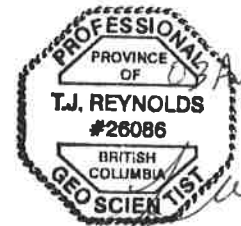


R.113311.001, S.S. Klondike Remediation, Whitehorse YT

Section No.	Section Title
01 11 00	Summary of Work
01 11 55	General Instructions
01 25 20	Mobilization and Demobilization
01 31 19	Project Meetings
01 32 16.07	Construction Progress
01 33 00	Submittal Procedures
01 35 13.43	Special Project Procedures for Contaminated Sites
01 35 29.14	Health and Safety for Contaminated Sites
01 35 43	Environmental Procedures
01 52 00	Construction Facilities
02 61 00.03	Contaminated Sites Excavation
02 61 00.04	Contaminated Sites Soil Transportation
02 61 00.06	Contaminated Sites Soil Disposal
02 83 12	Lead Abatement - Maximum Precautions
09 91 23	Exterior Repainting

Drawing No.	Drawing Title
101	Site Location
102	Existing Infrastructure and Access
103	Soil Physical Data
104	Contamination Extent – Plan View
105	Cross-Sections
106	Site Restoration



For specification content within Golder scope and responsibility

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Annex No.	Annex Title
A	Site Photographs
B	Environmental Reports
	1. EBA Engineering Consultants Ltd. Report for Project No. 0201-01-15178001 titled, “Assessment of Lead Based Paint Contamination SS Klondike and Takhini Complex, Whitehorse, Yukon” dated March 2002, prepared for Parks Canada.
	2. Parks Canada Memorandum titled, “SS Klondike Soil Sampling for Lead Paint Residue – Paddlewheel area” dated August 1, 2011.
	3. Stantec Consulting Ltd. Report for Project No. 123220304 titled, “Hazardous Building Materials Assessment, Atlin Barge and Limited Areas of the SS Klondike, Whitehorse, YT” dated September 28, 2015, prepared for Parks Canada c/o Public Works and Government Services Canada.
	4. Stantec Consulting Ltd. Report for Project No. 144902686 titled, “Pre-Renovation Hazardous Building Materials Assessment, S.S. Klondike, 10 Robert Service Way, Whitehorse, Yukon Territory” dated October 15, 2018, prepared for Parks Canada Agency.
	5. Golder Associates Ltd. Report for Project No. 1786835 titled, “Assessment to Delineate Lead Contamination in Soil, SS Klondike National Historic Site, Whitehorse, YT” dated November 27, 2018, prepared for Public Works and Government Services Canada.
	6. Golder Associates Ltd. Report, Reference No. 20147682-002-L-Rev0 “Results of Lead Paint Sampling, SS Klondike Sternwheeler, Whitehorse, Yukon”, dated December 21, 2020, prepared for Public Services and Procurement Canada.
	7. Arcadis Canada Inc. Report for Project No. 30087850 titled “Leachate Sample Results, SS Klondike Paddle Wheel, Lead Abatement, Whitehorse, Yukon”, dated Jun 18, 2021, prepared for Public Services and Procurement Canada.
	8. Golder Associates Ltd. Letter, Reference No. 20147682-008-L-Rev0 “Supplemental Soil Sampling Data – S.S. Klondike Remediation, Whitehorse, YT”, dated July 7, 2021, prepared for Public Services and Procurement Canada.

Annexes are for reference purposes only.



1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Not Used.

1.4. Work Covered by Contract

1.4.1. Work to be performed under the Contract includes, but is not limited to, the following items, including all ancillary Work, covered further in the Contract:

1.4.1.1. Lead-paint abatement of the Paddlewheel, refer to components as defined in Definitions and Section 01 11 55.

1.4.1.2. Repainting of Paddlewheel, refer to components as defined in Definitions and Section 09 91 23.

1.4.1.3. Landscaping.

1.4.2. Optional work to be performed under the Contract includes, but is not limited to, the following items, including all ancillary Work, covered further in the Contract:

1.4.2.1. Remediation (excavation, disposal, and backfilling of new material) of contaminated soils area, excavation estimated to be 12.5m x 8.5m x 0.6m (deep).

1.4.3. Contract Method.

1.4.3.1.1. Conduct Work under stipulated price in Contract, including the following bid list:

1.4.3.1.1.1. Mobilization / Demobilization

1.4.3.1.1.2. Excavation of contaminated soils.

1.4.3.1.1.3. Disposal of contaminated soils.

1.4.3.1.1.4. Replacement of clean fill, including backfilling and compaction.

1.4.3.1.1.5. Site Restoration

1.4.3.1.1.6. Lead Abatement for Paddlewheel

1.4.3.1.1.7. Repainting of Paddlewheel

1.4.3.1.2. Relations and Responsibilities between Contractor and Subcontractor are as defined in conditions of Contract. Assigned Subcontractors must, in addition:

1.4.3.1.2.1. Furnish to Contractor, bonds covering faithful performance of Subcontracted work and payment of obligations thereunder when Contractor is required to furnish such bonds to Owner.

1.4.3.1.2.2. Purchase and maintain liability insurance to protect from claims for not less than limits of liability which Contractor is required to provide to Owner,

1.4.3.2. Site access restrictions are as follows:

1.4.3.2.1. The Site is a National Historic Site located in the downtown core of Whitehorse, YT. Access to the Site is available to the public via parking lot entrance off South

- Access Road (near roundabout) as well as the pedestrian walking path (Millennium Trail) along the Yukon River.
- 1.4.3.3. Neighbouring or sensitive sites restrictions are as follows:
- 1.4.3.3.1. Project is located on parkland adjacent to Yukon River and within close proximity to residential neighbourhood.
- 1.4.3.3.2. Work is to remain within Parks Canada Site Limits shown on the Drawings. All Site facilities, laydown areas and excavation extents including sloping and/or shoring are to remain within the limits shown on the Drawings. Contractor is responsible for permits or land use agreements with the City of Whitehorse if municipal rights of way are proposed to be used for Site facilities or laydown.
- 1.4.3.3.3. Work week is considered 7 days Sunday – Saturday. Occasional work restriction on Saturdays may be required.
- 1.4.3.3.4. Work on long weekends, between May and September 2021 where Statutory holidays fall on a Friday or Monday, is not permitted during the project.
- 1.4.3.4. Classes of Soil based on Environmental Quality Criteria are:
- 1.4.3.4.1. Waste Quality: Soil concentrations which exceed the Canadian Council of Ministers of the Environment (CCME) soil quality guidelines for Parkland (PL), specifically with respect to lead.
- 1.4.3.4.2. Non-Contaminated Quality: Soil concentrations which meet CCME PL soil quality guidelines, specifically with respect to lead.
- 1.4.3.5. Soil classification is based on insitu testing; exsitu testing may be required as directed by the Departmental Representative
- 1.4.3.6. Excavation of Contaminated Soil as per Drawings. Contractor solely responsible for excavating to Excavation Extents. Excavation Extents on Drawings based vertical sidewalls for volume estimating purposes only; actual shoring and/or slope requirements responsibility of the Contractor.
- 1.4.3.7. Transportation of Contaminated Material to Disposal Facility(ies). Contractor takes ownership of all material leaving site.
- 1.4.3.8. Disposal of Contaminated Material. All material identified as Contaminated, including contaminated soil and surface material (i.e. geotextile, cobble, and crushed glass) that overlies contaminated soil on the Site must be disposed of at a licensed Disposal Facility. Plan for disposal to be submitted as part of Contract which identifies Licensed Disposal Facility.
- 1.4.3.9. Hazardous Materials: Specially for the Work, anticipated Hazardous Materials include Lead Paint containing materials. Refer to Section 02 83 12. All material identified as Hazardous Waste on the Site must be disposed of at a licensed Disposal Facility approved to accept Hazardous Waste. Plan for disposal to be submitted as part of Contract which identifies licensed Disposal Facility.

1.5. Location

- 1.5.1. The Site location is shown on Drawings.

1.6. Project/Site Conditions

- 1.6.1. Contractor must provide personnel and equipment with appropriate experience for Site conditions, including experience in remediating Site-specific Contaminated Material and handling/treating Hazardous Material. Contractor to provide specialized material handling, health and safety, and environmental protection procedures, and must have knowledge of appropriate regulations.
- 1.6.2. Contractor must adhere to local restrictions and requirements applicable to working in park area, including working hours, traffic control, noise and dust control, and maintaining proper housekeeping of the Site.
- 1.6.3. Work at Site involves work with Hazardous Material and Contaminated Soil. Complete list of anticipated contaminants and concentration levels on the Site available separately in Annexes and Drawings.
- 1.6.4. Existing condition on the Site identified according to Drawings. Annexes provided for reference purposes only.

1.7. Other Contracts

- 1.7.1. Other contracts are currently in progress at Site.
- 1.7.2. Other contracts are:
 - 1.7.2.1. Environmental and other consultants.
 - 1.7.2.2. Site users as identified in Contract.
- 1.7.3. Further contracts may be awarded while the Contract is in progress.
- 1.7.4. Cooperate with other contractors in carrying out their respective works and carry out directions from Departmental Representative.
- 1.7.5. Coordinate Work with that of other contractors. If any part of Work under the Contract depends for its proper execution or result upon Work of another contractor, report promptly to Departmental Representative, in writing, any defects which can interfere with proper execution of this Work.

1.8. Contractor's Use of Site

- 1.8.1. Use of Site:
 - 1.8.1.1. For the sole benefit of Canada.
 - 1.8.1.2. Exclusive and only for completion of the execution of Work.
 - 1.8.1.3. Assume responsibility of Prime Constructor (YT) or, for any task that may be performed in BC, assume the role of Prime Contractor (BC), and control for assigned premises for performance of this Work.
 - 1.8.1.4. Be responsible for coordination of all Work activities onsite, including the work of other contractors engaged by the Departmental Representative.
 - 1.8.1.5. Parking of private vehicles will not be permitted on Site, unless otherwise agreed to by Departmental Representative. Parking lot is shared with municipal trails, and parking space at the Site is limited.
- 1.8.2. There are no pre-existing arrangements for access or encroachment on neighbouring properties. Offsite access, occupancy, or encroachment is the responsibility of the Contractor.

- 1.8.3. Perform Work in accordance with Contract. Ensure Work is carried out in accordance with schedule accepted by Departmental Representative.
- 1.8.4. Do not unreasonably encumber Site with material or equipment.
- 1.8.5. Walkways and Roadways need to be clear at all times. Contractor to provide a detailed Traffic Management Plan and have flagging personnel/signage present during work. Traffic Management Plan to consider pedestrian traffic, vehicle travel in the parking lot, travel on the grassed area on route to Site, travel on high use areas during opening of the site and when the Site is closed. Contractor to provide Parks Canada 14 business days notice for approval of closures of the SS Klondike and must have an approved traffic management plan by the Departmental Representative in place. One public closure of up to 7 days is permitted. Contractor will have more accessibility options to the SS Klondike following Labour Day.
- 1.8.6. Fencing is required. Segregate Contractor's Work Area from common areas to prevent unintentional multiple employer worksite, as required.
- 1.8.7. Contractor will have access to the Site to the Contract end date of 31 October 2021. Contractor to provide a schedule of work being completed.
- 1.8.8. Laydown space location for Contractor equipment, staging, and office space to be as shown on Drawings and confirmed with Departmental Representative. If vehicles need to travel to the Work Area on the lawn, traffic control needs to be in place and approved by the Departmental Representative.
- 1.8.9. No access will be permitted into unauthorized buildings unless approved by the Departmental Representative.
- 1.8.10. Fire Lanes are to be kept clear, open and accessible at all times. No parking or blocking in designated fire lanes.

1.9. Existing Permits

- 1.9.1. Existing Permits and Authorizations are included in the Annexes:
 - 1.9.1.1. None
- 1.9.2. Permits required are responsibility of Contractor. Including, but not limited to:
 - 1.9.2.1. Appropriate permits and waste manifests for transportation of contaminated materials off-Site.

1.10. Schedule Requirements

- 1.10.1. Work to be initiated: as soon as practicable.
- 1.10.2. Pre-Mobilization Submittals: at least 10 Working Days prior to mobilization to Site, Submit all documents required for mobilization, including at a minimum the Contractor's site-specific project Health and Safety Plan and emergency procedures, Contaminated Soil Management Plan, Excavation and Backfilling Plan, Contaminated Material Transportation Plan, Contaminated Material Disposal Plan, and Environmental Protection Plan, Site Restoration Plan, Traffic Management Plan. Hazardous Materials abatement documentation including, but not limited to, Site-specific risk assessments and Site-specific exposure control plans, personnel training records, planned Disposal Facility(ies), etc., as listed in Contract documents.

1.11. Hours of Work

1.11.1. Restrictive as follows:

1.11.1.1. Working Days are Sunday to Saturday. Occasional closures on Saturdays may be required.

1.11.1.2. Working Hours are 07:00 to 19:00.

1.11.2. Working Days and Hours in accordance with municipal bylaws.

1.11.3. Work outside of Working Days and Working Hours is at Department Representative's sole discretion, and must be accepted in writing by Departmental Representative by Submission.

1.11.4. Be responsible for Site outside of Working Days and Working Hours and have a continuous presence on Site as required, in accordance with the Contract, or as directed by the Departmental Representative, to ensure:

1.11.4.1. Protection of health and safety for potentially hazardous activities (e.g. deep open excavations).

1.11.4.2. Site security for Sites in urban environments.

1.11.4.3. Maintenance of environmental monitoring and protection measures for Sites in urban environments or with sensitive neighbouring properties.

1.12. Security Clearances

1.12.1. Not Used.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

- 1.2.1. Action level: 50% of the occupational exposure limit for an airborne exposure hazard (e.g. lead). If workers are expected to be exposed in excess of the action level (or if air monitoring results show this to be the case), appropriate controls (work procedures, personal protective equipment) are to be implemented in accordance with applicable Territorial and Federal Occupational Health and Safety Regulations.
- 1.2.2. Advisory: notices, instructions, or directions issued by the Departmental Representative to the Contractor.
- 1.2.3. Airlock: system for permitting ingress or egress without permitting air movement between contaminated area and uncontaminated area, typically consisting of two curtained doorways at least 2 m apart.
- 1.2.4. Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.
- 1.2.5. Certificate of Completion: see General Conditions.
- 1.2.6. Change Order: PWGSC form issued by the Departmental Representative to the Contractor as per the relevant Contemplated Change Notice.
- 1.2.7. Classification: material (including soil and water) categorized into different classes based on Environmental Quality Criteria. Includes Hazardous Waste Quality, Waste Quality, Non-Contaminated Quality. Sub-classification based on specific parameters as identified in Contract. Re-classification must have approval of Departmental Representative.
- 1.2.8. Competent Worker: in relation to specific work, means a worker who:
- 1.2.8.1. Is qualified because of knowledge, training and experience to perform the work.
- 1.2.8.2. Is familiar with the provincial/territorial and federal laws and with the provisions of the regulations that apply to the work.
- 1.2.8.3. Has knowledge of all potential or actual danger to health or safety in the work.
- 1.2.9. Is capable of identifying existing hazards associated with lead and/or other hazardous building materials that may be impacted by the Work, and taking corrective measures to eliminate them.
- 1.2.10. Confirmation Soil Samples: soil samples collected from the base and walls of the excavation by the Departmental Representative to confirm that the remedial objectives for the Work have been met.
- 1.2.11. Contaminated Material: material where substances occur at concentrations that: (i) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment, or (ii) exceed the levels specified in policies and regulations, or (iii) Surface Material as defined in 1.2.78 of this section. Includes Soil, Water, Debris, and Organic Matter. Includes Waste Quality. Relevant regulations, unless otherwise in accordance with the Contract or as directed by the Departmental Representative, include:

GENERAL INSTRUCTIONS

- 1.2.11.1. Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines*, the CCME *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in Soil*, and the Federal Contaminated Sites Action Plan (FCSAP) *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites*.
- 1.2.11.2. BC *Hazardous Waste Regulation*.
- 1.2.11.3. BC *Contaminated Sites Regulation*.
- 1.2.11.4. Yukon *Special Waste Regulation*.
- 1.2.11.5. Yukon *Contaminated Sites Regulation*.
- 1.2.12. Contaminated Soil: Soil which exceeds the Canadian Council of Ministers of the Environment (CCME) soil quality guidelines applicable at the Site for Parkland (PL) land use and exceeds the Yukon CSR soil standards for PL. Specifically, soil with elevated lead concentrations.
- 1.2.13. Contaminated Soil Extents: lateral and vertical extents of Contaminated Soil to be remediated to meet remediation objectives (CCME PL and Yukon CSR PL). Extents, including contaminants and concentrations, on Drawings are approximate and may vary based on field observations or Confirmation Samples.
- 1.2.14. Contaminated Water Treatment Plant: a temporary onsite or existing offsite facility located in Canada that is designed, constructed and operated for the handling or processing of Contaminated Water in such a manner as to change the physical, chemical or biological character or composition of the water to lower than the site-specific remedial objective, Discharge Approval, and in compliance with all regulations.
- 1.2.15. Contemplated Change Notice: PWGSC form issued by the Departmental Representative to the Contractor requesting Contractor to provide a quote, which may result in a Change Order.
- 1.2.16. Contract: see General Conditions.
- 1.2.17. Contract Amount: see General Conditions.
- 1.2.18. Contractor: see General Conditions.
- 1.2.19. Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - 1.2.19.1. Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - 1.2.19.2. Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.
 - 1.2.19.3. Overlap each polyethylene sheet at openings not less than 1.5 m on each side.
- 1.2.20. Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- 1.2.21. Departmental Representative: see General Conditions.
- 1.2.22. Discharge Approval: permit, certificate, approval, license, or other required form of authorization issued by appropriate federal agency, province, territory, or municipality having jurisdiction and authorizing discharge.

GENERAL INSTRUCTIONS

- 1.2.23. Disposal Facility: an offsite licensed facility specifically used to introduce Contaminated Soil and/or Material into the environment for the purpose of final burial.
- 1.2.24. Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- 1.2.25. DOP Test: testing method used to determine integrity of Negative Pressure unit using dioctyl phthalate (DOP) HEPA-filter leak test.
- 1.2.26. Environmental Protection: prevention, control, mitigation, and restoration of pollution and habitat or environmental disruption during construction. Control of Environmental Pollution and Damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; vibrations; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.
- 1.2.27. Environmental Protection Plan: plan developed by the Contractor to ensure Environmental Protection and prevent Environmental Pollution and Damage identifying all environmental risks and mitigation measures, including: personnel requirements, emergency contacts, Environmental Protection methods, procedures, and equipment, and emergency response including a Spill Control Plan.
- 1.2.28. Environmental Quality Criteria: numerical material criteria used on Site based on Standards and/or Guidelines specified by the Canadian Council of Ministers of the Environment and Yukon *Contaminated Sites Regulation*, as applicable, using appropriate Land Use and Site-specific Factors. Standards outlined in BC *Contaminated Sites Regulation* are applicable for evaluation of Disposal Facility classification only if contaminated soil is transported outside Yukon Territory.
- 1.2.29. Excavation Extents: lateral and vertical extents of Soil to be excavated to meet Contaminated Soil Extents, as determined by the Departmental Representative. Contractor's Qualified Professional responsible for method and layout of excavation extents. Extents on Drawings are approximate and may vary based on field observations or Confirmation Samples.
- 1.2.30. Extension of Time: see General Conditions.
- 1.2.31. Extension of Time on Contracts: PWGSC form requesting an Extension of Time.
- 1.2.32. Facility Authority:
 - 1.2.32.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
- 1.2.33. Final Completion: see General Conditions.
- 1.2.34. Final Excavation Limits: lateral and vertical extents of excavation as determined by Departmental Representative.
- 1.2.35. Friable material: means material that:
 - 1.2.35.1. When dry, can be crumbled, pulverized or powdered by hand pressure, or
 - 1.2.35.2. is crumbled, pulverized or powdered.
- 1.2.36. Hazardous Building Material: component of a building or structure that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when altered, disturbed or removed during maintenance, renovation or demolition

- 1.2.37. Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- 1.2.38. Hazardous Waste: material no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- 1.2.39. Hazardous Waste Quality: Contaminated material which meets the applicable Regulatory definition of Hazardous Waste.
- 1.2.40. HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- 1.2.41. Landfill Facility: an offsite facility specifically used to introduce Non-Contaminated Quality Material into the environment for the purpose of final burial.
- 1.2.42. Landscaping Material: material to be used as part of Site restoration. Includes material used as part of Site restoration and re-instatement of original conditions at the Site.
- 1.2.43. Lead in Dust: wipe sampling on vertical and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.
- 1.2.44. Master Plan: baseline schedule determined by Contractor compliant with Schedule Requirements. Duration for any portion of the Work based on Master Plan.
- 1.2.45. Material: Soil, Sediment, Water, Debris, and Organic Matter. Includes cleared and grubbed vegetation, other vegetation, litter, rubbish, cobbles, boulders, excess construction material, lumber, steel, plastic, concrete, asphalt and other waste material.
- 1.2.46. Materials Source Separation Program: consists of a series of ongoing activities to separate reusable and recyclable waste into categories from other types of waste at point of generation.
- 1.2.47. National Master Specifications: the Specifications are subdivided in accordance with the current 6 digit National Master Specifications System; the first 2 digits are the Division, the last 4 digits are the Section. A Division may consist of the Work of more than 1 Subcontractor; responsibility for determining which Subcontractor provides the labour, material, equipment and services required to complete the Work rests solely with the Contractor.
- 1.2.48. Negative Pressure: system that extracts air directly from work area, filters such extracted air through High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building.
- 1.2.48.1. System to maintain minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas, be equipped with alarm to warn of system breakdown, and be equipped with instrument to continuously monitor and automatically record pressure differences.
- 1.2.49. Non-Contaminated Quality Material: material that does not exceed applicable Environmental Quality Criteria. Includes Soil, Water, Debris, and Organic Matter. Specifically for soil material, lead concentrations that meet CCME PL soil quality guidelines.

- 1.2.50. Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- 1.2.51. Oversize Debris: Waste that is required to be excavated and is: larger than 1 cubic metre or longer than 2 metres in one dimension, cannot be removed with a typical excavator with bucket, and requires the use of special equipment (e.g., saws, hydraulic cutters, excavator hammers, vibratory pile extractors). Includes bedrock, boulders, pilings, pipes, building structures, and concrete foundations.
- 1.2.52. Paddlewheel: An object that forms part of the SS Klondike and is to remain secured in its existing position during the contracted works. Also referred to as “Paddle Wheel” in Supporting Documents. The paddlewheel includes all associated vessel supports, including but not limited to, stern face of vessel, paddles, drive arm, walking beam, crank arm, monkey and main rudders, support arm, aft beam, and material below the hog pole.
- 1.2.53. Prime Contractor: see General Conditions “Contractor”, BC Occupational Health and Safety Regulations “Prime Contractor”, and Yukon Occupational Health and Safety Act “Prime Constructor”.
- 1.2.54. Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
- 1.2.55. Progress Payment: see General Conditions.
- 1.2.56. Progress Survey: Survey conducted using equipment such as tape measurements, non-differential GPS, theodolite, or truck counts. Not a survey conducted by a Qualified Professional Surveyor.
- 1.2.57. PWGSC: Public Works and Government Services Canada (also known as PSPC: Public Services and Procurement Canada). Representative of Canada with control of the Site.
- 1.2.58. Qualified Professional: a person who is registered in relevant jurisdiction with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (i.e. no "in training" designations). Includes:
 - 1.2.58.1. Association of the Chemical Profession of British Columbia.
 - 1.2.58.2. British Columbia College of Applied Biology.
 - 1.2.58.3. British Columbia Institute of Agrologists.
 - 1.2.58.4. Engineers and Geoscientists British Columbia.
 - 1.2.58.5. Engineers Yukon.
- 1.2.59. Qualified Professional Surveyor: a person who is registered in relevant jurisdiction with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (i.e. no "in training" designations). Includes:

- 1.2.59.1. Association of British Columbia Land Surveyors.
- 1.2.59.2. Association of Canada Lands Surveyors.
- 1.2.59.3. Applied Science Technologists & Technicians of British Columbia registered in Site Improvements Surveys.
- 1.2.59.4. Engineers and Geoscientists British Columbia.
- 1.2.59.5. Engineers Yukon.
- 1.2.60. Qualified person or worker: in relation to specific work, means a worker who:
 - 1.2.60.1. Is qualified because of knowledge, training and experience to perform the work.
 - 1.2.60.2. Is familiar with the provincial/territorial and federal laws and with the provisions of the regulations that apply to the work.
 - 1.2.60.3. Has knowledge of all potential or actual danger to health or safety in the work.
- 1.2.61. Quote: Quotation for Design Change or Additional Work. Contractor's cost proposal issued to the Departmental Representative as per the relevant Contemplated Change Notice. May be either a Lump Sum Arrangement or a Unit Price Arrangement.
- 1.2.62. Remediation by Excavation: excavation of Contaminated Soil to the excavation extents for the purpose of remediating the Site to meet numerical standards. Includes disposal. Does not include risk assessment or risk management of material onsite. Does not include encapsulation or solidification in place.
- 1.2.63. Request For Information: notice or other communication issued by the Contractor to the Departmental Representative.
- 1.2.64. Sewage: liquid waste which is not suitable for direct discharge to the environment, and which must be either treated offsite or discharged to a sanitary sewer. Includes water from hand basin, shower, personal hygiene facilities, or other liquid waste from sanitary facilities.
- 1.2.65. Site: property lot boundary available to Contractor according to Drawings (site extents). Does not include shared or public areas, including common roads.
- 1.2.66. Soil: unconsolidated mineral or organic material, rock, fill, and sediment deposited on land, and other solid material excavated incidentally. Includes cobbles and boulders.
- 1.2.67. Special Waste: equivalent of Hazardous Waste.
- 1.2.68. Spill: a spill in excess of the amounts specified in the applicable provincial/territorial, federal regulations. For spills in the Yukon, refer to Schedule A of the Yukon Spills Regulations, O.I.C. 1996/193, under the Yukon Environment Act, RSY, 2002, c.76.
- 1.2.69. Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for work.
- 1.2.70. Subcontractor: see General Conditions.
- 1.2.71. Submit/Submittals: documents from the Contractor to the Departmental Representative as: required by Contract; stipulated in permit, certificate, approval, license, or any other form of authorization; by convention or industry practice. Submittals are final only after review and accepted in writing by Departmental Representative.
- 1.2.72. Substantial Performance: see General Conditions.
- 1.2.73. Superintendent: see General Conditions
- 1.2.74. Supplier: see General Conditions.

- 1.2.75. Surface Material: material located at ground surface and within the footprint of the Contaminated Soil Excavation Extents, consisting of cobbles, large gravel, crushed glass and geotextile.
- 1.2.76. Toolbox Meeting: a meeting between the Departmental Representative, Qualified Professionals, and the Contractor that will occur on a daily basis throughout the duration of the Work. The Toolbox Meeting will focus on daily Health and Safety considerations associated with planned construction activities. The Contractor shall be responsible for scheduling daily Toolbox Meetings with the Departmental Representative and Qualified Professionals (as needed). Equivalent to Tailgate Meeting.
- 1.2.77. Topsoil: a surface organic soil layer to facilitate vegetation growth.
- 1.2.78. Transfer/Interim Storage Facility: an offsite facility specifically used to transfer or short term storage Contaminated Soil during offsite transport.
- 1.2.79. Treat: handling or processing of Contaminated Material in such a manner as to change the physical, chemical or biological character or composition of Contaminated Material such that it becomes Non-Contaminated Quality and is suitable for final Discharge or Disposal. Treatment includes filtering, bioremediation, thermal desorption, and incineration. Treatment does not include blending, mixing, or dilution. Material sent to a Treatment Facility must be Treated as follows:
 - 1.2.79.1. Water must be Treated to meet requirements of a valid and subsisting Discharge Approval held by the Treatment Facility.
 - 1.2.79.2. Traffic Management Plan. A plan which outlines the manner in which vehicular and pedestrian traffic on roadways and walkways adjacent and on the Work Site will be managed.
- 1.2.80. Waste Quality: material that exceeds applicable Environmental Quality Criteria but is not Hazardous Waste
- 1.2.81. Wastewater: Non-Contaminated Quality Water that is not Sewage.
- 1.2.82. Work: see General Conditions.
- 1.2.83. Workplace Hazardous Materials Information System (WHMIS): Canada-wide system designed to give employers and workers information about Hazardous Materials used in workplace. Under WHMIS, information on Hazardous Materials is provided on container labels, material safety data sheets (MSDS), and worker education programs. WHMIS is put into effect by combination of federal and territorial laws.

1.3. Action and Informational Submittals

- 1.3.1. Permits: at least 10 Working Days prior to mobilization to Site. Submit copies of all permits, certificates, approvals, or any other form of authorizations and all reporting required.
- 1.3.2. Daily Work Records: at the end of each shift Submit daily Work records to the Departmental Representative, during onsite Work. Include:
 - 1.3.2.1. Quantities for each Description of Work identified in the Unit Price Table and Change Orders.
 - 1.3.2.2. Description of Work performed.
 - 1.3.2.3. Current Site conditions.

- 1.3.2.4. General information including: date, time shift started and ended, Subcontractor(s) onsite, Health and Safety items (incidents, near misses, and corrective measures), and Environmental Protection items (incidents, near misses, and corrective measures), communications with community members, field observations, updated progress schedule, quantities of material transported, treated and disposed, including copies of transport manifests and disposal receipts for all materials removed from Site.
- 1.3.2.5. Signature of Superintendent.
- 1.3.3. Cash Flow: with each Progress Payment, Submit a cash flow forecast. Include:
 - 1.3.3.1. Calculation of planned cost versus actual cost and schedule forecasting and cash flow projections on a monthly basis, indicating anticipated value of future Progress Payments, for each Description of Work identified in the Unit Price Table.
 - 1.3.3.2. Progress Payments will not be processed until cash flow has been accepted by the Departmental Representative.
- 1.3.4. Coordination Meeting Minutes and Drawings: at least 5 Working Days prior to relevant Work commencing, Submit final meeting minutes and drawings from coordination with Subcontractors.
- 1.3.5. Quality Management Plan: within 10 Working Days after Contract award, Submit a quality management plan. Include:
 - 1.3.5.1. Details on planned review, inspection and testing to provide Quality Assurance and Quality Control for the Work.
 - 1.3.5.2. Subcontractors responsible for review, inspection and testing.
 - 1.3.5.3. Schedule of submittals of review, inspection and testing results.
- 1.3.6. Review, Inspection, and Testing Results: within 5 Working Days of receipt. Submit all results of reviews, inspection, and testing performed as part of the Work, including laboratory reports and sampling chains of custody.
- 1.3.7. Weigh Scale Certification: at least 5 Working Days prior to use. Submit a copy of the Measurement Canada. Weigh Scale Certification for any onsite or offsite weigh scale used during excavation, transportation, treatment or disposal.
- 1.3.8. Weigh Scale Slips: within 10 Working Days of measurement, Submit all onsite and offsite weigh scale slips for material.

1.4. Laws and Regulations

- 1.4.1. Comply with restrictions of applicable local bylaws, rules and regulations enforced at the location concerned. These include:
 - 1.4.1.1. Pollution, waste, or garbage restrictions.
 - 1.4.1.2. Truck, traffic, and road access restrictions.
 - 1.4.1.3. Regulation of removal, movement and deposition of Soil on and to lands within the Yukon Territory and British Columbia per applicable legislation.
 - 1.4.1.4. Water, storm water, and sewer restrictions.
 - 1.4.1.5. Noise restrictions.
 - 1.4.1.6. Signage, fencing, storage restrictions.
 - 1.4.1.7. Fire prevention restrictions.
 - 1.4.1.8. Fuel equipment and storage restrictions.

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- 1.4.2. Meet or exceed requirements of Contract, specified standards, codes and referenced documents.
- 1.4.3. In any case of conflict or discrepancy, the most stringent requirements will apply.
- 1.4.4. Generally, provincial, territorial and municipal laws, regulations, bylaws and other requirements do not apply to federal lands, works or undertakings. Soil, water, or other materials that are removed from federal lands may become subject to provincial, territorial or municipal laws and regulations.
- 1.4.5. Provincial, territorial or municipal standards may be used in relation to federal lands only as guidelines for the purpose of establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document, and does not imply that standards contained in provincial, territorial or municipal laws and regulations apply on Federal lands, activities or undertakings.
- 1.4.6. *Canadian Environmental Protection Act, 1999* (CEPA 1999)
- 1.4.7. Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).
- 1.4.8. Department of Justice Canada (Jus)
- 1.4.9. *Transportation of Dangerous Goods Act, 1992* (TDG Act) [1992], (c. 34).
- 1.4.10. Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- 1.4.11. Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- 1.4.12. Material Safety Data Sheets (MSDS).
- 1.4.13. National Research Council Canada Institute for Research in Construction (NRC IRC).
- 1.4.14. National Fire Code of Canada-(2010).
- 1.4.15. Yukon Government
 - 1.4.15.1. *Yukon Territory Occupational Health and Safety Act* and Regulations (YT OHS Reg.), including amendments to the date of the work
 - 1.4.15.2. Solid Waste Regulations, including amendments to the date of the Work
 - 1.4.15.3. Special Waste Regulations, including amendments to the date of the Work
 - 1.4.15.4. Contaminated Sites Regulation, including amendments to the date of the Work
- 1.4.16. Government of Canada
 - 1.4.16.1. The Canada Labour Code, Part II, Canada Occupational Health and Safety Regulations (COHSR)
 - 1.4.16.2. The Federal PCB Regulations (SOR/2008-273).
 - 1.4.16.3. The Federal Halocarbons Regulation (FHR 2003).
- 1.4.17. Environment Canada
- 1.4.18. Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2, dated August 1991 (PCB Guide)
- 1.4.19. Canadian Construction Association
 - 1.4.19.1. Standard Construction Document CCA 82 "Mould Guidelines for the Canadian Construction Industry" (2004 – further referred to herein as "CCA 82").

1.5. Green Requirements

- 1.5.1. Use only environmentally responsible green materials/products with no Volatile Organic Compounds (VOC) emissions or minimum VOC emissions of indoor off-

gassing contaminants for improved indoor air quality – subject of acceptance of Submittal of Materials Safety Data Sheet (MSDS) Product Data.

- 1.5.2. Use materials/products containing highest percentage of recycled and recovered materials practicable – consistent with maintaining cost effective satisfactory levels of competition.
- 1.5.3. Adhere to waste reduction requirement for reuse or recycling of waste materials, not including soil or water, thus diverting materials from Landfill Facility.

1.6. Smoking Environment and Prohibited Substances

- 1.6.1. Smoking on the Site is not permitted.
- 1.6.2. Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on the work site.
- 1.6.3. Any person employed on the Work Site will be subject to immediate removal from property if they:
 - 1.6.3.1.1. Appear to be under the influence of alcohol, drugs or narcotics.
 - 1.6.3.1.2. Behave in an unusual or disorderly manner.

1.7. System of Measurement

- 1.7.1. The metric system of measurement (SI) will be employed on the Contract.

1.8. Documents Required

- 1.8.1. Maintain 1 copy each of the following posted at the Work Site:
 - 1.8.1.1. General Conditions.
 - 1.8.1.2. Drawings.
 - 1.8.1.3. Specifications.
 - 1.8.1.4. Addenda or other modifications to Contract.
 - 1.8.1.5. Change orders.
 - 1.8.1.6. Current Work schedule.
 - 1.8.1.7. Reviewed and final Drawings Submittals.
 - 1.8.1.8. One set of record Drawings and Specifications for “as-built” purposes.
 - 1.8.1.9. Field and laboratory test reports.
 - 1.8.1.10. Reviewed and accepted Submittals.
 - 1.8.1.11. Corporate Health and Safety Policy
 - 1.8.1.12. Site-Specific Health and Safety Plan and other safety related documents, including all daily Toolbox Meetings, Notice of Project, and utility clearances.
 - 1.8.1.13. Environmental Protection Plan, relevant environmental permits and other environment related documents.
 - 1.8.1.14. Final Meeting Minutes, Agendas and associated attachments.
 - 1.8.1.15. Permits and other approvals.
 - 1.8.1.16. COVID-19 Mitigation plan that adheres to Federal and Territorial Requirements.
 - 1.8.1.17. Other documents as specified.

1.9. Setting out of Work

- 1.9.1. Contractor to assume full responsibility for and execute complete layout of Work to locations, lines and elevations according to Drawings. Work to be verified by the Departmental Representative.
- 1.9.2. Provide devices needed to layout and construct Work.
- 1.9.3. Provide such services and devices in accordance with the Contract to facilitate Departmental Representative's inspection of Work.

1.10. Works Coordination

- 1.10.1. Co-operate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Parks Canada's usage of premises or property, where applicable. Contractor to provide schedule update to the Departmental Representative if work deviates from previously submitted schedules.
- 1.10.2. Coordinate Work of Subcontractors.
 - 1.10.2.1. Designate one person to be responsible for review of Contract and Drawings and managing coordination of Work.
- 1.10.3. Convene meetings between Subcontractors whose Work interfaces and ensure awareness of areas and extent of interface required.
 - 1.10.3.1. Provide each Subcontractor with complete Drawings and Specifications for Contract, to assist them in planning and carrying out their respective work.
 - 1.10.3.2. Develop coordination drawings when required, illustrating potential interference between Work of various trades and distribute to affected parties.
 - 1.10.3.3. Facilitate meeting and review coordination drawings. Ensure Subcontractors agree and sign off on coordination drawings.
 - 1.10.3.4. Publish minutes of each meeting.
 - 1.10.3.5. Submit a copy of coordination drawings and meeting minutes as directed by the Departmental Representative.
- 1.10.4. Submit Drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
- 1.10.5. Work coordination:
 - 1.10.5.1. Ensure cooperation between trades in order to facilitate general progress of Work and avoid situations of spatial interference.
 - 1.10.5.2. Ensure that each trade provides all other trades reasonable opportunity for Final Completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed Work.
 - 1.10.5.3. Ensure disputes between Subcontractors are resolved.
- 1.10.6. Failure to coordinate Work is responsibility of Contractor.

1.11. Record Keeping

- 1.11.1. Advisory: Contractual correspondence from the Departmental Representative to the Contractor. Does not include Change Documents. To be sequentially numbered. Include cross references to applicable Request For Information. The status of the Contractor, including the function of Prime Contractor (BC)/ Prime Constructor (YT), must not change by reason of any Advisory.

- 1.11.2. Request For Information: Contractual correspondence from Contractor to the Departmental Representative. Includes Submittals. Does not include Change Documents. Must be sequentially numbered. Include cross references to applicable Advisory. Status of the Contractor, including the function of Prime Contractor (BC)/ Prime Constructor (YT), must not change by reason of any Request For Information.
- 1.11.3. Maintain adequate records to support information provided to Departmental Representative.
- 1.11.4. Maintain bills of lading for minimum of 300 Working Days from date of shipment or longer period required by applicable law or regulation.

1.12. Change Documents

- 1.12.1. Change Documents do not relieve Contractor of any obligation.
- 1.12.2. Change Documents do not change the Contractor's responsibility for methods, means and sequences.
- 1.12.3. Change Documents do not change by any reason the status of the Contractor, including the function of Prime Contractor (BC)/ Prime Constructor (YT) or as supervisor.
- 1.12.4. Change Documents include:
 - 1.12.4.1. Change Order: There may be a change to the Contract Amount by reason of any Change Order. No Extension of Time for completion of the Work by reason of any Change Order.
 - 1.12.4.2. Contemplated Change Notice: No increase to the Contract Amount by reason of any Contemplated Change Notice. No Extension of Time for completion of the Work by reason of any Contemplated Change Notice.
 - 1.12.4.3. Extension of Time on Contracts: There may be a change to the completion of the Work by reason of an Extension of Time on Contracts. No increase to the Contract Amount by reason of any Extension of Time on Contracts.
 - 1.12.4.4. Quote: No increase to the Contract Amount by reason of any Quote. No Extension of Time for completion of the Work by reason of any Quote.

1.13. Inspection

- 1.13.1. Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Site, allow access to such Work whenever it is in progress. Work at locations other than Site includes offsite work areas.
- 1.13.2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or applicable Laws.
- 1.13.3. Mandatory Inspections requiring approval by the Departmental Representative include:
 - 1.13.3.1. Departmental Representative to inspect extents of remedial excavation once Contaminated Soil Extents have been reached, and if additional excavation is required.
- 1.13.4. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- 1.13.5. Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract. If, upon examination such work is

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found not in accordance with Contract, correct such Work and pay cost of examination and correction. Remove defective work, whether result of poor workmanship, use of defective products or damage and whether incorporated in work or not, which has been rejected by the Departmental Representative as failing to conform to Contract Documents. Replace or re execute in accordance with Contract Documents.

- 1.13.6. Make good other contractor's work damaged by such removals or replacements promptly.

2. PART 2 - PRODUCTS**2.1. Not Used**

- 2.1.1. Not used.

3. PART 3 - EXECUTION**3.1. Lead Abatement Work**

- 3.1.1. Lead abatement associated with removal of lead-containing paint from the Paddlewheel structure.
- 3.1.2. Re-painting of Paddlewheel to a historically accurate standard. Paint colour for the Paddlewheel will be by Contractor submittal.

3.2. Contaminated Soils Work

- 3.2.1. Contractor responsible for excavation of Contaminated Material, as identified by Contract Documents and the Departmental Representative.
- 3.2.2. Contractor responsible for transportation and disposal of Contaminated Material, as identified by Contract Documents and the Departmental Representative.
- 3.2.3. Contractor responsible for backfilling the remedial excavation and restoring the excavation area, as identified by Contract Documents and the Departmental Representative.

