polychlorinated biphenyls (PCBs)
- mould-impacted materials
- equipment with elemental mercury
- equipment with ozone-depleting substances (ODSs)
- building materials that may contain silica
- stored hazardous materials such as heavy metals, toxic, flammable, explosive or controlled products
- needles and sharps
- animal droppings and carcasses

The site work was conducted by Mr. Steve Chou and Ms. Sabrina Guglielmi on September 22, 2020.

1.1 UNDERSTANDING OF THE PROJECT

Stantec understands that the information pertaining to the identity, location and approximate extent of hazardous building materials (if any) associated with the subject structure is not on-file. As the structure is planned for demolition, the Client commissioned this assessment to meet the requirements of the May 2016 Port of Vancouver *Project & Environmental Review Guidelines - Demolition*, and as a measure of diligence in maintaining compliance with BC Reg. 296/97 as it pertains to the identification of hazardous materials prior to demolition work.

2.0 SCOPE

The scope of work for this assessment involved the following:

- visual assessment of readily accessible areas for the presence of suspected hazardous building materials
- collection of representative bulk samples from building materials suspected to contain asbestos fibres
- collection of paint chip samples for the determination of the lead content in paint finishes
- collection of bulk samples of painted building materials in forms presumed to be representative of waste generated during demolition for the determination of whether waste may be considered a toxic leachate (and require special disposal)
- submission of samples collected for laboratory analysis
- evaluation and interpretation of field findings and sample analytical results to develop conclusions and recommendations pertaining to hazardous building materials identified

2.1 LIMITATIONS

In preparation of this report, Stantec used professional judgment based on experience. The work was conducted in accordance with generally accepted professional standards. Stantec relied on information gathered during the site investigation and laboratory analytical reports.

This report reflects the observations made within accessible and accessed areas of the subject structure, and the results of analyses performed on the specific material sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

2.1.1 Physical and Sampling Limitations

Sampling was conducted pertaining to suspected ACMs, suspected LCPs and bulk building materials coated with paint presumed to be destined for landfill disposal. The assessment for the presence of other hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible spaces only. Concealed spaces were inspected via existing access panels, where present. Interior and exterior finishes, and structural elements were not removed to access concealed areas.

Due to limitations on the agreed to scope of work for this project, there are specific limitations to the information that can be provided regarding each hazardous building material considered in this assessment, as outlined below.

- Building materials that may contain asbestos but were not accessible for sampling include, but are not limited to the following:
  - materials below the surface of the water
  - sub-grade materials (e.g., asbestos cement drainage pipe)

- Samples of paint applications suspected to contain lead were collected from surfaces of major paint applications where visually different paint colours and/or types were identified. Although the surfaces where samples were collected may be covered with more than one coat of paint, the paint samples are described by the surface (visible) colour only. Attempts were made to represent all layers of paint in the samples collected. As analytical results are referenced to the surface paint colour only, the lead content of all painted surfaces similar to that represented by the surface paint colour were presumed to be the same, regardless of differing sub surface paints, if any.
- Sampling for analysis of lead leachate was conducted such that building material samples were collected in a form presumed to be representative of waste generated during demolition. The lead leachate samples are meant to represent the general waste that would be created when painted surfaces are demolished, without having paint removed.
  - Materials such as metal and concrete that are coated with LCPs are typically not tested for leachable lead content for the following reasons:
    - If removed with paint in-tact, these materials are expected to be recycled, not disposed of via landfill. As such, the leachable lead content will not impact the “disposal” option, as recycling facilities will typically accept metal or concrete with lead-containing paint.
    - If removal of the paint from the substrate is considered, the waste associated with that process (paint chips and removal substrate—sand, beads, etc.) is typically presumed to be hazardous waste (leachable for lead in excess of 5.0 mg/L) or must be tested in its actual form (once removed, with the removal substrate) to confirm.
    - In most cases, during an initial assessment, it is not practical to try to remove sufficient paint from the substrate in order to appropriately analyze for lead leachate, as a significant area would have to be “scraped” (50–100 g of sample is required).
- Due to height restrictions and the risk of electrical shock in handling operational light fixtures, the ballasts present in the fixtures observed were not inspected for PCB labels or other PCB identifiers. Conclusions and recommendations regarding the presence of PCBs are based on limited observations in combination with information provided by site staff regarding lighting renovations (where requested by Stantec, based on visual observations) and are presented to provide guidance regarding the likelihood that PCB-containing equipment is or is not present. The exact extent and/or number of fluorescent lamp ballasts containing PCBs, if any, will not be commented on.
  - Although they may also be present in other items in limited amounts (e.g., plastics, molded rubber parts, applied dried paints, coatings or sealants, caulking, adhesives, paper, sound-deadening materials, insulation, or felt and fabric products such as gaskets), PCBs are not expected to be present in those materials in concentrations that would necessitate the requirement for PCB-specific handling procedures, separate removal and/or disposal considerations for renovation or demolition. As such, these items were not considered in our assessment.

- Visual assessment for the presence of suspected visible mould and/or suitable conditions for mould growth (e.g., moist and/or water-stained building materials) was conducted. The conclusions made in this report provide description(s) of the potential source(s) of moisture that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. The visual assessment did not include an intrusive assessment. The conclusions provided herein will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the impacted area(s).
- The potential presence of mercury or mercury-containing equipment in inaccessible areas or as internal parts of heating, ventilation and air conditioning (HVAC) mechanisms or other equipment was not assessed.
  - Although limited amounts of mercury may be present in paints and adhesives, mercury is not expected to be present in those materials in concentrations that would necessitate the requirement for mercury-specific handling procedures, separate removal and/or disposal considerations for renovation or demolition. As such, these items were not considered in our assessment.
- Investigation was limited to a visual review in accessed areas of readily accessible building-related cooling and refrigeration equipment which could contain ODSs. Testing was not conducted. Equipment or materials that were not assessed but that may contain ODSs included, but were not limited to, portable equipment (including domestic-type refrigerators and water coolers, tenant-related refrigeration equipment), flexible plastic foam or rigid insulation foam, solvents, aerosol spray propellants and fire extinguishing equipment.
- In general, the assessment for the presence of hazardous building materials was visual in nature and was conducted pertaining to readily visible surfaces within accessible accessed spaces only. Additional hazardous building materials are potentially present in inaccessible areas not assessed including, but not limited to: concealed materials and materials below the surface of the water.

3.0 HAZARDOUS BUILDING MATERIALS ASSESSMENT

Structure information and the results of the assessment for each of the considered hazardous building materials are provided in the following sub-sections.

Background information and health effects information, as well as information regarding regulatory framework and relevant legislation with respect to standard/typical hazardous building materials (asbestos, lead, PCBs, mould, mercury, ODSs and silica) are provided in Appendix A.

A floor plan showing the locations of samples collected during this assessment as well as identified hazardous building materials (where practical) is provided in Appendix B.

3.1 STRUCTURE DESCRIPTION

The T-Dock Outfitting Pier is located at 50 Pemberton Avenue in North Vancouver, British Columbia (BC) and consists of a single level wood pile and plank-constructed pier with three floats surrounding the structure, and three sheds plus a seacan on the main surface. The reported construction date of the structure is 1967 and it was reportedly widened/extended in 1980. These construction time periods are consistent with those dates when hazardous building materials were commonly used.

Note: assessment of the seacan is provided for reference as the structure is expected to be relocated during demolition of the pier.

The typical structural components, mechanical components and building finishes associated with this structure consist of the following:

- foundation – wood piles
- exterior cladding – plywood (electrical sheds)
- exterior cladding – metal sheet (storage shed)
- structural – wood framing (pier and electrical sheds)
- structural – metal stud framing (storage shed)
- mechanical – un-insulated pipes and systems and pipes insulated with fibreglass
- decking – wood planking
- interior flooring – plywood (electrical sheds)
- Interior flooring– metal sheet (electrical sheds)

3.2 ASBESTOS

A summary list of the bulk samples collected by Stantec, including a description of the material, sampling location and laboratory test results is provided in Appendix C. Copies of the Laboratory Certificates of Analysis for bulk samples analyzed are provided in Appendix D.

Based on our observations of construction (estimated vintage of finishes and uniformity of building material use) and on our interpretations of the analytical results of suspected ACMs collected through this assessment, ACMs were not identified.

Our assessment methodologies and findings are further summarized in the following sub-sections.

3.2.1 Methodology

Asbestos-containing materials are grouped into two classifications, friable and non-friable materials. Friable ACMs are those that can easily be crumbled or broken apart by mere hand pressure. When these materials break apart asbestos fibres are then released into the atmosphere. Non-friable ACMs are materials that by the nature of their manufacturing and/or construction do not readily allow the release of asbestos fibres. Some non-friable materials such as plaster, drywall joint compound and ceiling tiles that are considered to be non-friable in an undisturbed state can more readily release fibres when damaged or disturbed.

The presence of asbestos in the workplace in British Columbia is governed by BC Reg. 296/97. According to the current version of BC Reg. 296/97, ACM means any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos.

Based on these criteria, a visual assessment of accessible areas was undertaken to check for the presence of suspected ACMs. Locations to collect discrete bulk samples of suspected ACMs were identified and samples of representative materials were then collected at these locations.

Multiple samples were collected from each “homogenous application” of observed suspected ACMs (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) and submitted to EMSL Canada Inc. (EMSL) in Burnaby, BC for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (USEPA) 600/R-93/116 method.

The number of samples to be collected for each homogenous application of a suspected ACM was based on accepted occupational hygiene standards and protocols, on the recommendations provided in the 2017 WorkSafeBC publication *Safe Work Practices for Handling Asbestos* (Asbestos Guide), and on the assessor’s experience and understanding of the consistency of that building material’s application.