3.3. COVID-19 Requirements

- 3.3.1. Contractor is to be responsible for costs of all labour, expenses, accommodations, meals and/or materials, etc. required to comply with current recommended or otherwise legislated requirements for minimizing the spread of COVID-19, including, but not limited to:
- 3.3.1.1. Self-isolation of workers, if entering the Yukon from other countries, provinces and/or territories where the Yukon Government has implemented such requirements.
- 3.3.1.2. Requirements for physical distancing – during travel and on-site.
- 3.3.1.3. Requirements for personal protective equipment – supply and use.
- 3.3.1.4. Requirements for hygiene and disinfection on Site and for workers.
- 3.3.2. Contractor shall submit a detailed COVID-19 mitigation plan as a submittal.
- 3.3.3. Exceptions to COVID-19 isolation requirements subject to approval from local authorities, including but not limited to the Yukon Government and City of Whitehorse.

END OF SECTION

MOBILIZATION AND DEMOBILIZATION**1. PART 1 - GENERAL****1.1. Measurement Procedures**

- 1.1.1. Pre-Mobilization Submittals will be paid in accordance with lump sum price established for all Preconstruction Meetings, final design, planning, health and safety, and other Submittals in accordance with the Contract or required and accepted by the Departmental Representative as in accordance with the Contract prior to mobilization to Site. Also includes Preconstruction Condition Survey and Preconstruction As-Built Documents.
- 1.1.2. Mobilization will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Works to the Site.
- 1.1.3. Site Preparation will be paid in accordance with lump sum price established to prepare the Site for planned construction works. Includes as required: Protection of Site Features, the Paddlewheel, Site Clearing, and Exiting Utilities. Does not include offsite Transport and Disposal of any incidental or generated material.
- 1.1.4. Standby Time will be paid in accordance with unit rate price established for time when construction Work is unable to proceed and that is directly attributable to any neglect or delay that occurs after the date of the Contract on the part of the Departmental Representative in providing any information or in doing any act that the Contract expressly requires of the Departmental Representative. Measurement as recorded time by Departmental Representative. Includes machinery and labour standby costs. Does not include items covered by Site Facilities Operation. Standby Time may be pro-rated based on hours of work. Make all efforts to minimize impacts due to delays caused by the Departmental Representative, including re-sequencing Work. Provide documentation of a sufficient description of the facts and circumstances of the occurrence to enable the Departmental Representative to determine whether or not the Standby Time is justified. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work for reviews, sampling, or other work conducted by the Departmental Representative that have time allowances in accordance with the Contract.
- 1.1.5. Site Restoration will be paid in accordance with the lump sum price established to restore the Site to make suitable for post-Work use according to Drawings and Section 01 25 20 – 1.9.
- 1.1.6. Demobilization will be paid in accordance with lump sum price established for demobilizing all equipment and personnel associated with the Work from the Site. Includes decontaminating all equipment prior to removal from Site.
- 1.1.7. Closeout Submittals will be paid in accordance with lump sum price established for Final Site Inspection (for Certificate of Completion purposes), Closeout Meetings, Postconstruction Condition Survey and final As-Built Documents as directed by the Departmental Representative.

MOBILIZATION AND DEMOBILIZATION

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Preconstruction As-Built Documents: at least 5 Working Days prior to commencing any disturbance. Submit drawings identifying all infrastructure, including utilities, on the Site. Update drawings as directed by the Departmental Representative. As determined by the Departmental Representative, Preconstruction Documents include, but not limited to:
- 1.3.1.1. Plans for the Temporary Facilities to be used for the duration of the project Work. Includes, but not limited to, abatement work areas, sanitation, washing facilities in proximity to the vessel.
- 1.3.2. Preconstruction Condition Survey: at least 5 Working Days prior to commencing any disturbance, submit a report by Contractor's Qualified Professional Surveyor documenting preconstruction condition of Site and adjacent sites.
- 1.3.3. Breakdown of Lump Sum Prices: at least 5 Working Days prior to submitting the first Progress Payment, submit a breakdown of the Contract lump sum prices including labour, material and time, in detail as directed by the Departmental Representative and aggregating Contract Amount.
- 1.3.4. Postconstruction As-Built Documents: within 10 days of completing site Work, provide Drawings showing all Work, including infrastructure, utilities, excavation limits, backfill material limits and compaction, final grades, and any other improvements or reinstatements.
- 1.3.5. Postconstruction Condition Survey: within 10 days of completing site Work, Submit a report by Contractor's Qualified Professional Surveyor documenting preconstruction condition of Site and adjacent sites. Documentation of any condition affected by the work, includes, but not limited to the vessel (specifically the rear portion around the Paddlewheel) and the soil excavation areas.
- 1.3.6. Closeout Documents: within 20 Working Days of Final Completion of Site Restoration, Submit Completion Documents. As determined by the Departmental Representative, Closeout Documents include, but not limited to:

1.4. Examination

- 1.4.1. Determine preconstruction condition of Site and requirements to make the Site suitable for Work.
- 1.4.2. Preconstruction Condition Survey to be completed by Contractor's Qualified Professional Surveyor prior to commencing any other Work.
- 1.4.3. Postconstruction Condition Survey to be completed by Contractor's Qualified Professional Surveyor after completing all other Work.
- 1.4.4. Condition Surveys to include documentation of any condition that will be affected by the Work, includes, but not limited to: the vessel (specifically the rear portion around the Paddlewheel), the Paddlewheel, the soil excavation areas, property lines, site grades (surface elevations) and condition of buildings, utilities, roadways, pathways, landscaping, significant vegetation or landscaping, and other features

MOBILIZATION AND DEMOBILIZATION

(including infrastructure) both on-Site and adjacent sites that may be potentially impacted by the Work.

1.5. Mobilization and Demobilization

- 1.5.1. Move all personnel, equipment, supplies, and incidentals to and from the Site.

1.6. Protection of Features

- 1.6.1. Protect existing features with temporary barriers and enclosures as required by applicable local regulations. Note this includes the protection of the Paddlewheel at the Site. Specifically, plans for the protection of the Paddlewheel must be approved by the Departmental Representative prior to conducting the Work. The Contractor shall inform the Department Representative if there are any deviations from the Paddlewheel Protection Plan and follow the direction of the Departmental Representative to ensure the protection of the Paddlewheel at the Site.
- 1.6.2. Protect natural and man-made features required to remain undisturbed. Protect existing trees and other prominent natural features from damage unless otherwise required or located in an area to be occupied by new construction. Protect existing structures, including roads, walkways, walls, and buildings.
- 1.6.3. Protect above ground and buried utilities that are required to remain undisturbed or in continuous operation during the Work. Utility locates are required and are the responsibility of the Contractor. The Contractor is not to rely on the Drawings for the locations of utilities.
- 1.6.4. Protect features from surface water damage by temporary structures to divert flow as appropriate.
- 1.6.5. Protect grass and landscaped areas. Contractor responsible for re-seeding and maintenance until 2022 if damage occurs.
- 1.6.6. Security and Safety:
 - 1.6.6.1. Provide safety measures to ensure worker and public safety.
 - 1.6.6.2. Ensure Site is secure during on-Site Work, provide, install, and remove fencing, temporary hoarding, and other security measures as appropriate. Provide on-Site personnel security 24 hours/ day 7 days/week as appropriate determined by the contractor or in accordance with Contract.
 - 1.6.6.3. Site including all work areas should be secured with locked fencing, temporary hoarding and security personnel as required.

1.7. Site Clearing

- 1.7.1. Prepare Site as required to complete Work.
- 1.7.2. Divert water and associated infrastructure and equipment as required to facilitate Work in the dry.
- 1.7.3. Remove obstructions, ice and snow, from surfaces to be worked.
- 1.7.4. Demolish or temporarily remove existing infrastructure in accordance with the Contract or as required to facilitate Work, if applicable. Notify Departmental Representative at least 5 Working Days in advance of demolition, if required.

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1.8. Existing Utility Services

- 1.8.1. Size, depth and location of existing utilities and structures as provided in Contract are for guidance only. Completeness and accuracy are not guaranteed.
- 1.8.2. Establish location and extent of service lines in area of Work and notify Departmental Representative prior to commencing any other Work. All utilities entering Site must be confirmed prior to subsurface disturbance (i.e. do not rely on as-built documents). As appropriate, confirm locations of buried utilities by independent utility locator and using hand test excavations or hydrovac methods.
- 1.8.3. Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.
- 1.8.4. Maintain and protect from damage all utilities and structures encountered, unless Work involves temporarily breaking, rerouting, or connecting existing utilities.
- 1.8.5. Where Work requires temporarily breaking, rerouting, or connecting into existing utilities, obtain permission from both users and utility companies of intended interruption of services, and carry out Work at times determined by the authorities having jurisdiction.
- 1.8.6. Submit schedule to and obtain approval for any shutdown or closure of active service. Adhere to schedule accepted by Departmental Representative and provide notice to affected parties.
- 1.8.7. Provide temporary services as required to maintain critical systems.
- 1.8.8. Where unknown utilities are encountered, immediately verbally notify Departmental Representative and confirm findings in writing.

1.9. Site Restoration

- 1.9.1. Site Restoration includes all areas impacted by the Works, including re-establishment of pre-existing infrastructure, final grading, revegetation and seeding, and deconstructing and removal from Site of all temporary facilities and removal of any incidental or generated material.
- 1.9.2. Final Site grades must be within 5 cm of pre-existing grades before Work commenced, unless otherwise specified.
- 1.9.3. Re-establish pre-existing drainage, unless otherwise specified. Detailed grading plan to be supplied by the Contractor to the Departmental Representative for approval.
- 1.9.4. Clean permanent access roads of contamination and tracked dirt resulting from Work as required or as directed by Departmental Representative, with no increases to Contract Amount or Extension of Time for completion of the Work. Any access routes must be reclaimed to pre-construction condition by the Contractor.
- 1.9.5. Upon Final Completion of Work, correct defects as directed by the Departmental Representative.
- 1.9.6. Protect newly graded areas from traffic and erosion and maintain free of trash or debris until demobilization is completed and accepted by the Departmental Representative.
- 1.9.7. Reinstate pre-existing utilities and other infrastructure to original location and condition, meeting current standards, codes, and other requirements, unless

MOBILIZATION AND DEMOBILIZATION

otherwise identified according to Drawings or as directed by the Departmental Representative.

- 1.9.8. Reinstatement surface to pre-existing conditions, including surface material (e.g. vegetation, gravel, pavement, landscaping material, etc.), unless otherwise identified according to Drawings or as directed by the Departmental Representative.
- 1.9.9. Seeding, if required as a result of damages to grass areas, to be consistent with *Canadian Landscape Standards* for lawns unless otherwise identified according to Drawings.

1.10. As-Built Documents

- 1.10.1. Refer to Section 1.3 (Action and Submittals) for list of As-Built Documents Required. The Departmental Representative will provide paper copies of the Construction Documents as per the Special Instructions to Bidders. Electronic copies of data and drawings in their native format are available on request.
- 1.10.2. Postconstruction Condition Survey to be completed by Contractor's Qualified Professional Surveyor and other Qualified Professionals, as appropriate.
- 1.10.3. As Work progresses, maintain accurate records to show all deviations from the Contract. Note changes as they occur on as-built Specifications and Drawings.
- 1.10.4. Drawings: legibly mark each item to record actual construction, including:
 - 1.10.4.1. Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - 1.10.4.2. Field changes of dimension and detail.
 - 1.10.4.3. Changes made by change orders.
 - 1.10.4.4. Details not on original Drawings.
 - 1.10.4.5. References to related Drawings and modifications.
- 1.10.5. Contract Specifications: legibly mark each item to record actual workmanship of construction, including:
 - 1.10.5.1. Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - 1.10.5.2. Changes made by addenda and change orders.
- 1.10.6. As-built information:
 - 1.10.6.1. Record changes in red ink.
 - 1.10.6.2. Mark on 1 set of Drawings and Specifications at Final Completion of project and, before final inspection, neatly transfer notations to second set.
 - 1.10.6.3. Submit 1 set in editable AutoCAD file format with all as-built information.
 - 1.10.6.4. Submit all sets as directed by the Departmental Representative.
- 1.10.7. As required, surveying to be completed by Contractor's Qualified Professional Surveyor for as-built documents.

1.11. Completion Documents

- 1.11.1. Refer to Section 1.3 (Action and Submittals) for list of Completion Documents Required. Submit as directed by the Departmental Representative, a written certificate that the following have been performed:

MOBILIZATION AND DEMOBILIZATION

- 1.11.1.1. Work has been completed, and inspected and accepted by the Departmental Representative, in accordance with the Contract.
- 1.11.1.2. Disposal of all other soils has been completed.
- 1.11.1.3. Damage has been repaired, deficiencies have been completed, missing items have been provided, and non-conformance has been corrected, in the opinion of the Departmental Representative.
- 1.11.1.4. Contractor's Qualified Professional report documenting backfilling has met all requirements of the Contract.
 - 1.11.2. Defective products will be rejected, regardless of previous inspections. Replace defective products.
 - 1.11.3. Prepare all documentation required as part of any permits or other authorizations obtained or otherwise the responsibility of the Contractor.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 – GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Preconstruction Meeting Minutes: within 2 Working Days of the Preconstruction Meeting, Submit meeting minutes.

1.3.2. Progress Meeting Minutes: within 2 Working Days of a Progress Meeting, Submit meeting minutes. Submit revised minutes within 2 Working Days of receiving comments by Departmental Representative.

1.3.3. Information for Progress Meetings: at least 2 Working Days prior to scheduled Progress Meetings, Submit all information in accordance with the Contract for Progress Meetings. Include:

1.3.3.1. Agenda for the proposed Progress Meeting.

1.3.3.2. Updated Project Schedule.

1.3.3.3. Copies of transport manifests and disposal receipts for all materials removed from Site.

1.3.3.4. Other information as directed by the Departmental Representative or relevant to agenda for upcoming progress meeting.

1.3.4. Final Site Inspection: within 2 Working Days of the Final Site Inspection, Submit meeting minutes.

1.3.5. Closeout Meetings: within 2 Working Days of the Closeout Meeting, Submit meeting minutes.

1.4. Administrative

1.4.1. Schedule and administer project meetings throughout the progress of the Work as required and at the call of the Departmental Representative.

1.4.2. Prepare agenda for meetings.

1.4.3. Submit written notice with agenda of each meeting 2 Working Days in advance of meeting date as directed by the Departmental Representative.

1.4.4. Provide physical space and make arrangements for meetings, or arrange for teleconference meetings, as directed by Departmental Representative.

1.4.5. Preside at meetings.

1.4.6. Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

1.4.7. Maintain records of meeting minutes for a minimum of 2 years after Work is completed.

1.4.8. Representative of Contractor, Subcontractor(s) and Supplier(s) attending meetings must be qualified and authorized to act on behalf of party each represents.

1.5. Preconstruction (Kickoff) Meeting

- 1.5.1. Within 5 Working Days after award of Contract, request a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities.
- 1.5.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.5.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.5.4. Agenda to include:
 - 1.5.4.1. Appointment of official representative of participants in the Work, including Contractor's Superintendent and Departmental Representative.
 - 1.5.4.2. Schedule of Work including Master Plan.
 - 1.5.4.3. Schedule of Submittals including premobilization Submittals including Insurance, Contract Security, Health and Safety Plan, and Environmental Protection Plan.
 - 1.5.4.4. Requirements for temporary facilities.
 - 1.5.4.5. Site security, Health and Safety, Environmental Protection, coordination with other Site users including consultants and other subcontractors.
 - 1.5.4.6. Change orders, procedures, approvals required, administrative requirements.
 - 1.5.4.7. Monthly Progress Payments, administrative procedures, hold backs.
 - 1.5.4.8. Appointment of inspection and testing agencies or firms.
 - 1.5.4.9. List of Subcontractor(s).

1.6. Progress Meetings

- 1.6.1. During course of Work schedule progress meetings weekly subject to approval by Departmental Representative.
- 1.6.2. Contractor, Superintendent, major Subcontractor(s) involved in Work, and Departmental Representative are to be in attendance.
- 1.6.3. Agenda to include:
 - 1.6.3.1. Review and acceptance of minutes of previous meeting.
 - 1.6.3.2. Review health and safety, including incidents, near misses, and corrective measures.
 - 1.6.3.3. Review Environmental Protection, including incidents, near misses, and corrective measures.
 - 1.6.3.4. Review contractual compliance.
 - 1.6.3.5. Review regulatory compliance.
 - 1.6.3.6. Review communications, problems or concerns with community.
 - 1.6.3.7. Review of Work progress since previous meeting.
 - 1.6.3.8. Field observations, problems, conflicts.
 - 1.6.3.9. Updated progress schedule detailing activities planned over next 2 week period. Include review of progress with respect to previously established dates for starting and stopping various stages of Work.
 - 1.6.3.10. Problems which impede construction schedule.
 - 1.6.3.11. Corrective measures and procedures to regain projected schedule.
 - 1.6.3.12. Revision to construction schedule.
 - 1.6.3.13. Progress schedule, during succeeding Work period.
 - 1.6.3.14. Review submittal schedules: expedite as required.

- 1.6.3.15. Maintenance of quality standards.
- 1.6.3.16. Quantities of material transported, treated, and disposed.
- 1.6.3.17. Review proposed changes for effect on construction schedule and on Final Completion date.
- 1.6.3.18. Other business.
- 1.6.4. Submit draft Progress Meeting Minutes for review and comment by Departmental Representative. Incorporate comments into final Progress Meeting Minutes.

1.7. Toolbox Meetings

- 1.7.1. During the course of the Work, schedule daily toolbox (tailgate) meetings at the start of each Work shift. Multiple meetings are required if the Contractor works multiple shifts within a 24-hour period.
- 1.7.2. All on Site workers to attend, including Contractor, Superintendent, major Subcontractor(s), and Qualified Professionals such as environmental consultants, Structural Engineer(s), etc. Departmental Representative may attend.
- 1.7.3. Agenda to include:
 - 1.7.3.1. Planned Work activities and environmental considerations for that shift, including hazards, mitigation measures, and emergency procedures.
 - 1.7.3.2. Problems which may impede construction schedule.
 - 1.7.3.3. Maintenance of quality standards.
 - 1.7.3.4. Review previous relevant incident or near-miss reports, both from Site and other Sites.
 - 1.7.3.5. Coordination activities, and roles and responsibilities, required between Contractor, Subcontractor(s), Departmental Representative, other contractor(s) including environmental consultant, site users, and protection of general public and offsite resources.
 - 1.7.3.6. Health and Safety items, including PPE requirements and COVID-19 protocols.
 - 1.7.3.7. Environmental Protection items, including emergency equipment.

1.8. Interim Site Inspection

- 1.8.1. As required by Departmental Representative, interim Site Inspections include:
 - 1.8.1.1. When lateral and vertical extents of excavation are reached
 - 1.8.1.2. If results of confirmatory sampling require extensions of excavation.

1.9. Final Site Inspection

- 1.9.1. Within 5 Working Days of completion of Site Works but prior to Demobilization, request a meeting on Site for Final Site Inspection.
- 1.9.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.9.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.9.4. Agenda to include:
 - 1.9.4.1. Inspect removal of all temporary equipment, materials, supplies, and facilities.
 - 1.9.4.2. Inspect final surface grades.
 - 1.9.4.3. Inspect final vegetation.

- 1.9.4.4. Inspect permanent facilities for performance and damage.
- 1.9.4.5. Document all damage, deficiencies, missing items, and non-conformance.
- 1.9.5. If required, and in the opinion of the Departmental Representative, perform another Final Site Inspection after resolving all documented damage, deficiencies, missing items, and non-conformance.

1.10. Closeout Meeting

- 1.10.1. Within 10 Working Days of completion of the Work, request a meeting to review the project.
- 1.10.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
- 1.10.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
- 1.10.4. Agenda to include:
 - 1.10.4.1. Review Certificate of Completion.
 - 1.10.4.2. Review final payment.
 - 1.10.4.3. Identify lessons learned.
 - 1.10.4.4. Perform Contractor Performance Evaluation Report Form.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Master Plan: within 10 Working Days after Contract award, Submit a Master Plan.

1.3.2. Schedule of Interruption of Services: at least 5 Working Days prior to any shutdown or closure of active utilities or facilities Submit a schedule identifying type of service and dates of shutdown or closure.

1.3.3. Project Schedule and Updates: with Progress Payment, Submit a Project Schedule updated as appropriate. Progress Payment submission is incomplete without an updated Project Schedule acceptable to Departmental Representative.

1.4. Requirements

1.4.1. Ensure Master Plan and detail Project Schedules are practical and are compliant with Schedule Requirements.

1.4.2. Plan to complete Work in accordance with prescribed milestones and time frame.

1.4.3. Limit activity durations to maximum of approximately 5 Working Days, to allow for progress reporting.

1.4.4. Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.4.5. Include Work sequencing description and schedule:

1.4.5.1. Work Sequencing description must describe methods, means, and sequences to perform each major task.

1.4.5.2. Work Sequencing schedule must show on a Gantt chart, start, end and dependencies of each major task and also indicates Work to be performed in sequence and in parallel.

1.4.5.3. Major tasks include all items identified on Unit Price Table.

1.5. Master Plan

1.5.1. Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

1.5.2. Departmental Representative will review and return revised schedules within 5 Working Days.

1.5.3. Revise impractical schedule and resubmit within 5 Working Days.

1.5.4. Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6. Project Schedule

1.6.1. Develop detailed Project Schedule as updates to Master Plan.

- 1.6.2. Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - 1.6.2.1. Dates of commencement and completion of Work for each description of Work identified on the Unit Price Table.
 - 1.6.2.2. Dates of Submittals including Drawings, product data, MSDS sheets and samples.
 - 1.6.2.3. Dates of inspection and testing.
 - 1.6.2.4. Final Completion date within the time period in accordance with the Contract, including Amendments.

1.7. Project Schedule Reporting

- 1.7.1. Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.
- 1.7.2. Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
- 1.7.3. Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating Contract price. After approval by Departmental Representative cost breakdown will be used as basis for progress payments.

1.8. Project Meetings

- 1.8.1. Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current accepted dates shown on baseline schedule.
- 1.8.2. Weather related delays with their remedial measures will be discussed and negotiated

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Drawings: at least 5 Working Days prior to commencing applicable Work, Submit Drawings signed by a Contractor's Qualified Professional.

1.4. General

- 1.4.1. Required Action and Information Submittals are identified in each Section under Subsection 1.3. Other Submittals may be required as determined by Departmental Representative.
- 1.4.2. Submission to be commensurate for type of Work and Site conditions. Details depend on Work performed and Contractor's methods, means, and sequences.
- 1.4.3. Contractor's responsibility for errors and omissions in Submittals is not relieved by the Departmental Representative's review of Submittals.
- 1.4.4. Notify Departmental Representative in writing at time of Submittals, identifying deviations from requirements of Contract and stating reasons for deviations.
- 1.4.5. Contractor's responsibility for deviations in Submittals from requirements of Contract is not relieved by the Departmental Representative's review of Submittals unless Departmental Representative gives written acceptance of specific deviations.
- 1.4.6. Make any changes in Submittals which Departmental Representative requires to be in accordance with the Contract and resubmit.
- 1.4.7. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those directed by the Departmental Representative.
- 1.4.8. Do not proceed with Work until relevant Submittals are finalized and accepted.
- 1.4.9. Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to Submit in ample time is responsibility of Contractor.
- 1.4.10. Review Submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each Submittal has been checked and coordinated with requirements of Work and Contract. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- 1.4.11. Verify field measurements and affected adjacent Work are coordinated.
- 1.4.12. Adjustments made on Submittals by the Departmental Representative will not result in an increase the Contract Amount nor an Extension of Time for completion of the Work.
- 1.4.13. Keep one final copy of each Submittal onsite.

1.5. Submission Requirements

- 1.5.1. Coordinate each Submittal with the requirements of the Work and the Contract. Individual Submittals will not be reviewed until:
 - 1.5.1.1. Submittals are complete.
 - 1.5.1.2. All related information is available.
- 1.5.2. Allow 10 Working Days for Departmental Representative's review of each Submittal, unless otherwise specified. No Standby Time charges or increases to Contract Amount or Extension of Time for Departmental Representative's review.
- 1.5.3. All Submittals are to be sent to Departmental Representative in duplicate as a hardcopy and in electronic format compatible with Departmental Representative's software.
- 1.5.4. Submittals must include:
 - 1.5.4.1. Date and revision dates.
 - 1.5.4.2. Project title and number.
 - 1.5.4.3. Name and address of:
 - 1.5.4.3.1. Subcontractor.
 - 1.5.4.3.2. Supplier.
 - 1.5.4.3.3. Manufacturer.
 - 1.5.4.4. Signature of Superintendent, certifying approval of Submittals, verification of field measurements and in accordance with the Contract.
 - 1.5.4.5. Contractor's Qualified Professional to sign and seal Submittals in accordance with the Contract or as required by the nature of the Submittal. Submittals to include at a minimum 1 hard copy of original ink sealed document.
 - 1.5.4.6. Details of appropriate portions of Work as applicable.

1.6. Administrative

- 1.6.1. Submit electronic copies of drawings for each requirement requested in the specifications sections and as Departmental Representative may reasonably request.
- 1.6.2. Present Drawings and Production Data in SI Metric Units. Where items or information is not produced in SI Metric units converted values are acceptable.
- 1.6.3. Submit electronic copies of colour digital photography in ".jpg" format, standard resolution as directed by Departmental Representative.
- 1.6.4. Photographic documentation upon completion of Work, and as directed by Departmental Representative.
- 1.6.5. Immediately after award of Contract, submit Yukon Workers' Compensation Health and Safety Board status or clearance letter.
- 1.6.6. Submit transcription of insurance immediately after award of Contract.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.1. Action and Informational Submittals

1.1.1. Contaminated Soil and Water Management Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Soil and Contaminated Water Management onsite for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include

1.1.1.1. Personnel and equipment decontamination.

1.1.1.2. Segregation of different Classifications.

1.2. Sequencing and Scheduling

1.2.1. Commence Work involving contact with Contaminated or potentially Contaminated Soil or Water after all applicable Environmental Protection procedures (including those identified in Contaminated Soil and Water Management Plan and Environmental Protection Plan) and facilities (including those identified in Site Layout) are operational and accepted by Departmental Representative.

1.2.2. Plan work sequencing and traffic patterns to prevent contamination of clean areas due to traffic or debris.

1.3. Drums

1.3.1. Provide, maintain, and operate drum staging pad as required.

1.3.2. Construct drum staging pad with sump capable of collecting leachate and rain runoff. Place impermeable liner that contours over top of berm, and collects leachate and runoff from staging pad which is conducted solely to sump on staging pad. Leachate is Contaminated Water.

1.3.3. Storage of solid or liquid waste: 200 L steel drums meeting Transportation of Dangerous Goods Act, closable lids, complete with labels for marking contents and date filled.

1.4. Personnel Decontamination Facility

1.4.1. Provide an area or areas close to the workers' changing facilities to enable workers and other personnel leaving areas such as exclusion area to remove deleterious and Contaminated Soils from boots, clothing and skin surfaces.

1.4.2. Be responsible for ensuring that all materials, chemicals, protective clothing, wash water and deleterious materials are collected, treated and disposed of in accordance with applicable environmental standards and regulations.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

- 1.4.3. Personnel Decontamination Facility to be available for use by persons other than the Contractor's workers and Subcontractors, including federal employees, other contractor(s), and environmental agencies. Provide use of facilities to other persons.

1.5. Equipment Decontamination Facility

- 1.5.1. Prior to commencing Work involving equipment contact with potentially Contaminated Soil, construct equipment decontamination facilities to accommodate the largest potentially contaminated equipment onsite.
- 1.5.2. Collect and contain equipment decontamination wastewater and sediment. Transfer collected wastewater and sediment to treatment facilities accepted by Departmental Representative.

1.6. Equipment Decontamination

- 1.6.1. At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated.
- 1.6.2. If required, as directed by the Departmental Representative, use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in clean area before removing from Site or travelling on clean areas. Perform assessment as directed by the Departmental Representative to determine effectiveness of decontamination.
- 1.6.2.1. Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.
- 1.6.2.2. Collect decontamination wastewater and sediment which accumulate in decontamination location. Treat collected wastewater as Contaminated Water. Manage decontamination sediment as Waste Quality.
- 1.6.3. In the opinion of the Departmental Representative, each piece of equipment must be inspected by the Departmental Representative after decontamination and prior to travel on clean areas or demobilization from Site. Perform additional decontamination as required in the opinion of the Departmental Representative.
- 1.6.4. Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.7. Progress Decontamination

- 1.7.1. Decontaminate equipment after working in potentially contaminated Work areas and prior to subsequent Work or travel on clean areas.

SPECIAL PROJECT PROCEDURES FOR CONTAMINATED SITES

1.8. Final Decontamination

- 1.8.1. Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially Contaminated Soil prior to demobilization from Site.

1.9. Contaminated Material Management

- 1.9.1. Remove all Contaminated Material within Work areas in accordance with the Contract and as directed by the Departmental Representative. Remove Non-Contaminated Quality Material incidental to the Work or as directed by the Departmental Representative.
- 1.9.2. Material will be Classified by the Departmental Representative based on insitu results, field observations, field measurements, and/or ex-situ characterization. Departmental Representative solely responsible for Classification; Contractor cannot re-Classify Material.
- 1.9.3. Handle (including Excavate, Transport, Treat, and Dispose) material separately into the Classifications in accordance with the Contract or as directed by the Departmental Representative. Take necessary precautions to avoid mixing of different classifications. Do not blend, or mix and dilute, different material Classifications.
- 1.9.4. Contractor responsible for Transportation, Treatment, and Disposal based on Classification by Departmental Representative. Contractor responsible for material of separate Classifications that are blended, or mixed and diluted; Departmental Representative responsible for Classification. No increases to Contract Amount or Extension of Time due to material blended, or mixed and diluted.
- 1.9.5. Material Characterization (e.g., sampling and testing) of parameters additional to information provided in Contract as required by the Contractor (ego for Transportation, Treatment Facility or Disposal Facility purposes) responsibility of Contractor.
- 1.9.6. Material segregation additional to Contract as required for Transportation, Treatment Facility or Disposal Facility responsibility of Contractor.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION



HEALTH AND SAFETY FOR CONTAMINATED SITES

PSPC Update on Asbestos Use

Effective April 1, 2016, all Public Services and Procurement Canada (PSPC) contracts for new construction and major rehabilitation will prohibit the use of asbestos-containing materials.

COVID 19

All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites, Provincial Regulations, and Federal Site Specific COVID 19 Procedures.

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Submit to Departmental Representative Submittals listed for review.

1.3.2. Work affected by Submittal must not proceed until review is complete.

1.3.3. Site Specific Health and Safety Plan: within 7 Working Days after Contract award and prior to mobilization to Site, Submit a health and safety plan. Include:

1.3.3.1. Results of Site-specific safety hazard assessment.

1.3.3.2. Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

1.3.4. Submit digital copy of Contractor's authorized representative's Work Site health and safety inspection reports to Departmental Representative.

1.3.5. Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

1.3.6. Submit copies of incident and accident reports.

1.3.7. Departmental Representative will review Contractor's Site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 10 days after receipt of comments from Departmental Representative.

1.3.8. Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

1.3.9. Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.3.10. On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3.11. Submit:

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.3.11.1. Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- 1.3.11.2. Emergency Procedures.
- 1.3.11.3. Notice of Project.

1.4. References

- 1.4.1. Government of Canada:
 - 1.4.1.1. Canada Labour Code - Part II.
 - 1.4.1.2. Canada Occupational Health and Safety Regulations.
- 1.4.2. National Building Code of Canada (NBC):
 - 1.4.2.1. Part 8, Safety Measures at Construction and Demolition Sites.
- 1.4.3. The Canadian Electric Code (as amended).
- 1.4.4. Canadian Standards Association (CSA) as amended:
 - 1.4.4.1. CSA Z797-2009 Code of Practice for Access Scaffold.
 - 1.4.4.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
 - 1.4.4.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
 - 1.4.4.4. CSA Z1006-10 Management of Work in Confined Spaces
 - 1.4.4.5. CSA Z462 Workplace Electrical Safety Standard.
- 1.4.5. National Fire Code of Canada 2010 (as amended):
 - 1.4.5.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
 - 1.4.5.2. FCC No. 302, Standard for Welding and Cutting.
- 1.4.6. American National Standards Institute (ANSI):
 - 1.4.6.1. ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- 1.4.7. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - 1.4.7.1. Material Safety Data Sheets (MSDS).
- 1.4.8. Canadian Construction Association
 - 1.4.8.1. COVID-19 Standardized Protocols for All Canadian Construction Sites
- 1.4.9. Province of British Columbia (as appropriate):
 - 1.4.9.1. *Workers Compensation Act* Part 3-Occupational Health and Safety.
 - 1.4.9.2. Occupational Health and Safety Regulation.
- 1.4.10. Yukon Territory (as appropriate):
 - 1.4.10.1. *Occupational Health and Safety Act*.
 - 1.4.10.2. *Workers' Compensation Act*.
 - 1.4.10.3. Occupational Health and Safety Regulation

1.5. Worker's Compensation Board Coverage

- 1.5.1. Comply fully with the relevant *Workers' Compensation Act*, regulations and orders made pursuant thereto, and any amendments up to the Final Completion of the Work.
- 1.5.2. Maintain Workers coverage as required by relevant acts and regulations during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

HEALTH AND SAFETY FOR CONTAMINATED SITES**1.6. Compliance with Regulations**

- 1.6.1. Conduct a Site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
- 1.6.2. Prepare and comply with a Site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - 1.6.2.1. Primary requirements:
 - 1.6.2.1.1. Contractor's safety policy.
 - 1.6.2.1.2. Identification of applicable compliance obligations.
 - 1.6.2.1.3. Definition of responsibilities for project safety / organization chart for project.
 - 1.6.2.1.4. General safety rules for project including COVID-19 protocols.
 - 1.6.2.1.5. Job-specific safe work procedures.
 - 1.6.2.1.6. Inspection policy and procedures.
 - 1.6.2.1.7. Incident reporting and investigation policy and procedures.
 - 1.6.2.1.8. Occupational Health & Safety Committee / Representative procedures.
 - 1.6.2.1.9. Occupational Health & Safety meetings.
 - 1.6.2.1.10. Occupational Health & Safety communications and record keeping procedures.
 - 1.6.2.2. Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the Site work.
 - 1.6.2.3. List Hazardous Materials to be brought on Site as required by Work.
 - 1.6.2.4. Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
 - 1.6.2.5. Identify personal protective equipment (PPE) to be used by workers.
 - 1.6.2.6. Identify personnel and alternates responsible for site safety and health.
 - 1.6.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
- 1.6.3. Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.
- 1.6.4. Revise and update Health and Safety Plan as required and re-submit to the Departmental Representatives.
- 1.6.5. Departmental Representative's review: the review of Site-Specific Health & Safety Plan by Public Services and Procurement Canada (PSPC) shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.7. General Requirements – Site Specific Safety Plan (SSSP/HASP)

- 1.7.1. Develop written Site-Specific Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from Site. Health and Safety Plan must address project specifications.
- 1.7.2. Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns.

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- 1.7.3. Preparing and implementing the Site-specific HASP is the responsibility of the Contractor in their role as the Prime Contractor (BC)/ Prime Constructor (YT), as applicable. The HASP will clearly indicate that the Work will follow the most stringent of:
 - 1.7.3.1. All relevant federal requirements.
 - 1.7.3.2. All relevant provincial/territorial requirements, including WorkSafeBC/Yukon Workers' Compensation Health and Safety Board.
 - 1.7.3.3. Relevant portions of the Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites.
 - 1.7.3.4. Client/Custodian/site operator requirements.
 - 1.7.3.5. Corporate protocols.
- 1.7.4. Completed HASPs are to be forwarded to Departmental Representative for acceptance (of meeting contractual and due diligence requirements)

1.8. Filing of Notice

- 1.8.1. The Prime Contractor (BC)/ Prime Constructor (YT) must complete and submit a Notice of Project as required by Provincial or Territorial authorities.
- 1.8.2. Provide copies of all notices to the Departmental Representative.

1.9. Safety Assessment

- 1.9.1. Perform Site-specific safety hazard assessment related to project.

1.10. Meetings

- 1.10.1. Attend health and safety pre-construction meetings and all subsequent meetings call by the Departmental Representative.

1.11. Regulatory Requirements

- 1.11.1. Do Work in accordance with Regulatory Requirements.

1.12. Responsibility

- 1.12.1. Assume responsibility as the Prime Contractor (BC)/ Prime Constructor (YT) for work under this Contract.
- 1.12.2. Be responsible for health and safety of persons on site, safety of property on Site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- 1.12.3. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, territorial and local statutes, regulations, and ordinances, and with Site-specific Health and Safety Plan.

1.13. Compliance Requirements

- 1.13.1. Comply with the CCA COVID-19 – Standardized Protocols for All Canadian Construction Sites.
- 1.13.2. Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.13.3. Comply with (as applicable) B.C. and Y.T. Workers Compensation Act, Worksafe B.C., Yukon Workers' Compensation Health and Safety Board, BC and YT *Occupational Health and Safety Act* and Regulations.
- 1.13.4. The most stringent will apply in the applicable jurisdiction.

1.14. Unforeseen Hazards

- 1.14.1. When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Safety Officer and follow procedures in accordance with Acts and Regulations of Territory having jurisdiction and advise Departmental Representative verbally and in writing.

1.15. Health and Safety Coordinator

- 1.15.1. The Health and Safety Coordinator must:
 - 1.15.1.1. Be responsible for completing all health and safety training, ensure that personnel that do not successfully complete the required training are not permitted to enter the site to perform the work.
 - 1.15.1.2. Be responsible for implementing, daily enforcing, and monitoring the Site-Specific Safety Plan (SSSP) or Health and Safety Plan (HASP).
 - 1.15.1.3. Be on site during execution of work.

1.16. Posting of Documents

- 1.16.1. Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Territory having jurisdiction, and in consultation with Departmental Representative.

1.17. Correction of Non-Compliance

- 1.17.1. Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- 1.17.2. Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- 1.17.3. Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.18. Work Stoppage

- 1.18.1. Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.19. Powder Actuated Devices

- 1.19.1. Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.20. General Safety Conditions

- 1.20.1. Provide safety barricades and lights around work Site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.20.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work Site.
- 1.20.2.1. Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
- 1.20.2.2. Secure site at nighttime or provide security guard as deemed necessary to protect Site against entry.

1.21. Project/Site Conditions

- 1.21.1. Work at Site will involve contact with:
 - 1.21.1.1. Multi-employer work site.
 - 1.21.1.2. Federal employees and general public.
 - 1.21.1.3. Municipal water and sanitary utilities.
 - 1.21.1.4. Energized electrical and telecommunication services.
 - 1.21.1.5. Working from heights.
 - 1.21.1.6. Working in open exposed to unpredictable weather.
 - 1.21.1.7. Residential vehicular and pedestrian traffic.
 - 1.21.1.8. Contaminants identified in Contract Documents and environmental reports.
- 1.21.2. Contractor to provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- 1.21.3. Contractor to ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

1.22. Utility Clearances

- 1.22.1. The Contractor is solely responsible for all utility detection and clearances prior to starting the Work.
- 1.22.2. The Contractor will not rely solely upon the reference Drawings or other information provided for utility locations.

1.23. Regulatory Requirements

- 1.23.1. Comply with specified codes, Acts, bylaws, standards, and regulations to ensure safe operations at Site (the most stringent will apply).
- 1.23.2. In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.24. Work Permits

- 1.24.1. Obtain specialty permit(s) related to project before start of work.

1.25. Emergency Procedures

- 1.25.1. List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e., names / telephone numbers) of:

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.25.1.1. Designated personnel from own company.
- 1.25.1.2. Regulatory agencies applicable to work and as per legislated regulations.
- 1.25.1.3. Local emergency resources.
- 1.25.1.4. Departmental Representatives.
- 1.25.2. Include the following provisions in the emergency procedures:
 - 1.25.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency
 - 1.25.2.2. Evacuate all workers safely.
 - 1.25.2.3. Check and confirm the safe evacuation of all workers.
 - 1.25.2.4. Notify the fire department or other emergency responders.
 - 1.25.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - 1.25.2.6. Notify Departmental Representatives.
- 1.25.3. Provide written rescue / evacuation procedures as required for, but not limited to:
 - 1.25.3.1. Work at high angles.
 - 1.25.3.2. Work in confined spaces or where there is a risk of entrapment.
 - 1.25.3.3. Work with hazardous substances.
 - 1.25.3.4. Underground work.
 - 1.25.3.5. Work on, over, under, and adjacent to water.
 - 1.25.3.6. Workplaces where there are persons who required physical assistance to be moved.
- 1.25.4. Design and mark emergency exit routes to provide quick and unimpeded exit.

1.26. Hazardous Products

- 1.26.1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of Hazardous Materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representatives and in accordance with the Canada Labour Code.
- 1.26.2. Where use of hazardous and toxic products cannot be avoided:
 - 1.26.2.1. Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00.
 - 1.26.2.2. In conjunction with Departmental Representative, schedule to carry out work during “off hours” when tenants have left the building.
 - 1.26.2.3. Provide adequate means of ventilation in accordance with Section 01 52 00.
 - 1.26.2.4. The Contractor shall ensure that the product is applied as per manufacturers recommendations.
 - 1.26.2.5. The Contractor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.
- 1.26.3. Provide name[s] and qualifications of person[s] responsible for manifesting hazardous waste to be removed from site.
- 1.26.4. Notify Departmental Representative if additional, previously un-identified suspected Hazardous Material (e.g. asbestos, lead, PCB, mercury, etc.) during the Work. Leave undisturbed (as much as possible) until Departmental Representative provides instructions.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.27. Asbestos Hazard

- 1.27.1. Carry out any activities involving asbestos in accordance with applicable Provincial/Territorial Regulations.
- 1.27.2. Removal and handling of asbestos will be performed in accordance with current applicable Territorial/Federal Regulations, and as indicated on the PSPC website.

1.28. PCB Removals

- 1.28.1. Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.
- 1.28.2. Removal, handle, transport, and dispose of as indicated on the PSPC website.

1.29. Removal of Lead Containing Paint

- 1.29.1. All paints containing toxicity characteristic leaching procedure (TCLP) lead concentrations above 5 ppm are classified as hazardous waste.
- 1.29.2. Carry out demolition and/or remediation activities involving lead-containing paints in accordance with applicable Provincial/ Territorial Regulations.
- 1.29.3. Refer to reports in Annex B for information pertaining to Lead paint Hazardous Materials that have been identified at the Site and will require disturbance during the project Work.
- 1.29.4. Dry Scraping/Sanding of any materials containing lead is strictly prohibited.
- 1.29.5. The use of Methylene Chloride based paint removal products is strictly prohibited.

1.30. Electrical Safety Requirements

- 1.30.1. Comply with authorities and ensure that when installing new facilities or modifying existing facilities, all electrical personnel are familiar with existing and new electrical circuits and equipment and their operation.
 - 1.30.1.1. Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.
 - 1.30.1.2. Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.31. Electrical Lockout

- 1.31.1. Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- 1.31.2. Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request / authorization form. Have procedures for review upon request by the Departmental Representatives.
- 1.31.3. Keep the documents and lockout tags at the Site in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representatives or by any authorized safety representative.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.32. Overloading

- 1.32.1. Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.33. Falsework

- 1.33.1. Design and construction falsework in accordance with CSA S269.1-1975 (R2003).

1.34. Scaffolding

- 1.34.1. Design, construct, and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 and BC Occupational Health and Safety Regulations.

1.35. Confined Spaces

- 1.35.1. Carry out with confined spaces in compliance with Provincial/Territorial Regulations.

1.36. Powder Actuated Devices

- 1.36.1. Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

1.37. Fire Safety and Hot Work

- 1.37.1. Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.
- 1.37.2. Hot work includes cutting / melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.38. Fire Safety Requirements

- 1.38.1. Store oily / paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.
- 1.38.2. Handle, store, use, and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.
- 1.38.3. Portable gas and diesel fuel tanks are not permitted on most federal work site. Approval from the DR is required prior to any gas or diesel tank being brought onto the work site.

1.39. Fire Protection and Alarm System

- 1.39.1. Fire protection and alarm shall not be:
 - 1.39.1.1. Obstructed.
 - 1.39.1.2. Shut off.
 - 1.39.1.3. Left inactive at the end of a working day or shift.
- 1.39.2. Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- 1.39.3. Be responsible / liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.
- 1.39.4. Fire extinguishers to be located in Site office, Contractor vehicles, and accessible work areas.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.40. Unforeseen Hazards

- 1.40.1. Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.41. Posted Documents

- 1.41.1. Post legible versions of the following documents on site:
 - 1.41.1.1. Site Specific Health and Safety Plan
 - 1.41.1.2. Sequence of work
 - 1.41.1.3. Emergency procedures
 - 1.41.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - 1.41.1.5. Notice of Project
 - 1.41.1.6. Floor plans or site plans
 - 1.41.1.7. Notice as to where a copy of the *Workers' Compensation Act* and Regulations are available on the work site for review by employees and workers.
 - 1.41.1.8. Workplace Hazardous Materials Information System (WHMIS) documents.
 - 1.41.1.9. Material Safety Data Sheets (MSDS)
 - 1.41.1.10. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- 1.41.2. Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- 1.41.3. Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.42. Meetings

- 1.42.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.
- 1.42.2. Ensure all Site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:
 - 1.42.2.1. Sign-in of all attendees.
 - 1.42.2.2. Planned Work activities and environmental considerations for that shift.
 - 1.42.2.3. Hazards associated with these Work activities, including environmental hazards (e.g. potential for hypothermia, heat exhaustion, heat stroke).
 - 1.42.2.4. Appropriate job-specific safe work procedures.
 - 1.42.2.5. Required personal protective equipment (PPE).
 - 1.42.2.6. Appropriate emergency procedures.
 - 1.42.2.7. Review recent accidents on Site, including near misses.
- 1.42.3. Retain records of all health and safety meetings onsite during Work, and retain as corporate records for a minimum of 7 years after Work is completed.

HEALTH AND SAFETY FOR CONTAMINATED SITES

1.43. Hazardous Occurrence Investigation, Recording and Reporting (HOIRR)

1.43.1. Hazard includes:

1.43.1.1. Any source of potential damage, harm or adverse effects on life, health, property or environment at work. It refers to any biological, chemical, ergonomic, physical, psychosocial and safety factor that is reasonably likely to cause harm or damage to humans, other organisms, or the environment in the absence of its control. Sometimes a hazard is referred to as being the actual harm or the health effect it caused rather than the hazard. For example the disease tuberculosis might be called a hazard by some but in general the tuberculosis-causing bacteria would be considered the “hazard” or “hazardous biological agent”. Exposure to tuberculosis would be the hazardous incident. For types of Hazards refer to the Standard on Hazard Prevention Program.

1.43.2. Hazardous Occurrence includes:

1.43.2.1. An event occurring at a PWGSC managed building or worksite, or through the course of an employee's work that results in, or has the potential to result in, a fatality, injury, illness, exposure to a hazardous substance or property damage or an escapement of a Hazardous Material. For the purpose of investigating, recording and reporting hazardous occurrences, the following are included under this term: disabling injuries, minor injuries and near-misses.

1.43.3. Hazardous Occurrence Investigation and Reporting Procedures:

1.43.3.1. Includes information regarding the person involved and the basic circumstances surrounding the hazardous occurrence.

1.43.3.2. Provides a detailed and thorough description of the hazardous occurrence and the sequence of events.

1.43.3.3. Indicates corrective measures that have been taken since the occurrence.

1.43.3.4. Requires the appointment of a qualified investigator.

1.43.3.5. Provides recommendations for additional corrective measures, if required.

1.43.4. Fatal or Serious Accidents Procedures:

1.43.4.1. Call emergency number to advise the police organization having jurisdiction to secure the scene and investigate the matter.

1.43.4.2. Advise the Departmental Representative of the fatality or serious accident within 1 hour.

1.43.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.

1.43.4.4. Unless authorized to do so, do not allow anyone to remove or in any way interfere with or disturb any wreckage, article or thing related to the incident except to the extent necessary to: save a life, prevent injury or relieve human suffering in the vicinity; maintain an essential public service; or prevent unnecessary damage to or loss of property.

1.44. Personal Protective Equipment Program

1.44.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing as appropriate:

1.44.1.1. Donning and doffing procedures.

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.44.1.2. PPE selection based upon Site hazards.
- 1.44.1.3. PPE use and limitations of equipment.
- 1.44.1.4. Work mission duration, PPE maintenance and storage.
- 1.44.1.5. PPE decontamination and disposal.
- 1.44.1.6. PPE inspection procedures prior to, during, and after use.
- 1.44.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
- 1.44.1.8. Medical surveillance requirements for personnel assigned to work at Site.
- 1.44.1.9. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
- 1.44.1.10. Site control measures employed at Site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
- 1.44.1.11. Decontamination procedures for both personnel and equipment.
- 1.44.1.12. Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial/territorial, or federal agencies.
- 1.44.1.13. Written respiratory protection program for project activities.
- 1.44.1.14. Procedures dealing with heat and/or cold stress.
- 1.44.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.45. Offsite Contingency and Emergency Response Plan

- 1.45.1. Prior to commencing Work involving handling of Hazardous Materials, develop offsite Contingency and Emergency Response Plan.
- 1.45.2. Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or Hazardous Material from Site.

1.46. Personnel Health, Safety, and Hygiene

- 1.46.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
- 1.46.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
- 1.46.3. Personal Protective Equipment:
 - 1.46.3.1. Ensure all site personnel are furnished with appropriate PPE.

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.46.3.2. Unless identified otherwise in site-specific health and safety plan, minimum PPE to include: industrial protective headwear, high-visibility safety apparel, and protective footwear.
- 1.46.3.3. Ensure that safety equipment and protective clothing is kept clean and maintained.
- 1.46.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
 - 1.46.4.1. Ensure industrial protective headwear is of appropriate CSA Standard and meets other appropriate standards.
 - 1.46.4.2. Ensure high-visibility safety apparel is of appropriate CSA Standard and meets other appropriate standards.
 - 1.46.4.3. Ensure protective footwear is of appropriate CSA Standard and meets other appropriate standards.
 - 1.46.4.4. Dispose of or decontaminate PPE worn onsite at end of each workday.
 - 1.46.4.5. Decontaminate reusable PPE before reissuing.
 - 1.46.4.6. Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas, as appropriate.
 - 1.46.4.7. Ensure facial hair does not interfere with proper respirator fit.
- 1.46.5. Respiratory Protection:
 - 1.46.5.1. Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
 - 1.46.5.2. Develop, implement, and maintain respirator program.
 - 1.46.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.
 - 1.46.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
 - 1.46.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
 - 1.46.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.
 - 1.46.5.7. Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
- 1.46.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
- 1.46.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
 - 1.46.7.1. Suitable containers for storage and disposal of used disposable PPE.
 - 1.46.7.2. Potable water and suitable sanitation facility.
- 1.46.8. Emergency and First-Aid Equipment:
 - 1.46.8.1. Locate and maintain emergency and first-aid equipment in appropriate location onsite including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.
- 1.46.9. Site Communications:

HEALTH AND SAFETY FOR CONTAMINATED SITES

- 1.46.9.1. Identify, provide and implement appropriate dedicated communication devices for Site and post emergency numbers near dedicated devices.
- 1.46.9.2. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
- 1.46.9.3. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
- 1.46.9.4. Furnish selected personnel with 2-way radios.
- 1.46.9.5. Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or Work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Not used

1.1.1. Not used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Environmental Protection Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit a plan detailing protection of the environment. Include:
- 1.3.1.1. Comprehensive overview of known or potential environmental issues to be addressed during Work.
 - 1.3.1.2. Identify requirements that plan complies with. Includes: permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the Contract.
 - 1.3.1.3. Communications identifying emergency contact list and conditions for implementing emergency contact. Emergency contact to include: Contractor emergency response team including Superintendent; Departmental Representative and alternate, and other contractor(s) and individuals as directed by the Departmental Representative; and federal, provincial/territorial, and municipal emergency contacts.
 - 1.3.1.4. Work Area showing proposed activity in each portion of areas, such as exclusion zone(s), decontamination zone(s) and clean zone(s), and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized Work areas.
 - 1.3.1.5. Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.
 - 1.3.1.6. Historical, Archaeological, Cultural Resources, Biological Resources and Valued Habitat Protection identifying methods, means, and sequences for preventing, monitoring, and controlling protection of historical, archaeological, cultural resources, biological resources and valued habitat. Include procedures if previously unknown historical, archaeological, cultural, and biological resources are discovered during Work. Includes Species At Risk.
 - 1.3.1.7. Traffic Management Plan including signage and traffic control personnel for Site ingress and egress. Implementation of Traffic Management Plan required during Site work. Traffic Management Plan, vehicles and vehicle traffic must comply with all federal, provincial/territorial, and municipal laws and regulations.
 - 1.3.1.8. Noise Control identifying methods, means, and sequences for preventing, monitoring, and controlling noise for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the

ENVIRONMENTAL PROCEDURES

- Contract. Include thresholds and procedures if: noise does not comply with appropriate levels, or if there are public complaints.
- 1.3.1.9. Vibration Control identifying methods, means, and sequences for preventing, monitoring, and controlling vibration for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; in accordance with the Contract; in accordance with recommendations from the Contractor's Qualified Professional. Include thresholds and procedures if: vibration does not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.
- 1.3.1.10. Vapours, Dust, and Particulate Control identifying methods, means, and sequences for preventing, monitoring, and controlling vapours, dust and other airborne particulates for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/ territorial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: vapours, dust, and particulates do not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.
- 1.3.1.11. Spill Control identifying methods, means, and sequences for preventing, monitoring, and controlling spills for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the Contract. Identify reporting requirements for spills. Identify locations and contents of spill kits.
- 1.3.1.12. Erosion and Sediment Control identifying methods, means, and sequences for preventing, monitoring, and controlling onsite surface water, erosion and sedimentation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the Contract.
- 1.3.1.13. Work in or Adjacent to Waterways Control, as required, identifying methods, means, and sequences for preventing, monitoring, and controlling work in or adjacent to waterways for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the Contract. Include measures for protection of fish and wildlife during Work in or Adjacent to Waterways including isolation and dewatering of work zones and monitoring. Include coordination with owner's Environmental Consultant for fish and wildlife salvage prior to Work in or Adjacent to Waterways.
- 1.3.1.14. Monitoring requirements for general compliance with Environmental Protection Plan.
- 1.3.1.15. Environmental Protection Plan must be signed and sealed by Contractor's Qualified Professional, as required by potential impact to environment by Contractor's methods, means and sequences.
- 1.3.2. Submit amended Environmental Protection Plan if there are changes to the assumed Site conditions, changes to the Work procedures, or in the event that any methods and procedures are inadequate as directed by the Departmental Representative.

- 1.3.3. Submit Spill and Response Report for all Spills. Include: description of spill (location, time, quantity and quality), notifications (including copies of any reports forwarded to regulatory agencies), and describe any remediation activities (time, quantity, quality, and fate of spill impacted material). Include environmental analytical results for spill or other environmental testing.
- 1.3.4. After hours work: at least 5 Working Days prior to commencing after hours work Submit a schedule showing requested dates, times, and reasons for after hours work. Approval will only be granted for reasons valid, if request can be reasonably accommodated by other contractors and Site users, and third parties are not adversely affected, in the sole opinion of the Departmental Representative.

1.4. Contractor's Qualified Professional

- 1.4.1. Perform design, construction, monitoring, reporting, and other required tasks under the supervision of the Contractor's Qualified Professional applicable to the performance of the Work.

1.5. Cleaning

- 1.5.1. Maintain cleanliness of Work and surrounding Site to comply with federal, provincial/territorial, and municipal fire and safety laws, ordinances, codes, and regulations applicable to the performance of the Work.
- 1.5.2. Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.
- 1.5.3. Ensure cleanup of the Work areas each day after Final Completion of Work.

1.6. Site Clearing and Plant Protection

- 1.6.1. Minimize stripping of Topsoil and vegetation. Use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction.
- 1.6.2. Restrict tree and plant removal to areas in accordance with the Contract or as directed by the Departmental Representative. To greatest extent practicable, prune or top the vegetation instead of grubbing/uprooting. Protect all other trees and plants on Site and offsite.
- 1.6.3. Salvage all trees and plants to be removed in accordance with the Contract or as directed by the Departmental Representative.
- 1.6.4. Wrap salvaged trees in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
- 1.6.5. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- 1.6.6. Restore Site Landscaping Material per Contract Drawings.

1.7. Archaeological

- 1.7.1. Attend archaeological awareness training provided by Departmental Representative.

- 1.7.2. Abide by Chance Find Procedures developed by Departmental Representative, as appropriate.

1.8. Heritage and Environmentally Sensitive Areas

- 1.8.1. Prepare and follow special procedures to ensure no damage to any heritage structures, including additional spotters for heavy equipment.
- 1.8.2. Prepare and follow special procedures to ensure no damage to environmentally sensitive areas (including parks and refuges), including ensuring import and restoration material is free from noxious or invasive species.

1.9. Species At Risk

- 1.9.1. Protect all Species At Risk, including meeting all federal, provincial, territorial, and municipal laws and regulations.
- 1.9.2. Modify Work procedures, including stopping Work, as instructed by Contractor's Qualified Professional or Departmental Representative to protect Species At Risk.

1.10. Solid Waste and Water Management

- 1.10.1. Solid waste
- 1.10.1.1. Remove surplus materials and temporary facilities from Site.
- 1.10.1.2. Do not burn or bury any waste onsite.
- 1.10.1.3. Do not discharge wastes into streams or waterways.
- 1.10.1.4. Do not dispose of volatile or Hazardous Materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
- 1.10.2. Sewage
- 1.10.2.1. Store Sewage from toilet facilities with wastewater from handbasins, and/or showers, for ultimate disposal.
- 1.10.2.2. Provide, operate, and maintain Sewage storage tanks to store Sewage.
- 1.10.2.3. Transport and dispose of Sewage at a Disposal Facility, or discharge to municipal sanitary sewer system in compliance with Municipal requirements, as accepted by Departmental Representative.
- 1.10.2.4. Discharges: comply with applicable discharge limitations and requirements; do not discharge Sewage to Site sewer systems that do not conform to or are in violation of such limitations or requirements; and obtain approval prior to discharge of Sewage.
- 1.10.3. Wastewater
- 1.10.3.1. Dewater various parts of Work including, excavations, structures, foundations, and Work areas, unless otherwise specified or directed by Departmental Representative.
- 1.10.3.2. Employ construction methods, plant procedures, and precautions that ensure Work, including excavations, are stable, free from disturbance, and dry.
- 1.10.3.3. Direct surface waters that have not contacted potentially Contaminated Material to surface drainage systems.
- 1.10.3.4. Control surface drainage including ensuring that gutters are kept open, wastewater is not allowed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.

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- 1.10.3.5. Dispose of Wastewater in manner not injurious to public health or safety, to the environment, to onsite or offsite property, or to any part of Work completed or under construction.
- 1.10.3.6. Control disposal or runoff of Wastewater containing suspended materials or other harmful substances in accordance with local authority requirements.
- 1.10.3.7. Ensure pumped Wastewater into waterways, sewer or drainage systems is free of suspended materials. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.
- 1.10.3.8. Obtain permits to discharge Wastewater to environment or municipal system (sewer, ditches).
- 1.10.3.9. Do not discharge water which may have come in contact with potentially Contaminated Material or otherwise be Contaminated directly offsite to the environment or to municipal system.

1.11. Public Traffic Management

- 1.11.1. Where applicable, traffic to include pedestrian traffic.
- 1.11.2. Ensure pedestrians have safe and unencumbered access in public areas. Provide traffic control personnel wherever Contractor's activities (including vehicle crossings) impedes sidewalks, pathways, bike paths, roadways, or other public routes, or elsewhere as required or as directed by Departmental Representative.
- 1.11.3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- 1.11.4. Comply with requirements of Acts, regulations and bylaws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- 1.11.5. Comply with current version of WorkSafeBC Occupational Health and Safety Regulation *Part 18 Traffic Control* or Yukon Workers' Compensation Health and Safety Board Occupational Health and Safety Act and Regulations *Public Way 1.46 and 1.47*, as appropriate.
- 1.11.6. Comply with current version of BC Ministry of Transportation and Infrastructure *2015 Interim Traffic Management Manual for Work on Roadways*.
- 1.11.7. Obtain all necessary permits or other authorizations regarding traffic control, including access and road usage.
- 1.11.8. Provide and maintain road access and egress to property fronting Site and in other areas in accordance with the Contract, except where other means of road access exist that are accepted.
- 1.11.9. Prevent tracking or spilling of debris or material onto private and public roads.
- 1.11.10. Immediately sweep or scrape up debris or material on private and public roads.
- 1.11.11. Clean public roads within a minimum 200 m radius of the Site entrance or as required at least once per shift, or as directed by Departmental Representative.

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1.11.12. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.12. Noise, Vibration, Vapours, and Dust Control

- 1.12.1. Maintain acceptable levels not injurious or objectionable to worker safety, public health, the environment, and equipment and infrastructure.
- 1.12.2. Comply with applicable municipal bylaws and other applicable requirements; Contractor's Qualified Professional may determine lower acceptable levels.
- 1.12.3. Maximum levels allowed at site boundaries to prevent nuisance, unless otherwise accepted by Departmental Representative:
 - 1.12.3.1. Noise: 55 dBa (based on municipal noise bylaws in Canada).
 - 1.12.3.2. Vibration: 0.315 m/s² (based on ISO 2631-1).
 - 1.12.3.3. Dust PM₁₀: 50 µg/m³ (based on BC Ambient Air Quality Objectives Particulate Matter 24 hour exposure).
- 1.12.4. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.
- 1.12.5. Specific procedures to prevent dust:
 - 1.12.5.1. Cover or wet down relevant Work to prevent vapours and blowing dust and debris, including temporary roads, excavations, and stockpiles. In urban environments or if sensitive neighbouring properties (e.g. residences, parklands, protected areas) provide full time coverage or wetting down.
 - 1.12.5.2. Covers to be impermeable (e.g. minimum 5 mil polyethylene) and securely fashioned to prevent blowing off. Use fresh (non-saline) water for dust and particulate control.
 - 1.12.5.3. Use appropriate covers on vehicles, including trucks, barges, and trains, hauling vapour-generating or fine or dusty material. Use watertight vehicles to haul wet materials.
 - 1.12.5.4. In urban environments or if sensitive neighbouring properties (e.g. residences, parklands, protected areas) provide privacy screening on security fence.

1.13. Spill Control

- 1.13.1. Pollution includes spills or other releases from Contractor's activities that could potentially contaminate soil, sediment, water, and atmosphere from discharge of hazardous, deleterious or regulated substances, including from equipment and material handling.
- 1.13.2. Prevent spills or releases.
 - 1.13.2.1. Maintain temporary erosion and pollution control features.
 - 1.13.2.2. Do not store fuel onsite other than tanks forming part of the equipment.

- 1.13.2.3. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.
- 1.13.2.4. Control emissions from equipment and plant to meet applicable authorities' emission requirements.
- 1.13.2.5. Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.
- 1.13.3. Be prepared to intercept, cleanup, and dispose of spills or other releases that can occur whether on land or water.
- 1.13.4. Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills or other releases.
 - 1.13.4.1. Spill kits are to include sufficient quantities of absorbent material, containers, booms, shovels and other tools, and personal protective equipment.
 - 1.13.4.2. Spill response materials must be compatible with type of equipment being used or type of material being handled.
 - 1.13.4.3. Spill kits are to be in close proximity to machinery.
 - 1.13.4.4. During the Work there are to be trained and qualified personnel available that are ready to deploy spill kits when necessary.
- 1.13.5. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.
- 1.13.6. Promptly report spills and releases potentially causing damage to environment to:
 - 1.13.6.1. Authority having jurisdiction or interest in spill or other release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
 - 1.13.6.2. Contractor emergency response team including Superintendent.
 - 1.13.6.3. Departmental Representative and other contractor(s) and individuals as directed by the Departmental Representative.
- 1.13.7. Departmental Representative can collect samples for chemical analyses prior to, during, and upon Final Completion of Work to monitor potential pollution caused by Contractor's activities. Assist Departmental Representative in collection of samples.
- 1.13.8. Remediation of soil, sediment or water contaminated by Contractor's activities.
 - 1.13.8.1. Remediate all soil, sediment or water contaminated by Contractor's activities associated with the Work onsite and offsite.
 - 1.13.8.2. Remediation includes excavation, pumping, testing, transport, treatment and disposal as appropriate for the type of contamination incurred, and at a minimum in accordance with the Contract.
 - 1.13.8.3. Submit procedures for remediating soil, sediment or water contaminated by Contractor's activities.
 - 1.13.8.4. Remediate as directed by the Departmental Representative.
 - 1.13.8.5. Contractor is responsible for any additional investigation, testing, and assessments required as acceptable to the Departmental Representative.
- 1.13.9. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in

accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.14. Erosion and Sediment Control

- 1.14.1. Implement an Erosion and Sediment Control Plan for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear.
- 1.14.2. Install effective erosion and sediment control measures before starting work to prevent sediment from entering the water body.
- 1.14.3. Manage water flowing onto the Site, as well as water being pumped/diverted from the Site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system.
- 1.14.4. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction.
- 1.14.5. Repair erosion and sediment control measures and structures if damage occurs.
- 1.14.6. Remove non-biodegradable erosion and sediment control materials once site is stabilized.
- 1.14.7. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.15. Work In or Adjacent to Waterways

- 1.15.1. Approvals and Practices:
 - 1.15.1.1. Follow practices described in *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada/Ministry of Environment, Lands and Parks, 1993 September) and *Measures to avoid causing harm to fish and fish habitat including aquatic species at risk* (Fisheries and Oceans Canada, 2018 December 14).
 - 1.15.1.2. Follow practices described in *Preferred practices for works affecting Yukon waters* (Government of Yukon, 2019 March)
- 1.15.2. Shoreline/bank Re-vegetation and Stabilization
 - 1.15.2.1. Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting. Coordinate with Departmental Representative for fish and wildlife salvage prior to conducting Work within or Adjacent to waterbodies
- 1.15.3. Operation of Machinery
 - 1.15.3.1. Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

- 1.15.3.2. Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.
- 1.15.3.3. Limit machinery fording of the watercourse to a one-time event (i.e. over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.
- 1.15.3.4. Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g. dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g. swamp mats, pads) if minor rutting is likely to occur during fording.
- 1.15.3.5. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.
- 1.15.3.6. Do not ford, place crossing materials or operate machinery on the bed of a waterbody where SARA-listed shellfish occur, or critical habitat or residences of freshwater SARA-listed aquatic species occur.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Site Facilities - Provision will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all infrastructure in accordance with the Contract. Includes temporary structures and facilities, environmental protection, stockpile areas, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utility services.
- 1.1.2. Site Facilities - Operation will be paid in accordance with lump sum price established to operate and maintain all infrastructure between mobilization and demobilization. Includes temporary structures and facilities, environmental protection, access, onsite roadways, temporary hoarding, security fencing, federal signage, office facilities, sanitary facilities, stormwater management infrastructure, lighting, and utilities. Also includes ongoing services including administration, overhead, project management, security, surveying, noise monitoring, vibration monitoring, utility services, project meetings, inspections, progress Submittals, traffic control, health and safety, Environmental Protection, cleaning, and operation during inclement weather. Also includes living out allowances, travel and room and board. Lump sum may be pro-rated based on duration in Master Plan for Extension of Time.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Site Layout: within 10 Working Days after Contract award and prior to mobilization to Site, Submit Site Layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor. Include:
- 1.3.1.1. Equipment and personnel decontamination areas.
 - 1.3.1.2. Means of ingress, egress and temporary traffic control.
 - 1.3.1.3. Equipment and material staging areas.
 - 1.3.1.4. Stockpile areas and construction details, including base preparation and water control features.
 - 1.3.1.5. Exclusion areas, contaminant handling areas, and other areas identified in Contractor's site-specific Health and Safety Plan and Environmental Protection Plan.
 - 1.3.1.6. Grading, including contours, required to construct temporary facilities.
 - 1.3.1.7. Location of all temporary facilities including: truck wash and decontamination units, office trailers, modular camp structures, parking, storage, environmental monitoring stations, above ground and underground utilities, roads, and other temporary facilities.
- 1.3.2. Signs: at least 5 Working Days prior to posting, Submit any signs viewable by public.

1.4. Utility Services

- 1.4.1. Utility Services (including electrical power, potable water, sewers, and telecommunications) not identified as being available on Site must be supplied at the Contractor's expense. Provide supplied utilities for entire work force, including Subcontractors and Departmental Representative and their consultants.

1.5. Sanitary Facilities

- 1.5.1. Provide sanitary facilities for work force (including Contractor, Subcontractors, Departmental Representative, and Consultants) in accordance with governing regulations and ordinances.
- 1.5.2. Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.6. Temporary Heating and Ventilation

- 1.6.1. If required, provide temporary heating, as required during construction period, including attendance, maintenance, and fuel.
- 1.6.2. Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- 1.6.3. Provide temporary heat and ventilation in enclosed areas as required to:
- 1.6.3.1. Facilitate progress of Work.
 - 1.6.3.2. Protect Work and products against dampness and cold.
 - 1.6.3.3. Prevent moisture condensation on surfaces.
 - 1.6.3.4. Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - 1.6.3.5. Provide adequate ventilation to meet health regulations for safe working environment.
- 1.6.4. Ventilating:
- 1.6.4.1. Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during work.
 - 1.6.4.2. Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - 1.6.4.3. Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - 1.6.4.4. Ventilate storage spaces containing hazardous or volatile materials.
 - 1.6.4.5. Ventilate temporary sanitary facilities.
 - 1.6.4.6. Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

1.7. Fire Protection

- 1.7.1. Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

1.8. Access and Delivery

- 1.8.1. Only the designated entrance in accordance with the Contract can be used for access to Site.
 - 1.8.1.1. Maintain for duration of Contract.
 - 1.8.1.2. Make good damage resulting from Contractor's use.
- 1.8.2. Use of the Site will be granted to the Contractor through the Departmental Representative.
- 1.8.3. Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, where required, and in accordance with relevant municipal territorial and other regulations.

1.9. Installation and Removal

- 1.9.1. Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- 1.9.2. Identify areas which have to be graveled or otherwise treated to prevent tracking of mud.
- 1.9.3. Indicate use of supplemental or other staging area.
- 1.9.4. Provide construction facilities in order to execute work expeditiously.
- 1.9.5. Provide temporary utilities in order to execute Work expeditiously.
- 1.9.6. Remove from Site all such Work after use.

1.10. Site Storage/Loading

- 1.10.1. Confine work and operations of employees in accordance with the Contract. Do not unreasonably encumber premises with products.
- 1.10.2. Storage space must be limited to the Site.
- 1.10.3. Do not load or permit to load any part of Work with weight or force that will endanger Work.
- 1.10.4. Where required, provide, operate and maintain lifting equipment and manpower required for moving of heavy products in accordance with applicable standards and regulations.

1.11. Construction Parking

- 1.11.1. Parking of private vehicles will not be permitted on Site, unless otherwise agreed to by Departmental Representative. Parking lot is shared with municipal trails, and parking space at the Site is limited.
- 1.11.2. Provide and maintain adequate access to project site.

1.12. Security

- 1.12.1. Be responsible security of site and contents of site after working hours and during holidays. Provide onsite security personnel as appropriate and in accordance with the Contract.
- 1.12.2. Control access to Site and maintain a log of all personnel onsite. No non-Work visitors allowed without prior written consent of Departmental Representative.

1.13. Contractor's Site Office

- 1.13.1. Provide mobile office space to accommodate Contractor's operations, such as a designated work vehicle or small shed suitable for supporting administrative tasks on Site, if required by the Contractor.
- 1.13.2. Provide a clearly marked and fully stocked first-aid case in a readily available location in accordance with YT OHS regulation requirements.

1.14. Equipment, Tools and Materials Storage

- 1.14.1. Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. Provide secure lock box for materials storage, as necessary.
- 1.14.2. Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.15. Construction Signage

- 1.15.1. Provide and erect 2 project signs within 10 Working Days of mobilization in a location designated by Departmental Representative. Project signs must, unless otherwise directed by Departmental Representative, include: name of Client, name of Project, and information contact number in both official languages using graphic symbols to CAN/CSA-Z321. Project signs to be a minimum of 1200 x 2400mm.
- 1.15.2. Contractor signage must be accepted by Departmental Representative.
- 1.15.3. Contractor signage must include at a minimum:
 - 1.15.3.1. Name of Contractor.
 - 1.15.3.2. Emergency contact number.
 - 1.15.3.3. Personal Protective Equipment requirements.
 - 1.15.3.4. Other pertinent safety warnings (e.g. "open excavation, Hazardous Materials").
- 1.15.4. Maintain accepted signs and notices in good condition for duration of project, and dispose of offsite on completion of project or earlier if directed by Departmental Representative.

1.16. Onsite Traffic Management

- 1.16.1. Where applicable, traffic to include pedestrian traffic.
- 1.16.2. Provide access and temporary relocated roads as necessary to maintain traffic.
- 1.16.3. Maintain and protect traffic on affected roads during construction period.
- 1.16.4. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- 1.16.5. Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- 1.16.6. Verify adequacy of existing roads and allowable load limit on these roads. Contractor responsible for repair of damage to roads caused by construction operations.

1.17. Truck Wash and Decontamination Units

- 1.17.1. Provide, install and operate truck wash, including the installation of a water supply, or as directed by the Departmental Representative:
 - 1.17.1.1. No vehicles which have come in contact with Contaminated Material must leave the Site without passing through the truck wash.
 - 1.17.1.2. The truck wash must provide, at a minimum, the ability to wash truck tires and load boxes to a minimum height of 1.7 m.
 - 1.17.1.3. Truck wash must have a solid separation tank and all solids collected must be classified as Contaminated Material and disposed of at a Disposal Facility.
 - 1.17.1.4. Recycle or treat as Contaminated Water truck wash water.
- 1.17.2. Alternatives to a truck wash, including isolating truck traffic from contact with Contaminated Material, may be accepted by the Departmental Representative. Alternatives will not be accepted if, in the opinion of the Departmental Representative, the alternatives are not adequately designed or performing.
- 1.17.3. Provide personnel decontamination units (minimum of 2) for use by Hazardous Material, testing and inspection personnel working in areas of Hazardous Materials and for general clean-up of personal protective equipment to remove Contaminated Material. Provide decontamination units for work force
 - 1.17.3.1. At least one personnel decontamination unit must have overhead shower capability.
 - 1.17.3.2. The personnel decontamination units to be available to Departmental Representative and their consultants.
 - 1.17.3.3. The personnel decontamination units are subject to acceptance of Departmental Representative.
- 1.17.4. The truck wash and personnel decontamination units must be maintained in good working order during onsite Work.
- 1.17.5. The truck wash and personnel decontamination units must be removed from the Site during Site Decommissioning.

1.18. Clean-Up

- 1.18.1. Remove construction debris, waste materials, packaging material from work site daily.
- 1.18.2. Clean dirt or mud tracked onto paved or surfaced roadways.
- 1.18.3. Store materials resulting from demolition activities that are salvageable.
- 1.18.4. Stack stored new or salvaged material not in construction facilities.

1.19. Storage Tanks

- 1.19.1. Abide by the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations for stored petroleum products and allied petroleum products tank system located on federal or Aboriginal land, or within federal jurisdiction as described in the regulations.
- 1.19.2. Temporary storage tanks subject to the regulations must be registered with Environment Canada.
- 1.19.3. Mobile tanks subject to the regulations must be certified to be mobile.
- 1.19.4. Storage tanks to meet the following minimum requirements:
 - 1.19.4.1. Corrosion protection.

- 1.19.4.2. Secondary containment.
- 1.19.4.3. Containment sumps, if applicable.
- 1.19.4.4. Overfill protection.
- 1.19.5. All components of tank system must bear certification marks indicating that they conform to the standards set out in the regulations.
- 1.19.6. Product transfer area must be designed to contain spills.
- 1.19.7. Prepare an emergency plan.
- 1.19.8. Prior to first filling, storage tanks must:
 - 1.19.8.1. Be registered.
 - 1.19.8.2. Be certified and marked.
 - 1.19.8.3. Transfer area be constructed.
 - 1.19.8.4. Emergency plan in place.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

- 3.1.1. Not Used.

END OF SECTION

CONTAMINATED SITES EXCAVATION

1. PART 1 - GENERAL**1.1. Measurement Procedures**

- 1.1.1. Test Pitting, if required, will be paid in accordance with unit rate price established for time to excavate a test pit, temporarily stockpile excavated material adjacent to test pit, and backfill with excavated material using machine tamping. Measurement as recorded time by Departmental Representative.
- 1.1.2. Excavation of Contaminated Soil and Material will be paid in accordance with unit rate price established for volume of contaminated soil removed. Includes provision, installation, removal, supervision, and inspection. Includes all onsite handling, loading, hauling, unloading and stockpiling. Interim Excavation volume as recorded insitu Excavation volume using Progress Survey. Final Excavation volume as recorded insitu Excavation volume using Contractor's Qualified Professional Surveyor, based on difference between Preconstruction Condition Survey and Final Excavation Limits. Measurement as recorded insitu Excavation volume using Progress Survey for interim measurement and Contractor's Qualified Professional Surveyor for final excavation volume extents (As-Built). Insitu volume is simple dimensions of excavation and does not consider exsitu bulking (expansion or swell) and insitu compaction (densifying) factors.
- 1.1.3. Backfill—Imported backfill will be paid in accordance with unit rate price established per weight for material imported for Backfill for Contaminated Soil Excavation. Includes Contractor's analytical testing and inspections to demonstrate compliance with Contract, provision, all onsite and offsite handling, loading, hauling, unloading, placing, grading and compacting. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Excavation and Backfilling Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Excavation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the Contract. Include:
- 1.3.1.1. If required based on the depth of the excavation, prepare an Excavation Temporary Slope and Shoring Design which must be signed and sealed by Contractor's Qualified Professional, as required by ground conditions, excavation depth, shoring type, or support type.
- 1.3.1.2. Methods, means, and sequences for excavation dewatering and heave protection.
- 1.3.1.3. Support of structures design.
- 1.3.1.4. Procedures for excavations adjacent to utilities or other structures if the excavation has the potential to impact utilities or other structures.

CONTAMINATED SITES EXCAVATION

- 1.3.1.5. Backfilling requirements. Meet or exceed requirements in accordance with the Contract and any other codes, bylaws, rules and regulations applicable to the performance of the Work. Backfilling requirements include, but not limited to, the City of Whitehorse Engineering Standards, Section 3.11 – Subgrade Preparation and Section 3.13 – Granular Sub-Base. Backfilling requirements are applicable to both Imported Backfill and Owner Supplied Backfill.
- 1.3.1.6. Backfilling design for utilities or other infrastructure to be reinstated or new.
- 1.3.1.7. Monitoring and inspection requirements, including frequency or milestones when Contractor's Qualified Professional must inspect Works.
- 1.3.1.8. Excavation and Backfilling Plan must be signed and sealed by Contractor's Qualified Professional, as dictated by ground conditions, excavation depth, shoring type, or support type.
- 1.3.2. Import Backfill Material Quality: at least 5 Working Days prior to bringing material onsite, submit documentation signed and sealed by Contractor's Qualified Professional verifying that material is acceptable for import and intended use, and free of invasive plant species. Include:
 - 1.3.2.1. Phase I Environmental Site Assessment performed by Contractor's Qualified Professional for each import source unless the Contractor's Qualified Professional can provide rationale for why a Phase I Environmental Site Assessment is not required, subject to acceptance by the Departmental Representative.
 - 1.3.2.2. Grain-size distribution information.
 - 1.3.2.3. Chemical analyses for Potential Contaminants of Concern, including metals.
 - 1.3.2.4. Testing to be performed by Contractor's Qualified Professional at sufficient frequency to characterize all Imported Backfilled. Test using appropriate guidelines and practices.
- 1.3.3. Import Backfill Samples: at least 10 Working Days prior to bringing material to Site, Submit samples of Imported Backfilled.
 - 1.3.3.1. Samples to be representative of all Imported Backfilled. Sample frequency subject to acceptance by Departmental Representative.
 - 1.3.3.2. Submit sufficient sample size to allow geotechnical and environmental quality testing as directed by Departmental Representative.
- 1.3.4. Temporary Hoarding, Signage and Fencing: at least 5 Working Days prior to installation, Submit a description of temporary hoarding, signage and fencing.
- 1.3.5. Monitoring and Testing Results : within 5 Working Days of sampling, Submit all monitoring and testing results. Include procedures, frequency of sampling, Quality Assurance and Quality Control testing and documentation to be provided. Provide monitoring and testing results, including any assessments performed by Contractor's Qualified Professional. Include:
 - 1.3.5.1. Backfill testing results, including geotechnical and environmental quality, confirming results meet requirements in Contract and Excavation Plan.
 - 1.3.5.2. Compaction testing results, confirming results meet requirements in Contract and Excavation Plan.

1.4. Sequencing for Free Phase Products

- 1.4.1. When floating free phase substance (Non Aqueous Phase Liquids) is present, remove free phase from saturated soil or sediment without further contaminating soil, sediment or groundwater prior to commencing other construction Work.
- 1.4.2. Collect free phase product (NAPL), load, and transport to a Treatment Facility.

2. PART 2 - PRODUCTS

2.1. Materials

- 2.1.1. Short term temporary liners and covers to be a minimum of 5 mil plastic.
- 2.1.2. Erosion and sediment control materials to meet the following minimum requirements:
 - 2.1.2.1. Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.
 - 2.1.2.2. Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.
 - 2.1.2.3. Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.
- 2.1.3. Gradations to be within limits specified when tested to ASTM C117-13 (Standard Test Method for Materials Finer than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing) and ASTM C136-06 (Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates). Sieve sizes to SCC CAN/CGSB-8.1-88 (Sieves, Testing, Woven Wire, Inch Series) and CAN/CGSB-8.2-M88 (Sieves, Testing, Woven Wire, Metric Series).
- 2.1.4. Import fill materials to meet the following minimum geotechnical requirements:
 - 2.1.4.1. Import fill materials must be granular aggregate composed of inert, clean, tough, durable particles of crushed rock, gravel and sand capable of withstanding the deleterious effects of exposure to water, freeze-thaw, handling, spreading and compacting, and be free of any invasive plant species. The aggregate particles must be uniform in quality and free from clay lumps, wood and free from an excess of flat or elongated pieces. Imported backfill total silt and clay content not to exceed 15% by mass or as required by Contract unless otherwise accepted by Departmental Representative.
- 2.1.5. Import fill materials for Uplands use must originate from a licensed and approved source facility and meet the lesser of the following minimum environmental quality requirements for the site, or as required by Contract unless otherwise accepted by Departmental Representative:
 - 2.1.5.1. Canadian Council of Ministers of the Environment Soil Quality Guidelines for Residential/Parkland Land Uses.