EMSL’s analytical laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

3.2.1.1 Potential Asbestos-Containing Vermiculite Insulation

As part of the assessment, Stantec assessed the subject structure for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, floor cavities and masonry block or brick walls, which are typical areas where vermiculite is found.

3.2.1.2 Sample Results Interpretation

When asbestos is detected in concentrations greater than 0.5% percent in one of the samples within a set that was collected to represent a “homogenous application” of a particular material (or detected in any concentration, in a set of samples collected for applications of vermiculite), the entire sample set, and the entire application of that material is then considered to be an ACM.

3.2.1.3 Asbestos Sampling Quality Assurance/Quality Control

Sampling activities pertaining to asbestos were conducted in accordance with Stantec's safe work practices, which take into account current provincial and/or territorial regulations pertaining to such work (i.e., sampling procedures, required number of samples and laboratory analytical procedures).

Representative bulk samples were collected of accessible suspect ACMs in sufficient quantities for laboratory analysis. Suspect ACM samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples.

All sample bags were compiled in order and placed into a single container accompanied with a chain of custody form outlining the project information, date, structure location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.2.2 Findings

No ACMs were identified through this assessment.

3.2.2.1 Non-Asbestos-Containing Materials

The bulk samples collected during this assessment for which no asbestos was detected through laboratory analysis can be seen in the table in Appendix C.

Non-Friable Materials Containing Less Than 0.5% Asbestos

Three samples of black wrap applied to pipes was collected from the underside of the pier. The sample results indicate an asbestos content of 0.34% chrysotile in one sample and no asbestos detected in the other two samples. The number of samples collected for this material would be adequate to appropriately characterize its asbestos content based on its extent and published standards for sampling of homogenous applications of suspected ACMs (e.g., the Asbestos Guide). Given the analytical results and the non-friable nature of this material, it would not be considered an ACM.

Materials Not Suspected to Contain Asbestos

Various materials within the subject structure were observed and/or presumed to be present, which are not suspected to contain asbestos. Typical materials of this nature that were observed and are not considered suspected ACMs, include but are not limited to the following:

- Materials comprised of glass, such as:
  - pre-formed fibreglass insulation on mechanical pipes
  - lights and lighting components

- Materials comprised of metal, such as:
  - electrical wiring and conduit
  - structural components
  - handrails
  - siding
- Materials comprised of wood, such as:
  - wall framing
  - structural components
  - handrails
  - decking
- Other materials generally not suspected to contain asbestos:
  - poured concrete items such as rope tie off anchors
  - silicone-based clear caulking or sealants

3.2.2.2 Potential for Vermiculite Insulation

As part of the assessment, Stantec assessed the subject structure for areas where vermiculite insulation, a potential ACM, would likely be present. This included making note of and assessing attic spaces, floor cavities and masonry block or brick walls, which are typical areas where vermiculite is found. No vermiculite or locations that may potentially contain vermiculite (that could not otherwise be assessed) were observed.

3.2.3 Recommendations

Based on the visual assessment and results of laboratory analyses, Stantec recommends the following with regards to meeting the requirements of BC Reg. 296/97 as they pertain to managing asbestos during demolition projects:

- Should a material suspected to contain asbestos fibres become uncovered during demolition activities, all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if asbestos fibres are present. Confirmed ACMs should be handled in accordance with applicable guidelines and regulations.
- Asbestos-containing cement pipe may be present below ground—caution should be used at any time when excavation is required.
- In the event that ACMs are identified during demolition, ensure asbestos waste is handled, stored, transported and disposed of in accordance with the requirements of the Federal Transportation of Dangerous Goods Regulation and the British Columbia Hazardous Waste Regulation (BC Reg. 63/88).

3.3 LEAD

A summary list of the samples collected including a description of the samples, sampling locations and laboratory analytical results is provided in Appendix E. Copies of the Laboratory Certificates of Analysis for paint chip samples analyzed are included in Appendix F.

Based on our observations and interpretations of suspected LCP sample analytical results, the paints presented in the table in Appendix G were identified as LCPs.

The following information is included for each identified LCP:

- paint colour
- substrate to which paint is applied
- location/approximate extent of the LCP within the structure
- lead content of paint
- condition
- representative photographs, where available

Our assessment methodologies and findings are further summarized in the following sub-sections.

3.3.1 Methodology

A visual assessment of accessible areas was undertaken in order to check for the presence of materials that may contain lead. These materials included paint applications, wiring and plumbing, batteries, etc.

3.3.1.1 Lead in Paint

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled *Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*, indicates the following:

- improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - the exposure limit indicated in BC Reg. 296/97 is 0.05 mg/m^3
  - the potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan
- lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - any risk assessment should include for the presence of high risk individuals within the workplace

In addition to the above, the 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.

When reviewing the above, “high risk” individuals are not expected to be present in the workplace associated with this structure during operations and maintenance or building material alteration activities (i.e., demolition) that would create significant disturbance to paint with such individuals present. As such, paints containing 600 ppm lead or more will be considered “lead-containing” for the purpose of this report, such that appropriate risk assessments can be completed for demolition planning. However, information regarding the lead content of all paints tested is provided herein, for reference and risk assessment should the consideration of high risk individuals be necessary, based on the requirements of a particular situation.

Based on the above, samples of potential LCPs were collected from major paint applications, in sufficient quantity to conduct analysis for total lead content. The sampling of paint applications involved the collection of paint chip samples of paint layers to the substrate, where possible. A minimum volume of 5 cc or a half teaspoon of paint chips was typically collected. Wherever necessary and possible, paint was separated from any backing material such as paper, concrete or wood and placed in a sealed, clearly labelled plastic bag.

Samples collected were submitted to EMSL in Mississauga, Ontario for analysis of total lead content using EPA Method SW 846 3050B*/7000B. EMSL’s analytical laboratory is also accredited by the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Approval Program (ELLAP).

Welding, Burning or Torch Cutting

Although a concentration of 600 ppm lead has been used to define paint coatings as LCPs, it should be noted that this is related to painted surfaces and the determination of appropriate provisions to protect occupants and employees from exposure to elevated concentrations of lead during typical operations and maintenance or simple renovation. This does not include painted metal surfaces that are to be welded, burned or torch-cut.

Using an arc welder or oxyacetylene torch on steel that is coated with lead-containing paint can create hazardous lead fumes and is prohibited by section 12.115 of BC Reg. 296/97.

> Regulatory excerpt: **12.115 Coatings on metals**
>
> A coating on metal which could emit harmful contaminants (such as lead, chromium, organic materials, or toxic combustion products) must be removed from the base metal, whenever practicable, before welding or cutting begins.

In addition, the following information is provided in the Lead Guideline:

- Welding or torch cutting of paints or coatings on metal can create very high concentrations of airborne lead fumes. Torch cutting structural steel, coated with paint containing as little as 130 mg/kg (equivalent to ppm) lead, can release airborne levels of lead as high as 0.8 mg/m^3 (16 times the exposure limit).

Given this information and that the analytical detection limit for lead paint analysis is approximately 80–90 ppm (not significantly different than 130 ppm, which, per above, may release airborne lead levels 16 times the exposure limit), any paint coating on a metal surface to be welded, burned or torch-cut may present a lead exposure hazard.

3.3.1.2 Building Materials—Leachable Lead Content

According to BC Reg. 63/88, lead waste may be considered a toxic leachate (and require special disposal) if lead is in a dispersible form and its leachate contains greater than 5.0 mg/L lead.

Based on the above, bulk samples of painted building materials that would be expected to be disposed-of via landfill were collected in a form presumed to be representative of waste generated during demolition, each sample containing over 50 g in weight. The samples were submitted to EMSL in Cinnaminson, New Jersey.

Upon receipt and review of paint chip sample analytical results for total lead content, leachate analysis of bulk samples of building materials coated with identified LCPs can be requested. When requested, leachate analysis is conducted by EMSL through toxicity characteristic leaching procedure, using US EPA Method SW846, 1311/7420.

3.3.1.3 Assessment of Paint Condition

The criteria for condition evaluation pertaining to LCPs described herein are generally based on the United States Housing and Urban Development (HUD) 2012 *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

When evaluating the condition of LCPs, an attempt should be made to determine whether the deterioration is due to a moisture problem or some other existing building deficiency.

"Poor" surfaces are considered to be a hazard and should be corrected. "**Fair"** surfaces should be repaired but are not yet considered to be a hazard; if not repaired, they should be monitored frequently. "**Good/intact"** surfaces should be monitored to ensure that they remain in a nonhazardous condition.

In addition, the presence of paint debris must be considered in evaluating condition. Given the variety of paint uses, there are many applications that can have a tendency for the paint to "wear" from the surface slowly, over an extended period of time. Conditions where paint has worn from a surface are worth noting for maintenance discussions (i.e., related to re-coating the surface should, for example, the coating provide weather protection), however, in the absence of loose paint chip debris/dust, such conditions would not represent a potential exposure situation related to lead.

The condition evaluation criteria for LCPs are summarized in Table 1, below.

Table 1 Lead-Containing Paint Condition Categories

Type of Building Component[1]	Total Area of Deteriorated Paint on Each Component		
	Good/Intact	Fair[2]	Poor[3]
Exterior components with large surface areas.	Entire surface is intact.	Less than or equal to 10 square feet	More than 10 square feet
Interior components with large surface areas (walls, ceilings, floors, doors.	Entire surface is intact.	Less than or equal to 2 square feet	More than 2 square feet
Interior and exterior components with small surface areas (window sills, baseboards, soffits, trim).	Entire surface is intact.	Less than or equal to 10% of the total surface area of the component.	More than 10% of the total surface area of the component

NOTES:

1 Building component in this table refers to each individual component or side of building, not the combined surface area of all similar components in a room (e.g., a wall with 1 square foot of deteriorated paint is in "fair" condition, even if the other three walls in a room are intact).

2 Surfaces in "fair" condition should be repaired and/or monitored but are not considered to be "lead-containing paint hazards".

3 Surfaces in "poor" condition are considered to be "lead-containing paint hazards" and should be addressed through abatement or interim controls.

3.3.2 Findings

3.3.2.1 Lead in Paint

Greater than 600 ppm lead was detected through laboratory analysis of chip samples of the following paints:

- yellow coloured paint on metal railings
- white coloured paint on concrete rope anchor tie-offs

The following paints, which represent limited overall applications, should be presumed to be LCPs, as they are of similar application and vintage to the yellow LCP present on metal railings:

- light blue paint on metal pipes
- orange paint on metal pipes
- green paint on metal pipes
- off-white paint on metal pipes
- yellow paint on metal pipes

Additional information regarding extent and current condition of identified and presumed LCPs, including photographs (where available) are provided in Appendix G.

3.3.2.2 Building Materials—Leachable Lead Content

The two identified LCPs are on metal and concrete substrates and would be expected to be recycled, not disposed of via landfill. As collecting bulk samples of such materials is not practical, and as the leachable lead content is not expected to impact the disposal option (recycling facilities will typically accept metal or concrete with lead-containing paint), no leachate analysis was conducted as part of this assessment.

3.3.3 Recommendations

When paints or other lead-containing equipment/materials within the subject structure are to be disturbed and/or removed, including in instances where delaminating LCPs are addressed, ensure compliance with the following:

- exposure protection requirements of BC Reg. 296/97, including the provisions of the Lead Guideline
- transportation and disposal requirements of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88)
- transportation requirements of the Federal Transportation of Dangerous Goods Regulation

Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed the BC Reg. 296/97 eight-hour occupational exposure limit (OEL) of 0.05 mg/m^3 during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust. This can be achieved by:

- Providing workers with protective clothing and personal protective equipment or devices as necessary to protect them against the hazards to which the worker may be exposed.
- providing workers with adequate and training in the care and use of clothing, equipment or device before wearing or using such items
- Wetting the surface of the materials to prevent dust emissions.

- Providing workers with washing facilities with clean water, soap and individual towels to properly wash prior to exiting the work area.

To avoid the inhalation of lead, it is essential to have the following control methods in place:

- engineering controls
- work practices and hygiene practices
- respirators and personal protective equipment
- training

The work tasks required and the ways in which lead-containing materials (including paints containing any concentration of lead) will be impacted will determine the appropriate respirators, measures and procedures that should be followed to protect workers from lead exposure.

3.3.3.1 Welding, Burning or Torch Cutting

Any paint coating on a metal surface to be welded, burned or torch-cut must be removed prior to that action being undertaken, unless project-specific or tasks-specific risk assessments and safe work practices are developed by a qualified person. Development of such risk assessments and work practices will involve consideration of information including, but not limited to, the following:

- composition of the material to be disturbed
- lead content of the paint coating
- methods and tools to be used, including exhaust ventilation
- duration of the work and/or work shift
- training of the personnel conducting the task
- respiratory protection program in effect

3.4 POLYCHLORINATED BIPHENYLS

3.4.1 Methodology

A visual review for the presence of PCBs in electrical equipment was completed. Equipment that is generally suspected of containing PCBs includes lamp ballasts, transformers, hydraulic systems, compressors, switchgear and capacitors.

No sampling of dielectric fluids was undertaken as part of this assessment.

3.4.2 Findings

The fluorescent light fixture was observed to have high-efficiency light tubes. The ballasts within such fixtures are not suspected to contain PCBs.

3.4.3 Recommendations

Should a material suspected to contain PCBs become uncovered during demolition activities (i.e., dielectric fluids, hydraulic fluids), all work in the areas that may disturb the material should be stopped. Samples of the suspect material should be submitted for laboratory analysis to determine if PCBs are present.

PCB-containing items identified for removal and disposal should be handled, transported, stored and disposed of in accordance with the following:

- transportation and disposal requirements of BC Reg. 63/88
- transportation requirements of the Federal Transportation of Dangerous Goods Regulation
- federal PCB Regulations (SOR/2008-273)

3.5 MOULD

3.5.1 Methodology

The presence of suspect visible mould was assessed through visual observations. Material observed with dark-coloured staining and/or a textured and discoloured appearance is described as “suspected mould”. Mould identified visually is defined as “suspected mould” unless it is confirmed as mould by laboratory analysis.

The scope of work and procedures utilized for the visual assessment were based on the recommendations for such provided in the documents listed below:

- Standard Construction Document CCA 82 Mould Guidelines for the Canadian Construction Industry, Canadian Construction Association, 2004 (referred to as CCA 82)
- Guidelines on Assessment and Remediation of Fungi in Indoor Environment, New York City Department of Health and Mental Hygiene, November 2008 (referred to as the NYC Guidelines)
- Fungal Contamination in Public Buildings: Heath Effects and Investigation Methods, Federal-Provincial Committee on Environmental and Occupational Health, 2004 (referred to as the Health Canada Guide)
- Indoor Air Quality in Office Buildings: A Technical Guide, Report of the Federal-Provincial Advisory Committee on Environmental and Occupational Health, 1995 (referred to as the IAQ Guide)
- Bioaerosols: Assessment and Control, American Conference of Governmental Industrial Hygienists (ACGIH), 1999 (referred to as the ACGIH Report)
- Field Guide for the Determination of Biological Contaminants in Environmental Samples, AIHA, Second Edition 2005

3.5.2 Findings

As the subject structure is an outdoor structure constructed over water, some moisture impacted materials are expected to be present. No specific mould issues that would impact demolition procedures were observed.

3.5.3 Recommendations

As no mould and/or moisture-impacted building materials were observed within the subject structure during the assessment, no recommendations have been provided.

3.6 MERCURY

3.6.1 Methodology

An assessment for equipment that is likely to contain mercury (such as thermostats, thermometers and fluorescent light tubes) was completed visually. Information on the type of equipment (i.e., gauges, switches, batteries, thermometers, etc.), model and serial numbers and quantities was recorded, where such information was available.

3.6.2 Findings

Mercury vapour is present in the light tubes/bulbs in one fluorescent light fixtures observed inside of the seacan.

3.6.3 Recommendations

Complete removal of mercury-containing equipment is required prior to demolition activities that may disturb the equipment. When mercury-containing items (e.g., fluorescent light bulbs/tubes) are removed, ensure all mercury waste is handled, stored transported and disposed of in accordance with the requirements the following:

- transportation and disposal requirements of the BC Reg. 63/88
- transportation requirements of the Federal Transportation of Dangerous Goods Regulation

Precautions should be taken if workers may potentially be exposed to mercury or mercury vapours to ensure that workers exposure levels do not exceed the occupational exposure limit of 0.025 mg/m^3 as per BC Reg. 296/97. This can be achieved by providing respiratory and skin protection applicable to the hazard and task to be completed.

3.7 OZONE DEPLETING SUBSTANCES

3.7.1 Methodology

An assessment for equipment or systems likely to contain ODSs (such as refrigeration/cooling equipment or fire suppression systems) was completed visually. Information on the type of equipment, manufacturer and type and quantity of refrigerants was recorded, where available.

3.7.2 Findings

Building related cooling and refrigeration equipment suspected to be ODS-containing was not observed.

3.7.3 Recommendations

As no suspect ODS-containing equipment was observed within the subject structure during the assessment, no recommendations have been provided.

3.8 SILICA

3.8.1 Methodology

An assessment for the presence of silica was conducted visually. The presence of typical silica-containing building materials such as concrete, masonry, stone, terrazzo, refractory brick, gypsum, ceramic tile, ceiling tile and other items, was noted.

3.8.2 Findings

Silica is expected to be present in the concrete rope tie anchors, which were observed in various locations throughout.

3.8.3 Recommendations

Silica-containing materials can be managed in place; therefore, no further action is recommended at this time.

If silica-containing materials within the subject structure are to be disturbed and/or removed (e.g., coring through concrete slabs, demolition of masonry or concrete units), ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by BC Reg. 296/97 (cristobalite and quartz—each 0.025 mg/m^3). This would include, but not be limited to, the following:

- providing workers with respiratory protection
- Wetting the surface of the materials, and use of water or dust suppressing agents to prevent dust emissions.
- Providing workers with facilities to properly wash, prior to exiting the work area.

3.9 OTHER SUBSTANCES OF CONCERN

3.9.1 Methodology

Stantec reviewed the subject structure for other substances that may pose concern or require appropriate procedures for removal and/or disposal during demolition including:

- stored hazardous materials such as heavy metals, toxic, flammable, explosive or controlled products
- needles and sharps
- animal droppings and carcasses

3.9.2 Findings

Regarding the other substances of concern that were assessed, the following was observed:

- stored hazardous materials such as heavy metals, toxic, flammable, explosive or controlled products—not observed
- needles and sharps—not observed
- animal droppings and carcasses—rodent droppings were observed in the south wood electrical shed on top of the electrical box

3.9.3 Recommendations

With respect to rodent waste, various documents provide recommendations related to appropriate methods, tools, and PPE to be used during removal of rodent contamination, because such removal activities can expose workers (and adjacent areas) to airborne fungal spores and other microbial hazards. One such document is the 2006 WorkSafeBC publication “A Hantavirus Exposure Control Program for Employers and Workers”. Although Hantavirus is not a concern for this site, following the guidelines of this document would be sufficient to protect workers, adjacent spaces, and the public from potential exposures to the waste materials during removal of rodent waste.