CONTAMINATED SITES EXCAVATION

- 2.1.5.2. For the top 3m (final grade), Yukon Contaminated Sites Regulation Numerical Soil Standards Schedules 1 and 2 Park Land Use (PL), Site-Specific Factors (i) Intake of contaminated soil, (ii) Groundwater used for drinking water, (iii) Toxicity to soil invertebrates and plants, (iv) Groundwater flow to surface water used by aquatic life (Freshwater or Marine, as appropriate).
- 2.1.6. Import fill material that is cobble sized or larger (> 64mm) brought onsite must be tested by the Contractor for Acid Rock Drainage (ARD) and Metals Leaching (ML) potential using Acid Base Accounting (ABA) for assessment of ARD potential and more specifically using the Modified Sobek Test Method. The potential for metals leaching must use Shake Flask Extraction (SFE) Method for analysis of metals leaching. See guidance document *Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials* MEND Report 1.20.1, Natural Resources Canada, Price 2009.
- 2.1.7. Any import fill material which has a discrete sample exceeding the environmental quality requirements specified must be removed from the Site and replaced, including relevant placed material, as directed by the Departmental Representative. An alternate source of backfill must be provided, with no increases to Contract Amount or Extension of Time for completion of the Work.
- 2.1.8. Environmental quality requirements may be modified by the Departmental Representative taking into consideration background concentrations, commercially available material, and site-specific factors and/or land use.
- 2.1.9. Import fill material additional testing:
- 2.1.9.1. Perform additional testing as directed by the Departmental Representative to confirm suitability.
- 2.1.9.2. Facilitate testing by the Departmental Representative to confirm suitability.
- 2.1.10. Asphalt, if required, must, at minimum, meet the specifications for: Upper Course #1 mix-type as specified in Section 32 12 16, Hot Mix Asphalt Concrete Paving; of the current version of the *BC Master Municipal Construction Document (2009) Platinum Edition*.

3. PART 3 - EXECUTION

3.1. Surface Preparation and Operation

3.1.1. Security and Safety:

- 3.1.1.1. Ensure Excavations are secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as required and specified.

3.2. Import Fill Material Characterization

- 3.2.1. Sample, analyse, and compare to Contract requirements all import fill material for each backfill material type and for each import source for grain-size distribution and chemical analyses for Potential Contaminants of Concern at the following frequency:

3.2.1.1. A minimum of three random samples

- 3.2.2. Sampling frequency must be increased as directed by the Departmental Representative:

3.2.2.1. If any sample collected does not meet requirements according to Contract.

CONTAMINATED SITES EXCAVATION

- 3.2.3. Provide two random samples representative of each class and source of imported fill material samples to the Departmental Representative. Samples may be tested for geotechnical and environmental quality by Departmental Representative. Import fill material testing may take up to 5 Working Days not including day of sample provision.
- 3.2.4. Do not import fill material until Departmental Representative has completed and analyzed testing. Testing and analysis will depend on parameters. Testing will be performed at industry regular (standard) turnaround times (i.e. not priority, emergency, same day or other rush turnaround times).
- 3.2.5. Departmental Representative will inspect import fill material brought onsite, and will not allow import of fill material that varies from Submittal samples.

3.3. Excavation Temporary Sloping and Shoring

- 3.3.1. Design, provide, install, remove, supervise, and inspect appropriate sloping or shoring to allow excavation of Contaminated Soil Extents according to Drawings or as directed by Departmental Representative.
- 3.3.2. Departmental Representative responsible for determining Contaminated Soil Extents.
- 3.3.3. Contractor's Qualified Professional to determine Excavation Extents. Departmental Representative to inspect and accept Excavation Extents determined by Contractor's Qualified Professional prior to commencement of excavation activities.
- 3.3.4. Drawings are for reference purposes only, and are Conceptual and not Issued For Construction.
- 3.3.5. Design Requirements:
 - 3.3.5.1. Design must be completed by, and is the sole responsibility of, the Contractor's Qualified Professional. If required based on the depth of the excavation, all Drawings of sloping and shoring design to be signed and sealed by Contractor's Qualified Professional.
 - 3.3.5.2. Act as sloping or shoring structures for excavations as well as for stability of foundations and infrastructure during remediation excavation.
 - 3.3.5.3. Allow excavation of all Contaminated Soil laterally and vertically on the Site to Contaminated Soil Extents in accordance with the Contract. Allow excavation of additional Contaminated Soil beyond Contaminated Soil Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples.
 - 3.3.5.4. Provide a safe working environment for personnel and equipment within the excavation area, including collection of confirmatory samples or other work that may be required at the base of the excavation.
 - 3.3.5.5. Additional design requirements as determined by the Contractor's Qualified Professional.
 - 3.3.5.6. Additional sloping or shoring may be required to extend excavation beyond Contaminated Soil Extents according to Drawings. Revise Temporary Sloping and Shoring design as required by Contractor's Qualified Professional.
 - 3.3.5.7. Temporary shoring cannot have any tiebacks or supports which extend beyond the project Site boundary.

CONTAMINATED SITES EXCAVATION

- 3.3.5.8. Temporary shoring must not flex or bend when exposed while excavations are occurring on the Site.
- 3.3.5.9. Sloping and shoring structures are temporary structures only. Resistance to seismic loads will be at the sole discretion of the Contractor's Qualified Professional. Be responsible for any failures and resultant costs should the temporary sloping or shoring fail due to a seismic event during the construction period.
- 3.3.5.10. Temporary sloping and shoring designs to be completed in accordance with methods in current version of Canadian Foundation Engineering Manual.
- 3.3.6. Installation:
 - 3.3.6.1. Installation must be supervised by, and is the sole responsibility of, the Contractor's Qualified Professional. All inspection reports of sloping and shoring to be signed and sealed by Contractor's Qualified Professional.
 - 3.3.6.2. All installation activities must take place on the Site. No staging or construction activities are to take place on adjacent properties.
- 3.3.7. Maintain side slopes of excavations in safe condition by appropriate methods and in accordance with relevant regulations.
- 3.3.8. During backfill operation:
 - 3.3.8.1. Unless otherwise identified according to Drawings or as directed by the Departmental Representative, remove temporary shoring from excavations.
- 3.3.9. Temporary sloping and shoring excavated material:
 - 3.3.9.1. Material excavated for sloping or shoring may be re-used as backfill to replace material removed as accepted by Contractor's Qualified Professional and Departmental Representative.
 - 3.3.9.2. Material excavated for sloping or shoring that is accepted for backfilling must follow procedures in accordance with requirements of Contractor's Qualified Professional and meet Contract requirements.
 - 3.3.9.3. Material excavated for sloping or shoring not accepted must be removed from Site.

3.4. Dewatering and Heave Protection

- 3.4.1. Keep excavations free of water while Work is in progress unless otherwise identified according to Drawings or as directed by the Departmental Representative.
- 3.4.2. Provide to Departmental Representative details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- 3.4.3. Plan for excavation below groundwater table to avoid quick conditions or heave.
- 3.4.4. Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.
- 3.4.5. Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- 3.4.6. Keep excavations, staging pads, and other Work areas free from water. Provide standby equipment to ensure continuous operation of dewatering system.
- 3.4.7. Dewatering Methods: includes sheeting and shoring; groundwater control systems; surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and other measures necessary to enable Work to be carried out in dry conditions.

CONTAMINATED SITES EXCAVATION

3.5. Excavation

- 3.5.1. Notify Departmental Representative at least 5 Working Days in advance of excavation operations at the Site.
- 3.5.2. Excavate to lines, grades, elevations and dimensions according to Drawings or as directed by Departmental Representative using methods, means, and sequences as determined by Contractor's Qualified Professional.
- 3.5.3. Excavate all Contaminated Soil laterally and vertically on the Site to Contaminated Soil Extents in accordance with the Contract. Excavate additional Contaminated Soil beyond Contaminated Soil Extents in order to result in no residual contamination at the Site based on field observations or Confirmation Samples.
- 3.5.4. Drawings show nominal Contaminated Soil Extents for volume estimating purposes only. Contractor's methods, means, and sequences should allow for variations in actual extents, contaminants, and concentrations.
- 3.5.5. Excavation must not interfere with bearing capacity of adjacent foundations and infrastructure.
- 3.5.6. Machine cut banks and slopes.
- 3.5.7. Protect bottom of excavations from excessive traffic.
- 3.5.8. Grade excavation top perimeter to prevent surface water run-off into excavation.
- 3.5.9. Keep excavated and stockpiled materials safe distance away from edge of excavation.
- 3.5.10. Restrict vehicle operations directly adjacent to open excavations.
- 3.5.11. Remove Oversize Debris.
 - 3.5.11.1. Piles encountered during excavation must be cut off at base of excavation. Piles are not to be extracted beyond the base of the excavation.
 - 3.5.11.2. Debris that impinges on infrastructure or neighbouring properties is not to be removed unless directed by Departmental Representative. Contractor's Qualified Professional to confirm debris can be removed without impacting infrastructure or neighbouring properties.
- 3.5.12. Earth bottoms of excavations to be undisturbed soil or sediment, level, free from loose, soft or organic material.
- 3.5.13. Notify Departmental Representative when lateral and vertical extents of excavation are reached based on Contaminated Soil Extents.
- 3.5.14. Provide assistance for collection of Confirmation Samples as directed to the Departmental Representative, including the use of equipment and personnel as required.
- 3.5.15. Obtain acceptance by Departmental Representative of completed excavation.

3.6. Backfill Types and Compaction

- 3.6.1. Use only Imported Backfilled in accordance with the Contract and which has been recommended by Contractor's Qualified Professional, and previously accepted as a Submittal. Backfill requirements include, but not limited to, the City of Whitehorse Engineering Standards, Section 3.11 – Subgrade Preparation and Section 3.13 – Granular Sub-Base.
- 3.6.2. Compact material in accordance with the more stringent of Excavation Plan or Contract to ensure no long term settlement and is suitable for planned post-remediation use. Machine compact all fill materials unless otherwise according to Contract.

CONTAMINATED SITES EXCAVATION

- 3.6.2.1. Backfill should be placed in lifts not exceeding 150 mm in loose thickness
- 3.6.2.2. Compaction of backfill material to minimum 95% of the Standard Proctor Maximum Dry Density (SPMDD), corrected for oversize content, or as specified by the Departmental Representative.

3.7. Backfilling

- 3.7.1. Backfill immediately only if required for stability purposes as determined by the Contractor's Qualified Professional.
- 3.7.2. Unless required to backfill immediately, do not proceed with backfilling operations until completion of following:
 - 3.7.2.1. Confirmation Samples collection, analysis, and assessment has been completed by the Departmental Representative. Confirmation Samples analysis and assessment may take up to 5 Working Days. No Standby Time charges or increases to Contract Amount or Extension of Time for completion of the Work can be incurred for Confirmation Samples results provided within 5 Working Days, not including day of sample collection.
 - 3.7.2.2. Surveying has been completed by the Contractor's Qualified Professional for Final Excavation Limits and As-Built documents, including utilities locations.
 - 3.7.2.3. Departmental Representative has inspected and accepted Contaminated Material Extents by the Departmental Representative based on survey data and Confirmation Samples results.
 - 3.7.2.4. Departmental Representative has inspected and accepted backfill material.
 - 3.7.2.5. Contractor to notify Departmental Representative when backfill is to be imported to Site and placed in excavation and prior to placement and compaction.
 - 3.7.2.6. Imported fill material brought onsite can be sampled and tested for geotechnical and environmental quality by Departmental Representative. Backfill material testing may take up to 5 Working Days not including day of sample collection.
 - 3.7.2.7. Departmental Representative has inspected and accepted compaction results for previous lift.
- 3.7.3. Areas to be backfilled to be free from debris, snow, ice, water and frozen ground to greatest extent practicable.
- 3.7.4. Do not use backfill material which is frozen or contains ice, snow or debris to greatest extent practicable.
- 3.7.5. Place backfill material in uniform layers not exceeding 300 mm compacted thickness, or in accordance with the Contract. Compact each layer to the satisfaction of the Contractor's Qualified Professional and in accordance with the Contract before placing succeeding layer.
- 3.7.6. Backfill compaction to be conducted in accordance with Excavation Plan and verified by Departmental Representative.
- 3.7.7. Notify Departmental Representative when final backfill grade is reached.

END OF SECTION



CONTAMINATED SITES SOIL TRANSPORTATION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Contaminated Soil Transport: will be paid in accordance with unit rate price established for weight of material transported. Includes all handling, stabilization/amending, loading, hauling, unloading, transfer, interim storage, manifestation and transport to and from intermediate locations and final placement location. Stabilization/amending includes all measures required to prepare material for Transport, and Disposal; includes provision and application of stabilizers or other amendments. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Contaminated Sites Transportation Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Transportation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, territorial or municipal requirements; and in accordance with the Contract. Include for each Transfer/Interim Storage Facility, if used:

1.3.1.1. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Transfer/Interim Storage of relevant Contaminated Soil.

1.3.1.2. Letter from Contractor's Qualified Professional that the Transfer/Interim Storage Facility is appropriate for the nature, type, concentration, and quantity of Contaminated Soil to be Transferred/Interim Stored in accordance with any authorization and complies with appropriate government requirements of a general nature (e.g. BC/YT Landfill Criteria).

1.3.1.3. Letter from Transfer/Interim Storage Facility that they can accept within the schedule in Contract the nature, type, concentration, and quantity of Contaminated Soil to be Transferred/Interim Stored at the Facility, signed by an authorized representative of the Facility.

1.3.2. Transport Manifests: within 5 Working Days of offsite transport, Submit documentation verifying that material has been transported appropriately. Include:

1.3.2.1. Method of transport.

1.3.2.2. Name of transport company.

1.3.2.3. Weigh scale receipt including location, date, and weight of loading, as appropriate.

1.3.2.4. Weigh scale receipt including location, date, and weight of unloading.

CONTAMINATED SITES SOIL TRANSPORTATION

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Contaminated Soil Transport

- 3.1.1. Assume ownership of, and be responsible for, Contaminated Soil once it is loaded on a vehicle, barge, or other vessel for transport.
- 3.1.2. Transport material as soon as practical; do not unreasonably stockpile onsite.
- 3.1.3. Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leaching from material.
- 3.1.4. All vehicles must be watertight. Excess water in material must not be allowed to flow out of vehicle or vessel during transport.
- 3.1.5. Stabilize material for transport as necessary.
- 3.1.6. All vehicles, vessels and operators must be appropriately licensed and equipped to transport Contaminated Soil.
- 3.1.7. Barges must be certified by an independent Marine Surveyor for stability.
- 3.1.8. Manifest and correlate quantities of all Contaminated Soil transported from Site documenting nature, type, concentration, and quantity removed from Site. Include all Transfer/Interim Storage, Treatment, and Disposal Facilities. Discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:
 - 3.1.8.1. No manifest or an incomplete manifest.
 - 3.1.8.2. Material transported does not match the description in the manifest.
 - 3.1.8.3. Amount transported differs by more than 5% in the manifest.
 - 3.1.8.4. Material transported is in a hazardous condition.
- 3.1.9. Transfer/Interim Storage Facility must:
 - 3.1.9.1. Be an existing offsite facility located in Canada or the United States.
 - 3.1.9.2. Be designed, constructed and operated for the transfer or interim storage of Contaminated Soil.
 - 3.1.9.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the transfer or interim storage of relevant Contaminated Soil.
 - 3.1.9.4. Comply with requirements of acts, regulations, bylaws, and other requirements, in force or appropriately adopted as guidelines, including the BC Environmental Management Act and BC Landfill Criteria for Municipal Solid Waste, or Yukon Environment Act and Yukon Solid Waste Regulations, municipal zoning bylaws, or equivalent.

END OF SECTION



CONTAMINATED SITES SOIL DISPOSAL

1. PART 1 - GENERAL

1.1. Measurement Procedures

- 1.1.1. Contaminated Soil Disposal and Contaminated Material Disposal will be paid in accordance with unit rate price established for weight of material disposed. Measurement as recorded on weigh scale certified by Measurement Canada and results provided to Departmental Representative on Certificates of Disposal.

1.2. Definitions

- 1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

- 1.3.1. Contaminated Sites Disposal Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Sites Disposal for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial/territorial, or municipal requirements; and in accordance with the Contract. Include for each Disposal Facility:
- 1.3.1.1. Letter from Contractor's Qualified Professional that the Disposal Facility is: appropriate for the nature, type, concentration, and quantity of Contaminated Soil to be Disposed in accordance with any authorization; complies with appropriate government requirements of a general nature (e.g. BC/YT Landfill Criteria); and meets the Disposal Facility Minimum Criteria.
- 1.3.1.2. Letter from Disposal Facility that they can accept within the schedule in Contract the nature, type, concentration, and quantity of Contaminated Soil to be Disposed at the Facility, signed by an authorized representative of the Facility.
- 1.3.1.3. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Disposal of relevant Contaminated Soil.
- 1.3.2. Certificate of Disposal: within 30 Working Days of disposal at Disposal Facility, submit documentation verifying that materials have been disposed by Contractor. Include:
- 1.3.2.1. Issued by the Disposal Facility.
- 1.3.2.2. On company letterhead.
- 1.3.2.3. Name and location of facility where the material is being disposed.
- 1.3.2.4. Date and weight for each shipment received and total weight received at the Disposal Facility.
- 1.3.2.5. Identification of acceptance of final ownership of material.
- 1.3.2.6. Signed by identified authorized disposal company representative.

2. PART 2 - PRODUCTS

2.1. Not Used

- 2.1.1. Not Used.

CONTAMINATED SITES SOIL DISPOSAL

3. PART 3 - EXECUTION

3.1. Contaminated Soil Disposal

- 3.1.1. Assume ownership of, and be responsible for, Contaminated Soil disposed.
- 3.1.2. Contaminated Soil Disposal: dispose all Contaminated Soil and Contaminated Material at Disposal Facility provided by Contractor and accepted by the Departmental Representative.
- 3.1.3. Disposal Facility must:
 - 3.1.3.1. Be an existing offsite facility located in Canada or the United States.
 - 3.1.3.2. Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.
 - 3.1.3.3. Hold a valid and subsisting permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the Disposal of relevant Contaminated Soil.
 - 3.1.3.4. Comply with requirements of Acts, regulations, bylaws, and other requirements, in force or appropriately adopted as guidelines, including the BC *Environmental Management Act* and BC Landfill Criteria for Municipal Solid Waste, or *Yukon Environment Act* and Yukon Solid Waste Regulations, municipal zoning bylaws, or equivalent.
- 3.1.4. Dispose material as soon as practical and within 100 Working Days of leaving Site or as required by Contract unless otherwise accepted by Departmental Representative.
- 3.1.5. Material sent to a Disposal Facility must be permanently stored at that facility.
- 3.1.6. If proposed Disposal Facility is not acceptable to Departmental Representative, provide an alternate Disposal Facility that is acceptable.

3.2. Disposal Facility Minimum Criteria

- 3.2.1. Designed, inspected, and monitored by a Qualified Professional.
- 3.2.2. Permitted facility approved for disposal of metals contaminated soil. Facility to be verified by the Departmental Representative.
- 3.2.3. Closure Plan prepared by a Qualified Professional.
- 3.2.4. Has appropriate Environmental Liability Insurance for operation.

END OF SECTION

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

Part 1 General

1.1 SUMMARY

- .1 Refer to the following reports (further referred to herein as the “Assessment Reports”), for information pertaining to lead-containing paints (LCPs) that have been identified at SS Klondike Sternwheeler, Whitehorse, Yukon (the Site):
 - .1 Stantec Consulting Ltd. Report for Project No. 123220304 entitled “Hazardous Building Materials Assessment, Atlin Barge and Limited Areas of the SS Klondike, Whitehorse, YT” dated September 28, 2015, prepared for Parks Canada c/o Public Works and Government Services Canada.
 - .2 Stantec Consulting Ltd. Report for Project No. 144902686 entitled “Pre-Renovation Hazardous Building Materials Assessment, S.S. Klondike, 10 Robert Service Way, Whitehorse, Yukon Territory” dated October 15, 2018, prepared for Parks Canada Agency.
 - .3 Golder Associates Ltd. Report, Reference No. 1786835-001-L-Rev0, “Assessment to Delineate Lead Contamination in Soil, SS Klondike National Historic Site, Whitehorse, YT”. Note – this document contains information specific to the lead content of the paint on the Paddlewheel structure.
 - .4 Golder Associates Ltd. Report, Reference No. 20147682-002-L-Rev0 “Results of Lead Paint Sampling, SS Klondike Sternwheeler, Whitehorse, Yukon”, dated December 21, 2020, prepared for Public Services and Procurement Canada.
 - .5 Arcadis Canada Inc. Report for Project No. 30087850 titled “Leachate Sample Results, SS Klondike Paddle Wheel, Lead Abatement, Whitehorse, Yukon”, dated Jun 18, 2021, prepared for Public Services and Procurement Canada.
- .2 Outline of Work
 - .1 Area of work includes all material located behind the main Hog pole, including but not limited to, stern face of vessel, paddles, drive arm, walking beam, crank arm, monkey and main rudders, support arm, aft beam. Hereafter referred to as the “Paddlewheel”.
 - .2 Remove orange painted wood main rudders (4) with paint intact. Note the rudders extend under the sternwheeler and the wood skirting must be removed to facilitate removal. If it is required to enter the space under the sternwheeler confined space requirements must be considered.

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- .3 Rebuild and replace wood main rudders (4) to match existing size and shape, using existing hardware. Replacement wood is Western Red Cedar, Grade 134A/134B as defined in the National Lumber Grade Authority – Standard Grading Rules for Canadian Lumber Aug 1, 2017. No sap wood and minimum 12 rings per inch is required. Wood must be air dried and seasoned for no less than 12 months. No microwave or kiln dried lumber will be accepted. Lumber must not exceed 14% moisture content as verified by Departmental Representative. No substitutions accepted. Rudders must be installed in conjunction with paint abatement to allow for repainting.
- .4 Remove all white, orange and black paint on all metal material of the Paddlewheel, including but not limited to supports, brackets, nuts, bolts, to bare substrate, including any underlying colors of paint and primer.
- .5 Remove all white and orange paint from wood material of the Paddlewheel to bare substrate, including any underlying colors of paint and primer.
- .3 Comply with requirements of this Section when performing following Work:
 - .1 Removal of LCPs by abrasive blasting following high-risk work procedures.
 - .2 Remove all paint/primer to bare substrate (metal, wood), leaving surfaces with profile suitable for the finish paint. The preferred blasting media is Sodium Bicarbonate (Soda). Review the safety data sheet (SDS) before using abrasive media.
 - .3 Note: Abrasive blasting on wood substrates is to be carefully monitored. If degraded wood is encountered or if the blasting process is degrading the wood, all work must halt, and the Departmental Representative must be consulted.
 - .4 Provide full containment enclosures equipped with HEPA-filtered mechanical ventilation kept under negative pressure.
 - .5 If wet abrasive blasting is used, enclosures must be designed to capture the resulting water and debris.
 - .6 Enclosures to be constructed with rigid material such as wood and sealed with polyethylene.
 - .7 Construct a decontamination facility including a dirty room (to remove contaminated clothing), shower room (with warm water), and a clean room (to change into street clothes).
 - .8 Wear full-facepiece Type CE abrasive-blast supplied-air respirator operated in pressure-demand or positive-pressure mode.
 - .9 Any ventilation or collection system that carries contaminated dust must be HEPA filtered before air is released into atmosphere.

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

- .10 Dispose of all waste including but not limited to, abrasive, wash water, vacuum collected dust, polyethylene, coveralls, cleaning materials etc., as hazardous waste.

1.2 RELATED REQUIREMENTS

- .1 Section 09 91 23 Exterior Painting

1.3 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA Z180.1-[00(R2005)], Compressed Breathing Air and Systems.
 - .2 CSA Standard Z94.4-M2003, Selection, Care, and Use of Respirators.
 - .3 CSA Standard S269.2-M1980, Scaffolding Construction.
 - .4 CSA Standard Z1006-16 Confined Spaces
- .2 Department of Justice Canada
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS).
 - .2 Safety Data Sheets (SDS).
- .4 Human Resources and Social Development Canada (HRSDC)
 - .1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.
- .5 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH)
 - .1 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).
- .7 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances
 - .1 Lead in Construction Regulation - 29 CFR 1926.62-[1993].
- .8 Underwriters' Laboratories of Canada (ULC)
- .9 Province of British Columbia
 - .1 Safe Work Practices for Handling Lead, 2017.
- .10 Yukon Territory
 - .1 Occupational Health and Safety Act, R.S.Y. - Updated [2006].

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.2 Occupational Health and Safety Regulation, O.I.C. 2006/178

1.4 DEFINITIONS

- .1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .2 Authorized Visitors: Departmental Representative or designated representative[s] of regulatory agencies.
- .3 Occupied Area: area of building or work site outside Work Area.
- .4 Dioctyl Phthalate (DOP)/Poly Alpha Olefin (PAO), Test: testing method used to evaluate particle penetration and air flow resistance properties of filtration materials - HEPA filter leak test.
- .5 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Appropriate capacity for scope of work.
- .6 Airlock: ingress or egress system without permitting air movement between contaminated area and uncontaminated area. Consisting of two curtained doorways at least 2 m apart.
- .7 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - .1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and add weight to bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings 1.5 m on each side.
- .8 Action level: employee exposure, without regard to usage of respirators, to an airborne concentration of lead of 50 micrograms per cubic metre of air calculated as an 8-hour time-weighted average (TWA). Maximum precautions for lead abatement are based on airborne lead concentrations greater than 1.25 milligrams per cubic metre of air within Work Area.
- .9 Competent person: individuals/Departmental Representative/Consultant capable of identifying existing lead hazards in workplace and taking corrective measures to eliminate them.
- .10 Lead in Dust: wipe sampling on the vertical and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square foot.
- .11 Lead Cleaning Agent: Phosphate-free lead dissolving agent.

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- .12 Paddlewheel: the work area and includes all material below the hop pole, including but not limited to, stern face of vessel, paddles, drive arm, walking beam, crank arm, monkey and main rudders, support arm, aft beam.
- .13 Negative Air Pressure Machine: extracts air directly from work area and filters extracted air through a HEPA filter, discharge air to exterior of building.
 - .1 Maintain pressure differential of 5 to 7 Pa relative to adjacent areas outside of work areas. Machine to be equipped with alarm to warn of system breakdown and equipped with instrument to continuously monitor and automatically record pressure differences.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.
- .3 Provide Territorial requirements for Notice of Project Form.
- .4 Submit proof satisfactory to Department Representative that employees have valid fit test for a respirator that is personally issued.
- .5 Submit test results, satisfactory to the Consultant, certifying that supplied-air respiratory systems meet the requirements of CSA Standard CAN3-Z180.1-M85, Compressed Breathing Air and Systems. Testing of respiratory systems must be conducted within the last 12 months and test results must be submitted for approval by the Departmental Representative prior to use.
- .6 Provide site specific work procedures and exposure control plan for disturbance of lead based paint.
- .7 Submit proof of Scaffold certification and certifying agency's qualifications. Provide scaffolds inspection schedule.
- .8 Provide proof of Contractor's General and Environmental Liability Insurance.
- .9 Quality Control:
 - .1 Provide Departmental Representative necessary permits for transportation and disposal of lead based paint waste and proof it has been received and properly disposed.
 - .2 Provide proof satisfactory, in writing, to Departmental Representative that all employees had instruction on hazards of lead exposure, respirator use, dress, entry and exit from Work Area, and aspects of work procedures and protective measures.
 - .3 Provide proof that supervisory personnel have attended lead abatement course of not less than two days duration, approved by Departmental Representative. Minimum of one supervisor for every ten workers.

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- .10 Product data:
 - .1 Provide documentation including test results, fire and flammability data, and WHMIS Safety Data Sheets (SDS) for chemicals or materials including:
 - .2 Encapsulants.
 - .3 Amended water.
 - .4 Slow drying sealer.
 - .5 Abrasives

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Territorial and local requirements pertaining to lead, in case of conflict among those requirements or with these specifications the more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 Health and Safety:
 - .1 Respirator Protection
 - .2 Provide appropriate respiratory equipment for the work being performed for persons who are required to enter the Work Area.
 - .3 Workers must have respirators fit checked by qualitative or quantitative fit-testing.
 - .4 Use positive pressure or continuous flow abrasive blasting (Type CE) respirators for abrasive blasting work.
 - .5 The Maximum Use Concentrations of the continuous flow abrasive blasting respirator with tight fitting facepiece is 2.5 milligrams per cubic metre of air (mg/m³). If exposures in the Work Area exceed this level, the contractor must use pressure demand supplied air respirators. Pressure demand respirators will be allowed for airborne lead exposures up to 50 mg/m³.
 - .6 Use full-facepiece Powered Air Purifying Respirators fitted with Dust, Fume and Mist (High Efficiency) filter cartridges, for cleaning of Work Area. Replace PAPR cartridge filters after 8 hours of use, unless tested on-site.
 - .7 Respiratory protective devices must be certified by the National Institute of Occupational Safety and Health (NIOSH).
 - .8 Maintain respiratory equipment in proper functioning and clean condition or remove from site.
 - .9 Used filters must be replaced or tested according to the manufacturer's specifications and replaced, as necessary.
 - .10 Ensure that no person required to enter a Work Area has facial hair which affects the seal between respirator and face.

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

- .2 Protective Clothing and Equipment
 - .1 Provide all workers with full body protective coveralls including attached head covering. Provide boot covers with non-slip soles, or work boots dedicated to the Work Area. Provide abrasive blasters with appropriate blasting coveralls, to be worn over the full body protective coveralls. Once protective coveralls and boot covers are worn, they must be treated as lead-contaminated waste and disposed of.
 - .2 Wear hard hats, safety shoes and other protective apparel required by Ministry of Labour regulations.
 - .3 Use impervious rubber gloves for all handling of Lead Cleaning Agent.
- .3 Requirements for workers:
 - .1 Eating, drinking, chewing, and smoking are not permitted in Work Area.
 - .2 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual lead abatement.
 - .3 Ensure workers wash hands and face when leaving Work Area.
 - .4 Provide and post in Clean Change Room and in Dirty Room the procedures described in this Section.
 - .5 Ensure no person required to enter Work Area has facial hair that affects seal between respirator and face.
 - .6 Visitor Protection:
 1. Provide protective clothing and approved respirators to Authorized Visitors to Work Areas.
 2. Instruct Authorized Visitors to Work Areas.
 3. Instruct Authorized Visitors in use of protective clothing, respirators and procedures.
 4. Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Work Area.
- .4 Lead Abatement Supervisor Qualifications
 1. The Lead Abatement Supervisor must have performed a hazardous materials abatement project of a similar size and scope using abrasive blasting media in the last 10 years.
 2. Provide on site for each work shift, a Lead Abatement Supervisor who has authority regarding all aspects related to manpower, equipment and production. Lead Abatement Supervisor must hold a recognized certificate proving attendance at a lead abatement training course.

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1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling where applicable.
- .2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .3 Disposal of lead waste generated by removal activities must comply with Federal and Territorial regulations. Dispose of lead waste in sealed double thickness 6 mil bags or leak proof drums. Label containers with appropriate warning labels.
- .4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are bound into this specification.
- .2 Notify Departmental Representative of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

- .1 Hours of Work: perform work during normal working hours as indicated in Contract Documents
- .2 Contractor is to notify Department Representative of schedule for activities planned under this Section, if any, at least 10 business days prior to initiation.
- .3 Provide Departmental Representative copy of notifications at least 10 days prior to start of Work.

Part 2 Products

2.1 MATERIALS

- .1 Polyethylene 0.15 mm unless otherwise specified; in sheet size to minimize joints.
- .2 FR polyethylene: 0.15 mm woven fibre reinforced fabric bonded both sides with polyethylene.
- .3 Tape: fibreglass-reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.
- .4 Slow-drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for trapping residual lead paint residue.
- .5 Lead waste containers: metal and/or fibre type acceptable to dump operator with tightly fitting covers or double 0.15 mm sealable polyethylene bags.
 - .1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

Part 3 Execution

3.1 SUPERVISION

- .1 Approved Supervisor must remain within Work Area during disturbance, removal, or handling of lead based paints.

3.2 PREPARATION

- .1 Security of the work area is the responsibility of the contractor. Ensure tools and work area are locked and secure at the end of each shift to minimize the potential for harm to passersby.
- .2 Remove and wrap items to be salvaged or reused, and transport and store in area specified by Departmental Representative.
- .3 Work Area:
 - .1 Scaffold construction must comply with applicable CSA Standards and Yukon OHS regulations. Working at heights regulatory requirements must be followed in accordance with Yukon OHS regulations.
 - .2 Full enclosure, including walls, floors and ceiling of the Work Area must be constructed. Walls and ceiling must be covered with at least one layer of rip-proof polyethylene and be constructed to withstand inclement weather for the duration of the project.
 - .3 Install two layers of rip-proof polyethylene sheeting on ground surface.
 - .4 Install negative pressure machine system and operate continuously from installation of polyethylene sheeting until completion of final cleanup. Provide automatic continuous monitoring and recording instrument of pressure difference.
 - .5 Seal off openings with polyethylene sheeting sealed with tape.
 - .6 Build airlocks at entrances and exits from work areas to ensure work areas are always closed off by one curtained doorway when workers enter or exit.
 - .7 At point of access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used:
 - .8 CAUTION LEAD HAZARD AREA (25 mm).
 - .9 NO UNAUTHORIZED ENTRY (19 mm)
 - .10 WEAR ASSIGNED PROTECTIVE EQUIPMENT AND RESPIRATOR (19 mm).
 - .11 BREATHING LEAD CONTAMINATED DUST CAUSES SERIOUS BODILY HARM (7 mm).

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

- .12 Maintain emergency and fire exits from work areas or establish alternative exits satisfactory to Authority having jurisdiction.
- .13 Where water application is required for wetting lead-containing materials, provide temporary water supply by use of appropriately sized hoses for application of water as required.

Provide electrical power and shut off for operation of powered tools and equipment. Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment. Use of generators must comply with local noise and exhaust fume bylaws.

.4 Worker Decontamination Enclosure System:

- .1 A decontamination facility comprised of three linked rooms, a Dirty Room a Shower Room, and a Clean Change Room. Rooms, Occupied Areas and the Work Area, must be separated by curtained doorways at each door, as follows:
- .2 Dirty Room: Room between Shower Room and the Work Area. Construct with two curtained doorways, one to the shower room, and one to work area. Install waste receptor and storage facilities for workers' shoes and protective clothing to be re-worn in work areas. Build large enough to accommodate specified facilities, equipment needed, and at least one worker allowing sufficient space to change comfortably.
- .3 Shower Room: Room between Clean Room and Dirty Room.
 - i. One walk through shower unit for every six workers.
 - ii. Constant supply of hot and cold water, controllable at each shower. Water supply must be sufficient to provide water at a minimum temperature of 40 degrees Celsius (maximum 50 degrees) in a volume required for all workers to properly decontaminate.
 - iii. A water supply with individual hot and cold shut-off valves located on clean side of Shower Room. Connect shower to these valves.
 - iv. Rigid piping with watertight connections for supply and drains.
 - v. A sealed drip pan, below and on each side of shower.
 - vi. Sump pumps, sufficient for volume of waste shower water from showers and drip pan. Direct waste shower water to sanitary sewer drains.
 - vii. Ground fault protected power switch on both sides of shower for sump pumps, or time for shut off.

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

- viii. Soap, clean towels and appropriate containers for disposal of used respirator filters.
- .4 Ground fault protected power supply, hooks and shelves on clean side of shower for storage of respirators and recharging of batteries as required.
- .5 Clean Room: A room between the Shower Room and Occupied Areas Construct with curtained doorway to outside of enclosures. Provide lockers or hangers and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.
- .5 Construction of Decontamination Enclosures:
 - .1 Construct framing for enclosures or use existing rooms. Line enclosure with polyethylene sheeting and seal with tape, apply two layers of rip-stop polyethylene on floor.
 - .2 Construct curtain doorways between enclosures so when people move through or waste containers and equipment are moved through doorway, one of two closure comprising doorway always remains closed.
 - .3 Shower room in decontamination facility to be provided with the following:
 - .4 Hot and cold water or water of constant temperature not less than 40 degrees Celsius or more than 50 degrees Celsius.
 - .5 Individual controls inside to regulate water flow and temperature.
 - .6 Prior to each shift in which a decontamination facility is being used, a competent person should inspect the facility to ensure that there are no defects that would allow lead-containing dust to escape. Defects should be repaired before the facility is used. The decontamination facility should be maintained in a clean and sanitary condition.
- .6 Separation of Work Areas from Occupied Areas:
 - .1 Barriers between Work Area and occupied area to be constructed as follows:
 - .2 Construct floor to ceiling lumber and/or metal stud framing, cover with polyethylene sheeting and seal with duct tape. Apply plywood over polyethylene sheeting. Seal plywood joints and between adjacent materials with surface film forming sealer, to create airtight barrier.
 - .3 Cover plywood with polyethylene sheeting and sealed with duct tape.

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- .7 Maintenance of Enclosures:
 - .1 Maintain enclosures in tidy condition.
 - .2 Ensure barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately.
 - .3 Visually inspect enclosures at beginning of each working day.
 - .4 Use smoke test method to test effectiveness of barriers as directed by Departmental Representative.

3.3 LEAD-BASE PAINT ABATEMENT

- .1 Removal of lead based paint to be performed by abrasive blasting.
- .2 Blast paint in sections in a slow and consistent pattern. Protect enclosure from damage from abrasive blasting.
- .3 Abrasive blasting on wood substrates is to be carefully monitored. If degraded wood is encountered or if the blasting process is degrading the wood, all work must halt, and the Departmental Representative must be consulted.
- .4 Remove abrasive blast debris as contaminated waste. Maintain debris in damp condition.
- .5 Seal filled containers. Clean external surfaces thoroughly by wet wiping. Remove immediate from working area to staging area. Clean external surfaces thoroughly again by wet sponging before moving containers to designated waste storage area. Ensure containers are removed by workers who have entered from uncontaminated areas dressed in clean coveralls.
- .6 After completion of blasting work, wire brush and wet sponge surface to remove visible material. During this work keep surfaces wet. After wire brushing and wet sponging, wet clean with lead cleaning agent and HEPA vacuum entire work area including Dirty Room. Compressed air or dry sweeping is not to be used to clean up lead-containing dust or waste. After inspection and approval by Departmental Representative apply continuous coat of slow drying sealer to surfaces. The sealer must be compatible with primer listed in Section 09 91 23 Exterior Painting. Do not disturb work area for 8 hours, no entry, activity, or ventilation other than operation negative air machine during this period.
- .7 After enclosing lead painted surfaces, wet clean work area and Dirty Room. During settling period no entry, activity, or ventilation will be permitted.

3.4 INSPECTION

- .1 Perform inspection to confirm compliance with specification and governing authority requirements. Inspect the integrity of the containment throughout the work shift and make repairs immediately. If large breaches are discovered, stop work and repair. Deviations from requirements not approved in writing by Departmental Representative will result in Work shutdown, at no cost to Owner.
- .2 Departmental Representative will inspect work for:

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

- .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 Containment breeches
 - .4 No additional costs will be allowed for additional labour or materials required to provide specified performance level.
- .3 When lead dust leakage from Work Area occurs Departmental Representative will order Work shutdown.
- .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 LEAD SURFACE SAMPLING - WORK AREAS

- .1 Final lead surface sampling conducted as follows:
- .1 After Work Area has passed a visual inspection for cleanliness approved by Departmental Representative and acceptable coat of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period of 8 hours has passed, Departmental Representative will perform lead wipe sampling in Work Area.
 - .2 Final lead wipe sampling results from horizontal and vertical surfaces must show lead levels of less than 40 micrograms of lead in dust per square foot. Samples collected and analyzed in accordance with EPA 747-R-95-007.
 - .3 If wipe sampling results show levels of lead dust in excess of 40 micrograms per square foot, re-clean work area at contractor's expense and apply another acceptable coat of lock-down agent to surfaces.
 - .4 Repeat as necessary until lead dust levels are less than 40 micrograms per square foot.

3.6 FINAL CLEANUP

- .1 Following specified cleaning procedures, and when lead wipe sampling is below acceptable concentrations proceed with final cleanup.
- .2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.
- .3 Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.
- .4 Clean up Work areas, Dirty Room, and other contaminated enclosures.
- .5 Remove sealed waste containers and equipment used in Work and remove from work areas at appropriate time in cleaning sequence.

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- .6 Conduct final check to ensure no dust or debris remain on surfaces as result of dismantling operations.

3.7 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

3.8 AIR MONITORING

- .1 Air monitoring may be conducted, at the discretion of the Departmental Representative.
- .2 Where air monitoring is undertaken, it will be conducted by the Departmental Representative, and in accordance with the requirements and procedures as outlined in the Territorial OHS Regulations. Samples to be collected inside and outside of Work Area enclosures in accordance with Territorial Occupational Health and Safety Regulations and Federal requirements.
- .3 If air monitoring shows that areas outside Work Area enclosures are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Work Area.
- .4 If airborne dust levels exceed the Maximum Use Concentration specified for the respirator in use, the work will be halted. The contractor will have to modify work practices to observe the Maximum Use Concentrations specified.
- .5 Co-operate with the Department Representative in collection of air samples, including providing workers to wear sampling pumps for up to full-shift periods. Contractor's forces must exercise care with air sampling equipment. The Department Representative reserves the right to back-charge the Contractor for resampling of samples damaged by tampering or abuse.

3.9 Department Representative INSPECTIONS

- .1 From commencement of work until completion of clean-up operations, the Department Representative will be present periodically on site both inside and outside the work area.
- .2 Inspection of the Work Area will be performed to confirm compliance with the requirements of the specification and governing authorities. Any deviations from these requirements, that have not been approved in writing, may result in a stoppage of work, at no cost.
- .3 The Department Representative is empowered to inspect adherence to specified procedures and materials, and to inspect for final cleanliness and completion. Additional labour or materials expended by the Contractor to provide performance to the level specified must be at no additional cost.

LEAD ABATEMENT - MAXIMUM PRECAUTIONS

- .4 The Department Representative is empowered to order a shutdown of work when a leakage of lead from the controlled work area has occurred or is likely to occur. Additional labour or materials to rectify unsatisfactory conditions must be at no cost.
- .5 Inspection and air monitoring performed as a result of the Contractor's failure to perform satisfactorily regarding quality, safety, or schedule, will be back charged to the Contractor.
- .6 The Department Representative has been retained to perform the following milestone inspections:
 - .1 **Milestone Inspection A - Pre-contamination inspection of work area preparation and set-up prior to disturbance and removal of lead or lead-contaminated materials.**
 - .2 **Milestone Inspection B – Periodic inspection to inspect containment integrity, work procedures and to collect air sampling during work activities.**
 - .3 **Milestone Inspection C - Visual clearance inspection of work area following clean-up work procedures but prior to final tear-down procedures.**
 - .4 **Milestone Inspection D - Clearance inspection and testing of work area surfaces following Milestone Inspection C prior to final tear-down procedures.**
 - .5 **Milestone Inspection E - Dismantling inspection following final tear-down procedures.**

3.10 Waste Disposal

- .1 The main wood rudders (4) have been tested and characterized as leachable toxic waste. Once removed the rudders are to be disposed of as hazardous waste.
- .2 Unless otherwise determined by the Contractor through appropriate sampling and analysis, remaining waste is to be considered leachable for lead in excess of applicable landfill standards (i.e. >5 mg/L leachable lead).
- .3 Should the Contractor wish to conduct testing to verify actual leachable lead content of wastes once they are generated, the Contractor is responsible to retain and pay for the services associated with sampling and analysis.
- .4 If testing changes the categorization of a particular waste stream from “hazardous” (i.e. leachable for lead in excess of standards) to “non-hazardous”, testing records and supporting documentation must be provided to the Departmental Representative, and the waste cannot be shipped for end disposal until approved by the Departmental Representative.
- .5 Copies of all waste transportation and disposal documents are to be provided to the Departmental Representative.

END OF SECTION

1. PART 1 - GENERAL

1.1. Description

- 1.1.1. Prepare and Repaint the areas affected by the lead paint abatement to SS Klondike-Sternwheeler. Area of work includes all wood and metal material located behind the main Hog pole, including but not limited to, paddlewheel, drive arm, walking beam, crank arm, monkey rudder, main rudder, support arm, aft beam and stern face of vessel. Hereafter referred to as the "Paddlewheel".
- 1.1.2. Section Includes: All labor, materials, tools and other equipment, services and supervision required to complete all interior and exterior repainting work of all previously painted surfaces as indicated on Finish Schedules and to the full extent of the drawings and specifications.
- 1.1.3. Work under this Contract shall also include, but not necessarily be limited to:
 - 1.1.3.1. Surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas to the limits defined under *MPI* Repainting Manual Preparation requirements.
 - 1.1.3.2. Specific pre-treatments noted herein or specified in the *MPI* Repainting Manual.
 - 1.1.3.3. Sealing/priming surfaces for repainting in accordance with *MPI* Repainting Manual requirements.
- 1.1.4. Include all incidental items not specifically noted above but considered part of the finished surface.
- 1.1.5. Refer to Finish Schedule for type, location and extent of exterior repainting required scheduled or specified.
- 1.1.6. This Section along with the Finish Schedule forms part of the Contract documents and is to be read, interpreted and coordinated with all other parts.
- 1.1.7. Division 1, and Division 2, General Requirements form an integral part of this Section of Work. The Painting Contractor shall refer to these and all other related parts.

1.2. Related Sections – Work Excluded:

- 1.2.1. Unless otherwise noted, the following work is not included under this Section of work
 - 1.2.1.1. Condition of substrates, correction of DSD-4 defects and deficiencies in substrates which may adversely affect repainting work, except for minimal work performed by this trade and preparation of surfaces to receive paint and finishes under this section of work.
 - 1.2.1.2. All factory-finished metal work (such as finished flashings).

1.3. Quality Assurance:

- 1.3.1. The Contractor shall have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified

EXTERIOR REPAINTING

crew of painters throughout the duration of the work. When requested, the Painting Contractor shall provide a list of the last three comparable exterior repainting jobs including, name, location, Specifying Authority / Project Manager/ Property Management, start / completion dates and value of the work.

- 1.3.2. Only trades qualified journeypersons, as defined by local jurisdiction, shall be engaged in exterior repainting work. Registered apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.
- 1.3.3. All materials, preparation and workmanship shall conform to the standards contained in the latest edition of the Master Painters Institute (*MPI*) Maintenance and Repainting Manual (herein referred to as the *MPI* Repainting Manual) as issued by the local *MPI* Accredited Quality Assurance Association having jurisdiction.
- 1.3.4. All exterior repainting work shall be inspected by the MPDA Inspection Agency. The Painting Contractor shall notify the MPDA Inspection Agency a minimum of one week prior to commencement of work.
- 1.3.5. All surfaces requiring repainting shall be inspected by the Painting Contractor who shall notify the MPDA Inspection Agency, Owner or Authorized Representative in writing of any defects or problems, prior to commencing repainting or after preparation work.

1.4. Inspection

- 1.4.1. The MPDA Technical Representative will not be responsible for and will not have control or supervise the Painting Contractor or Subcontractors in performance of the Work.
- 1.4.2. The MPDA Technical Representative will be responsible to observe and report and shall not be responsible for the Painting Contractor or Subcontractors failure to carry out the Work in accordance with the Contract Documents.

1.5. Regulatory Requirements:

- 1.5.1. Conform to workplace safety regulations for storage, mixing, application and disposal of all paint related materials to requirements of those authorities having jurisdiction.
- 1.5.2. Conform to safety precautions in accordance with the latest requirements to Industrial Health and Safety Regulations, latest edition, of authorities having jurisdiction.
- 1.5.3. Notify the MPDA Inspection Agency on award of contract and make application for assignment of an MPDA Technical Representative using appropriate forms supplied by the Agency as well as, finish schedule and list of MPI Approved Products Intended for Use on the Project for verification purposes prior to commencement of work.
 - 1.5.3.1. Fully cooperate at all times with the requirements of the MPDA Paint Inspection Agency in the performance of their duties, including providing access and assistance as required to complete inspection work.
- 1.5.4. To reduce the amount of contaminants entering waterways, sanitary / storm drain systems or into the ground the following procedures shall be strictly adhered to but not limited to:

- 1.5.4.1. Retain cleaning water for water-based materials to allow sediments to be filtered out.
- 1.5.4.2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
- 1.5.4.3. Return solvent and oil-soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- 1.5.4.4. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
- 1.5.4.5. Empty paint cans are to be dry prior to disposal or recycling (where available).
- 1.5.4.6. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
- 1.5.4.7. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

1.6. Mock-Ups:

- 1.6.1. When requested by the Owner, Authorized Representative or MPDA Technical Representative, prepare and repaint a designated exterior surface area or item to requirements specified herein, with specified paint or coating showing selected colors, gloss/sheen, texture and workmanship to MPI Repainting Manual standards for review and approval. When approved, the exterior surface area and/or item shall become the acceptable standard of finish quality and workmanship for similar on-site repainting work.

1.7. Submittals:

- 1.7.1. All submittals shall be in accordance with the requirements of Section 01 33 00 – Submittal Procedures. Submittals include a mock-up of the painting, prior to the application of paint to the Paddlewheel. A submittal with paint type and colour to be determined by the Departmental Representative.
- 1.7.2. Submit written proof of ability to supply a 100% two (2) year Maintenance Bond, if Paint Association warranty option is not used with Bid Submission.
- 1.7.3. Submit list of all MPI Approved Products Intended for Use on the Project to the MPDA Inspection Agency for review prior to ordering materials, including sundries.
- 1.7.4. Submit two sets of Safety Data Sheets (SDS) prior to commencement of work for review and for posting at job site as required.
- 1.7.5. Submit certification reports for ecologo paint products used.
- 1.7.6. If requested submit an invoice list of all paint materials ordered for the Work to the Paint Inspection Agency indicating manufacturer, types and quantities for verification and compliance with specification.
- 1.7.7. Submit work schedule for various stages of the Work to the Owner or Authorized Representative for approval if requested.

- 1.7.8. At project completion provide an itemized list complete with manufacturer, paint type and color coding for all colors used for Owner's later use in maintenance.

1.8. Product Delivery, Storage and Handling:

- 1.8.1. Deliver all painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.
- 1.8.2. Store all paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45 F (7 C). Only materials used on this project are to be stored on site.
- 1.8.3. Where toxic and/or volatile / explosive / flammable materials are being used, provide adequate fireproof storage lockers and take all necessary precautions and post adequate warnings (e.g. no smoking) as required.
- 1.8.4. Take all necessary precautionary and safety measures to prevent fire hazards and spontaneous combustion and to protect the environment from hazard spills. Materials that constitute a fire hazard (paints, solvents, drop clothes, etc.) shall be stored in suitable closed and rated containers and removed from the site on a daily basis.
- 1.8.5. Comply with requirements of authorities having jurisdiction, in regard to the use, handling, storage and disposal of hazardous materials.

1.9. Temporary Facilities

- 1.9.1. The temporary use of existing electrical power and water services shall be subject to the conditional approval of the Owner. Disconnect all such temporary services as required and remove at job completion; the Painting Contractor shall supply their own hoses, cords, etc.
- 1.9.2. Unless otherwise approved or supplied by the Owner, provide temporary dry, heated, ventilated and secure portable self-contained field office/material, equipment and tool storage shed(s) as required for the execution of the work to the requirements of the authorities having jurisdiction.
- 1.9.3. Unless otherwise approved or supplied by the Owner, provide and maintain clean, enclosed and screened sanitary facilities for use of trades in accordance with the authorities having jurisdiction.
- 1.9.4. At completion ensure all areas are cleaned and made good to the Owner's satisfaction.

1.10. Project / Environmental Requirements:

- 1.10.1. It is the Painting Contractors responsibility to conduct all required tests such as moisture content, pH tests, air and surface temperature and all other testing prior to the application of any coatings.

EXTERIOR REPAINTING

- 1.10.2. UNLESS specifically pre-approved by the Owner, Authorized Representative, MPDA Inspection Agency and the applied product manufacturer, perform no exterior repainting work when the ambient air and substrate temperatures are below 50 F (10 C).
- 1.10.3. Perform no exterior repainting work unless environmental conditions are within the MPI and paint manufacturer's requirements.
- 1.10.4. Perform no exterior repainting work when the relative humidity is above 85% or when the dew point is less than 5 F (3 C) variance between the air and surface temperature.
- 1.10.5. Perform no exterior repainting work when the maximum moisture content of the substrate exceeds:
 - 15% for wood
- 1.10.6. Conduct all moisture tests using a properly calibrated electronic Moisture Meter.

1.11. Protection

- 1.11.1. The Painting Contractor shall guard or otherwise protect the Work including all material, plant and real property related to the Work against loss or damage from any cause.
- 1.11.2. All ladders, scaffolds, lift equipment and general plant shall be securely locked when not in use to prevent access by other parties than the Contractor.
- 1.11.3. Protect all exterior surfaces and areas, including landscaping, walks, drives, all adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any labels and signage from repainting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

1.12. Scheduling:

- 1.12.1. Schedule repainting operations to prevent disruption of Owner's operations or building occupants. Obtain written authorization from Owner or Authorized Representative for changes in work schedule.

1.13. Guarantee:

- 1.13.1. Furnish a two (2) year Maintenance Bond both in accordance with MPI Repainting Manual requirements. The Maintenance Bond shall be obtained from an approved bonding company and shall warrant that all repainting work has been performed in accordance with MPI Repainting Manual requirements.
- 1.13.2. All exterior repainting work shall be in accordance with MPI Repainting Manual requirements and shall be inspected by the MPDA.
- 1.13.3. The cost for Painting Association inspections, at 5% of the contract value and travel costs/charges (airfare, accommodations, rental car/taxi), as well as Maintenance Bond shall be included in the Base Bid Price and any Separate Pricing or Cost-Plus items

awarded to the Painting Contractor. The Painting Contractor shall pay for these inspections.

1.14. Maintenance Materials:

- 1.14.1. At project completion provide a minimum of 4 liters (1 gallon) of each type and color of paint from same production run (batch mix) used in unopened cans, properly labeled and identified for Owner's later use in maintenance.

2. PART 2 - PRODUCTS

2.1. Materials:

- 2.1.1. All materials (primers, paints, coatings, varnishes, stains, etc.) shall be products listed in the latest edition of the *MPI* Approved Product List and shall be from a single manufacturer for each system used.
- 2.1.2. Other paint sundries such as linseed oil, shellac, solvents, shall be the highest quality product and shall be compatible with other coating materials as recommended by the *MPI* Approved product manufacturer.
- 2.1.3. All materials and paints shall be lead and mercury free.
- 2.1.4. Where required, paint products shall meet *MPI* Environmentally Friendly" E3 ratings or better based on VOC (EPA Method 24) content levels.
- 2.1.5. Caulking and filling compounds shall be as recommended by the Painting Contractors chosen paint manufacturer.
- 2.1.6. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc. Refer to 3.5, Field Quality Control / Standard of Acceptance requirements.
- 2.1.7. Slip Resistant Additives (SRA): rubber aggregate or clean / washed silica sand for use with or as a component part of paint (usually floor / porch / stair enamel) on exterior horizontal surfaces as required to provide slip resistance. Where site applied, material to either mixed into paint and mixed constantly to keep material in suspension.

2.2. Equipment:

- 2.2.1. Painting Equipment: to best trade standards for type of product and application.
- 2.2.2. Spray-Painting Equipment: of ample capacity, suited to the type and consistency of paint or coating being applied and kept clean and in good working order at all times.

2.3. Mixing and Tinting:

- 2.3.1. Unless otherwise specified or pre-approved, all paints shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.

- 2.3.2. Catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- 2.3.3. Where thinner is used, addition shall not exceed paint manufacturer's recommendations.
- 2.3.4. If required, thin paint for spraying in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to the MPDA Inspection Agency.

2.4. Finish and Colors:

- 2.4.1. Unless otherwise specified herein, all exterior repainting work shall be done in accordance with *MPI* Premium Grade requirements.
- 2.4.2. Colors shall be as selected by the Owner or Authorized Representative from a manufacturer's full range of colors. Refer to the Finish Schedule for identification and location.
- 2.4.3. Color selection will be based on four (4) base colors and two (2) accent colors. No more than (six (6)) colors will be selected for exterior painting work on this project unless specified otherwise.

2.5. Gloss / Sheen:

- 2.5.1. Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following *MPI* gloss / sheen standard values:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 maximum
G2	Velvet finish	10 maximum	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 minimum
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

- 2.5.2. Gloss level ratings of all painted surfaces shall be as specified herein and as noted on Finish Schedule.

3. PART 3 - EXECUTION

3.1. Condition of Surfaces:

- 3.1.1. Prior to commencement of repainting work, thoroughly examine (and test as required) all exterior conditions and surfaces scheduled to be repainted and report in writing to the Owner, Authorized Representative and MPDA Inspection Agency where applicable; any conditions or surfaces that will adversely affect work of this section.
- 3.1.2. The degree of surface deterioration (DSD) shall be assessed using the assessment criteria indicated in the MPI Maintenance Repainting Manual. In general, the MPI DSD ratings and descriptions are as follows:

Condition	Description
DSD-0	Sound Surface (may include visual (aesthetic) defects that do not affect films protective properties).
DSD-1	Slightly Deteriorated Surface (may show fading; gloss reduction, slight surface contamination, minor pin holes scratches, etc.) / Minor cosmetic defects (runs, sags, etc.).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, staining, etc.).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required by others).

- 3.1.3. No repainting work shall commence until all such DSD-4 adverse conditions and defects have been corrected and surfaces and conditions are acceptable to the Painting Contractor. The Painting Contractor shall not be responsible for the condition of the substrate or for correcting defects and deficiencies in the substrate, which may adversely affect the painting work except for minimal work normally performed by the Painting Contractor and as, indicated herein. It shall always, however, be the responsibility of the Painting Contractor to see that surfaces are properly prepared before any paint or coating is applied.
- 3.1.4. It shall also be the Painting Contractor's responsibility to paint the surface as specified providing that the owner accepts responsibility for uncorrected DSD-4 substrate conditions.

3.2. Preparation of Surfaces:

- 3.2.1. Prepare and test all exterior surfaces scheduled for repainting in accordance with MPI Repainting Manual requirements. Refer to the MPI Repainting Manual in reference to specific requirements for the following:
 - 3.2.1.1. environmental conditions.
 - 3.2.1.2. pH testing.
 - 3.2.1.3. acid etching.
 - 3.2.1.4. mildew removal.
 - 3.2.1.5. structural steel and miscellaneous metals
 - 3.2.1.6. galvanized and zinc coated metal.
 - 3.2.1.7. dimension and dressed lumber.
 - 3.2.1.8. wood decks, floors, stairs and steps.
- 3.2.2. Clean all surfaces in accordance with MPI Repainting Manual requirements if required. Allow sufficient drying time and test all surfaces using an electronic moisture meter before commencing work. Note: all existing paint/primer is to be removed to bare substrate as specified in Section 02 83 12 – Lead Abatement Maximum Precautions.
- 3.2.3. Prior to paint application review all surfaces and remove non-adhering coating material by the appropriate preparation method for the condition. Note: all existing paint/primer is to be removed to bare substrate as specified in Section 02 83 12 – Lead Abatement Maximum Precautions.
- 3.2.4. Remove all building attachments such as downspouts and signage not permanently attached to the buildings unless directed by the Owner or Authorized Representative, re-install and clean at completion of Work.

3.3. Wood

- 3.3.1. Existing stripped wood surfaces are to be fully sealed with clear penetrating epoxy sealer. At minimum, the clear penetrating epoxy sealer must meet the technical specifications specified in Section 3.9.1 of this document. Product will be subject to submittal and Departmental Representative approval.
- 3.3.2. Corroded nail heads shall be spot primed with an MPI Approved anti-corrosive epoxy primer. Protruding nails shall be removed or reset.
- 3.3.3. Cracks and fractures greater than 1/16 of an inch shall be caulked with the manufacturers approved caulking compound.

3.4. Metals

- 3.4.1. All metal surfaces must be free of surface contaminants such as salts (sulphates), nitrates, grease, oils and dirt deposits.

- 3.4.2. All substrates exhibiting corrosion and rust staining must be prepared to the following standards:
 - 3.4.2.1. SSPC-SP 1 Solvent Cleaning
 - 3.4.2.2. SSPC-SP 2 Hand Tool Cleaning
 - 3.4.2.3. SSPC-SP6 or SSPC-SP 11 Power Tool Cleaning to Bare Metal to locate the source of the corrosion, followed with the application of an MPI approved anti-corrosive primer prior to filling/patching (if applicable).
 - 3.4.2.4. Seal bare metal with an MPI Approved clear penetrating epoxy sealer prior to the application of primer. At minimum, the clear penetrating epoxy sealer must meet the technical specifications specified in Section 3.9.1 of this document. Product will be subject to submittal and Departmental Representative approval.

3.5. Application:

- 3.5.1. Do not commence repainting unless substrates and all environmental conditions are acceptable for the application of products.
- 3.5.2. Apply primer, paint in accordance with MPI Painting Manual Premium Grade finish requirements unless otherwise specified.
- 3.5.3. If the Painting Contractor elects to utilize spray application methods then all coating applications will require back-rolling/brushing unless approved otherwise by the Owner, Authorized Representative or MPDA Inspection Agency.
- 3.5.4. Apply primer, paint in a workmanlike manner using skilled and trade qualified applicators as noted under Quality Assurance.
- 3.5.5. Apply primer, paint within an appropriate time frame after cleaning and preparation to prevent weathering or water staining of substrate or before environmental conditions encourage flash-rusting, rusting, contamination or when the manufacturer's paint specifications require earlier applications.
- 3.5.6. Primer, paint coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.
- 3.5.7. Tint each coat of paint progressively darker to enable confirmation of number of coats unless approved by the MPDA Inspection Agency.
- 3.5.8. Where deep or bright colors are used allow for the application of a minimum of 4 finish coats to achieve satisfactory results.
- 3.5.9. Sand and dust between each coat to provide an anchor for next coat and to remove surface defects such as runs, sags, etc. on existing and new coatings were applicable for the surface texture.
- 3.5.10. Do not apply finishes on exterior surfaces that are not sufficiently dry. Unless manufacturer's directions state otherwise, each coat shall be sufficiently dry and hard before a following coat is applied.
- 3.5.11. To avoid air entrapment in applied coats, apply materials in strict accordance with manufacturer's spread rates and application requirements.

- 3.5.12. Where touch-up painting is undertaken and found to be noticeable, the entire surface will require repainting from break to break or corner to corner.

3.6. Priming and Back Priming

- 3.6.1. All wood which is to receive a paint finish, shall be primed and back primed prior to installation with MPI #17 Wood Primer, compatible with the finish system.
- 3.6.2. All wood and metal surfaces to be fully primed and sealed with an MPI Approved clear penetrating epoxy sealer prior to the application of primer. At minimum, the clear penetrating epoxy sealer must meet the technical specifications specified in Section 3.9.1 of this document. Product will be subject to submittal and Departmental Representative approval.
- 3.6.3. Primed and back primed metal, galvanized or wood surfaces with MPI products specified in Section 3.9.1 of this document, and compatible with the finish system.

3.7. Field Quality Control / Standard of Acceptance:

- 3.7.1. All surfaces, preparation and paint applications shall be inspected by the MPDA Inspection Agency.
- 3.7.2. Repainted exterior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the MPDA Technical Representative and not limited to:
- 3.7.2.1. brush/roller/tracking, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
- 3.7.2.2. spray application defects such as dry spray, gun spits, heavy orange peel etc.
- 3.7.2.3. damage due to touching before paint is sufficiently dry or any other contributory cause.
- 3.7.2.4. damage due to application on moist surfaces.
- 3.7.2.5. damage and/or contamination of paint due to windblown contaminants (dust, sand blast materials, salt spray, etc.).
- 3.7.3. Repainted exterior surfaces shall be considered unacceptable if any of the following are evident under natural lighting conditions:
- 3.7.3.1. visible defects are evident on vertical surfaces when viewed at 90 degrees to the surface from a distance not less than 1000 mm (39”).
- 3.7.3.2. visible defects are evident on horizontal surfaces when viewed at 45 degrees to the surface from a distance not less than 1000 mm (39”).
- 3.7.3.3. visible defects are evident on soffit and other overhead surfaces when viewed at 45 degrees to the surface.

- 3.7.3.4. when the final coat on any surface exhibits a lack of uniformity of sheen across full surface area.
- 3.7.4. Repainted surfaces rejected by the Owner or Authorized Representative or MPDA Technical Representative shall be made good at the expense of the Painting Contractor.

3.8. Clean-up:

- 3.8.1. Remove all primer or paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that will not cause damage to the finished surfaces.
- 3.8.2. Keep work area free from any unnecessary accumulation of tools, equipment, surplus materials and debris.
- 3.8.3. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
- 3.8.4. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers/strippers in accordance with the safety requirements of authorities having jurisdiction.
- 3.8.5. All brushes, rollers and spray equipment solvent residue shall not be disposed into site drains, utility sinks or any other water drainage systems.

3.9. Exterior Finish Schedule: SS Klondike Paddlewheel

- 3.9.1. On approval of mock-ups, repaint all Paddlewheel surfaces in relation to the Section 02 83 12 – Lead Abatement Maximum Precautions in accordance with the following MPI Repainting Manual requirements:

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Location and Substrate	Paint System	MPI #	Gloss Level
Wood - Paddlewheel Components	REX6.2L (Modified)- W.B. Light Industrial over WB Bonding. After cleaning adequate surface preparation and full application of clear penetrating epoxy sealer, full prime with MPI #17 followed by the intermediate and final application of MPI #163	179, 163	5
Galvanized Metal- Paddlewheel Components	REX5.3D-Pigmented Polyurethane. After cleaning and adequate surface preparation and full application of clear penetrating epoxy sealer full prime with MPI #120 followed by the intermediate and final application of MPI #72	120, 72	6
Ferrous Metal -Paddlewheel Components	REX5.1H-Polyurethane over High Build Epoxy. After cleaning and adequate surface preparation and full application of clear penetrating epoxy sealer, full prime with MPI #120 followed by the intermediate and final application of MPI #72.	120, 72	6
All Surfaces – Paddlewheel components	<p>Clear Penetrating Epoxy Sealer (such as S1 Penetrating Epoxy Sealer, Total Boat Penetrating Sealer or MAS Penetrating Epoxy or the like). Marine grade two-part clear penetrating sealer that is resistant to salt air and water, mild acids, alkalis, chemical and solvents.</p> <p>At minimum product characteristics must include:</p> <ul style="list-style-type: none"> • Mix Ratio by Volume (Resin:Hardener): 1:1 • Mix Ratio by Weight (Resin:Hardener): 100:94 • Viscosity (Mixed): 42cps @ 25°C • Application Temperature Range: 60°F-90°F (15°C-32°C) • Max Service Temperature: -4°F-160°F (-20°C-72°C) • Working Time @70°F (21°C): 5-8 min wet edge time • Full Cure: 7 Days • Pot Life: 24 hours • Solids: 50% by volume • Density: 7.9 pounds/gallon • V.O.C. Content: 650 grams/liter 	-	-

LEVEL OF SECURITY | NIVEAU DE SÉCURITÉ

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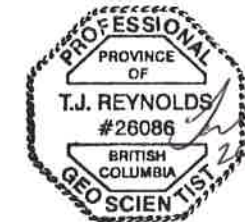


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DATUM: NAD83 PROJECTION UTM ZONE 8

- DRAWINGS TO BE VIEWED IN COLOUR
- DO NOT SCALE DRAWING
- VERIFY ALL DIMENSIONS AND CONDITIONS AND IMMEDIATELY NOTIFY THE DEPARTMENT REPRESENTATIVE OF DISCREPANCIES



ISSUED FOR TENDER



NO.	DATE	REVISION	APPR.
1	2021-07-20	ISSUED FOR TENDER	TR
0	2021-07-16	ISSUED FOR TENDER	AB

SCALE | ÉCHELLE

LOCATION | EMPLACEMENT
 WHITEHORSE, YUKON

PROJECT | PROJET
 S.S. KLONDIKE REMEDIATION

TRADE | MÉTIER
 SITING

DATE
 2021-07-20

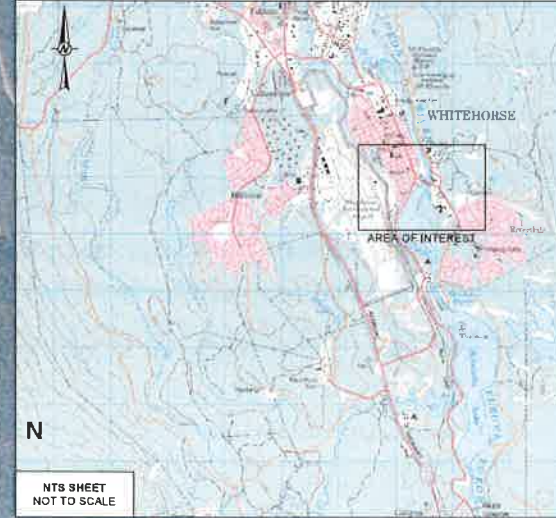
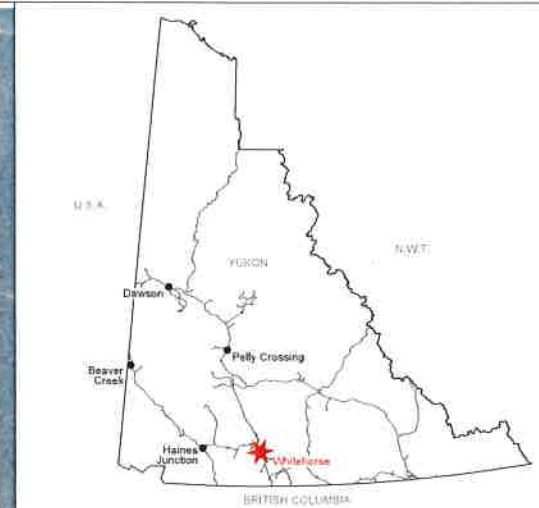
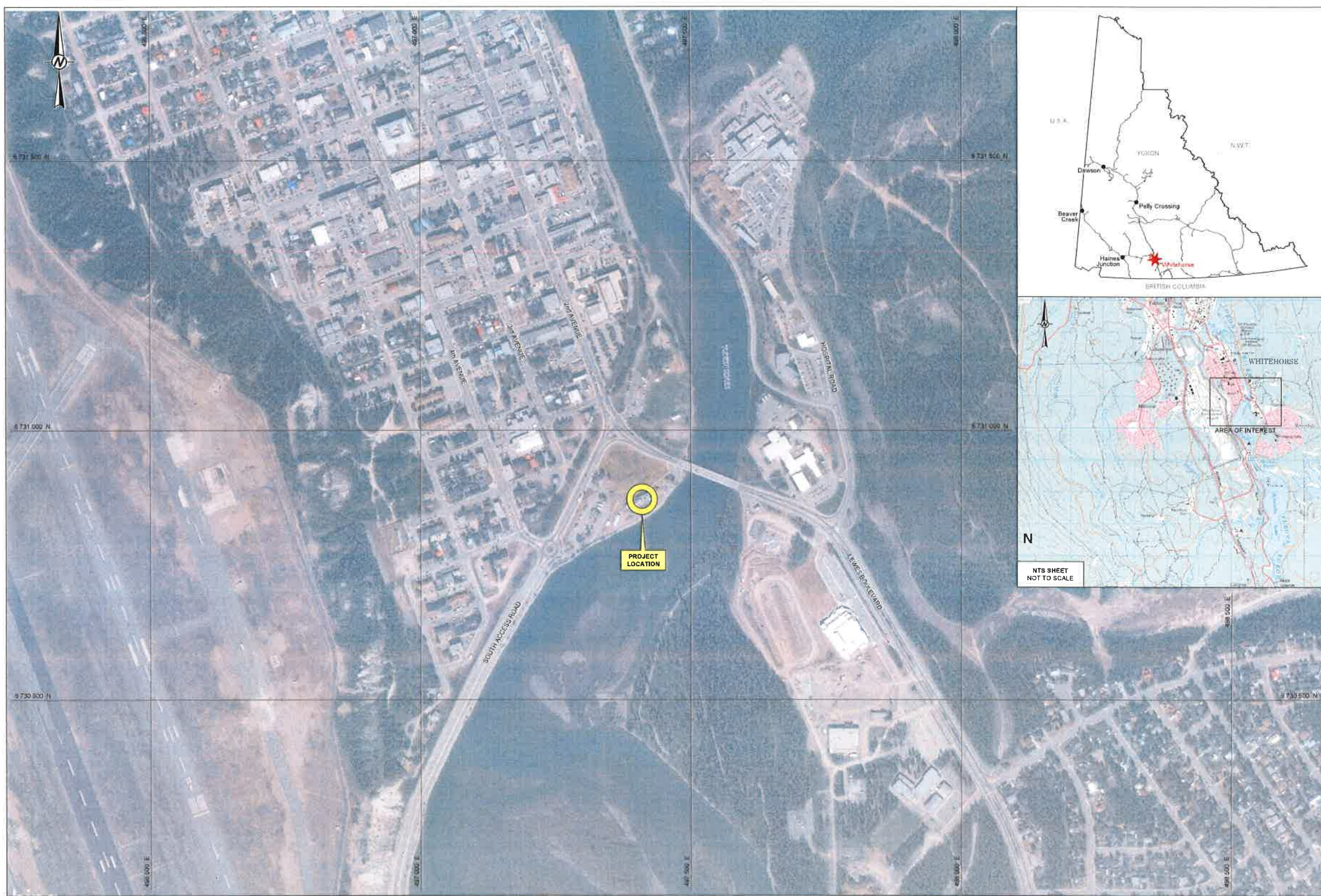
SUBJECT | SUJET
 SITE LOCATION

PRODUCTION	REVIEWED REVU	DESIGN AGENT CONC.
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PUBLIC SERVICES AND PROCUREMENT CANADA

S.S. KLONDIKE REMEDIATION

LIST OF DRAWINGS	
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102	EXISTING INFRASTRUCTURE AND ACCESS
103	SOIL PHYSICAL DATA
104	CONTAMINATION EXTENTS - PLAN VIEW
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106	SITE RESTORATION

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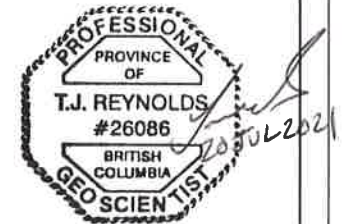
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LOCATION | EMPLACEMENT
WHITEHORSE, YUKON

PROJECT | PROJET
S.S. KLONDIKE REMEDIATION

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SUBJECT | SUJET
EXISTING INFRASTRUCTURE AND ACCESS

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 - GRASS AREA
 - OVERHEAD POWERLINE
 - UNDERGROUND ELECTRICAL (APPROXIMATE, FROM PHOTOS)
 - EDGE OF ASPHALT
 - BOARDWALK
 - GRAVEL PATH
 - EASEMENT BOUNDARY
 - LOT BOUNDARY
 - LOT BOUNDARY (SITE EXTENTS)
 - APPROXIMATE EXTENT OF S.S. KLONDIKE
 - POWER POLE, GUY AND ANCHOR
 - FLOOD LIGHTS
 - PLAQUES/MONUMENTS
 - FIRE HYDRANT
 - LAWN SPRINKLERS
 - BENCHES
 - MISCELLANEOUS FEATURES
 - GOLDER 2015 SOIL SAMPLING LOCATION
 - GOLDER 2021 SOIL SAMPLING LOCATION
 - PARKS CANADA 2011 SOIL SAMPLING LOCATION
 - EBA 2001 SOIL SAMPLING LOCATION
 - ONE OR MORE SOIL PARAMETER RESULT EXCEEDS APPLICABLE CCME SOIL QUALITY GUIDELINE FOR PL. (RED FONT INDICATES THE ASSOCIATED SAMPLE)
 - (12.5) LEAD CONCENTRATION IN SOIL (mg/kg)

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LOCATION | EMPLACEMENT
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PROJECT | PROJET
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TRADE | MÉTIER
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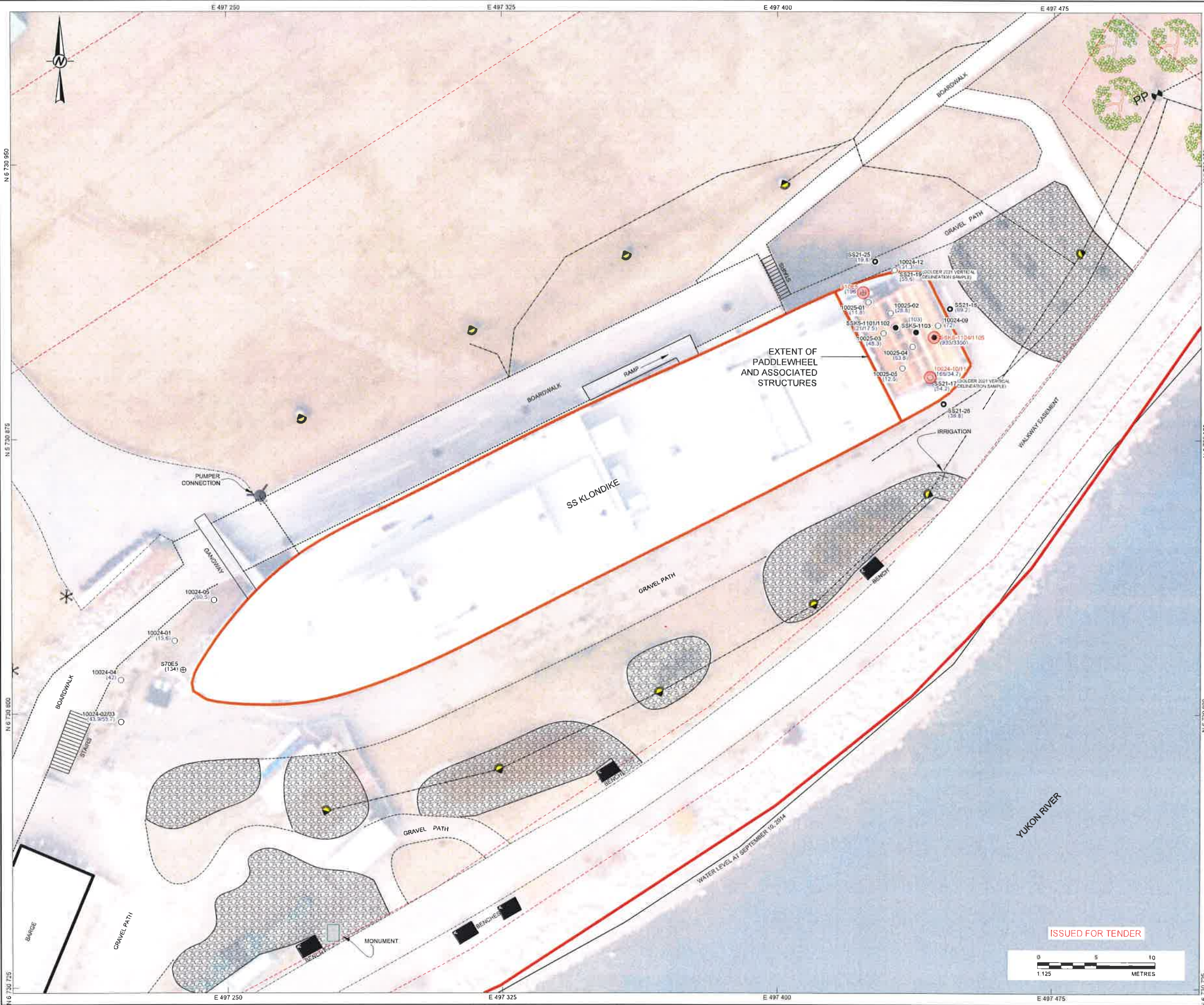
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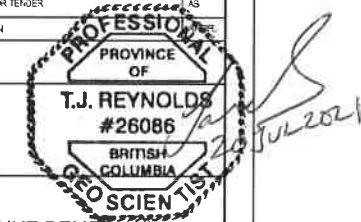
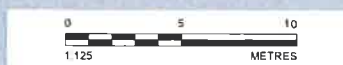