This work should be conducted by competent personnel who are knowledgeable of potential hazards of fungal spores and other microbial particle exposure, particularly as they pertain to rodent waste.

4.0 CLOSURE

This report has been prepared for the sole benefit of Seaspan Vancouver Shipyards. Any use which a third party makes of this report, or any reliance on decisions based on it, is the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The information and conclusions contained in this report are based upon work undertaken by trained professionals and technical staff in accordance with generally accepted engineering, scientific and occupational health and safety practices current at the time the work was performed. Conclusions presented in this report should not be construed as legal advice.

The conclusions presented in this report represent the best technical judgment of Stantec Consulting Ltd. based on the data obtained from the work. The conclusions are based on the site conditions encountered by Stantec Consulting Ltd. at the time the work was performed at the specific assessment and/or sampling locations, and can only be extrapolated to an undefined limited area around these locations. The extent of the limited area depends on building construction and conditions, building usage and other factors. Due to the nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental or health and safety liabilities.

If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

We trust that the above is satisfactory for your purposes at this time. Should you have any questions or concerns, or require additional information, please do not hesitate to contact the Stantec Project Manager at your convenience.

Regards,

Stantec Consulting Ltd.

APPENDIX A

Hazardous Building Materials Background Information, Health Effects Information and Regulatory Framework

Appendix A HAZARDOUS BUILDING MATERIALS BACKGROUND INFORMATION, HEALTH EFFECTS INFORMATION AND REGULATORY FRAMEWORK

A.1 ASBESTOS

Asbestos is a naturally occurring form of fibrous silicate that is durable and flexible; has high thermal and tensile strength; is resistant to heat, chemical corrosion and friction; does not conduct electricity; and insulates well against condensation, heat and noise. Due to these properties, asbestos was used in over 3,000 commercial products, and it is estimated that approximately 70% of the asbestos that was used in North America was used in building materials.

In buildings, and among many other potential asbestos-containing materials, asbestos is typically found in plaster, mechanical insulation, gaskets, thermal insulation on pipes, refractory material, roofing felts, floor tiles, ceiling tiles and parging, heat resistant panels, incandescent light fixture reflector plates, and any other material requiring a high degree of durability or thermal resistance.

Asbestos-containing materials are grouped into two classifications, friable and non-friable materials. Friable ACMs are those that can easily be crumbled or broken apart by mere hand pressure. When these materials break apart asbestos fibres are then released into the atmosphere. Non-friable ACMs or “manufactured products” are materials that by the nature of their manufacturing/construction do not readily allow the release of asbestos fibres. These materials should not be cut or shaped with power tools, since this procedure may allow for the release of the asbestos fibres. Some materials or “manufactured products”, such as plaster, drywall and ceiling tiles that are considered to be non-friable in an undisturbed state can become friable when damaged or disturbed.

The common use of friable (breakable by hand) asbestos-containing materials (ACMs) in construction ceased voluntarily in the mid-1970s; however, the spray application of asbestos-containing fireproofing was not prohibited until 1986. A material known as vermiculite, which was commonly used for insulation within attics, floor spaces or within masonry block wall systems and may be contaminated with asbestos due to its production processes, was used into the mid-1990s. In addition, asbestos cement products and roofing products (e.g., sealants) currently used in the construction of buildings may still contain asbestos.

A.1.1 Health Effects

Undisturbed asbestos within building materials poses no health risks. Asbestos poses a risk when building materials containing asbestos are impacted, or disturbed, thereby releasing the asbestos fibres into the air.

Asbestos-related diseases are caused when suspended airborne asbestos fibres are inhaled and the fibres settle into various regions of the lungs and remain for extended periods. Once embedded in the lungs the asbestos fibres cause scarring within the lung tissue, ultimately leading to impaired lung function (asbestosis) and/or various cancers (lung cancer; mesothelioma). These asbestos-related diseases are irreversible and fatal. The risk of lung-related cancers is increased in individuals who smoke.

These asbestos-related diseases most often occur in individuals who have been exposed to high concentrations of airborne asbestos over a long period of time, though mesothelioma has been found in individuals with short-term exposures. Symptoms or the development of these asbestos-related diseases usually occur 10 to 25 years after exposure.

A.1.2 Regulatory Framework

Asbestos is included British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97). Included in are provisions for the general duties of employers, requirements for health assessments, training and project notification. There are also sections that will also apply to abatement projects, depending on the work procedures and specific work site hazards.

BC Reg. 296/97 also established an 8-hour occupational exposure limit (OEL) for asbestos (all forms) to be 0.1 fibre/cubic centimetre.

The 2017 WorkSafeBC publication *Safe Work Practices for Handling Asbestos* (Asbestos Guide) is used by Occupational Health and Safety officers as a guide when reviewing abatement work practices and employer codes of practice.

The Asbestos Guide also provides significant additional background information pertaining to asbestos, along with details on health effects and other applicable legislation within the province of British Columbia (e.g., the federal *Hazardous Products Act*, the BC Building Code and waste disposal regulations).

According to the current version of BC Reg. 296/97, asbestos-containing material (ACM) means any material containing at least 0.5% asbestos, or vermiculite insulation with any asbestos.

Disposal of asbestos waste is governed by the British Columbia Hazardous Waste Regulation (BC Reg. 63/88). The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of asbestos waste in British Columbia. In general, and for transportation and disposal, the waste must be placed in a double sealed container, properly labeled, free of cuts, tears or punctures and disposed of at a licensed waste station which has been properly notified of the presence of asbestos waste.

A.2 LEAD

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as electric storage batteries, ammunition, lead solder, radiation shields, pipes, and sheaths for electric cables. Metallic lead is sometimes combined with other metals such as copper, tin and antimony as lead alloys for use in the manufacture of a variety of metal products.

Organic lead compounds contain a lead atom covalently bonded to carbon. Common examples of organic lead compounds include lead “soaps” such as lead oleates, high pressure lubricants, and anti-knock agents in gasoline.

Inorganic lead compounds (or lead salts) result when lead is combined with an element other than carbon. Examples are lead oxide, lead chromate, lead carbonate and lead nitrate. Inorganic lead compounds may occur as solids or in solutions, and are used in insecticides, pigments, paints, frits, glasses, plastics, and rubber compounds.

Lead is commonly found in buildings in items such as the solder used on copper domestic pipes; the caulking on bell fittings of cast iron drainage pipes; electrical equipment/wiring; batteries (e.g., emergency exit signage batteries); lead sheeting (e.g., x-ray rooms); vent and pipe flashings; and paints and ceramic tile glazes.

A.2.1 Health Effects

Elemental lead and inorganic lead compounds are absorbed through ingestion or inhalation and can incorporate into the bone marrow, nerve tissue, brain, and kidneys. In children, symptoms of lead poisoning can include headaches, irritability, abdominal pain, vomiting, anemia, weight loss, poor attention span, noticeable learning difficulty, slowed speech development, and hyperactivity. In adults, symptoms of lead poisoning can include pain, numbness or tingling of the extremities, muscular weakness, headache, abdominal pain, memory loss, unsteady gait, pale skin, weight loss, vomiting, irritability, and anemia. Although adults are susceptible to the toxic effects of lead, children are at high risk due to the nature of a child's activities that involve the introduction of non-food items into their bodies.

Excessive airborne lead and surface contamination can be transferred to employees’ hands and may results in lead ingestion. Therefore, work practices intended to minimize surface lead concentrations, such as frequent cleaning of work surfaces should be included in an overall lead exposure control plan.

A.2.2 Regulatory Framework

In the past, the United States Department of Housing and Urban Development (HUD) set a criteria of lead-based paint as 0.5% lead (by weight) or 5,000 parts per million (ppm) for evaluating whether lead is a hazard in a residential setting.

In Canada, the Surface Coating Materials Regulations (SOR/2016-193) under the federal *Hazardous Products Act* provides a concentration of lead that must not be exceeded in surface coatings that are presently sold in this country. This value was reduced from 600 ppm (in 2005) to 90 ppm (in 2010). However, it is important to note that this regulation does not comment on the potential occupational exposure if the material is disturbed.

Under BC Reg. 296/97, a regulatory limit has been established for occupational exposure to airborne lead that may be present in a workplace. Per BC Reg. 296/97, the OEL for airborne lead dust or fumes should not exceed the TWA value of 0.05 milligram per cubic metre of air (mg/m^3). The OEL represents the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, the 2011 WorkSafeBC manual titled *Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry*, indicates the following:

- Improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit
  - The potential for exposure exceeding half of the occupational exposure limit would be the trigger for implementation of an exposure control plan.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children
  - Any risk assessment should include for the presence of high risk individuals within the workplace.

In addition to the above, the 2017 WorkSafeBC publication *Safe Work Practices for Handling Lead* (Lead Guideline) indicates the following:

> Unlike for asbestos-containing material, WorkSafeBC does not numerically define what would be considered a lead-containing paint or coating. All suspected paints or coatings should be tested for lead because, depending on the nature of the work, even a small amount could pose a risk to workers. In order to determine which controls and personal protective equipment would be required for a particular job, a qualified person must consider this information as part of the risk assessment.

Work procedures that can be used to assist in protecting workers and adjacent work areas from exposure to lead during disturbance activities can also be found in this document.

According to the British Columbia Hazardous Waste Regulation (BC Reg. 63/88), lead waste may be considered a toxic leachate (and require special disposal) if lead is in a dispersible form and its leachate contains greater than 5.0 milligrams per litre (mg/L) lead.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of lead waste in British Columbia.

A.3 POLYCHLORINATED BIPHENYLS (PCBS)

PCBs are man-made toxic chemicals whose physical and chemical properties produce the following attributes: fire resistance, low electrical conductivity, high resistance to thermal breakdown, high chemical stability and resistance to oxidants and other chemical.

PCBs were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. In fluorescent fixtures, PCBs were usually found within the small capacitors inside the ballast that controls the lamp. The Federal Chlorobiphenyls Regulation, SOR/91-152, prohibited the use of PCBs in electrical equipment manufactured after July 1, 1980. Stocks of items such as ballasts containing PCBs may have been used into the early or mid-1980s.

A.3.1 Health Effects

PCBs are insoluble in water; however, they readily dissolve in fats and other organic compounds. It is these attributes and fat-solubility that allow PCBs to persist in the environment and bio-accumulate in humans and animals. Exposure to PCBs can affect the immune system, reproductive system, nervous system and endocrine system. In humans, PCBs are potentially cancer-causing.

A.3.2 Regulatory Framework

As of September 5, 2008, under subsection 93(1) of the Canadian *Environmental Protection Act,* (CEPA), Federal PCB regulations were published by the Canada Gazette Part II (SOR/2008-273) that imposed specific deadlines for the elimination of all PCBs in concentrations at or above 50 milligrams/kilogram (mg/kg). This regulation required the elimination of all PCBs and PCB-containing materials currently in-use and in storage and limited the period of time PCB materials could be stored before being eliminated. Other aspects of the regulation govern the labelling and reporting of stored PCB materials and equipment as well as improved practices for the management of PCBs that remain in use (i.e., those with PCB concentrations less than 50 mg/kg) until their eventual elimination.

Under SOR/2008-273, the following end-of-use dates were established:

- December 31, 2009
  - Equipment containing PCBs in a concentration of 500 mg/kg or more
  - Equipment containing PCBs in a concentration of at least 50 mg/kg but less than 500 mg/kg when located in sensitive locations (i.e., drinking-water treatment plant, food or feed processing plant, child care facility, preschool, primary or secondary school, hospital, or senior citizen care facility or the property on which the plant or facility is located, within 100 m of it)
- December 31, 2014
  - Certain specified equipment not replaced by the 2009 deadline due to technical constraints for engineered-to-order equipment or if the facility is scheduled for permanent closure before 2014

- December 31, 2025
  - Equipment containing PCBs in a concentration of at least 50 mg/kg but less than 500 mg/kg when located in non-sensitive locations

In addition to the above, a maximum storage period of one year is allowed for PCBs and products that contain PCBs at each of the following non-sensitive locations:

- owner's PCB storage site
- PCB storage site of an authorized facility for decontamination or of an authorized transfer site
- PCB storage site of an authorized destruction facility

For British Columbia, according to the British Columbia Hazardous Waste Regulation (BC Reg. 63/88):

- PCB wastes are defined as: PCB liquid, PCB solid, and PCB equipment that have been taken out of service for the purpose of treatment, recycling, reuse, or disposal, or for the purpose of storage prior to treatment, recycling, reuse, or disposal
  - "PCB liquid" means any liquid containing more than 50 parts per million (ppm) by weight of PCB
  - "PCB solid" means any material or substance other than PCB liquid that contains or is contaminated with chlorobiphenyls at a concentration greater than 50 ppm by weight of chlorobiphenyls
  - "PCB Equipment" means any manufactured item that contains or is contaminated with a PCB liquid or PCB solid is PCB equipment. While items of PCB equipment are often electrical components such as transformers or capacitors, the definition includes other items such as contaminated drums and containers.
    - NOTE: An item of equipment from which PCB liquid or PCB solid has been removed is still PCB equipment until it has been decontaminated by an approved protocol. This is because the removal is a treatment process and the equipment, until decontaminated, is a residue from the treatment

In British Columbia, PCB equipment becomes PCB wastes as soon as it is removed from service. This is the case even if the intent is to treat, recycle, or reuse the equipment.

When PCB wastes are stored in British Columbia, the full requirements of BC Reg. 63/88 apply to:

- 1.0 kg or more of pure PCB
- 100 L or more of any liquid containing more than 50 ppm of PCB
- 100 kg or more of any material other than a liquid, contaminated with more than 50 ppm of PCB

These amounts are the total of all amounts at a single location owned or controlled by the same person. They include PCB equipment. BC Reg. 63/88 also provides packaging requirements for storage, labeling requirements, waste destruction requirements, and references SOR/2008-273, indicating:

> NOTE: The federal PCB Regulations also apply to stored PCBs and have strict maximum allowable storage periods which would prohibit provisions in [BC Reg 63/88] related to storage prior to 1 April 1992. In event of a conflict between [BC Reg 63/88] and [SOR/2008-273], follow [SOR/2008-273].

The Federal Transportation of Dangerous Goods Regulation sets out the requirements for the proper transport of PCB waste across provincial boundaries.

In British Columbia, a manifest issued by the Ministry of Environment (or equivalent federal document) must be used for hazardous wastes shipped from sites in British Columbia. A manifest must be used to transport:

- 5 kg or more of PCB solids
- 5 L or more of PCB liquids
- An amount of a PCB solid or PCB liquid containing more than 500 g of PCB within BC
- 500 g or more of solids, liquids, or mixtures of these containing 50 mg/kg of PCB outside of BC

A.4 MOULD

Mould can be found everywhere in the outside environment—on plants, in soil and on dead and decaying matter (i.e., dead leaves). Mould requires two main conditions in order to grow—a source of food (a substrate typically comprised of cellulose) and water. Sources of food for mould are plentiful in outdoor and indoor environments; however, it is the presence of water in an indoor environment that will determine mould growth. The source of water can be a result of a water pipe leak or even excess condensation. Thus, the key to controlling mould indoors is to control the presence of water.

The removal of building materials impacted by mould growth may require workers with specific training and experience using work procedures that have been developed to protect workers and work areas from exposure to elevated concentrations of airborne mould.

A.4.1 Health Effects

There are a number of documented cases of health problems related to exposure to indoor fungi. Both high-level, short-term exposures and lower-level, long-term exposures can result in illness. The most common symptoms from exposure to mould in indoor environments are runny nose, eye irritation, cough, congestion, aggravation of asthma, headache, flu-like symptoms, fatigue, and skin rash. People with suppressed immune systems may be susceptible to fungal infections as a result of exposure to indoor moulds.

People who are exposed to mould growth on building materials will not necessarily exhibit adverse health effects. However, the mould must still be removed. Humans are at risk from indoor mould when fungal spores, fragments or metabolites are released into the air and inhaled or physically contacted (dermal exposure).

Not everyone experiences allergic reaction; the susceptibility to exposure varies with the individual's genetic predisposition, age, state of health, and concurrent exposures. For these reasons, and because the measurement of exposure is not standardized and biological markers of exposure to fungi are largely unknown, it is not possible to establish "safe" or "unsafe" levels of exposure. However, federal and provincial policies have been written to minimize mould exposure and the elimination of mould indoors.

A.4.2 Susceptibility to Mould Exposure

People's reaction to mould exposure is quite varied, and although anyone can be affected, some people may be more susceptible and at greater risk, including:

- infants and children
- elderly
- pregnant women
- individuals with respiratory conditions or allergies and asthma
- persons with weakened immune system (e.g., chemotherapy patients, organ or bone marrow transplant recipients, and people with HIV infections or autoimmune diseases)

People with specific health concerns should consult their doctor if concerned about mould exposure. Symptoms that may appear to stem from mould exposure may be due to other causes such as bacterial or viral infections or other allergies.

A.4.3 Regulatory Framework

At present, there are no specific laws or regulations governing acceptable levels of mould in buildings. The lack of specific regulatory standards is due in part to an inability to establish exposure-response relationships. Variation in individual susceptibility, limitations in sampling and analytical techniques, and the vast number of fungal agents and their products make it difficult to establish safe levels of exposure for all individuals. With a lack of defined exposure criteria, current Health Canada and other agency guidelines on the assessment and control of mould contamination in public buildings are largely based on prudent avoidance (i.e., remove any indoor growth or amplification site of mould, regardless of the concentration of moulds or their products in the indoor environment).

Although there are currently no regulations in Canada pertaining specifically to mould in buildings, occupational health and safety regulations typically require employers to take every precaution reasonable in the circumstances for the protection of workers. For example, BC Reg. 296/97 indicates the following:

- Section 4.79(1):
  - Employer must ensure that the indoor air quality is investigated when
    a) complaints are reported
- Section 4.79(2):
  - Air quality investigation must include
    c) sampling for airborne contaminants suspected to be present in concentrations associated with the reported complaints

The WorkSafeBC Guideline for Part 4 of BC Reg. 296/97 discusses the application of the Regulation to workplaces with mould showing on exposed or hidden surfaces, or where mould may be a factor in complaints regarding indoor air quality. The guideline provides information for investigating indoor air quality complaints with respect to mould contamination, including information on sampling for the presence of moulds in buildings. Information is also provided on possible health effects and for cleanup personnel involved in the remediation of buildings damaged by water and mould.