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- ROCK GARDEN
 - GRASS AREA
 - APPROXIMATE EXTENT OF LEAD CONTAMINATION IN SOIL
 - OVERHEAD POWERLINE
 - UNDERGROUND ELECTRICAL (APPROXIMATE, FROM PHOTOS)
 - EDGE OF ASPHALT
 - BOARDWALK
 - GRAVEL PATH
 - EASEMENT BOUNDARY
 - LOT BOUNDARIES
 - LOT BOUNDARY (SITE EXTENTS)
 - APPROXIMATE EXTENT OF S.S. KLONDIKE
 - POWER POLE, GUY AND ANCHOR
 - FLOOD LIGHTS
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 - GOLDER 2021 SOIL SAMPLING LOCATION
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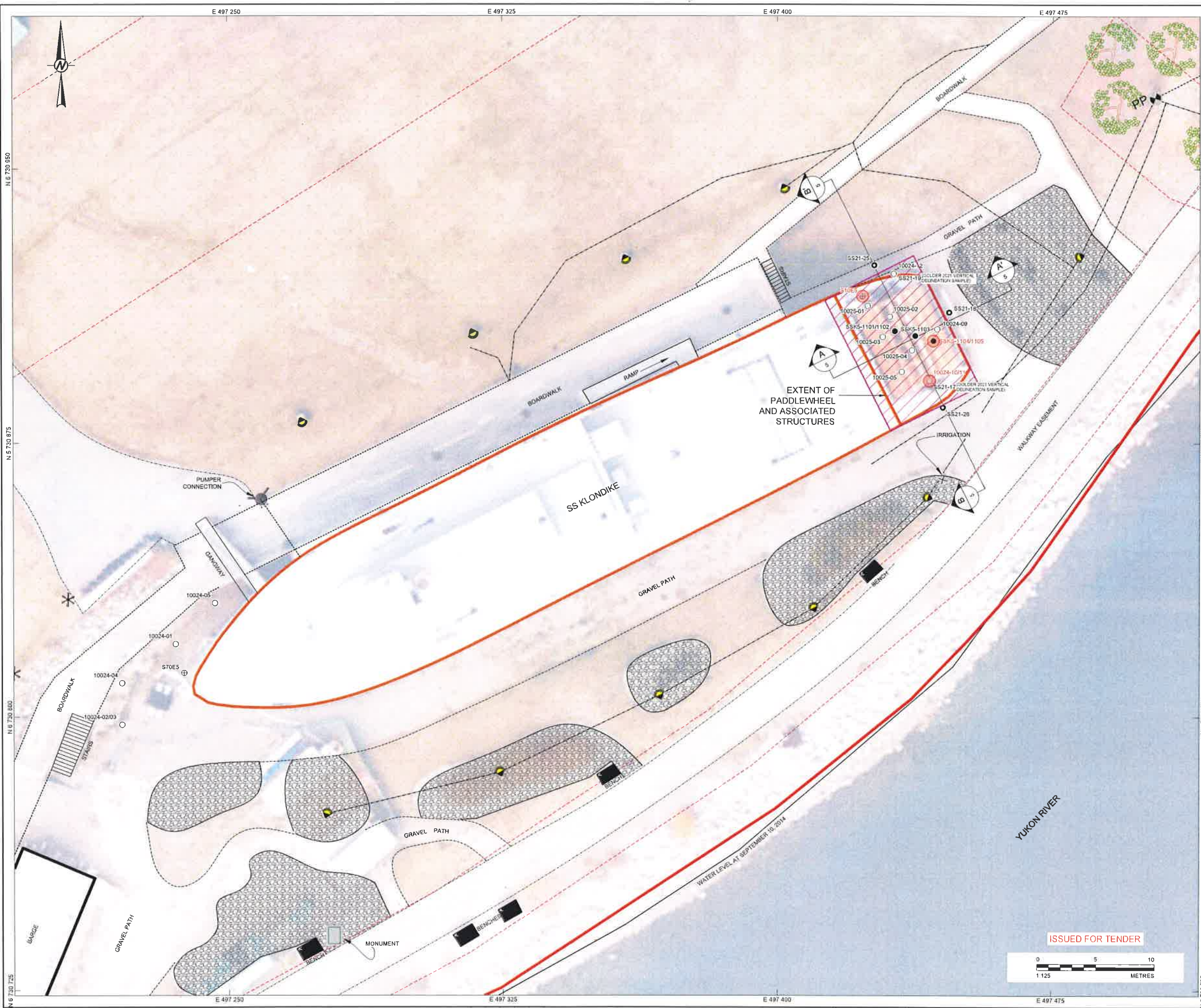
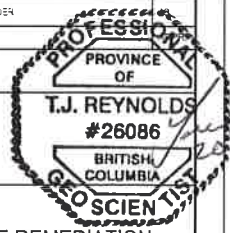
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- LEGEND**
- APPROXIMATE GROUND SURFACE
 - - - APPROXIMATE EXCAVATION EXTENTS
 - ▨ COBBLES
 - - - GEOTEXTILE
 - GOLDER 2018 SOIL SAMPLING LOCATION
 - GOLDER 2021 SOIL SAMPLING LOCATION
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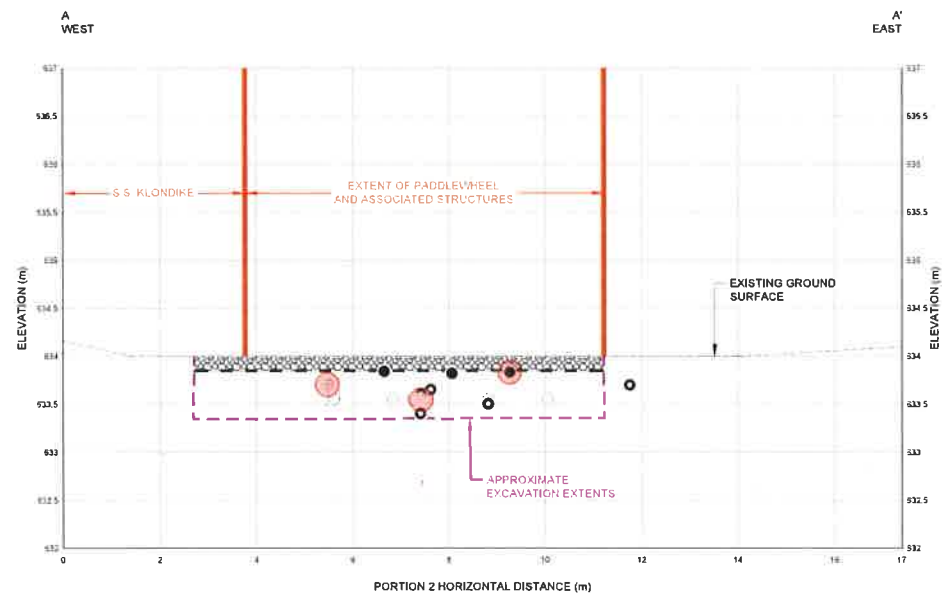
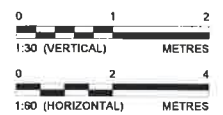
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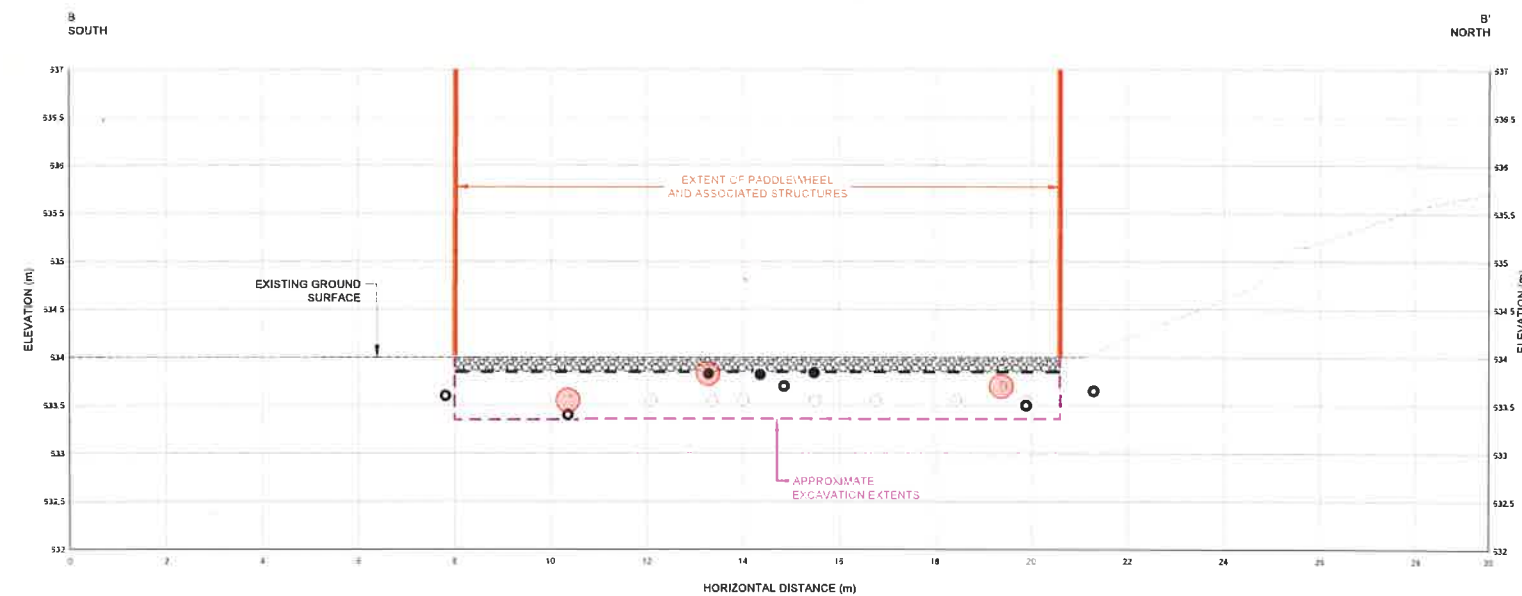
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HORZ SCALE 1:90 / VERT SCALE 1:30 / **B CROSS-SECTION B-B'** / 103



LOCATION EMPLACEMENT WHITEHORSE, YUKON			
PROJECT PROJET S.S. KLONDIKE REMEDIATION			
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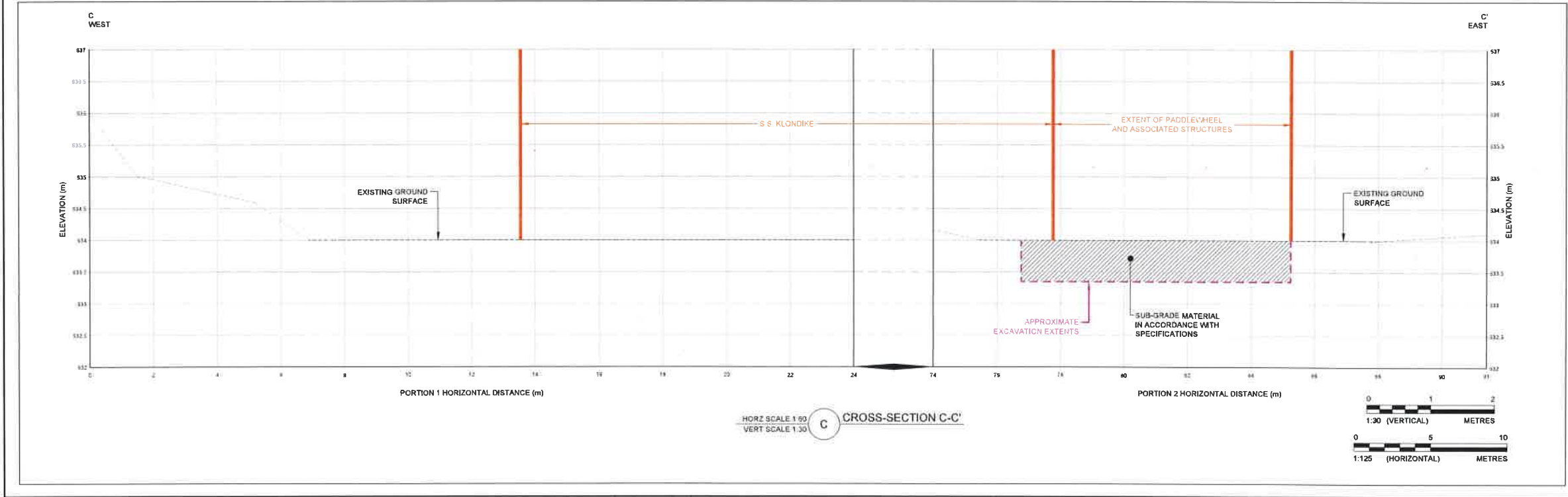
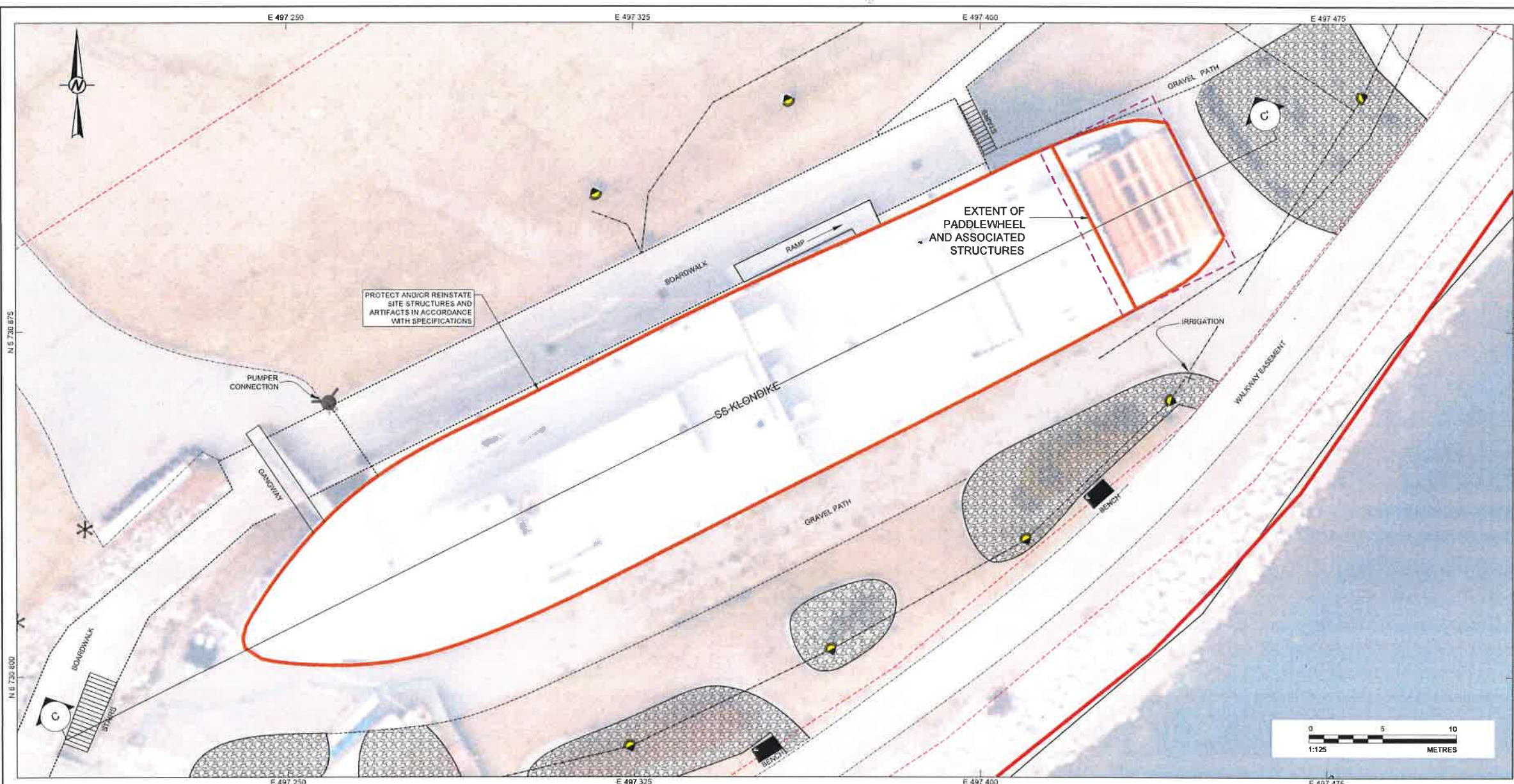
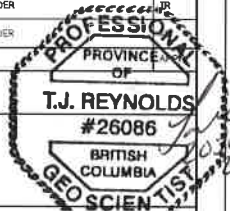
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PROJECT PROJET		
S.S. KLONDIKE REMEDIATION		
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SITING	2021-07-20	
SUBJECT SÉRIE		
SITE RESTORATION		
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DRAWN DESSIN	RYLAND JAMES	DES MGR GEST CONC.
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ANNEX A

Site Photographs



Photo 1: View of Paddlewheel and monkey rudders, facing southeast (towards Yukon River)



Photo 2: View of Paddlewheel and monkey rudders, facing northwest (away from Yukon river)



Photo 3: Side view of Paddlewheel features.



Photo 4: Close-up view of Paddlewheel features.

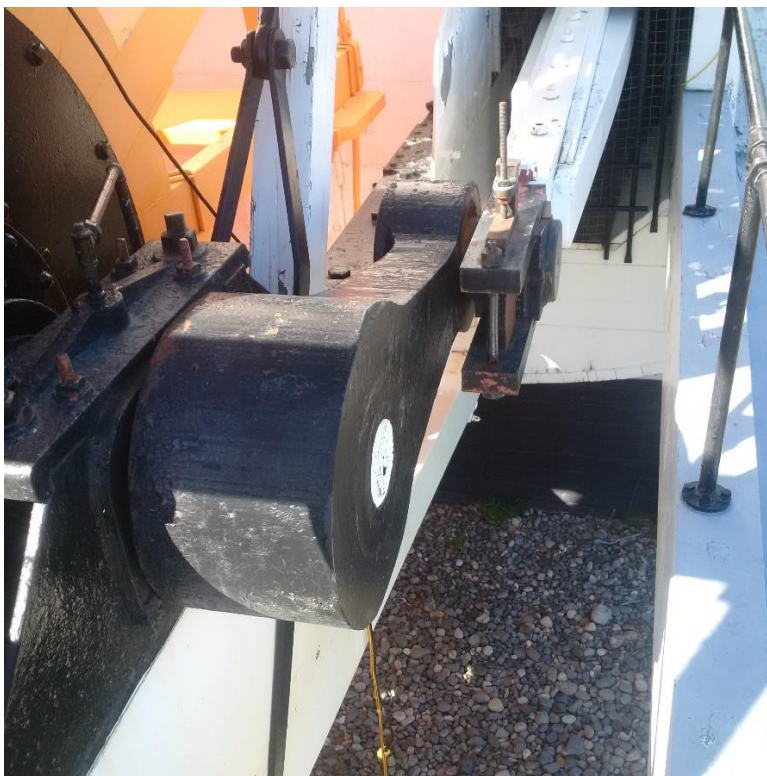


Photo 5: Close-up view of Paddlewheel features.



Photo 6: Close-up view of Paddlewheel features.



Photo 7: Close-up view of Paddlewheel features.

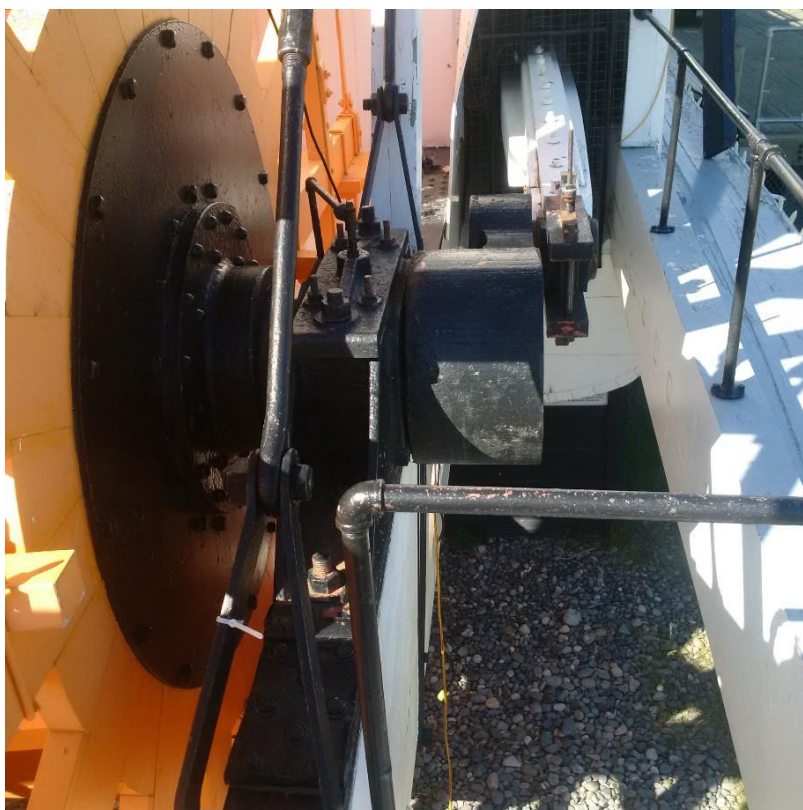


Photo 8: Close-up view of Paddlewheel features.

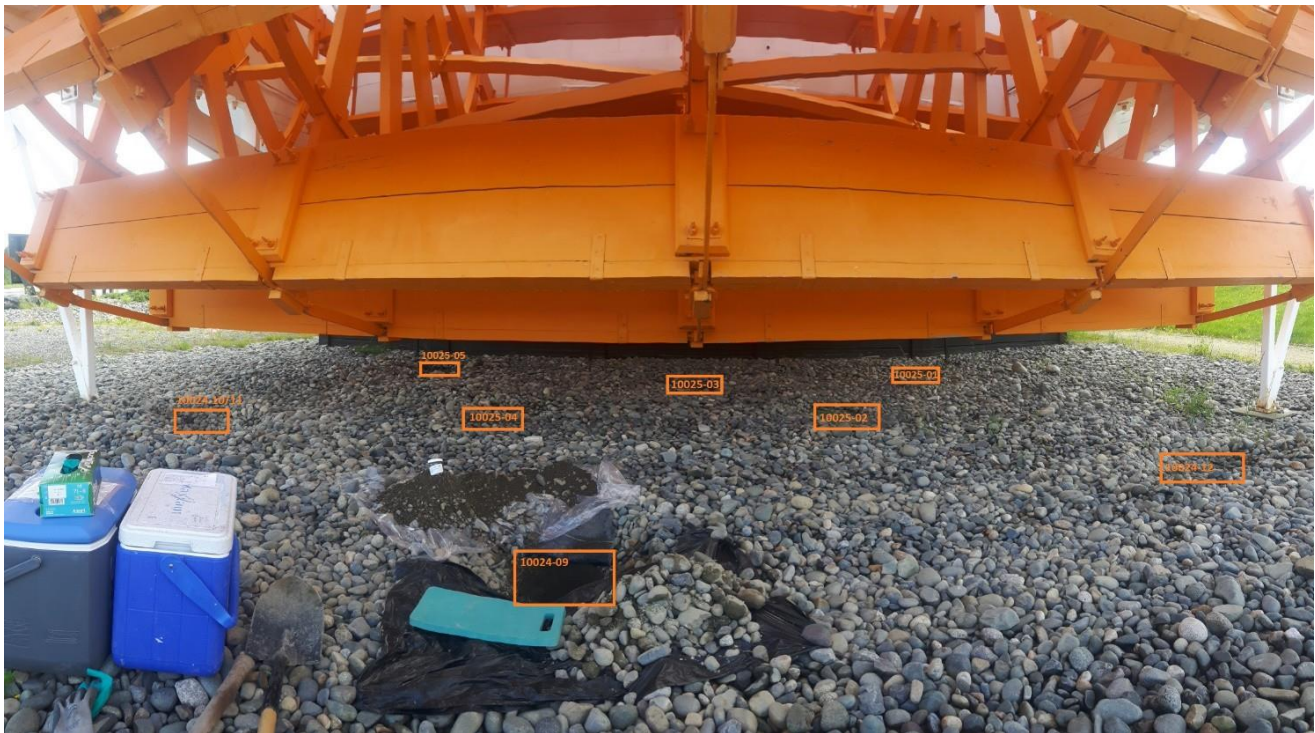


Photo 9: Paddlewheel soil sample locations



Photo 10: Paddlewheel soil sample 10024-09 at 30 cm depth, sand and gravel, some fines.



Photo 11: Paddlewheel soil sample 10024-12



Photo 12: Paddlewheel soil sample 10025-04

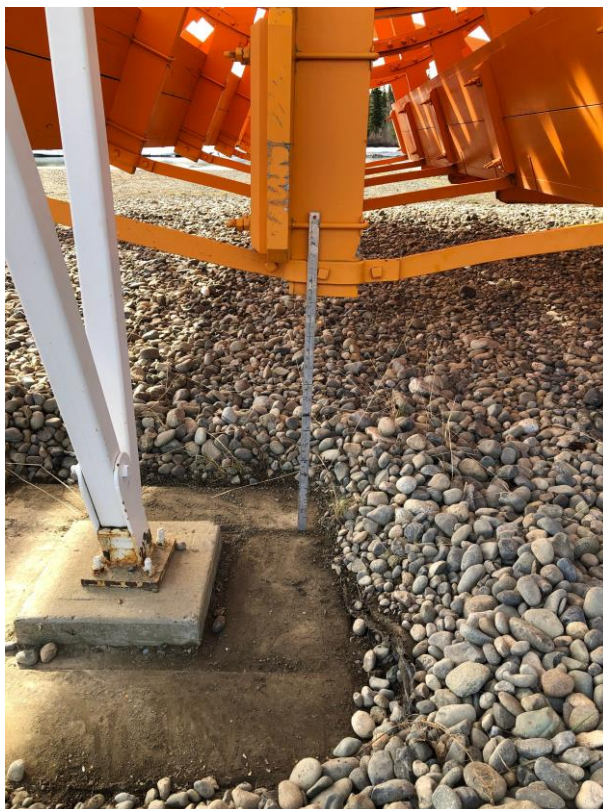


Photo 13: Paddlewheel clearance

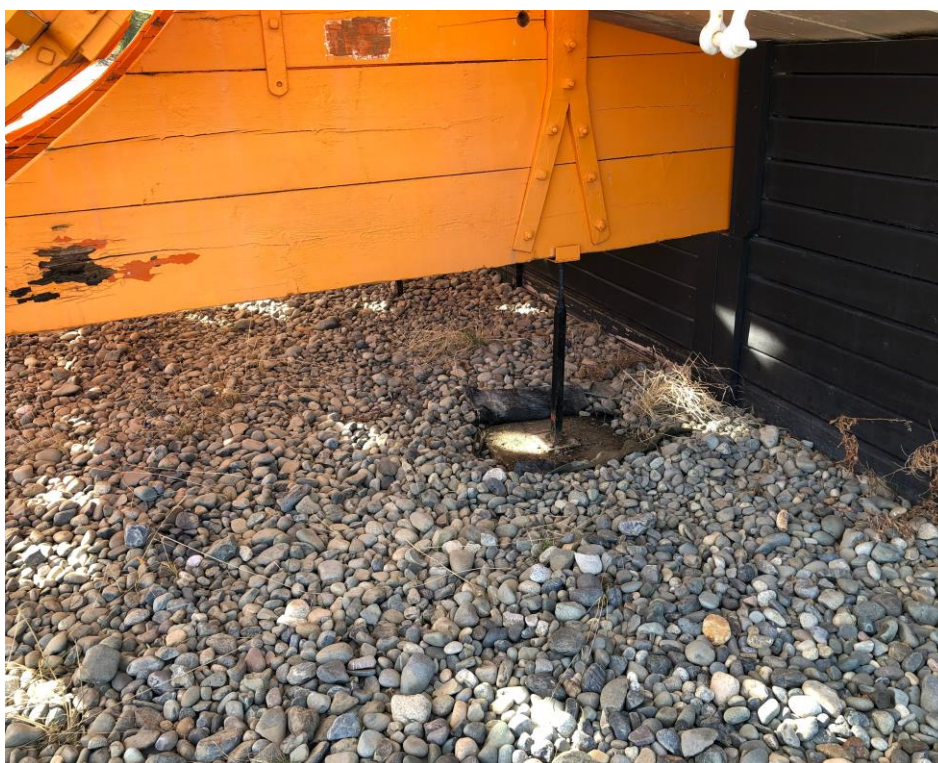


Photo 14: Paddlewheel main rudder



Photo 15: Main rudders and paddlewheel



Photo 16: Main rudder and skirting



Photo 17: Paddlewheel and associated components lead abatement work area



Photo 18: Paddlewheel work area



Photo 19: Paddlewheel work area, looking northwest



Photo 20: Paddlewheel work area, looking southwest

ANNEX B1

**ASSESSMENT OF LEAD BASED
PAINT CONTAMINATION
SS KLONDIKE AND TAKHINI COMPLEX
WHITEHORSE, YUKON**

Project No. 0201-01-15178001

March 2002

**ASSESSMENT OF LEAD BASED
PAINT CONTAMINATION
SS KLONDIKE AND TAKHINI COMPLEX
WHITEHORSE, YUKON**

Prepared by:

EBA ENGINEERING CONSULTANTS LTD.
Whitehorse, Yukon

Submitted To:

Parks Canada
Haines Junction, Yukon

Project No. 0201-01-15178001

March 2002

EXECUTIVE SUMMARY

EBA Engineering Consultants Ltd. (EBA) was retained by Parks Canada to assess the potential for lead contamination at the SS Klondike National Historic Site and the Parks Canada Complex in the Takhini Subdivision, both in Whitehorse, Yukon. The source of the potential lead contamination is the surface deposition of lead based paint from the SS Klondike Sternwheeler, and parts that were stored at the Takhini Complex. The lead based paint has been deposited on the ground surface at these sites in dry form as chips or dust by natural deterioration of the painted surfaces, and as a result of on-going restoration work being conducted at both sites.

Upon the completion of a sampling and analytical testing program, it was determined that, at both sites, there were lead concentrations above background levels. Four samples out of 18 total at the Takhini site tested above Canadian Council of Ministers of the Environment (CCME) numerical standards for lead, and one out of 19 total samples collected at the SS Klondike site tested over CCME numerical standards. However, the concentrations at both sites are below the current numerical regulatory standards of the Yukon Contaminated Sites Regulations.

Risk at both sites was assessed using the CCME National Classification System (NCS) for Contaminated Sites¹. The Takhini Asset Management Compound received a score of 46, and is classified as a Class 3 site of medium low risk potential where action may be required. The SS Klondike received a score of 57, and is classified as a Class 2 site of medium risk potential where action is likely required.

Parks Canada later requested that the assessment at the Takhini Parks Canada Complex be expanded to include other potential environmental concerns at this site; amongst them were asbestos, PCB's, and hydrocarbons. After site visits, it was concluded that these potential contaminants are not present in a form, or in sufficient quantities, to pose a risk to public health and safety.

¹ Report CCME EPC-CS39E March 1992

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APPENDIX B: Norwest Labs Analysis Report

APPENDIX C: Related Borehole Logs

APPENDIX D: NCS Classification Worksheets

1.0 INTRODUCTION

1.1 Authorization

This assessment was completed under the standing offer between EBA Engineering Consultants Ltd. (EBA) and Parks Canada. The SS Klondike National Historic Site and the Takhini Complex are two of the sites in the Yukon where EBA has completed Phase I and II Environmental Site Assessments. A formal workplan was prepared for review prior to the initiation of work on this project. Final authorization to proceed was received from Mr. Dale Hansen during a conference call on August 10, 2001.

This report incorporates and is subject to the attached EBA Environmental Report - General Conditions.

1.2 Objectives

The primary objective of this assessment was to establish the degree of risk that the two sites (SS Klondike and Takhini Complex) pose to the environment, human health, and safety. Recommendations are made herein appropriate to the measured degree of risk, consistent with the Canadian Council of Ministers of the Environment (CCME), and the Canadian Environmental Quality Criteria for Contaminated Sites, 1999.

1.3 Tasks Completed

The tasks completed for this assessment were as follows:

- An initial meeting was held with Parks Canada to discuss environmental concerns and the scope of work for the assessment of each site.
- A work plan was developed to complete the assessments and submitted for approval by Parks Canada.
- Historical aerial photographs were obtained and reviewed for changes in land use over time, and to determine the most probable locations of elevated lead concentrations.
- Records and photographs at the Yukon Archives were reviewed to ascertain restoration dates, work methods employed during the site restorations, the type of restoration work completed, and historical sites conditions.
- A site visit was conducted to visually inspect the sites to determine site terrain, site dynamics, site layout, and to gather photographic documentation.
- Interviews were conducted with current staff knowledgeable of the two sites.
- Surface soil samples were collected from the sites for analytical testing of lead.
- A final report was prepared summarizing the findings and conclusions.

1.4 Site Description

1.4.1 SS Klondike National Historic Site

The SS Klondike National Historic Site is located within the downtown core of Whitehorse, Yukon at the Southeast corner of the intersection of 2nd Avenue and Robert Service Way (South Access Road). The UTM coordinates of the site are 6 730 700 N and 497 500 E in Zone 8, NTS Map Sheet 105D/11. The site is currently under the care of Parks Canada. Apart from the SS Klondike Sternwheeler itself, the site contains a gift shop and interpretive centre with restrooms, a restored barge used for video presentations, and a wood storage and carpenter's shop within a fenced area.

1.4.2 Parks Canada Takhini Complex

The Parks Canada Takhini Complex, also known as the Asset Management Compound, is located in the Takhini Residential Subdivision situated in the geographic centre of Whitehorse, Yukon. The street address of the complex is 26 Normandy Road. The UTM coordinates of the site are 6 733 300 N and 494 900 E in Zone 8, NTS Map Sheet 105D/11. The site is used by Parks Canada as a base for restoration operations at the SS Klondike and other Parks Canada sites. The site contains a large carpenter's shop with some office space and several cold storage facilities. The site is completely fenced in with a locking gate for entry.

2.0 HISTORICAL REVIEW

2.1 Lead Based Paints

The most common uses for lead in paint are as white pigment, and to enhance the glaze and durability of paints. Lead concentrations used in paints have been decreasing since the 1950's. Finally, in 1976, legislation was passed regulating the use of lead in interior paints, and a voluntary agreement was struck with paint manufacturers for exterior paints. The risk of being exposed to lead from paints used on structures painted after 1978 is essentially nil.

Lead is known to affect human health adversely. Lead inactivates the sulfhydryl (SH) group of enzymes necessary for the synthesis of heme, which is the oxygen carrying pigment in the blood. The resulting symptoms of overexposure to lead are a long list of ailments including: damage of the central nervous system, kidneys, and the male reproductive system, weakness in the joints, anemia, brain damage, stunted growth in children, lack of appetite, abdominal pain,

constipation, fatigue, irritability, and headaches, plus numerous birth complications to expectant mothers. Although, these adverse health impacts reduce significantly with reduced exposure time and concentrations, some of these symptoms may manifest themselves even at relatively low levels. These symptoms may go unnoticed for several years before they become noticeable.

Health Canada has observed that the lowest blood lead levels for which symptoms have been observed is 10 µg/dL¹. Children from the ages of 3 to 6 face the highest risk of lead poisoning from paint chips as they commonly ingest soil, which may contain lead dust or paint chips.

2.2 Exposure Pathways

There are four modes by which lead can enter the bloodstream of receptors, these are: (1) direct ingestion of solid lead particles, (2) intake of water contaminated with dissolved phase lead, (3) consumption of plant or animal material contaminated with lead, or (4) inhalation of lead dust.

The fourth mode is most likely to occur only when restoration work is conducted at the sites. An operation such as sandblasting frees lead based paints into an easily mobile dust form. This exposure pathway can be eliminated by using dust masks, and enclosing the workspace with tarpaulins to limit airborne particle movement.

The second mode, intake of contaminated water, is not a concern at the Takhini Site, because the site is far removed from any water bodies. The risk is low at the SS Klondike also, because the intake for the City of Whitehorse water supply is upstream of the site, and dilution would most likely reduce lead concentrations to undetectable levels. Dilution would also assure that the third mode would not be an exposure pathway, as fish would not be exposed to a high enough concentration of lead for it to bio-accumulate and be sent up the food chain.

The most likely exposure pathway would be the first mode. Ingestion of lead based paint chips commonly occurs amongst small children. The risk is higher at the SS Klondike site because sections where the highest lead concentrations are observed, under the paddlewheel, are open to the public. The SS Klondike site is located in a park area where small children are known to frequent the grounds in summer months.

¹ micrograms per decilitre

2.3 Airphotos

Airphotos for this assessment were studied for the years: 1946, 1963, 1965, 1967, 1971, 1973, 1976, 1978, 1981, 1985, 1988, 1989, 1992, and 1995.

2.3.1 SS Klondike National Historic Site

The airphotos indicate the area where the SS Klondike is presently located was originally part of a ramshackle residential area known as South Whiskey Flats. The SS Klondike was relocated from its former site at the old Whitehorse Shipyards to the present site in 1966; this is shown in the 1967 airphoto. The 1967 airphoto shows that some remnants of South Whiskey Flats were visible, but most of the buildings had been removed. The 1971 airphoto shows the completion of a new road running parallel to the SS Klondike and located much closer to the boat than Robert Service Way is presently located. At this time, some of the adjacent land was being developed in Rotary Park. Fencing around the boat first appears in the 1973 airphoto, this also was the same time that the Robert Campbell Bridge was constructed over the Yukon River. The next major indications of site changes are seen in the 1976 airphoto. In this airphoto activities such as site clearing, and construction are evident. As well, the positions of both the boat and the South Access Road (now Robert Service Way) have changed from the 1973 airphoto. The boat was moved approximately 100 m north (downstream), and the road was moved further away from the SS Klondike closer to the railway tracks (refer to Figure 1). Later airphotos show little change when compared to the present site layout. The only major change at the site is the restoration of the SS Klondike's barge, which is apparent in the 1985 airphoto.

2.3.2 Parks Canada Takhini Complex

The complex is shown on the earliest dated airphotos from 1946. It was originally part of a military base known as Camp Takhini. The 1989 airphoto shows a road running through the complex. The 1965 airphoto shows the present complex was once part of a much larger fenced compound that included buildings along the Alaska Highway as far as the present location of the Department of Indian and Northern Affairs Forestry Building. The 1971 airphoto shows that the fence around the large compound was removed, and some debris is seen in the northwest corner of the present Parks Canada Complex. It is noted in chronologically successive airphotos that the surrounding military/governmental buildings were mostly removed over the years. The 1989 airphoto shows the Parks Canada Complex approximately as it is today (see Figure 2). Boat parts, possibly from the SS Klondike, are shown in the 1992 airphoto to be stored along the west fence and northwest corner of the property. Later airphotos show very little change in the site.

2.4 Archives

Information with regards to lead paint use and restoration work at the SS Klondike was very limited. However, the archive records did contain some anecdotal accounts of shipwrights adding extra lead to the paints used on the Sternwheelers. Accounts indicate that the paint with the highest lead content tended to be the orange paint used on the paddlewheel of the ships. The reason for the higher lead content was to enhance the durability and elastic nature of the paint, which was constantly subjected to hydrodynamic forces.

An archive photo (Figure 3: SS Klondike early 1960's) of the SS Klondike from the early 1960's shows that most of the paint was intact. The SS Klondike had been dry docked at its former location (Whitehorse Shipyards) from approximately 1955 to 1966. The SS Klondike was originally constructed in 1937, thus any paints deposited at the present SS Klondike National Historic Site and the Parks Canada Takhini Complex would most likely be paint from the late 1930's to early 1950's, a time when lead concentrations in paints were very high, when compared to present concentrations.

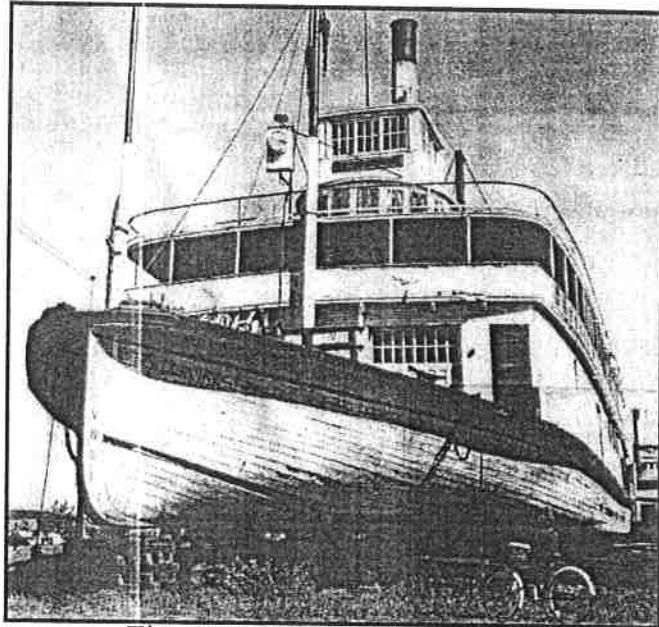


Figure 3: SS Klondike early 1960's

No relevant archive material was available for the Takhini Complex.

2.5 Interviews

There is no one presently associated with site that has recollection of former contractors, shipwrights, or managers associated with the site, and consequently, these people could not be interviewed. Records and documents relating to restoration work were unavailable.

An informal interview was conducted with Mr. Joe Mason during the initial site visit. Mr. Mason is the chief carpenter and asset maintenance manager for the SS Klondike National Historic Site. He has been associated with the sites since 1989, the longest of any of the Parks Canada staff currently associated with the sites. Mr. Mason stated that most of the restoration

work was completed before he started working with Parks Canada. However, sanding and repainting of the exterior and interior surface of the SS Klondike has been on-going during his tenure maintenance manager. He expressed his concern about the wind deposition of sanded-off paint dust and the surface deposition of paint chips. Many parts of the SS Klondike were removed from the ship and transported to the Takhini Complex to be worked on there. The boat parts, according to Mr. Mason, were stored at various locations at the Takhini site. Mr. Mason also provided an analytical laboratory test for lead in paint completed at Norwest Laboratories in Edmonton. These results have been attached in Appendix B. The analysis showed very high concentrations of lead in the paint, as high as 303,000 ppm.

2.6 Site Visits

Site visits were made coinciding with site sampling during the course of the assessment. Lead paints were visually observed at both sites. The ground surface at the SS Klondike contained sporadic depositions of paint chips under painted areas and at approximately a three metre offset around the ship. The area with the highest concentration of paint chips was the area under the paddlewheel. The highest concentration of paint chips visually observed was at the Takhini Complex. These areas of high deposition were situated immediately in and around areas where deteriorating parts of the SS Klondike were stored. Figure 4 shows typical surface paint chip deposition at the Takhini site, and corresponds with sample 15178-N31W42 (refer to Figure 6 for the exact location).



Figure 4: Typical Surface Paint Chip Deposition at the Takhini Site

3.0 SITE CONDITONS

3.1 SS Klondike National Historic Sites

Based on borehole logs from the area (provided in Appendix C), the site is founded on Yukon River alluvial deposits and, before the construction of the Whitehorse Rapids Dam, may have been subjected to flooding. The stratigraphic profile consists of sequences of silty sand and gravel that become increasingly coarser with depth. This is followed by sandy gravel that also becomes coarser to an indeterminate depth. The average pH of the soil found at the site is approximately 8.5 (slightly acid buffering), as indicated in the test results attached in Appendix A. Prevailing winds at the site come from the south. The average annual rainfall for the Whitehorse area is 159.5 mm, as provided by the Environment Canada website.

3.2 Parks Canada Takhini Complex

The surficial soils at the Takhini site consists of eolian sands overlying glaciolacustrine silt, based on evidence gathered during work on other EBA projects close to the site. Prevailing winds at the site come from the southwest. The average pH of the soil found at the site is approximately 8.5 (slightly acid buffering).

4.0 FIELD AND LABORATORY TESTING PROGRAM

4.1 Site Sampling Methodology

4.1.1 SS Klondike National Historic Site

The focus of the field lead sampling program was in the immediate area around the ship. As mentioned previously, the SS Klondike was located approximately 100 m south (upstream) for a period of time. This area was later cleared, levelled, resurfaced with granular basecourse, and paved. Therefore, it was felt that sampling in this area would not be necessary, as any surface lead deposition would have been encapsulated during the parking lot construction process.

A sampling grid was devised to assess surface lead deposition around the ship. Sampling was completed in grids with North/South increments of 10 m and East/West increments of 5 m. A stake was set up 5 m north and 1.5 m west of the most northern extremity of the paddlewheel of the boat. All sample locations were then named relative to this starting point, for example, a

sample that was taken 20 m south and 10 m east of the starting point was named 15178-S20E10 (refer to Figure 5 for sample locations).

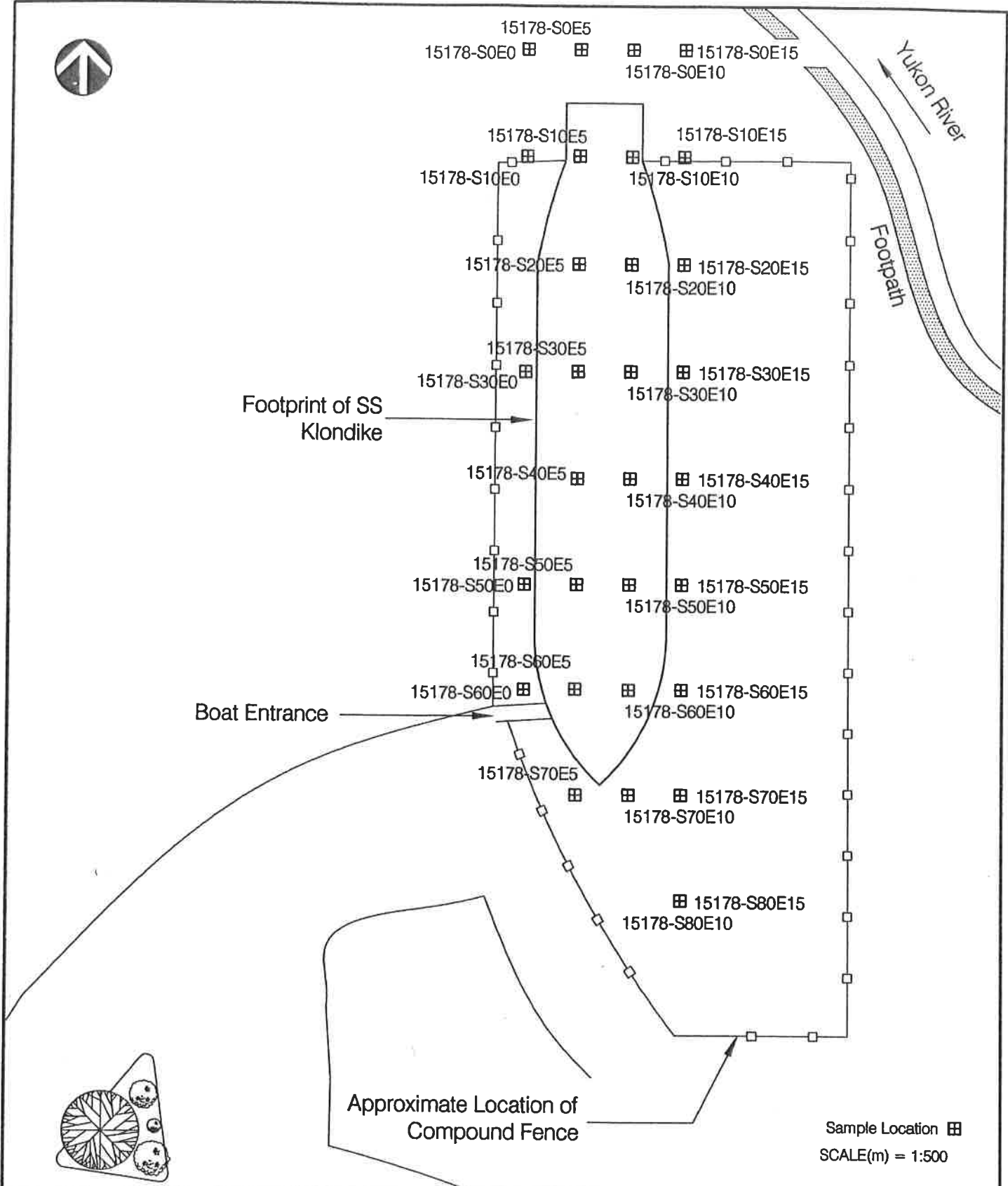
Solid lead is not very mobile, and does not migrate well through soils. The Whitehorse area receives relatively small amounts of rainfall, thus slowing down the mobility of solid lead even further. Many areas where the lead was observed to be deposited on the ground were sheltered. The lead was also deposited over a relatively short period of time for mobility to occur, approximately 30 years. Sampling of the top 0.15 to 0.3 m of the soil at the site was seen as adequate for determining lead concentrations at this site.

4.1.2 Parks Canada Takhini Complex

A similar approach was used at the Takhini Complex as was used at the SS Klondike site. Sampling occurred in the top 0.15 to 0.3 m of the soil at the site, and the southeast corner of the site was used as the starting point for sampling. However, the site did not lend itself well to a grid sampling approach, and a different technique was employed. Areas on the site where boat parts were known to be stored were specifically targeted. The sampling locations were then referenced to the starting point. A few samples were taken from areas where other potential sources of lead were observed to be present, and one sample was taken from an area thought to be free of lead to assess background conditions at the site (refer to Figure 6 for sample locations).

4.2 Analytical Testing Protocol

Groups of samples were collected and sent to Aurora Laboratory Services (ALS) in Vancouver. Analysis was requested on a select number of samples to give initial indications of contamination at the sites. The remainder of the samples were held for possible future analysis, if required, and would be properly disposed of upon completion of the project. The laboratory was requested to grind and mix the samples to avoid inconsistencies in analysis, as the goal of the lead analysis was to assess soil matrix lead concentrations and not sorbed concentrations. Further specifics on laboratory methodologies used for the lead analysis have been included in the attached ALS chemical analysis report.



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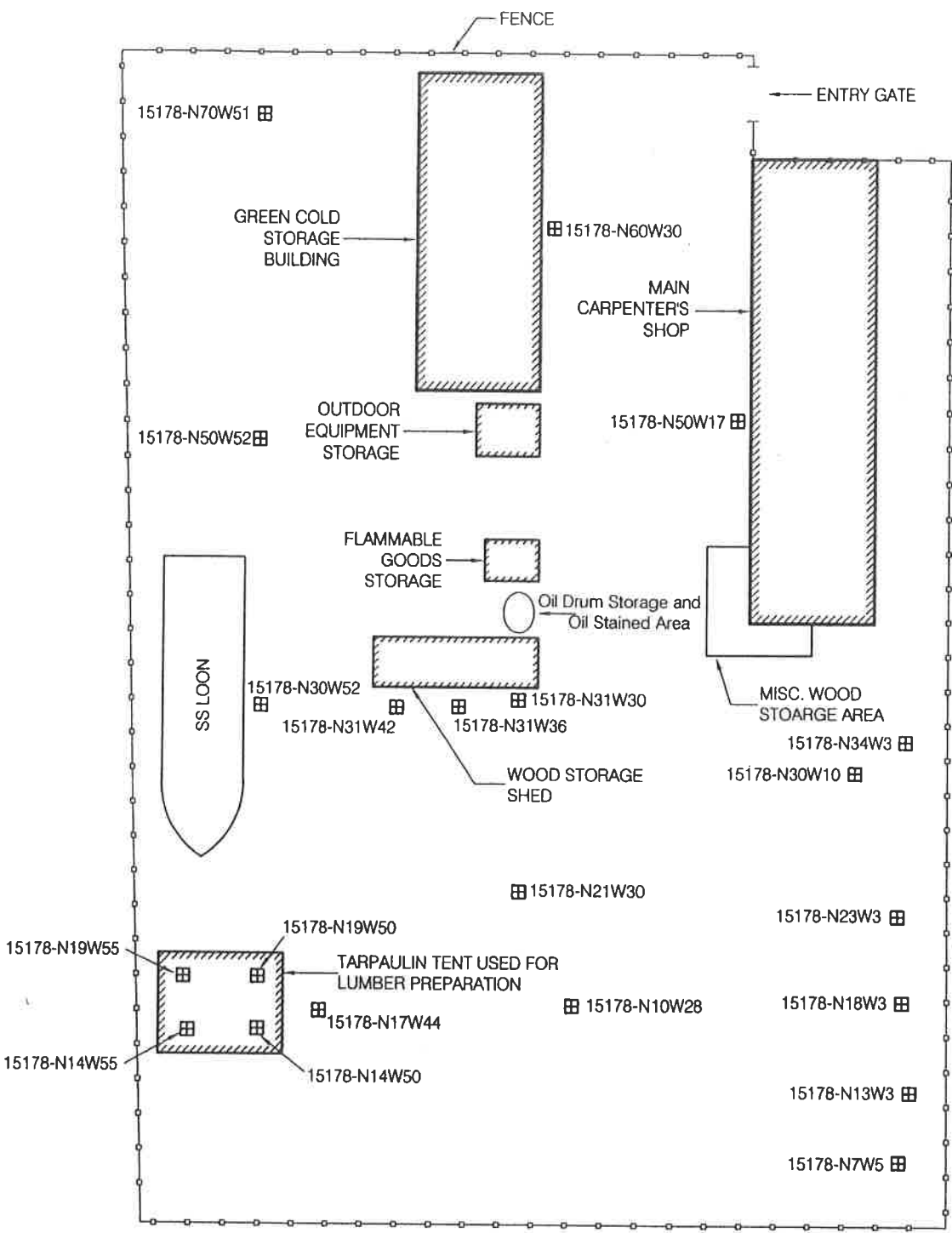
PROJECT: ASSESSMENT OF LEAD BASED PAINT CONTAMINATION
SS KLONDIKE AND TAKHINI COMPLEX - WHITEHORSE, YUKON

CLIENT: PARKS CANADA

TITLE: SITE PLAN OF SS KLONDIKE
SHOWING SAMPLE LOCATIONS


DATE: FEB. 2002 DWN. KSD CHKD. DJW

FILE NO. 0201-01-15178001 DRWG. FIGURE 5



▣ Sample Location

SCALE = 1 : 500

 EBA Engineering Consultants Ltd.		PROJECT ASSESSEMENT OF LEAD BASED PAINT CONTAMINATION SS KLONDIKE AND TAKHINI COMPLEX - WHITEHORSE, YUKON	
CLIENT PARKS CANADA		TITLE SITE PLAN OF PARKS CANADA TAKHINI COMPLEX	
DATE	FEB. 2002	OWN.	KSD/JSB
CHKD.	DJW	FILE NO.	0201-01-15178001
		DRWG.	FIGURE 6

5.0 DISCUSSION

5.1 Analytical Test Results

Analytical results indicate that some soil samples collected from the each site exceed the numerical parkland use guidelines of 140 ppm as set by Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (1999). All samples are presented in Table 1, exceedances of CCME guidelines are highlighted with bold text, sample locations are indicated in Figures 5 and 6. Background samples were also collected at 15178-N70W51 and 15178-S0E0. These samples came from one of the extreme corners of the sites, and show relatively low lead concentrations when compared to other samples; thus they most closely represent naturally occurring lead concentrations indicative of soil found at the site. It is noted that while Yukon Contaminated Sites Regulations (CSR) do not apply on federal land, lead concentrations in all samples were below the most stringent applicable Yukon CSR numerical standard (500 ppm, Human Health Protection, Intake of contaminated soil).

Table 1: Summary of Analytical Results

Sample ID	Site	Date	Lead Concentration (ppm)	CCME Guideline for Lead (ppm)
15178-N7W5	Takhini	Sep. 4, 2001	61	140
15178-N10W28	Takhini	Sep. 4,2001	188	140
15178-N14W50	Takhini	Sep. 4,2001	22	140
15178-N17W44	Takhini	Sep. 4,2001	18	140
15178-N18W3	Takhini	Sep. 4,2001	55	140
15178-N14W55	Takhini	Sep. 4, 2001	30	140
15178-N19W50	Takhini	Sep. 4, 2001	26	140
15178-N19W55	Takhini	Sep. 4, 2001	10	140
15178-N21W30	Takhini	Sep. 4, 2001	31	140
15178-N30W10	Takhini	Sep. 4, 2001	78	140
15178-N30W52	Takhini	Sep. 4, 2001	269	140
15178-N31W30	Takhini	Sep. 4, 2001	38	140
15178-N31W42	Takhini	Sep. 4, 2001	31	140
15178-N34W3	Takhini	Sep. 4, 2001	174	140
15178-N50W17	Takhini	Sep. 4, 2001	50	140

(Table 1 cont'd)

15178-N50W52	Takhini	Sep. 4, 2001	27	140
15178-N60W30	Takhini	Sep. 4, 2001	208	140
15178-N70W51	Takhini	Sep. 4, 2001	22	140
15178-S0E0	SS Klondike	Aug 28,2001	15	140
15178-S0E15	SS Klondike	Aug 28,2001	32	140
15178-S10E0	SS Klondike	Aug 28,2001	29	140
15178-S10E5	SS Klondike	Aug 28,2001	196	140
15178-S10E10	SS Klondike	Aug 28,2001	12	140
15178-S10E15	SS Klondike	Aug 28,2001	78	140
15178-S20E5	SS Klondike	Aug 29,2001	21	140
15178-S20E10	SS Klondike	Aug 29,2001	32	140
15178-S30E0	SS Klondike	Aug 28,2001	25	140
15178-S30E10	SS Klondike	Aug 29,2001	20	140
15178-S30E15	SS Klondike	Aug 28,2001	45	140
15178-S40E5	SS Klondike	Aug 29,2001	53	140
15178-S50E0	SS Klondike	Aug 28,2001	20	140
15178-S50E10	SS Klondike	Aug 29,2001	19	140
15178-S50E15	SS Klondike	Aug 28,2001	49	140
15178-S60E0	SS Klondike	Aug 28,2001	24	140
15178-S70E5	SS Klondike	Aug 28,2001	134	140
15178-S70E15	SS Klondike	Aug 28,2001	38	140
15178-S80E10	SS Klondike	Aug 28,2001	56	140

Note: Bold indicates an exceedance of CCME Canadian Environmental Quality Guidelines (1999).

5.2 Risk Assessment

The CCME National Classification System (NCS) for Contaminated Sites was used to assess the risk these sites pose. Other factors that are not addressed in the NCS classification system have also been noted.

The NCS uses known site conditions and contamination factors, and assigns them points based on a defined numerical scale. Some interpretation is required, and estimates are permissible. The following information was used to determine the classification of the site:

- Borehole Logs from previous reports completed in the area of the sites
- Rainfall data acquired through the Environment Canada Website
- Lead Concentrations from the field sampling and lab testing programme
- Topographic Information from topography maps
- Depositional Information from the site visits and airphotos
- Distances to water bodies and the type of adjacent land use from area maps.

5.2.1 SS Klondike National Historic Site

The SS Klondike site received an NCS score of 57, and is a Class 2 site of medium risk potential. The current score assigned to the site is approximately in the middle of the range for Class 2 sites. As more paint chips are deposited on the site, lead concentrations will most probably increase over time, barring changes in site conditions and on-site practices. However, it is anticipated that the rate of accumulation at the site will diminish as older parts of the boat are replaced, as is currently occurring at the site. The current classification of the site accurately reflects the severity of the potential environmental risks; future clean up is likely required, but is not imperative at this time.

5.2.2 Parks Canada Takhini Complex

The Takhini site received an NCS score of 46, and is a Class 3 site with medium low risk potential, and action may be required. As with the SS Klondike site, the standards concentrations are below the Yukon Contaminated Sites Regulations numerical standards. There is a possibility of future exceedances occurring under present work practices. Lead paint chips will accumulate on the site as more boat parts are stored at the site, and more paint chips are deposited on the surface. The NCS classification is appropriate for this site as the site may require a cleanup in the future under prevailing conditions. The NCS classification should be reviewed if the site conditions or land use change. This is particularly important for this site, as risk potential will change to medium risk at a score of 50.

6.0 ADDITIONAL ENVIRONMENTAL CONCERNS

At the request of Parks Canada, EBA examined the possibility of other contaminant issues being found at the sites. Extra site visits were made at both sites. The only environmental issue at the SS Klondike National Historic Site continued to be lead contamination. Other

potential contaminant issues at the Takhini Complex included hydrocarbons, PCB's, and asbestos; these are discussed in the following sections.

6.1 Asbestos

Possible asbestos insulation was noted in the Main Carpenter's Shop in what appeared to be an old steam pipe conduit located below the floor, along the eastern side of the building. A sample was sent to ALS in Vancouver for laboratory analysis, the result confirmed that it was not asbestos (refer to Appendix A). Asbestos was also observed in the Green Cold Storage Building as asbestos slate board surrounding an opening in the ceiling (see Figure 5). A sample of this slate board could not be collected; however, experience at other sites suggests that it most likely contains asbestos. Exposure to asbestos fibres can cause lung damage (asbestosis), however, at this site the potential for airborne particles appears limited. The asbestos in the cold storage building is exposed; the slate board is not friable and, therefore, is not expected to have contributed significant quantities of airborne particle. However, since the asbestos is no longer performing a useful function it could be removed and disposed of accordingly.

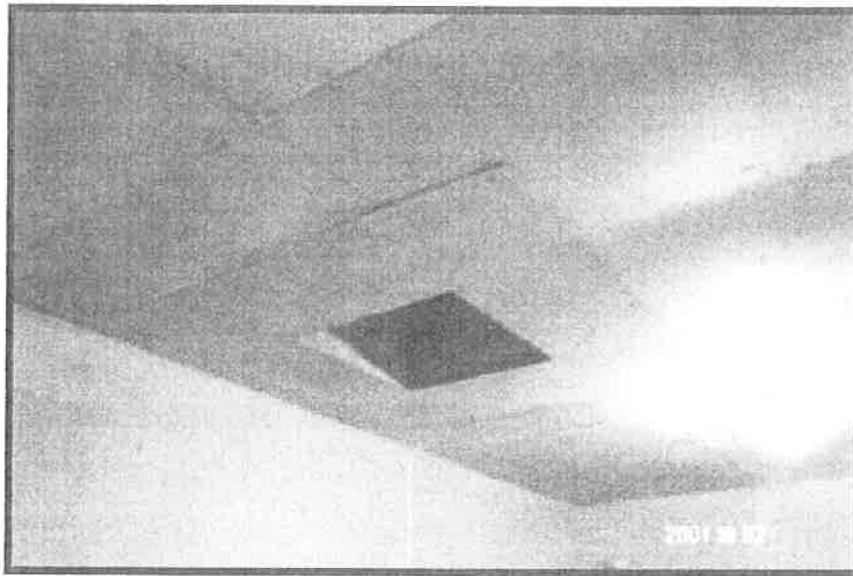


Figure 7: Asbestos Slate Board in the Cold Storage Building

6.2 Hydrocarbons

Several empty 45-gallon drums are stored within the site. These drums are used mainly for the storage of hydrocarbon-based products. Surface hydrocarbon staining was noted only in one area between the wood storage shed and the outdoor equipment storage shed. The stained area, shown in Figure 6, was a small patch of soil stained with waste oil. Poor storage and handling

practices appear to have contributed to the spillage of the waste oil. A surface test hole was excavated in the middle of the affected area. It is estimated that the volume of affected soil is under one cubic metre, and is not considered to be an environmental concern. This small amount of contaminated soil will be naturally attenuated over time, barring future spillage at this location. If a more timely solution is sought, the other option is to excavate and dispose of the affected soil at a local commercial soil treatment facility.

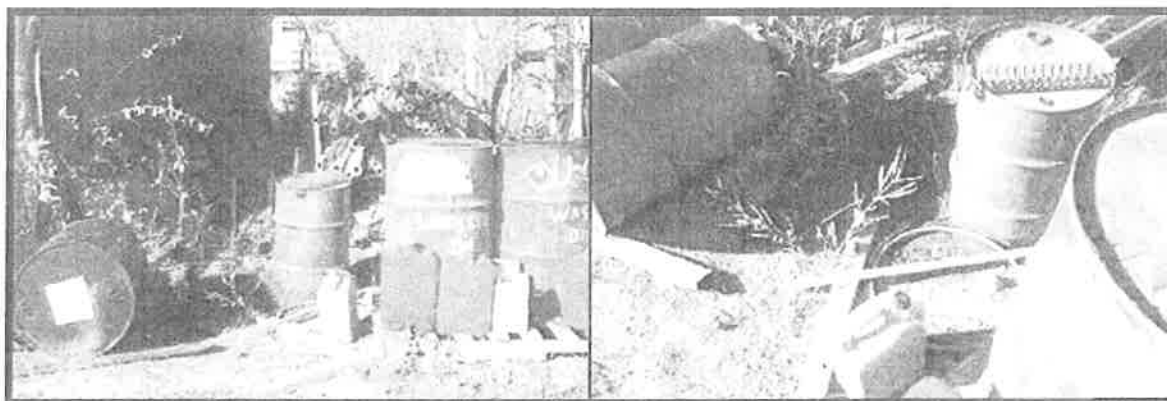


Figure 8: Area of Hydrocarbon Staining

6.3 PCB's

It is highly possible that the light ballasts used in fluorescent lights at all building at the Takhini Assets Management compound are pre-1978 and have PCB's. Joe Mason, the Parks Canada staff member in charge of maintenance, indicated that some of these light ballasts have been replaced with PCB-free ballasts. There were very few fluorescent lighting fixtures identified within the Takhini Compound, and replacement and proper disposal of the ballasts through regular maintenance is considered adequate for environmental concerns.

7.0 CONCLUSIONS

Lead is present in the top 0.3 m of the soil at both the SS Klondike National Historic Site and the Parks Canada Takhini Complex. The concentration of lead at both sites varies; however the highest lead concentrations in samples at both sites exceed the CCME Canadian Environmental Quality Guidelines (140 ppm). The samples with these elevated concentrations are 15178-N10W28 (Takhini Complex: Centre of South half of Complex), 15178-N34W3 (Takhini Complex: Area South of Main Carpenter's Shop), 15178- N30W52 (Takhini Complex: Beside SS Loon), 15178- N60W30 (Takhini Complex: Beside Green Cold Storage Building), and

15178-S10E5 (SS Klondike: Area under Paddlewheel section). Sample 15178-S70E5 (SS Klondike: Bow area of ship) was just below the numerical standard.

The only other environmental concern associated with these sites is asbestos found at the Takhini Complex, as slate board in the ceiling of the Cold Storage Building.

The NCS has been used to evaluate the risks associated with each site. The detailed evaluation forms are presented in Appendix D. The SS Klondike received a score of 57 indicating the contaminants present a "medium risk potential". The Takhini Complex received a score of 46 indicating it is a "medium low risk potential".

8.0 RECOMMENDATIONS

The potential for continued lead accumulation at the sites is possible. Therefore, the following recommendations are presented:

SS Klondike Site

1. Visible paint chips should be cleaned from the site. This should be done by manual raking, or by use of a vacuum truck.
2. The top 0.3 m of soil should be removed under the paddlewheel of the boat, as that area exceeds CCME guidelines for lead.
3. If work is initiated on the ship, such that it disturbs the paint, then polyethylene sheets should be placed on the ground, and the paint chips should be collected and disposed at a site authorized to handle such waste.
4. A dust mask and protective coverings should be worn when refinishing and repainting surfaces.
5. A sealing compound may be applied to surfaces before painting to keep the old lead paint intact and to seal it if only minor repairs are required to more sensitive parts of the ship.

Takhini Site

1. Ship parts known to contain lead paints should be stored at a designated and sheltered location at the site. The current arrangement finds parts spread throughout the site and stored sporadically in random locations.
2. Where ship parts are stored, the ground surface should be covered. Polyethylene sheets, tarpaulin, or plywood boards may be used.

3. Visible paint chips should be cleaned from the site. This should be done by manual raking, or by use of a vacuum truck.
4. A Phase III Assessment of the site should be conducted to delineate the extent of the lead contamination. This would include a more thorough and focused sampling pattern targeting areas where high lead concentrations were observed. Currently the areas identified with high lead concentrations are the areas in the vicinity of samples 15178-N10W28, 15178-N34W3, 15178-N30W52, and 15178-N60W30 in the top 0.3 m of soil.
5. The asbestos at the site is no longer performing a required function and should be removed by a qualified contractor.

9.0 CLOSURE

This report has been prepared for the exclusive use of Parks Canada, for the purposes as described in Section 1 of this report. The report has been prepared in accordance with generally accepted geo-environmental practices. Additional information regarding the use of this report is presented in the EBA Environmental Report – General Conditions, which form a part of this report.


EBA trusts this report meets your requirements at this time. If you have questions or require additional information please contact the undersigned.

Respectfully submitted,
EBA Engineering Consultants Ltd.

Reviewed by:



Kim S. Dhillon, B.A.Sc., E.I.T.
Junior Engineer



Donald J. Wilson, B.Sc.
Senior Environmental Scientist

This report incorporates and is subject to these "General Conditions".

A.1 USE OF REPORT

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of EBA. Additional copies of the report, if required, may be obtained upon request.

A.2 LIMITATIONS OF REPORT

This report is based solely on the conditions which existed on site at the time of EBA's investigation. The client, and any other parties using this report with the express written consent of the client and EBA, acknowledge that conditions affecting the environmental assessment of the site can vary with time and that the conclusions and recommendations set out in this report are time sensitive.

The client, and any other party using this report with the express written consent of the client and EBA, also acknowledge that the conclusions and recommendations set out in this report are based on limited observations and testing on the subject site and that conditions may vary across the site which, in turn, could affect the conclusions and recommendations made.

The client acknowledges that EBA is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the client.

A.2.1 Information Provided to EBA by Others

During the performance of the work and the preparation of this report, EBA may have relied on information provided by persons other than the client. While EBA endeavours to verify the accuracy of such information when instructed to do so by the client, EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

A.3 LIMITATION OF LIABILITY

The client recognizes that property containing contaminants and hazardous wastes creates a high risk of claims brought by third parties arising out of the presence of those materials. In consideration of these risks, and in consideration of EBA providing the services requested, the client agrees that EBA's liability to the client, with respect to any issues relating to contaminants or other hazardous wastes located on the subject site shall be limited as follows:

- (1) With respect to any claims brought against EBA by the client arising out of the provision or failure to provide services hereunder shall be limited to the amount of fees paid by the client to EBA under this Agreement, whether the action is based on breach of contract or tort;
- (2) With respect to claims brought by third parties arising out of the presence of contaminants or hazardous wastes on the subject site, the client agrees to indemnify, defend and hold harmless EBA from and against any and all claim or claims, action or actions, demands, damages, penalties, fines, losses, costs and expenses of every nature and kind whatsoever, including solicitor-client costs, arising or alleged to arise either in whole or part out of services provided by EBA, whether the claim be brought against EBA for breach of contract or tort.

EBA Engineering Consultants Ltd. (EBA)
ENVIRONMENTAL REPORT – GENERAL CONDITIONS

A.4 JOB SITE SAFETY

EBA is only responsible for the activities of its employees on the job site and is not responsible for the supervision of any other persons whatsoever. The presence of EBA personnel on site shall not be construed in any way to relieve the client or any other persons on site from their responsibility for job site safety.

A.5 DISCLOSURE OF INFORMATION BY CLIENT

The client agrees to fully cooperate with EBA with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The client acknowledges that in order for EBA to properly provide the service, EBA is relying upon the full disclosure and accuracy of any such information.

A.6 STANDARD OF CARE

Services performed by EBA for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

A.7 EMERGENCY PROCEDURES

The client undertakes to inform EBA of all hazardous conditions, or possible hazardous conditions which are known to it. The client recognizes that the activities of EBA may uncover previously unknown hazardous materials or conditions and that such discovery may result in the necessity to undertake emergency procedures to protect EBA employees, other persons and the environment. These procedures may involve additional costs outside of any budgets previously agreed upon. The client agrees to pay EBA for any expenses incurred as a result of such discoveries and to compensate EBA through payment of additional fees and expenses for time spent by EBA to deal with the consequences of such discoveries.

A.8 NOTIFICATION OF AUTHORITIES

The client acknowledges that in certain instances the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

A.9 OWNERSHIP OF INSTRUMENTS OF SERVICE

The client acknowledges that all reports, plans, and data generated by EBA during the performance of the work and other documents prepared by EBA are considered its professional work product and shall remain the copyright property of EBA.

A.10 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by EBA shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by EBA shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA's instruments of professional service will be used only and exactly as submitted by EBA.

The Client recognizes and agrees that electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

ANNEX B2

SS Klondike Soil Sampling for Lead Paint Residue – Paddlewheel area

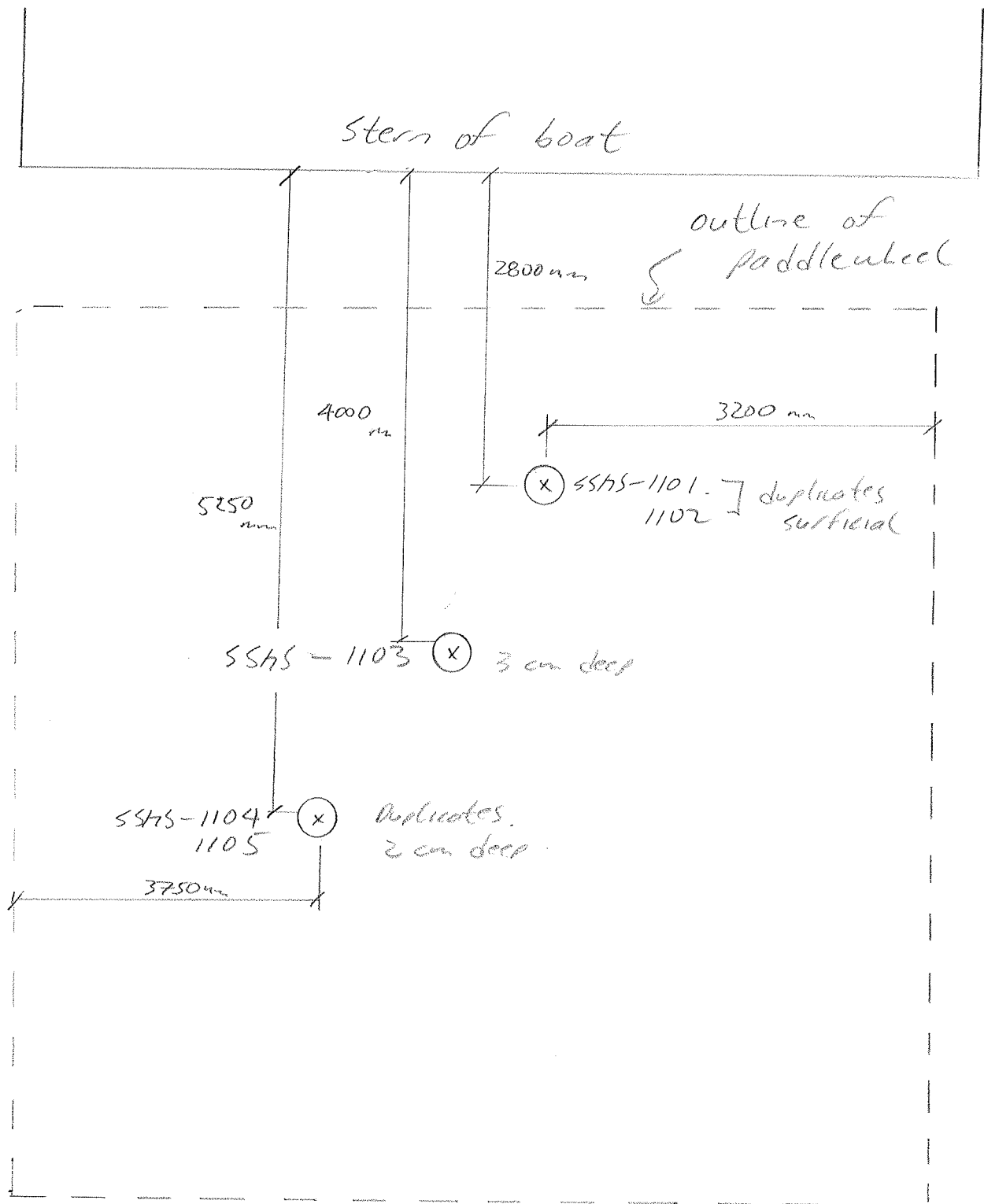
August 1, 2011



Overview



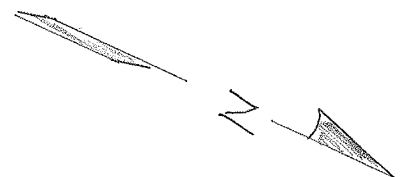
Sample Locations



SS Hlandike Soil Sampling
Paddletubed Area

Scale approx 1cm = 500mm

Aug 1, 2011





PARKS CANADA AGENCY
ATTN: Hugh Copland
Yukon Field Unit
205 - 300 Main Street
Whitehorse YT Y1A 4T2

Date Received: 29-AUG-11
Report Date: 12-SEP-11 15:59 (MT)
Version: FINAL

Client Phone: 867-667-3902

Certificate of Analysis

Lab Work Order #: L1050958
Project P.O. #: NOT SUBMITTED
Job Reference: SSK-PG SOILS
C of C Numbers:
Legal Site Desc:

STEFANIE TEO
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1050958-1 SOIL 01-AUG-11 12:00 SSKS-1101	L1050958-2 SOIL 01-AUG-11 12:00 SSKS-1102	L1050958-3 SOIL 01-AUG-11 12:00 SSKS-1103	L1050958-4 SOIL 01-AUG-11 12:00 SSKS-1104	L1050958-5 SOIL 01-AUG-11 12:00 SSKS-1105
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	3.88	3.86	4.22	5.13	4.63
	pH (1:2 soil:water) (pH)	8.41	8.32	8.29	8.29	8.19
Metals	Lead (Pb) (mg/kg)	21.0	17.5	103	935	3350
Volatile Organic Compounds	Benzene (mg/kg)					
	Ethylbenzene (mg/kg)					
	Methyl t-butyl ether (MTBE) (mg/kg)					
	Styrene (mg/kg)					
	Toluene (mg/kg)					
	ortho-Xylene (mg/kg)					
	meta- & para-Xylene (mg/kg)					
	Xylenes (mg/kg)					
	Surrogate: 4-Bromofluorobenzene (SS) (%)					
	Surrogate: 1,4-Difluorobenzene (SS) (%)					
Hydrocarbons	F1 (C6-C10) (mg/kg)					
	F1-BTEX (mg/kg)					
	F2 (C10-C16) (mg/kg)					
	F2-Naphth (mg/kg)					
	F3 (C16-C34) (mg/kg)					
	F3-PAH (mg/kg)					
	F4 (C34-C50) (mg/kg)					
	F4G-SG (mg/kg)					
	Volatile Hydrocarbons (VH6-10) (mg/kg)					
	VPH (C6-C10) (mg/kg)					
	Chrom. to baseline at nC50					
	Surrogate: 3,4-Dichlorotoluene (SS) (%)					
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)					
	Acenaphthylene (mg/kg)					
	Anthracene (mg/kg)					
	Benzo(a)anthracene (mg/kg)					
	Benzo(a)pyrene (mg/kg)					
	Benzo(b)fluoranthene (mg/kg)					
	Benzo(b+j+k)fluoranthene (mg/kg)					
	Benzo(g,h,i)perylene (mg/kg)					
	Benzo(k)fluoranthene (mg/kg)					
	Chrysene (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1050958-6 SOIL 26-AUG-11 13:30 PGS-1101	L1050958-7 SOIL 26-AUG-11 13:35 PGS-1102	L1050958-8 SOIL 26-AUG-11 13:35 PGS-1103	L1050958-9 SOIL 26-AUG-11 13:45 PGS-1104	L1050958-10 SOIL 26-AUG-11 13:45 PGS-1105	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	8.48	19.4	9.34	34.2	34.3
	pH (1:2 soil:water) (pH)					
Metals	Lead (Pb) (mg/kg)					
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Ethylbenzene (mg/kg)	<0.015	<0.015	<0.015	<0.015	<0.015
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20	<0.20	<0.20	<0.20	<0.20
	Styrene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Toluene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	ortho-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	meta- & para-Xylene (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Xylenes (mg/kg)	<0.075	<0.075	<0.075	<0.075	<0.075
	Surrogate: 4-Bromofluorobenzene (SS) (%)	72	90	94	81	97
	Surrogate: 1,4-Difluorobenzene (SS) (%)	87	93	88	81	83
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10	<10	<10	<10	<10
	F1-BTEX (mg/kg)	<10	<10	<10	<10	<10
	F2 (C10-C16) (mg/kg)	<30	46	<30	<30	<30
	F2-Naphth (mg/kg)	<30	46	<30	<30	<30
	F3 (C16-C34) (mg/kg)	<50	481	<50	197	198
	F3-PAH (mg/kg)	<50	481	<50	197	198
	F4 (C34-C50) (mg/kg)	<50	91	<50	128	136
	F4G-SG (mg/kg)		<500		510	540
	Volatile Hydrocarbons (VH6-10) (mg/kg)	<100	<100	<100	<100	<100
	VPH (C6-C10) (mg/kg)	<100	<100	<100	<100	<100
	Chrom. to baseline at nC50	YES	NO	YES	NO	NO
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	62	59	115	103	69
		SURR-ND	SURR-ND			SURR-ND
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Acenaphthylene (mg/kg)	<0.0050	<0.0060 ^{DLM}	<0.0050	<0.0050	<0.0050
	Anthracene (mg/kg)	<0.0040	<0.020 ^{DLM}	<0.0040	<0.0040	<0.0040
	Benz(a)anthracene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(a)pyrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Benzo(b)fluoranthene (mg/kg)	<0.010	0.020	<0.010	<0.010	<0.010
	Benzo(b+j+k)fluoranthene (mg/kg)	<0.015	0.020	<0.015	<0.015	<0.015
	Benzo(g,h,i)perylene (mg/kg)	<0.010	0.042	<0.010	<0.010	<0.010
	Benzo(k)fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010
	Chrysene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1050958-11 SOIL 26-AUG-11 13:45 PGS-1106			
Grouping	Analyte				
SOIL					
Physical Tests	Moisture (%)	25.4			
	pH (1:2 soil:water) (pH)				
Metals	Lead (Pb) (mg/kg)				
Volatile Organic Compounds	Benzene (mg/kg)	<0.0050			
	Ethylbenzene (mg/kg)	<0.015			
	Methyl t-butyl ether (MTBE) (mg/kg)	<0.20			
	Styrene (mg/kg)	<0.050			
	Toluene (mg/kg)	<0.050			
	ortho-Xylene (mg/kg)	<0.050			
	meta- & para-Xylene (mg/kg)	<0.050			
	Xylenes (mg/kg)	<0.075			
	Surrogate: 4-Bromofluorobenzene (SS) (%)	99			
	Surrogate: 1,4-Difluorobenzene (SS) (%)	82			
Hydrocarbons	F1 (C6-C10) (mg/kg)	<10			
	F1-BTEX (mg/kg)	<10			
	F2 (C10-C16) (mg/kg)	<30			
	F2-Naphth (mg/kg)	<30			
	F3 (C16-C34) (mg/kg)	72			
	F3-PAH (mg/kg)	71			
	F4 (C34-C50) (mg/kg)	81			
	F4G-SG (mg/kg)				
	Volatile Hydrocarbons (VH6-10) (mg/kg)	<100			
	VPH (C6-C10) (mg/kg)	<100			
	Chrom. to baseline at nC50	YES			
	Surrogate: 3,4-Dichlorotoluene (SS) (%)	104			
Polycyclic Aromatic Hydrocarbons	Acenaphthene (mg/kg)	<0.0050			
	Acenaphthylene (mg/kg)	0.0061			
	Anthracene (mg/kg)	0.0064			
	Benz(a)anthracene (mg/kg)	0.021			
	Benzo(a)pyrene (mg/kg)	0.021			
	Benzo(b)fluoranthene (mg/kg)	0.043			
	Benzo(b+j+k)fluoranthene (mg/kg)	0.058			
	Benzo(g,h,i)perylene (mg/kg)	0.017			
	Benzo(k)fluoranthene (mg/kg)	0.015			
	Chrysene (mg/kg)	0.036			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L1050958-1 SOIL 01-AUG-11 12:00 SSKS-1101	L1050958-2 SOIL 01-AUG-11 12:00 SSKS-1102	L1050958-3 SOIL 01-AUG-11 12:00 SSKS-1103	L1050958-4 SOIL 01-AUG-11 12:00 SSKS-1104	L1050958-5 SOIL 01-AUG-11 12:00 SSKS-1105
Grouping	Analyte					
SOIL						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)					
	Fluoranthene (mg/kg)					
	Fluorene (mg/kg)					
	Indeno(1,2,3-c,d)pyrene (mg/kg)					
	2-Methylnaphthalene (mg/kg)					
	Naphthalene (mg/kg)					
	Phenanthrene (mg/kg)					
	Pyrene (mg/kg)					
	Surrogate: Acenaphthene d10 (%)					
	Surrogate: Chrysene d12 (%)					
	Surrogate: Naphthalene d8 (%)					
	Surrogate: Phenanthrene d10 (%)					
	B(a)P Total Potency Equivalent (mg/kg)					
	IACR (CCME) (mg/kg)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1050958-6	L1050958-7	L1050958-8	L1050958-9	L1050958-10
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	26-AUG-11	26-AUG-11	26-AUG-11	26-AUG-11	26-AUG-11
		Sampled Time	13:30	13:35	13:35	13:45	13:45
		Client ID	PGS-1101	PGS-1102	PGS-1103	PGS-1104	PGS-1105
Grouping	Analyte						
SOIL							
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)	<0.0050	<0.0060 ^{DLM}	<0.0050	<0.0050	<0.0050	
	Fluoranthene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Fluorene (mg/kg)	<0.010	<0.010	<0.010	<0.020 ^{DLM}	<0.020 ^{DLM}	
	Indeno(1,2,3-c,d)pyrene (mg/kg)	<0.010	0.026	<0.010	<0.010	<0.010	
	2-Methylnaphthalene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Naphthalene (mg/kg)	<0.010	0.011	<0.010	<0.010	<0.010	
	Phenanthrene (mg/kg)	<0.010	<0.010	<0.010	<0.010	<0.010	
	Pyrene (mg/kg)	<0.010	<0.020 ^{DLM}	<0.010	<0.010	<0.010	
	Surrogate: Acenaphthene d10 (%)	74	73	77	76	77	
	Surrogate: Chrysene d12 (%)	75	70	95	80	81	
	Surrogate: Naphthalene d8 (%)	73	66	74	75	81	
	Surrogate: Phenanthrene d10 (%)	77	71	88	80	80	
	B(a)P Total Potency Equivalent (mg/kg)	<0.020	<0.020	<0.020	<0.020	<0.020	
	IACR (CCME) (mg/kg)	<0.15	0.22	<0.15	<0.15	<0.15	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID		L1050958-11 SOIL 26-AUG-11 13:45 PGS-1106				
Grouping	Analyte					
SOIL						
Polycyclic Aromatic Hydrocarbons	Dibenz(a,h)anthracene (mg/kg)	<0.0050				
	Fluoranthene (mg/kg)	0.052				
	Fluorene (mg/kg)	<0.010				
	Indeno(1,2,3-c,d)pyrene (mg/kg)	0.017				
	2-Methylnaphthalene (mg/kg)	<0.010				
	Naphthalene (mg/kg)	<0.010				
	Phenanthrene (mg/kg)	0.020				
	Pyrene (mg/kg)	0.048				
	Surrogate: Acenaphthene d10 (%)	69				
	Surrogate: Chrysene d12 (%)	101				
	Surrogate: Naphthalene d8 (%)	67				
	Surrogate: Phenanthrene d10 (%)	75				
	B(a)P Total Potency Equivalent (mg/kg)	0.034				
	IACR (CCME) (mg/kg)	0.52				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Moisture	DUP-H	L1050958-1, -2, -3, -4, -5

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
SURR-ND	Surrogate recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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F1-BTX-CALC-VA Soil F1-Total BTX CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F1 (C6-C10) and F1-BTEX, a subsample of the sediment/soil is extracted with methanol and analysed by purge & trap GC/FID. The F1-BTEX result is then calculated as follows:

F1-BTEX: F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).