Several additional guidelines and other resources describe procedures for the investigation and remediation of mould. The following documents indicate that mould observed in occupied building should be remediated in accordance with these procedures:

- Environmental Abatement Council of Ontario's (EACO) *Mould Abatement Guidelines*, 2010—Edition 2
- *Mould Guidelines for The Canadian Construction Industry*, Canadian Construction Association—82, 2004
- *Guidelines on Assessment and Remediation of Fungi in Indoor Environment*, New York City Department of Health and Mental Hygiene, November 2008
- *Bioaerosols: Assessment and Control,* ACGIH 1999
- *Fungal Contamination in Public Buildings: Health Effects and Investigation Methods*, Federal-Provincial Committee on Environmental and Occupational Health 2004
- *Field Guide for the Determination of Biological Contaminants in Environmental Samples*, AIHA 1996
- *Clean-Up Procedures for Mould in Houses,* Canada Mortgage and Housing Corporation (CMHC 2004)

A.5 MERCURY

Mercury is commonly found in buildings as mercury vapour lighting, thermostats/thermometers with mercury-containing glass ampoules, electrical switches and can also be found in minor amounts in fluorescent lamp tubes and vapour bulbs and may be present in stable forms in adhesives. If mercury is exposed to the air, odourless vapours are formed.

A.5.1 Health Effects

Routes of exposure for mercury and mercury compounds include inhalation, ingestion, skin and/or eye contact. Mercury is hazardous if it is inhaled or absorbed through the skin, therefore exposure controls (including both respiratory protection and skin protection) are important to consider.

Elemental (metallic) mercury most often causes health effects through inhalation of its vapour, which can be absorbed through the lungs. This kind of exposure can result when elemental mercury is spilled (or products that contain elemental mercury break) and the mercury is exposed to the air. Vapour concentrations can vary especially in warm or poorly-ventilated indoor spaces where the airborne concentration can exceed the permissible exposure limit (provincially set).

Chronic mercury "poisoning" can be caused by long-term exposure to low airborne concentrations (or low levels) of mercury. Symptoms or effects of mercury exposure include: tremors, emotional changes (e.g., mood swings, nervousness, irritability, etc.), neuromuscular effects (e.g., muscular weakness, twitching), mental changes/disturbances, digestive disturbances, headaches, insomnia, and changes in nervous response.

Factors that determine the severity of the health effects from mercury exposure include the following:

- chemical form of mercury (e.g., elemental, methylmercury, inorganic and organic)
- dose
- age of individual exposed
- duration of exposure
- route of exposure—as listed above
- health of individual exposed

A.5.2 Regulatory Framework

In Canada, the Surface Coating Materials Regulations (SOR/2016-193) under the federal *Hazardous Products Act* provides a concentration of mercury that must not be exceeded in surface coatings that are presently sold in this country. This value was set at 10 ppm in 2005. However, it is important to note that there is not a direct correlation between the concentration of mercury in a material to the potential occupational exposure if the material is disturbed.

Exposure to mercury is regulated by BC Reg. 296/97. The regulated occupational exposure limit for airborne mercury is 0.025 mg/m^3 (eight-hour TWA).

Mercury disposal should be through a scrap dealer (elemental mercury), recycling firm for mercury vapour and returned to the manufacturer for light tubes and fixtures. Disposal of mercury waste is governed by BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of mercury waste in British Columbia.

A.6 OZONE-DEPLETING SUBSTANCES

Ozone-depleting substances (ODSs) are chemical agents known as chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) used in various refrigeration equipment including air-conditioning, heat pump, refrigeration or freezer units. They have also been used in solvents, as aerosol additives in the production of foam insulation and in fire extinguishing equipment.

A.6.1 Health Effects

Health effects are not typically related to exposure to ODSs directly, but to the consequences of ODS release to the atmosphere, subsequent degradation of the earth's ozone layer, and implications associated with increased UVB light exposure.

A.6.2 Regulatory Framework

ODSs are regulated in British Columbia by the British Columbia *Waste Management Act*—Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99).

On federal land, aboriginal land and federal works, buildings and undertakings, the Federal Halocarbon Regulation 2003 (SOR/2003-289) applies. All other buildings and uses of refrigerants and other agents are under the Ozone-Depleting Substances Regulations 1998 (SOR/99-7), under CEPA. The regulations prohibit the release of halocarbons contained in refrigeration systems, air conditioning systems, fire extinguishers (except to fight a fire that is not a fire caused for training purposes) or containers or equipment used in the re-use, recycling, reclamation or storage of a halocarbon.

The regulations also impose restrictions on the servicing and dismantling, disposing of or decommissioning of any system containing halocarbons and requires the recovery of halocarbons into an appropriate container by a certified individual. The regulation also details an owner's record-keeping obligations.

If ODS-containing materials are to be removed and disposed of, all ODSs must be handled, recycled, stored, and/or disposed of in accordance with the requirements of BC Reg. 63/88.

The Federal Transportation of Dangerous Goods Regulation and BC Reg. 63/88 set out the requirements for the proper transport of ODS waste in British Columbia.

A.7 SILICA

Silica is a scientific name that refers to a mineral group made up of silicon and oxygen. It is the crystalline form of silica that is of concern when considering health effects. Crystalline silica occurs in several forms including quartz, cristobalite and tridymite. Silica's many uses include sand in golf courses and playgrounds, sandblasting abrasives, glass, ceramics, building materials (concrete, grout, bricks, blocks, asphalt, acoustical tiles, floor tiles, and plaster), electronic components.

Dust containing respirable crystalline silica is produced during construction-related activities such as the following:

- demolition
- masonry, bricklaying and/or stone setting
- rock drilling
- repair and/or finishing of concrete materials
- abrasive blasting
- dry sweeping
- quarrying and mining

A.7.1 Health Effects

Crystalline silica dust particles, which are small enough to be inhaled into the lungs (respirable size), can cause a number of health problems. As with asbestos, silica within building materials poses no threat to human health if left undisturbed.

Exposure to crystalline silica airborne dust my cause scaring of the lungs with coughing and shortness of breath—also known as "silicosis", a form of disabling, progressive, and sometimes fatal pulmonary fibrosis.

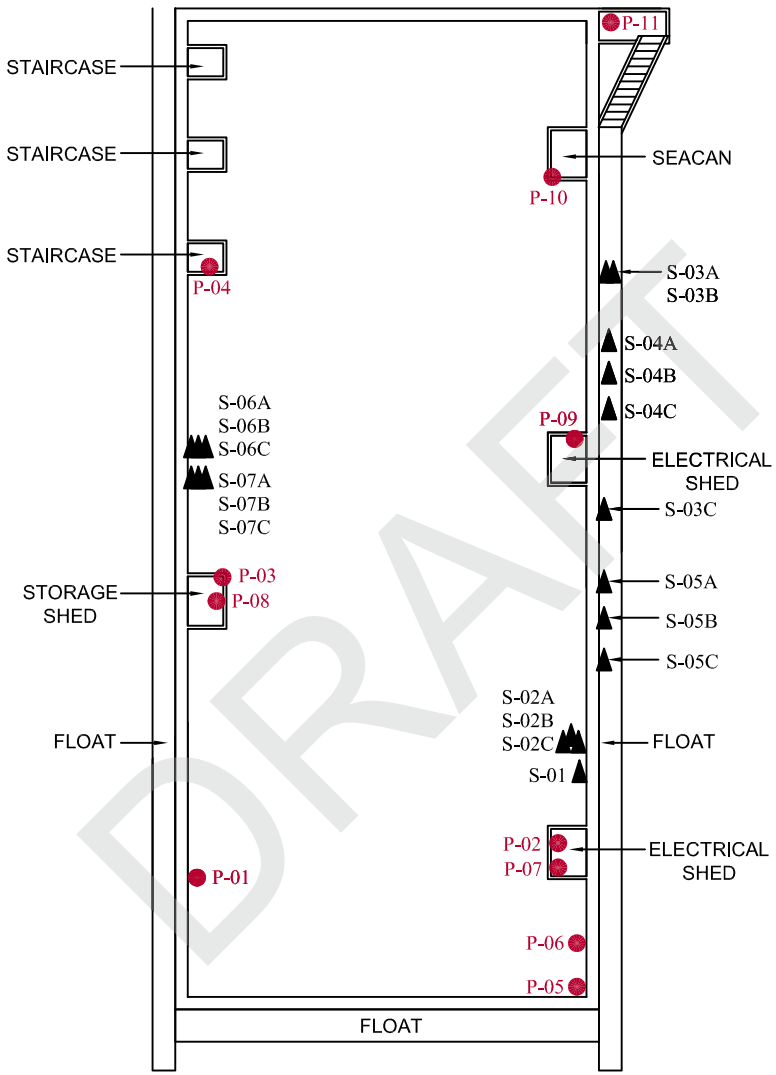
A.7.2 Regulatory Framework

Regulations pertaining to silica are provided in BC Reg. 296/97. Included are general provisions (minimizing release; keeping worksite clear of unnecessary accumulations; ensuring methods for decontamination prevent generation of airborne silica), provisions for "restricted areas" (where there is a reasonable chance that the airborne concentration of silica exceeds or may exceed the occupational exposure limit), provisions for use in abrasive blasting, and provisions for health assessments for workers exposed to silica.

BC Reg. 296/97 also establishes the eight-hour OEL for silica to be 0.025 mg/m^3 for each cristobalite and quartz.

APPENDIX B

Floor Plans



LEGEND

- BULK SAMPLE FOR ASBESTOS
- PAINT CHIP SAMPLES

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING SAMPLE LOCATIONS

T-DOCK OUTFITTING PIER, SEASPAN VANCOUVER SHIPYARDS, 50 PEMBERTON AVENUE, NORTH VANCOUVER, BC

Project No.:	115619249
Scale:	N.T.S.
Date:	20/09/26
Dwn. By:	CD SL2020090192 PT/CS
App'd By:	KI

Dwg. No.: 1

Client: SEASPAN VANCOUVER SHIPYARDS

Stantec

APPENDIX C

Summary of Results: Analysis of Bulk Samples for Asbestos

Appendix C SUMMARY OF RESULTS: ANALYSIS OF BULK SAMPLES FOR ASBESTOS

Table C-1 Suspected ACM Bulk Sample and Analytical Results Summary
T-Dock Outfitting Pier, Seaspan Vancouver Shipyards, North Vancouver, BC

Material/Homogenous Application Description	Sample Number	Sample Location	Result (% Asbestos)
Electrical gasket, black – applied to conduits throughout	S-01	Pier, south	None detected
Foam insulation, black – applied to pipes throughout	S-02A	Pier, south	None detected
	S-02B	Pier, south	None detected
	S-02C	Pier, south	None detected
Pipe sealant, white – applied to threads throughout	S-03A	Underside of pier, north	None detected
	S-03B	Underside of pier, north	None detected
	S-03C	Underside of pier, central	None detected
Textured matt (stripes), black – applied throughout east and west floats	S-04A	East float, north	None detected
	S-04B	East float, north	None detected
	S-04C	East float, central	None detected
Black wrap applied to wood piles throughout underside of pier	S-05A	Underside of pier, central	None detected
	S-05B	Underside of pier, central	None detected
	S-05C	Underside of pier, central	None detected
Black wrap applied to pipes (top layer) throughout underside of pier	S-06A	Underside of pier, central	0.34% Chrysotile
	S-06B	Underside of pier, central	None detected
	S-06C	Underside of pier, central	None detected
Pipe wrap, beige paper with silver backing applied to pipes (second layer under S-06ABC) throughout underside of pier	S-07A	Underside of pier, central	None detected
	S-07B	Underside of pier, central	None detected
	S-07C	Underside of pier, central	None detected

NOTE:

1. Discrepancies between sampled material or location descriptions between this table and the laboratory certificate – this table is to be considered correct

APPENDIX D

Laboratory Analytical Report—Asbestos: Polarized Light Microscopy

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692002262
Customer ID: 55JACQ30L
Customer PO: 115619249
Project ID:

Attn: Steve Chou
Stantec Consulting Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Collected: 9/22/2020
Received: 9/22/2020
Analyzed: 9/23/2020

Proj: SEASPAN T DOCK, 115619249.100.103

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-01 ***Lab Sample ID:*** **692002262-0001**
Sample Description: PIER, SOUTH/ELECTRICAL GASKET, BLACK - APPLIED TO CONDUITS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-02A ***Lab Sample ID:*** **692002262-0002**
Sample Description: PIER, SOUTH/FOAM INSULATION, BLACK - APPLIED TO PIPES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	9/23/2020	Black	0.0%	100.0%	None Detected	

Client Sample ID: S-02B ***Lab Sample ID:*** **692002262-0003**
Sample Description: PIER, SOUTH/FOAM INSULATION, BLACK - APPLIED TO PIPES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	9/23/2020	Black	0.0%	100.0%	None Detected	

Client Sample ID: S-02C ***Lab Sample ID:*** **692002262-0004**
Sample Description: PIER, SOUTH/FOAM INSULATION, BLACK - APPLIED TO PIPES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	9/23/2020	Black	0.0%	100.0%	None Detected	

Client Sample ID: S-03A ***Lab Sample ID:*** **692002262-0005**
Sample Description: UNDERSIDE OF PIER, NORTH/PIPE SEALANT, WHITE - APPLIED TO THREADS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	White	0.0%	100%	None Detected	

Client Sample ID: S-03B ***Lab Sample ID:*** **692002262-0006**
Sample Description: UNDERSIDE OF PIER, NORTH/PIPE SEALANT, WHITE - APPLIED TO THREADS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	White	0.0%	100%	None Detected	

Client Sample ID: S-03C ***Lab Sample ID:*** **692002262-0007**
Sample Description: UNDERSIDE OF PIER, CENTRAL/PIPE SEALANT, WHITE - APPLIED TO THREADS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	White	0.0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692002262
Customer ID: 55JACQ30L
Customer PO: 115619249
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-04A **Lab Sample ID:** **692002262-0008**

Sample Description: EAST FLOAT, NORTH/TEXTURED MATT (STRIPES), BLACK - APPLIED THROUGHOUT EAST AND WEST FLOATS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-04B **Lab Sample ID:** **692002262-0009**

Sample Description: EAST FLOAT, NORTH/TEXTURED MATT (STRIPES), BLACK - APPLIED THROUGHOUT EAST AND WEST FLOATS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-04C **Lab Sample ID:** **692002262-0010**

Sample Description: EAST FLOAT, CENTRAL/TEXTURED MATT (STRIPES), BLACK - APPLIED THROUGHOUT EAST AND WEST FLOATS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-05A **Lab Sample ID:** **692002262-0011**

Sample Description: UNDERSIDE OF PIER, CENTRAL/BLACK WRAP APPLIED TO WOOD PILES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-05B **Lab Sample ID:** **692002262-0012**

Sample Description: UNDERSIDE OF PIER, CENTRAL/BLACK WRAP APPLIED TO WOOD PILES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-05C **Lab Sample ID:** **692002262-0013**

Sample Description: UNDERSIDE OF PIER, CENTRAL/BLACK WRAP APPLIED TO WOOD PILES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-06A **Lab Sample ID:** **692002262-0014**

Sample Description: UNDERSIDE OF PIER, CENTRAL/BLACK WRAP APPLIED TO PIPES (TOP LAYER)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	99.7%	**0.34% Chrysotile**	

Client Sample ID: S-06B **Lab Sample ID:** **692002262-0015**

Sample Description: UNDERSIDE OF PIER, CENTRAL/BLACK WRAP APPLIED TO PIPES (TOP LAYER)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: (604) 757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 692002262
Customer ID: 55JACQ30L
Customer PO: 115619249
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: S-06C ***Lab Sample ID:*** **692002262-0016**

Sample Description: UNDERSIDE OF PIER, CENTRAL/BLACK WRAP APPLIED TO PIPES (TOP LAYER)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM Grav. Reduction	9/23/2020	Black	0.0%	100%	None Detected	

Client Sample ID: S-07A ***Lab Sample ID:*** **692002262-0017**

Sample Description: UNDERSIDE OF PIER, CENTRAL/PIPE WRAP, BEIGE PAPER WITH SILVER BACKING APPLIED TO PIPES (SECOND LAYER UNDER S-06ABC)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	9/23/2020	Beige	0.0%	100.0%	None Detected	

Client Sample ID: S-07B ***Lab Sample ID:*** **692002262-0018**

Sample Description: UNDERSIDE OF PIER, CENTRAL/PIPE WRAP, BEIGE PAPER WITH SILVER BACKING APPLIED TO PIPES (SECOND LAYER UNDER S-06ABC)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	9/23/2020	Beige	0.0%	100.0%	None Detected	

Client Sample ID: S-07C ***Lab Sample ID:*** **692002262-0019**

Sample Description: UNDERSIDE OF PIER, CENTRAL/PIPE WRAP, BEIGE PAPER WITH SILVER BACKING APPLIED TO PIPES (SECOND LAYER UNDER S-06ABC)

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	9/23/2020	Beige	0.0%	100.0%	None Detected	

Analyst(s):

Margaret Lee	PLM (6) PLM Grav. Reduction (8)
Nicole Yeo	PLM Grav. Reduction (5)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 09/23/202012:54:13

APPENDIX E

Summary of Results: Analysis of Paint Chip Samples for Lead

Appendix E SUMMARY OF RESULTS: ANALYSIS OF PAINT CHIP SAMPLES FOR LEAD

Table F-1 Suspected Lead-Containing Paint Sample and Analytical Results Summary T-Dock Outfitting Pier, Seaspan Vancouver Shipyards, North Vancouver, BC

Sample Number	Paint Colour/Application	Sample Location	Result (ppm)
P-01	**Yellow on metal railing along pier edges**	**Railings, south**	**46,000**
P-02	Orange on wood electrical sheds	Electrical shed, exterior, south shed	<82
P-03	Red on metal storage shed	Storage shed, exterior, central	120
P-04	Yellow on wood staircases and railing to east float	Staircase, central	<81
P-05	Orange on metal light fixtures throughout	Light post, south	<81
P-06	**White on concrete rope anchor tie-offs**	**Rope anchor tie-off, south**	**3,700**
P-07	White on wood interior of electrical sheds	Electrical shed, interior, south shed	<82
P-08	White on metal storage shed interior	Storage shed, interior, central	<80
P-09	Grey on wood interior of north electrical shed	Electrical shed, interior, north shed	140
P-10	White on metal interior and exterior of seacan	Seacan, exterior, north	570
P-11	Grey on wood walkway to east floats	Walkway to east floats, north	<80

NOTE:
Bold, highlighted text indicates confirmed LCP

APPENDIX F

Laboratory Analytical Report—Lead: Paint Chip Analysis

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552011894
CustomerID:	55JACQ30L
CustomerPO:	115619249100103
ProjectID:	

Attn: **Steve Chou**
Stantec Consulting Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Received: 9/23/2020 09:25 AM
Collected:

Project: **SeaspanTDock115619249.100.103**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
P-01 *552011894-0001*	Site: Railings, south Desc: Yellow on metal	9/23/2020	0.2479 g	1600 ppm	46000 ppm
P-02 *552011894-0002*	Site: Electrical shed, exterior, south shed Desc: Orange on wood	9/23/2020	0.2436 g	82 ppm	<82 ppm
P-03 *552011894-0003*	Site: Storage shed, exterior, central Desc: Red on metal	9/23/2020	0.2444 g	82 ppm	120 ppm
P-04 *552011894-0004*	Site: Staircase, central Desc: Yellow on wood	9/23/2020	0.2474 g	81 ppm	<81 ppm
P-05 *552011894-0005*	Site: Light post, south Desc: Orange on metal	9/23/2020	0.2479 g	81 ppm	<81 ppm
P-06 *552011894-0006*	Site: Rope anchor tie-off, south Desc: White on Concrete	9/23/2020	0.2501 g	80 ppm	3700 ppm
P-07 *552011894-0007*	Site: Electrical shed, interior, south shed Desc: White on wood	9/23/2020	0.2449 g	82 ppm	<82 ppm
P-08 *552011894-0008*	Site: Storage shed, interior, central Desc: White on metal	9/23/2020	0.2492 g	80 ppm	<80 ppm
P-09 *552011894-0009*	Site: Electrical shed, interior, north shed Desc: Grey on wood	9/23/2020	0.2484 g	81 ppm	140 ppm

Rowena Fanto, Lead Supervisor
or other approved signatory

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 09/24/2020 08:25:33

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	552011894
CustomerID:	55JACQ30L
CustomerPO:	115619249100103
ProjectID:	

Attn: **Steve Chou**
Stantec Consulting Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
Fax:
Received: 9/23/2020 09:25 AM
Collected:

Project: **SeaspanTDock115619249.100.103**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client SampleDescription	*Collected*	*Analyzed*	*Weight*	*RDL*	*Lead Concentration*
P-10		9/23/2020	0.2509 g	80 ppm	570 ppm
552011894-0010	Site: Seacan, exterior, north Desc: White on metal				
P-11		9/23/2020	0.2512 g	80 ppm	<80 ppm
552011894-0011	Site: Walkway to east floats, north Desc: Grey on wood				

Rowena Fanto, Lead Supervisor
or other approved signatory

Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.
Samples analyzed by EMSL Canada Inc. Mississauga, ON AIHA-LAP, LLC - ELLAP #196142

Initial report from 09/24/2020 08:25:33

APPENDIX G

Summary of Identified LCPS

Appendix G SUMMARY OF IDENTIFIED LCPS

Table G-1 Summary of Identified LCPs
T-Dock Outfitting Pier, Seaspan Vancouver Shipyards, North Vancouver, BC

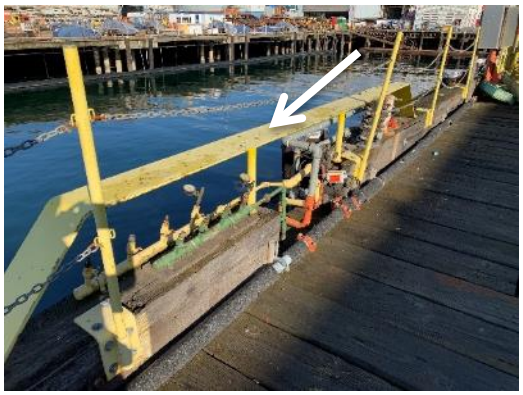
LCP Description		Photo
Paint colour	Yellow	
Substrate	Metal	
Location/approx. extent	Railings, south	
Lead content	46,000 ppm	
Condition	Good	
Paint colour	White	
Substrate	Concrete	
Location/approx. extent	Rope anchor tie-off, south	
Lead content	3,700 ppm	
Condition	Good	
Paint colour	Light blue	
Substrate	Metal	
Location/approx. extent	Pipes, central	
Lead content	Presumed to be LCP	
Condition	Good	

Table G-1 Summary of Identified LCPs
T-Dock Outfitting Pier, Seaspan Vancouver Shipyards, North Vancouver, BC

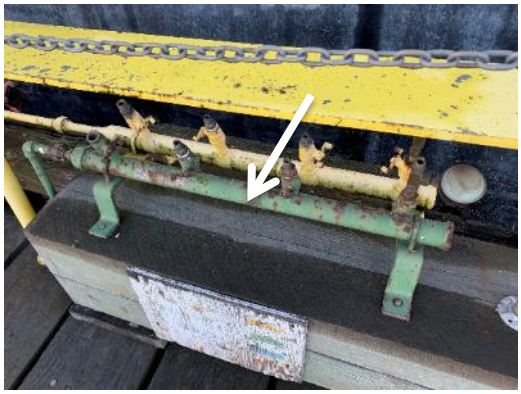
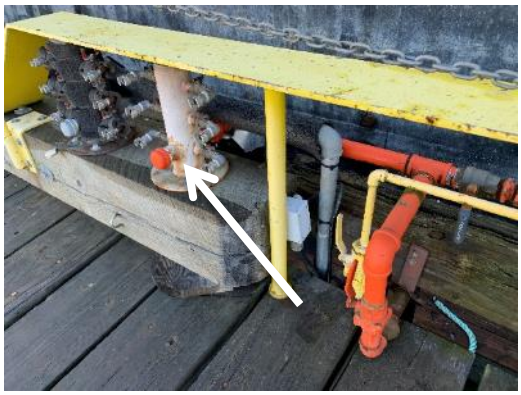
LCP Description		Photo
Paint colour	Orange	
Substrate	Metal	
Location/approx. extent	Pipes, central	
Lead content	Presumed to be LCP	
Condition	Good	
Paint colour	Green	
Substrate	Metal	
Location/approx. extent	Pipes, central	
Lead content	Presumed to be LCP	
Condition	Generally good, minor chipping/flaking observed	
Paint colour	Off-white	
Substrate	Metal	
Location/approx. extent	Pipes, central	
Lead content	Presumed to be LCP	
Condition	Good	

Table G-1 Summary of Identified LCPs
T-Dock Outfitting Pier, Seaspan Vancouver Shipyards, North Vancouver, BC

LCP Description		Photo
Paint colour	Yellow	
Substrate	Metal	
Location/approx. extent	Pipes, central	
Lead content	Presumed to be LCP	
Condition	Good	

APPENDIX B: HAZARDOUS MATERIALS FIELD SURVEY REPORT FORM

This form must be completed by a qualified registered professional, and submitted with the hazardous materials inspection report and survey as part of a complete application.

1. PROJECT INFORMATION

Project Permit Application Number: 20-034

Date of Application: October 5, 2020

Site Address: 50 Pemberton Avenue, North Vancouver, BC

Building/Installation Equipment Type: ☑ Industrial ☐ Residential ☐ Commercial ☐ Other

2. APPLICANT INFORMATION

Applicant Information:
Seaspan Shipyard, Seaspan ULC
Seaspan Outfitting Pier

Applicant's Name: George Geatros

Applicant's Civic Address: Seaspan
Vancouver Shipyards. 10 Pemberton Ave,
North Vancouver BC V7P 2R2 Alternate Number: Dary Lawes, 604-984-1067
Telephone Number: 604-984-1847
Email: ggeatros@seaspan.com

Hazardous Material Inspector:
Sabrina Guglielmi and Steve Chou

Consultant's Name:
Sabrina Guglielmi and Steve Chou, Stantec Consulting Ltd.
Company Name: Stantec

AHERA certification: N/A. Stantec personnel are Qualified Persons per WorkSafeBC Requirements for hazardous materials consulting services

Telephone Number: 604-396-6791 Alternate Number: 778-834-0613

Email: steve.chou@stantec.com, sabrina.guglielmi@stantec.com

[Appendix B page 1 of 4]

3. HAZARDOUS MATERIALS IDENTIFIED

Animal Carcases	Yes ☐	No ☑	Location:	N/A
Animal Droppings	Yes ☑	No ☐	Location:	Rat droppings in north electrical closet
Explosive Materials	Yes ☐	No ☑	Location:	N/A
Flammable Materials	Yes ☐	No ☑	Location:	N/A
Household Chemicals	Yes ☐	No ☑	Location:	N/A
Heavy Metals	Yes ☐	No ☑	Location:	N/A
Lead Based Paints	Yes ☑	No ☐	Location:	Yellow coloured paint on metal railings White coloured paint on concrete rope tie-off (See additional information for presumed lead paints)
Other Lead Products	Yes ☐	No ☑	Location:	N/A
Other Heavy Metals	Yes ☐	No ☑	Location:	N/A
Mercury	Yes ☑	No ☐	Location:	Mercury vapour is present in the light tubes/bulbs in one fluorescent light fixtures observed inside of the seacan.
Moulds	Yes ☐	No ☑	Location:	N/A
Needles and Sharps	Yes ☐	No ☑	Location:	N/A
Ozone Depleting Substances	Yes ☐	No ☑	Location:	N/A
PCBs	Yes ☐	No ☑	Location:	N/A
Radioactive Materials	Yes ☐	No ☑	Location:	N/A
Silica	Yes ☑	No ☐	Location:	Silica is expected to be present in the concrete rope tie anchors, which were observed in various locations throughout.

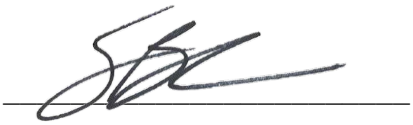
Asbestos Containing Materials (ACMs)					
Sample ID#	Material Type	% Asbestos	Location	Surface Area m^2	Volume m^3
S-01 - S-07C	Various	None Identified	Various	N/A	N/A

4. ADDITIONAL INFORMATION

-19 samples of suspect asbestos-containing material were collected - no ACMs were identified
-The following paints, which represent limited overall application, should be presumed to be LCPs, as they
are of similar application and vintage to the yellow LCP present on metal railings: light blue on metal pipes,
orange on metal pipes, green on metal pipes, off-white on metal pipes and yellow on metal pipes.

5. CERTIFICATION

I, Sean Brigden, B.Sc., P.B.Dipl., CRSP, certify that the information provided on this form is consistent with the findings of the attached Hazardous Materials Inspection Report Survey and supporting documentation.

Signature: 

Date: October 5, 2020

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