F1-HSFID-VA Soil CCME F1 by headspace GCMS EPA SW846, CCME CWS PHC TIER 1

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. The F1 fraction concentration is measured using flame ionization detection.

F2F3-PAH-CALC-VA Soil F2&F3-PAH CCME CWS PHC TIER 1 (2001)

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For F2 (C10-C16) and F3 (C16-C34), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds prior to analysis by on-column GC/FID. The F2-Naph and F3-PAH results are then calculated as follows:

1. F2-Naph: F2 (C10-C16) minus naphthalene.
2. F3-PAH: F3 (C16-C34) minus selected PAHs (phenanthrene, benz(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and pyrene).

F2F4-TUMB-H/A-FID-VA Soil Petroleum Hydrocarbon by Tumbler GCFID CCME PETROLEUM HYDROCARBONS

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For C10 to C50 hydrocarbons (F2, F3, F4) and gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds. F2, F3 & F4 are analyzed by on-column GC/FID, and F4G-sg is analyzed gravimetrically.

Notes:

1. F2 (C10-C16): Sum of all hydrocarbons that elute between nC10 and nC16.
2. F3 (C16-C34): Sum of all hydrocarbons that elute between nC16 and nC34.
3. F4 (C34-C50): Sum of all hydrocarbons that elute between nC34 and nC50.
4. F4G: Gravimetric Heavy Hydrocarbons
5. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
6. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
7. The gravimetric heavy hydrocarbon results (F4G-sg), cannot be added to the C6 to C50 hydrocarbon results.
8. This method is validated for use.
9. Data from analysis of quality control samples is available upon request.
10. Reported results are expressed as milligrams per dry kilogram.

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is dried at 40 C, then ground to < 2 mm particle size using a stainless steel flail grinder. A representative portion is digested with concentrated nitric and hydrochloric acids for 2 hours in an open vessel digester at 95 degrees. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MOISTURE-VA Soil Moisture content ASTM D2974-00 Method A

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

OGG-F4G-TUMB-SG-VA Soil CWS F4G with Silica Gel CCME PETROLEUM HYDROCARBONS-
GRAVIMETRIC

This analysis is carried out in accordance with the "Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Method, Canadian Council of Ministers of the Environment, December 2000." For gravimetric heavy hydrocarbons (F4G-sg), a subsample of the sediment/soil is extracted with 1:1 hexane:acetone using a rotary extractor. The extract undergoes a silica-gel clean-up to remove polar compounds

Reference Information

prior to gravimetric analysis.

Notes:

1. F4G-sg: Gravimetric Heavy Hydrocarbons (F4G) after silica gel treatment.
3. Where F4 (C34-C50) and F4G-sg results are reported for a sample, the larger of the reported values is used for comparison against the relevant CCME standard for F4.
4. The gravimetric heavy hydrocarbon (F4G-sg) result cannot be added to the C6 to C50 hydrocarbons results.
5. This method is validated for use.
6. Data from analysis of quality control samples is available upon request.
7. Reported results are expressed as milligrams per dry kilogram.

PAH-TMB-H/A-MS-VA Soil PAH - Rotary Extraction (Hexane/Acetone) EPA 3570/8270

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Methods 3545 & 8270, published by the United States Environmental Protection Agency (EPA). The procedure uses a mechanical shaking technique to extract a subsample of the sediment/soil with a 1:1 mixture of hexane and acetone. The extract is then solvent exchanged to toluene. The final extract is analysed by capillary column gas chromatography with mass spectrometric detection (GC/MS). Surrogate recoveries may not be reported in cases where interferences from the sample matrix prevent accurate quantitation. Because the two isomers cannot be readily chromatographically separated, benzo(j)fluoranthene is reported as part of the benzo(b)fluoranthene parameter.

PH-1:2-VA Soil pH in Soil (1:2 Soil:Water Extraction) BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

VH-HSFID-VA Soil VH in soil by Headspace GCFID B.C. MIN. OF ENV. LAB. MAN. (2009)

This analysis involves the extraction of a subsample of the sediment/soil with methanol. Aliquots of the methanol extract are then added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is analyzed for Volatile Hydrocarbons (VH) by capillary column gas chromatography with flame-ionization detection (GC/FID). The methanol extraction and VH analysis are carried out in accordance with the British Columbia Ministry of Environment, Lands and Parks (BCMELP) Analytical Method for Contaminated Sites "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1 July 1999).

VH-SURR-FID-VA Soil VH Surrogates for Soils BCMELP CSR ANALYTICAL METHOD 2

VOC7-L-HSMS-VA Soil VOCs in soil by Headspace GCMS EPA8260B, 5021, BC MELP

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

VOC7/VOC-SURR-MS-VA Soil VOC7 and/or VOC Surrogates for Soils EPA METHODS 8260B & 524.2

VPH-CALC-VA Soil VPH is VH minus select aromatics BC MOE LABORATORY MANUAL (2005)

These results are determined according to the British Columbia Ministry of Environment, Lands, and Parks Analytical Method for Contaminated Sites "Calculation of Volatile Petroleum Hydrocarbons in Solids or Water" (Version 2.1, July 20, 1999). According to this method, the concentrations of specific Monocyclic Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene, Xylenes and Styrene) are subtracted from the collective concentration of Volatile Hydrocarbons (VH) that elute between n-hexane (nC6) and n-decane (nC10). Analysis of Volatile Hydrocarbons adheres to all prescribed elements of BCMELP method "Volatile Hydrocarbons in Solids by GC/FID" (Version 2.1, July 20, 1999).

XYLENES-CALC-VA Soil Sum of Xylene Isomer Concentrations EPA 8260B & 524.2

Calculation of Total Xylenes

Total Xylenes is the sum of the concentrations of the ortho, meta, and para Xylene isomers. Results below detection limit (DL) are treated as zero. The DL for Total Xylenes is set to a value no less than the square root of the sum of the squares of the DLs of the individual Xylenes.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ANNEX B3

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Atlin Barge and Limited Areas of
the SS Klondike
Whitehorse, YT



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September 28, 2015

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Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by Parks Canada c/o Public Works and Government Services Canada (PWGSC) to conduct hazardous building materials assessments of the Atlin Barge and limited areas of the SS Klondike (subject vessels) located in Whitehorse, YT.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the Yukon Workers' Compensation Health and Safety Board (WCB) and the current version of the *Yukon Territory Occupational Health and Safety Act and Regulations* (YT OHS Reg.), prior to planned renovation activities.

The hazardous building materials considered included asbestos-containing materials (ACMs), lead-containing materials including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), mercury-containing items, ozone-depleting substances (ODSs), mould-impacted building materials and silica.

Based on Stantec's visual assessment and on the laboratory analyses performed on samples collected, hazardous building materials were identified within the subject vessels.

A summary of our findings and recommendations is presented below. Recommendations pertaining to the handling, removal, transportation and disposal of identified hazardous materials are provided in Section 6 of this report.

It should be noted that this summary is subject to the same restrictions and limitations as presented in **Section 4** (Assessment Limitations) and **Section 7** (Closure). The information provided is to be read in conjunction with the remainder of this report.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Identified Hazardous Building Materials: Atlin Barge

Asbestos

- No asbestos-containing materials were identified

Lead

- Brown paint on the new deck is lead-containing
- Dark brown paint on the old deck is lead-containing

PCBs

- No suspected PCB-containing equipment was observed

Mercury

- No mercury-containing equipment was observed

Mould

- No suspect mould or moisture impacted building materials were observed

Ozone-Depleting Substances

- No suspected ODS-containing equipment was observed

Silica

- No silica-containing building materials were observed

Identified Hazardous Building Materials: SS Klondike

Asbestos

- White window caulking on the exterior of the boat deck cabin is asbestos-containing
- Black mechanical gasket in the engine room is asbestos-containing

Lead

- Black paint on the trim on the main deck is lead-containing
- White paint on the interior is lead-containing
- Yellow paint on the pipes in the engine room is lead-containing
- White paint on the exterior is lead-containing
- Lead is expected to be present in older electrical wiring materials and sheathing and solder used in electrical equipment

PCBs

- No suspected PCB-containing equipment was observed

Mercury

- No mercury-containing equipment was observed

Mould

- No suspect mould or moisture impacted building materials were observed

Ozone-Depleting Substances

- No suspected ODS-containing equipment was observed

Silica

- No silica-containing building materials were observed

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Introduction
September 28, 2015

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Parks Canada c/o Public Works and Government Services Canada (PWGSC) to conduct hazardous building materials assessments of the Atlin Barge and limited areas of the SS Klondike (subject vessels) located in Whitehorse, YT.

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the Yukon Workers' Compensation Health and Safety Board (WCB) and the current version of the *Yukon Territory Occupational Health and Safety Act and Regulations* (YT OHS Reg.), prior to planned renovation activities.

The hazardous building materials considered included asbestos-containing materials (ACMs), lead-containing materials including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs), mercury-containing items, ozone-depleting substances (ODSs), mould-impacted building materials and silica.

The site work was conducted by Keith Irwin of Stantec on May 4th, 2015.

1.1 UNDERSTANDING OF THE PROJECT

Stantec understands that Parks Canada is planning renovation activities within the subject vessels. As a measure of diligence in maintaining compliance with the requirements of the WCB and the current version of the YT OHS Reg. pertaining to the identification of hazardous materials prior to planned renovation activities PWGSC/Parks Canada retained Stantec to conduct this assessment.

2.0 SCOPE AND METHODOLOGY

Keith Irwin of Stantec conducted a visual assessment within the subject vessels on May 5th, 2015. Site work was conducted in general compliance with the requirements of the Canada Labour Code, the WCB, the current version of the YT OHS Reg. and Stantec's Safe Work Practices (SWPs).

Mechanical systems, structures and finishes of each of the subject vessels were visually examined to determine the suspected presence of ACMs, lead including LCPs, PCBs, mercury, ODSs, mould, and silica. Where building materials were suspected but not confirmed to contain asbestos, lead (in paint), or mould samples were collected for analysis to confirm or deny the presence of these hazardous materials. Based on analytical results, visually similar materials were referenced to specific analyzed samples to reduce the number of samples collected.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope and Methodology
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Additional background information and the methodology used for the determination of presence or absence of each specific hazardous material considered in this assessment are outlined in the following sections.

2.1 ASBESTOS

The common use of friable (materials which, when dry, can be easily crumbled or powdered by hand pressure) ACMs in construction generally ceased voluntarily in the mid-1970s but was only banned through legislation by the late 1980s. Friable asbestos was used in many building products, primarily high temperature insulations, spray-applied structural fireproofing, and a material known as vermiculite that was commonly used as block wall insulation and may be contaminated with asbestos fibres. Asbestos was also used in many non-friable manufactured products such as floor tiles, ceiling tiles, Transite™ cement products, and various other construction materials. Some cement products currently used in the construction of buildings may still contain asbestos.

The presence of asbestos in federal workplaces, and pertaining to federally regulated workers is governed by the Canada Labour Code. The presence of asbestos in the workplace in the Yukon pertaining to territorially regulated workers is governed by the WCB, with provisions published in the current version of the YT OHS Reg. As both federally regulated workers and territorially regulated workers (e.g., contractors) are expected to carry out work activities within the subject vessels, and as the territorial regulations are generally more prescriptive pertaining to asbestos (and generally include the requirements noted in the Canada Labour Code), this assessment was conducted to meet the requirements of the current version of the YT OHS Reg.

According to current version of the YT OHS Reg., asbestos-containing material (ACM) means any material which is found to contain any asbestos.

Based on this criterion, a visual assessment of accessible areas was undertaken in order to check for the presence of materials suspected of containing asbestos. Locations to collect discrete bulk asbestos samples of suspect building materials were identified. 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 Mississauga, Ontario for analysis of asbestos content using polarized light microscopy (PLM) with dispersion staining, in accordance with the United States Environmental Protection Agency (EPA) 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, along with the assessor's experience and understanding of the consistency of that building material's application.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

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

2.1.1 Sample Results Interpretation

When asbestos is detected in concentrations greater than one percent for the method used in one of the samples within a set that was collected to represent a "homogenous application" of a particular material, the entire sample set and the entire application of that material is then considered to be an ACM.

In addition to the above, a "positive stop" option was used during the laboratory analysis of the building material samples submitted for asbestos analysis. The "positive stop" option is utilized by the laboratory when asbestos is detected at a concentration of greater than one percent in one of the samples within a set that was collected to represent a "homogenous application" of that material. At this point, further analysis of subsequent samples within the set is deemed to be unnecessary (as the entire set will be considered an ACM, per above), and the remainder of the samples within the set are not analysed.

2.1.2 Potential Asbestos-Containing Vermiculite Insulation

As part of the assessment, Stantec assessed the subject vessels 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 or brick walls, which are typical areas where vermiculite is found. Where masonry or brick walls were observed, destructive assessment (drilling) was not conducted to assess the cavity for the presence of vermiculite.

2.1.3 Asbestos Sampling Quality Assurance/Quality Control

Sampling activities pertaining to asbestos were conducted in accordance with Stantec's Safe Work Practices (SWPs), which take into account current 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 analyses. 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.

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



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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2.2 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. Lead is commonly found in buildings in the solder used on copper domestic pipes, in the caulking on bell fittings of cast iron drainage pipes and in electrical equipment.

The presence of lead-containing materials (other than paint) was assessed through visual means.

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, various occupational health and safety administrations have indicated that working with materials coated with paint that has a lead content that exceeds 600 ppm can lead to exposures in excess of 50% of the occupational exposure limit (OEL) for lead, when the OEL is 0.05 mg/m³ (the OEL for lead in the Yukon, according to the current version of the YT OHS Reg., is 0.15 mg/m³).

Prior to disposal, Yukon Environment recommends that analytical results for building materials should be compared to the territorial soil guideline value of 1,000 ppm as found in the Contaminated Sites Regulations. As such, and given that the OEL for lead in the Yukon is 3 times that of jurisdictions that reference 600 ppm as lead-containing, Stantec will reference the 1,000 ppm value in defining paints as "lead-containing" as the most applicable criteria.

Based on this criterion, samples of suspected LCPs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total lead content. Samples collected were placed into separate, sealed, and labeled polyethylene bags, and submitted to EMSL for analyses of total lead content using Flame Atomic Absorption Spectrometry AAS (SW 846 3050B*/7000B).

EMSL's analytical laboratory is also accredited by the American Industrial Hygiene Association (AIHA) Environmental Lead Laboratory Approval Program.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

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2.3 POLYCHLORINATED BIPHENYLS

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.

The presence of PCB-containing equipment was assessed through visual means. With respect to fluorescent lamp ballasts, due to the risk of electrical shock associated with dismantling operating fixtures, fluorescent lamp ballasts were not removed to view identification numbers/information.

The total number of fluorescent lamp ballasts that may contain PCBs within the subject vessels was approximated.

Suspected PCB-containing electrical equipment can be visually inspected and compared to the Environment Canada reference guide entitled "*Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2*", dated August 1991 (PCB Guide).

2.4 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. Exposure to mercury in workplaces is governed by the WCB.

The presence of mercury and mercury-containing equipment was assessed through visual means.

2.5 MOULD

Moist building materials may provide suitable conditions for mould growth, and 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.

The presence of suspect visible mould was assessed through visual means and limited sampling. Material observed with dark-colored staining and/or a textured and discolored appearance is described as "suspect mould". Mould identified visually is defined as "suspect mould" unless it is confirmed as mould by laboratory analysis.

Two bulk samples were collected from building materials exhibiting visual evidence of suspect mould growth in one of the residences scheduled for demolition. The bulk samples collected were placed into a separate, labeled plastic bag that was sealed and submitted to Sporometrics Inc. (Sporometrics) of Toronto, ON for analysis of the mould forms present.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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Sporometrics is accredited through the American Industrial Hygiene Association's Environmental Microbiology Proficiency Analytical Testing (EMPAT) program.

2.5.1 Mould Reference Guidelines

With respect to mould and/or moisture, the visual assessment and bulk sampling procedures utilized during this project were based on the recommendations 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, Bureau of Environmental and Occupational Disease Epidemiology, April 2000 (referred to as the "NYC Guidelines").
- " *Fungal Contamination in Public Buildings: Health 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).

2.6 OZONE-DEPLETING SUBSTANCES

Chlorofluorocarbons (CFCs) and other ODSs are often found in refrigeration units associated with air-conditioning or other refrigeration equipment. In September 1987, forty-seven countries agreed to the Montreal Protocol on Substances that Deplete the Ozone Layer. Disposal of ODSs are regulated in the Yukon by the Yukon Government's ' *Special Waste Regulations* ' (2010) and the *Federal Halocarbon Regulations*, 2003 (FHR 2003).

The presence of ODSs and equipment containing these materials was assessed through visual means.

2.7 SILICA

Silica, also referred to as free crystalline silica, is found in concrete, cement, mortar, ceramic wall and floor tiles, stucco finishes and acoustic ceiling tiles. Prolonged exposure to, and inhalation of free crystalline silica, may result in respiratory disease known as silicosis, which is characterized by progressive fibrosis of the inner lung tissue and marked shortness of breath or impaired lung function.

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Exposure to silica dust is governed by the WCB, with applicable exposure limits indicated in the current version of the YT OHS Reg., depending on the type of silica to be considered (quartz, cristobalite or tridymite).

The presence of silica was assessed through visual means.

3.0 ASSESSMENT 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 accessed areas of the subject vessels and the results of analyses performed on specific materials sampled during the assessment. Analytical results reflect the sampled materials at the specific sample locations.

Sampling was conducted pertaining to suspected ACMs and suspected LCPs only. 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, solid ceilings, walls, flooring and structural elements were not removed to access concealed areas.

It should be noted that the assessment scope for the SS Klondike was limited to areas which were reportedly to be impacted by an upcoming renovation project, as directed by Parks Canada personnel

As such, limited comments, if any, will be made regarding the presence, extent and/or condition of hazardous building materials in areas not accessed (e.g. the Boat Deck cabins and the entire Texas Deck).

Due to limitations on the agreed to scope of work for this project as well as physical limitations in accessing concealed areas and limitations associated with working in occupied/operational spaces, there are specific limitations to the information that can be provided to each hazardous building material considered in this assessment, as outlined below.

3.1 ASBESTOS

Suspected ACMs that were not sampled include, but are not limited to, the following (where present, based on vessel construction or as otherwise noted):

- Concealed roofing materials
- Sub-grade materials



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Assessment Limitations
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- Interior components of mechanical equipment (e.g., inner linings or gaskets in boilers)
- Interior components of heating, ventilation and air conditioning (HVAC) units
- Heat protection materials inside mechanical installations (e.g., gaskets) and light fixtures (e.g., paper backing in sealed incandescent fixtures)
- Flooring material concealed beneath ceramic tile, brickwork, hardwood flooring, and/or concealed beneath existing sub-floors
- Drywall and/or wall plaster and associated finish materials concealed behind new and/or additional walls or ceilings
- Woven tape inside duct connection joints or inner ducting insulation
- Materials within wall cavities, hard ceiling cavities or crawlspaces
- Insulation materials inside fire doors.

If encountered during renovation, demolition or other activities, any suspected ACMs not identified within this report should be presumed to contain asbestos and handled as such until otherwise proven, through analytical testing.

3.2 LEAD

Assessment for the presence of lead or lead-containing materials was visual in nature, and was conducted pertaining to readily visible surfaces within accessible (and accessed) spaces of the subject vessels only. The presence of lead or lead-containing materials in inaccessible areas not assessed included, but was not limited to: ceiling spaces, wall cavities, crawlspaces, and buried materials.

With respect to paint, samples of suspected LCPs were collected within the subject vessels only 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 will be presumed to be the same, regardless of differing sub surface paints, if any.

3.3 POLYCHLORINATED BIPHENYLS

Due to height restrictions and the risk of electrical shock in handling operational light fixtures, the ballasts present in the fixtures observed within the subject vessels were not removed for comparison to the PCB Guide.

Conclusions and recommendations regarding the presence of PCBs within the subject vessels are based on Stantec's limited observations in combination with information provided by staff regarding lighting renovations (where requested by Stantec based on observations) and is presented to provide guidance regarding the likelihood that PCB-containing equipment is or is

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Assessment Limitations
September 28, 2015

not present within the subject vessels. The exact extent and/or number of fluorescent lamp ballasts containing PCBs, if any, within the subject vessels will not be commented on.

3.4 MERCURY

Visual assessment for the presence of mercury-containing equipment within the subject vessels was conducted in accessible areas only. The presence of mercury or mercury-containing equipment in inaccessible areas includes, but is not limited to: ceiling spaces, wall cavities, and crawlspaces, or as internal parts of HVAC mechanisms.

3.5 MOULD

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) were conducted in accessed portions of the subject vessels only. The assessment was not intrusive in nature and included visual assessment of exposed surfaces and closer inspection of known problem areas.

The conclusions made in this report provide description(s) of the potential source(s) of moisture within the subject vessels that may have led to suitable conditions for mould growth, only in those cases where potential source(s) of moisture were identified. These conclusions will not necessarily identify all sources of moisture leading to suitable conditions for mould growth within the subject vessels or within the impacted area(s).

This assessment does not constitute a building envelope/building systems assessment for either of the subject vessels, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.

3.6 OZONE DEPLETING SUBSTANCES

Visual assessment for the presence of ODSs within the subject vessels was conducted in accessible areas only. The presence of ODS-containing equipment in inaccessible areas including, but not limited to, ceiling spaces, wall cavities and crawlspaces, was not assessed. In addition, portable equipment that may contain ODSs (refrigerators, drink coolers, etc.) was not considered as part of this assessment.

3.7 SILICA

Visual assessment for the presence of silica-containing materials within the subject vessels was conducted in accessible areas only. The presence of potential silica-containing materials in inaccessible areas including, but not limited to, ceiling spaces, wall cavities and crawlspaces was not assessed.



HAZARDOUS BUILDING MATERIALS ASSESSMENT

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4.0 FINDINGS

Floor plans showing bulk sample locations and locations of identified hazardous materials (where practical) are provided in **Appendix A**.

The results of the assessment for each of the considered hazardous materials are provided in the following sub-sections.

4.1 ASBESTOS

Stantec identified and sampled the following suspected ACMs:

- Seam liner
- Assorted caulking, penetrations and sealants
- Fitting insulation
- Mechanical gaskets in pipe flanges

Thirty (30) samples of the above-noted suspected ACMs were collected and submitted to EMSL for analysis of asbestos content and nature.

Summaries of the sample types, locations and analytical results are presented in Table 4-1 (**Atlin Barge**) and Table 4-2 (**SS Klondike**), below. Copies of the certificates of analysis provided by EMSL for the suspected ACM samples submitted are included in **Appendix B**.

**Table 4-1 Suspected ACM Sample Collection and Analysis Summary
Atlin Barge, Whitehorse, YT**

Sample Number	Material Description	Sample Location	Result (%/type asbestos)
AB-SL-01A	Seam liner	East perimeter	None Detected
AB-SL-01B	Seam liner	South perimeter	None Detected
AB-SL-01C	Seam liner	West perimeter	None Detected

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Findings
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**Table 4-2 Suspected ACM Sample Collection and Analysis Summary
SS Klondike, Whitehorse, YT**


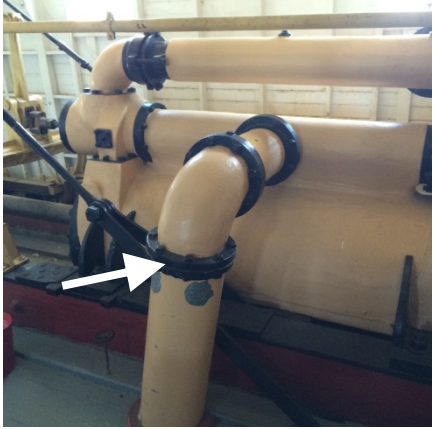
Sample Number	Material Description	Sample Location	Result (%/type asbestos)
SK-PCS-01A	Grey perimeter canvas sealant	Boat deck	None Detected
SK-PCS-01B	Grey perimeter canvas sealant	Boat deck	None Detected
SK-PCS-01C	Grey perimeter canvas sealant	Boat deck	None Detected
SK-PC-01A	Black penetration canvas	Saloon deck	None Detected
SK-PC-01B	Black penetration canvas	Saloon deck	None Detected
SK-PC-01C	Black penetration canvas	Saloon deck	None Detected
SK-SS-01A	Grey skylight sealant	Skylight deck	None Detected
SK-SS-01B	Grey skylight sealant	Skylight deck	None Detected
SK-SS-01C	Grey skylight sealant	Skylight deck	None Detected
SK-WC-01A	White window caulking	Exterior of Boat deck cabin	0.25% Chrysotile
SK-WC-01B	White window caulking	Exterior of Boat deck cabin	Stop Positive (not analysed)
SK-WC-01C	White window caulking	Exterior of Boat deck cabin	Stop Positive (not analysed)
SK-FI-01A	Grey fitting insulation	Boiler room	None Detected
SK-FI-01B	Grey fitting insulation	Boiler room	None Detected
SK-FI-01C	Grey fitting insulation	Boiler room	None Detected
SK-PDS-01A	Grey perimeter deck sealant	Main deck	None Detected
SK-PDS-01B	Grey perimeter deck sealant	Main deck	None Detected
SK-PDS-01C	Grey perimeter deck sealant	Main deck	None Detected
SK-WL-01A	Grey Waredeck liner	Main deck	None Detected
SK-WL-01B	Grey Waredeck liner	Main deck	None Detected
SK-WL-01C	Grey Waredeck liner	Main deck	None Detected
SK-PS-01A	Light blue pipe sealant	Storage area	None Detected
SK-PS-01B	Light blue pipe sealant	Storage area	None Detected
SK-PS-01C	Light blue pipe sealant	Engine room	None Detected
SK-MG-01A	Black mechanical gasket	Engine room	41.6% Chrysotile
SK-MG-01B	Black mechanical gasket	Engine room	Stop Positive (not analysed)
SK-MG-01C	Black mechanical gasket	Engine room	Stop Positive (not analysed)

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Findings
September 28, 2015

Based on our observations of building construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of suspected ACM sample analytical results, no ACMs were identified within the Atlin Barge, and the materials presented in Table 4-3, below were identified as ACMs within the SS Klondike.

**Table 4-3 Summary of Identified ACMs
SS Klondike, Whitehorse, YT**

Identified ACM Description and Condition Information		Photo
White window caulking applied to the exterior of windows throughout		
Friability	Non-friable	
Condition	Good	
Content	0.25% Chrysotile	
Mechanical gaskets in pipe flanges throughout		
Friability	Non-friable	
Condition	Good	
Content	41.6% Chrysotile	

4.1.1 Assessment for Vermiculite Insulation

As part of the assessment, Stantec assessed the subject vessels 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 or brick walls, which are typical areas where vermiculite is found. No vermiculite or potential areas where vermiculite might be found were observed.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Findings
September 28, 2015

4.2 LEAD

Lead is expected to be present in the following within the SS Klondike:

- Older electrical wiring materials and sheathing
- Solder used in electrical equipment

With respect to paint, 13 paint chip samples were obtained from the predominant suspected LCP applications within the vessels. Summaries of the sample types, locations and analytical results are presented in **Table 4-4 (Atlin Barge)** and **Table 4-5 (SS Klondike)**, below. Copies of the certificates of analysis provided by EMSL for the suspected LCP samples submitted are included in **Appendix C**.

**Table 4-4 Suspected LCP Sample Collection and Analysis Summary
Atlin Barge, Whitehorse, YT**

Sample No.	Sample Location	Sample Colour	Lab Result (ppm)	Lead Containing (Yes/No)
AB-P-01	Handrails	White	130	No
AB-P-02	New deck	Brown	4,600	Yes
AB-P-03	Exterior	Red	110	No
AB-P-04	Old deck	Dark brown	5,400	Yes
AB-P-05	Handrails	Pink	<90	No

HAZARDOUS BUILDING MATERIALS ASSESSMENT

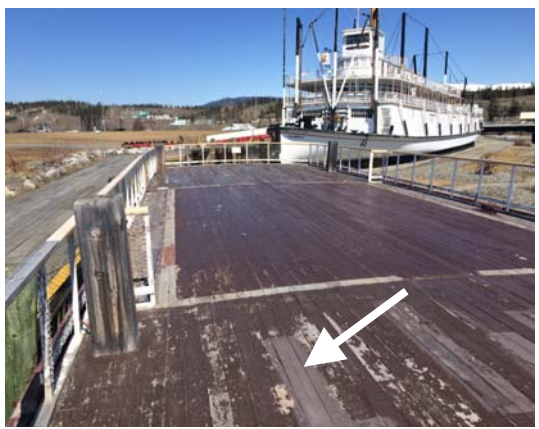
Findings
September 28, 2015

**Table 4-5 Suspected LCP Sample Collection and Analysis Summary
SS Klondike, Whitehorse, YT**

Sample No.	Sample Location	Sample Colour	Lab Result (ppm)	Lead Containing (Yes/No)
SK-P-01	Waredeck	Grey/white	130	No
SK-P-02	Trim on Main Deck	Black	1,200	Yes
SK-P-03	Interior	White	4,300	Yes
SK-P-04	Pipes in Engine Room	Yellow	71,000	Yes
SK-P-05	Pipes in Engine Room	Orange	260	No
SK-P-06	Exterior	White	7,800	Yes
SK-P-07	Interior	Black	340	No
SK-P-08	Exterior	Grey	370	No

Based on our observations and on our interpretations of suspected LCP sample analytical results, the materials presented in Table 4-6 (**Atlin Barge**) and Table 4-7 (**SS Klondike**), below were identified as LCPs.



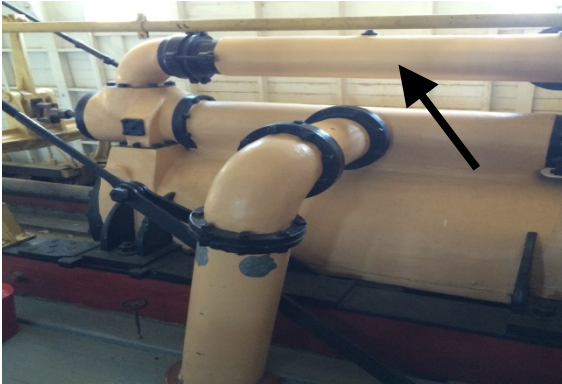
**Table 4-6 Summary of Identified LCPs
Atlin Barge, Whitehorse, YT**

Identified LCP Description	Photo
<p>Brown paint on both the old and new deck areas (both shades of brown) is lead-containing. Although worn in some locations, this paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Findings
September 28, 2015


**Table 4-7 Summary of Identified LCPs
SS Klondike, Whitehorse, YT**

Identified LCP Description	Photo
<p>Black coloured paint on trim of Main Deck. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>White coloured paint on interior walls. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	
<p>Yellow coloured paint on pipes in the engine room. This paint was observed to be in good condition (not bubbling, flaking or peeling).</p>	

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Findings
September 28, 2015

**Table 4-7 Summary of Identified LCPs
SS Klondike, Whitehorse, YT**

Identified LCP Description	Photo
White coloured paint on exterior. This paint was observed to be in good condition (not bubbling, flaking or peeling).	

4.3 POLYCHLORINATED BIPHENYLS

No suspected PCB-containing equipment was observed within the subject vessels.

4.4 MERCURY

No suspected mercury-containing equipment was observed within the subject vessels.

4.5 MOULD

No suspect mould or moisture impacted building materials were observed within the subject vessels.

4.6 OZONE-DEPLETING SUBSTANCES

No suspected ODS-containing equipment was observed within the subject vessels.

4.7 SILICA

No silica-containing building materials were observed within the subject vessels.

5.0 RECOMMENDATIONS

5.1 ASBESTOS

Based on the visual assessment and results of laboratory analyses, Stantec recommends the following with regards to meeting the requirements of the Yukon Workers' Compensation Health and Safety Board (WCB) and the YT OHS Reg. as it pertains to managing asbestos in the SS Klondike during renovation projects and/or for continued operations and maintenance:

- Identified ACMs that may be impacted during renovations activities should be removed prior to the onset of those activities, in accordance with the requirements of the Canada Labour Code, the WCB and the current version of the YT OHS Reg. It is expected that this will require the involvement of a qualified, licensed asbestos abatement contractor.
- In accordance with Parks Canada and PWGSC initiatives, an asbestos exposure control plan (also known as an "asbestos management plan" (AMP) or "asbestos operations and management plan") should be developed and implemented for vessels where ACMs are identified or remain. The AMP would serve to compile the available data, results and reports regarding the presence, extent, handling, removal, and disposal of ACMs within the subject vessels. The AMP would also provide sections for information regarding future sampling and analysis of suspected ACMs, if required, asbestos-abatement projects, if undertaken, and other information regarding the management of asbestos within the subject vessels.
- Identified ACMs that remain in the vessels and are in good condition can be managed in place, upon development and implementation of an AMP.
- Should a material suspected to contain asbestos fibres become uncovered during renovation 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 asbestos materials should be handled in accordance with applicable guidelines and regulations.
- Suspected ACMs deemed visually similar to the ACMs identified in this report should be considered asbestos-containing and handled as such, unless proven otherwise, through analytical testing (SS Klondike and Atlin Barge).
- Ensure asbestos containing waste is handled, stored, and disposed of in accordance with the requirements of the Federal Transportation of Dangerous Goods Regulation, the "Asbestos Abatement Code of Practice" (May 2012) and Yukon Environment Special Waste & Solid Waste Regulations document entitled "Asbestos Disposal" (2010).
- This report should be added to the AMP and referred to as the current ACM record.

5.2 LEAD

Lead-containing materials and LCPs in good condition do not pose significant hazards to workers for continued operations and maintenance.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Recommendations
September 28, 2015

If LCPs or other lead-containing materials are to be disturbed and/or removed during renovation or other activities, ensure compliance with the following:

- The occupational exposure control requirements of the Canada Labour Code and the WCB
- The disposal requirements of Yukon Environment – Contaminated Sites Regulations and the Yukon Government Special Waste Regulations
- The 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 WCB 8-hour Occupational Exposure Limit (OEL) of 0.15 milligram per cubic metre (mg/m³) 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.

5.3 POLYCHLORINATED BIPHENYLS

As no PCB-containing equipment was identified within the subject vessels, no recommendations have been developed.

5.4 MERCURY

As no mercury-containing equipment was identified within the subject vessels, no recommendations have been developed.

5.5 MOULD

As no mould or moisture damage was identified within the subject vessels, no recommendations have been developed.

5.6 OZONE DEPLETING SUBSTANCES

As no ODS-containing equipment was identified within the subject vessels, no recommendations have been developed.

5.7 SILICA

As no silica-containing material was identified within the subject vessels, no recommendations have been developed.

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
September 28, 2015

6.0 CLOSURE

This report has been prepared by Stantec Consulting Ltd. for the sole benefit of Parks Canada c/o Public Works and Government Services Canada. Any use that a third party makes of this report, or any reliance on decisions to be made 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 conclusions presented represent the best judgment of the assessor based on current environmental standards and the site conditions observed on the dates cited within this report. This report is based on, and limited by, circumstances and conditions stated herein, and on information available at the time of preparation of the report. Due to the limited nature of the investigation and the limited data available, Stantec Consulting Ltd. cannot warrant against undiscovered environmental liabilities. It is possible that additional, concealed hazardous materials may become evident during renovation and/or demolition activities within the subject vessels.

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 report meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Respectfully submitted,

STANTEC CONSULTING LTD.



Keith Irwin Dipl. Tech.
Environmental Technologist

Reviewed by:



Sean Brigden, B.Sc., P.B.Dipl., CRSP
Project Manager



Tiffany Waite, B.Sc.
Project Manager
Indoor Environments

KI/SB/TW

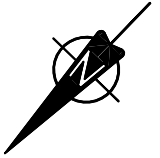


HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix A Floor Plan Drawing

October 22, 2015

Appendix A FLOOR PLAN DRAWING



▲
AB-SL-01A

▲ AB-SL-01B

▲
AB-SL-01C



● AB-P-05

● AB-P-01

● AB-P-02

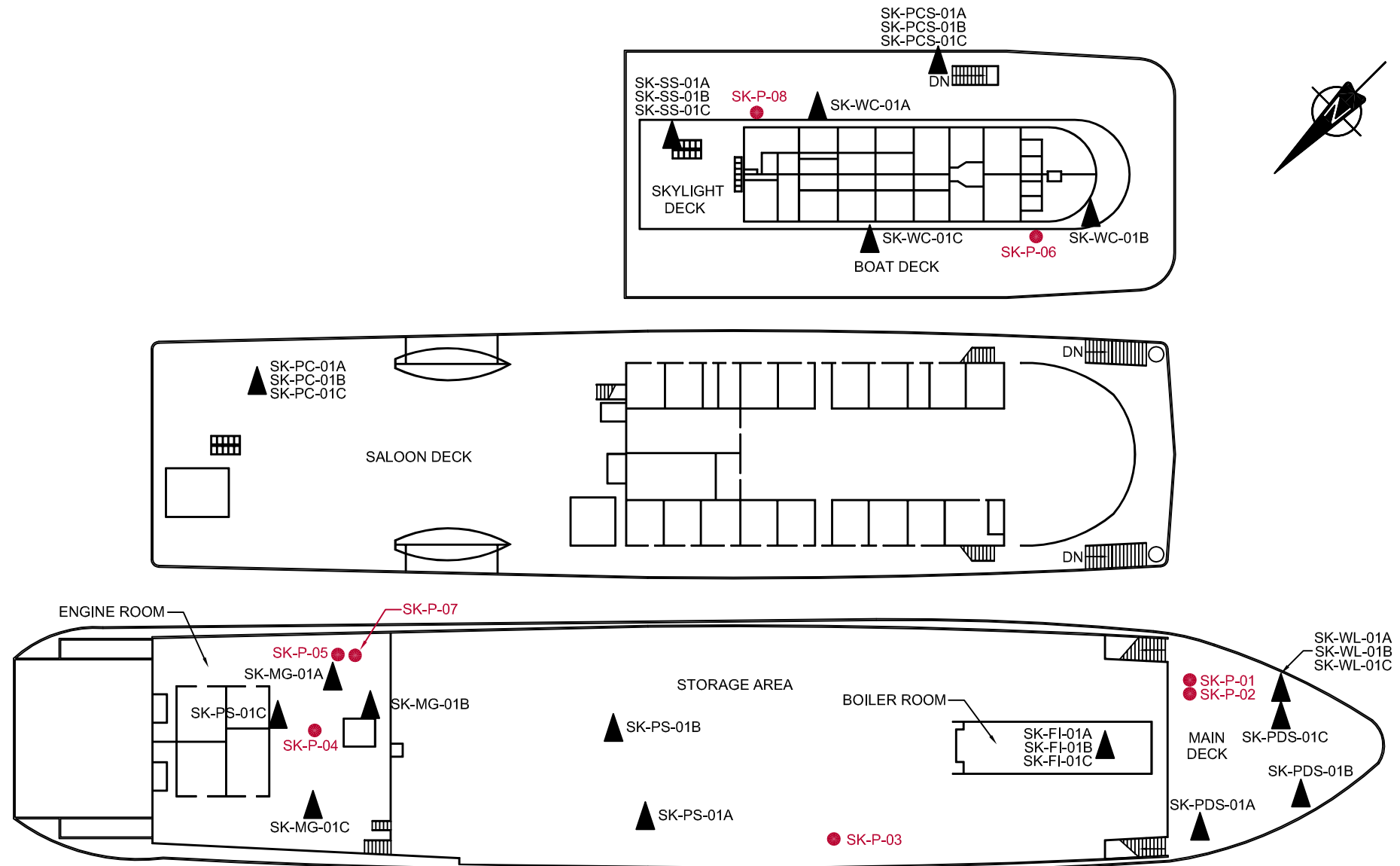
ATLIN BARGE

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

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

<h2 style="margin: 0;">FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS</h2> <p style="margin: 0;">ATLIN BARGE, WHITEHORSE, YT</p>	Project No.: 123220304	1	
	Scale: N.T.S.		
	Date: 15/06/02		
	Dwn. By: CD _{DM} SL2015060003		
Client: PARKS CANADA C/O PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	App'd By: TW		



SS KLONDIKE

LEGEND

- ▲ BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

- NOTES:**
1. WHITE WINDOW CAULKING APPLIED TO EXTERIOR OF WINDOWS THROUGHOUT IS ASBESTOS-CONTAINING.
 2. MECHANICAL GASKETS IN PIPE FLANGES THROUGHOUT ARE ASBESTOS-CONTAINING.
 3. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

SS KLONDIKE, WHITEHOUSE, YT

Client: PARKS CANADA C/O PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project No.:	123220304
Scale:	N.T.S.
Date:	15/09/26
Dwn. By:	CD <small>SL2015090299</small> PK/DM
App'd By:	TW

Dwg. No.:
1



HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix B Certificate of Analysis – Asbestos Samples
October 22, 2015

Appendix B CERTIFICATE OF ANALYSIS – ASBESTOS SAMPLES



EMSL Canada Inc.

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<http://www.EMSL.com> / torontolab@emsl.com

EMSL Canada Order 551505081
Customer ID: 55JACQ30L
Customer PO: 123220304
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 5/13/2015
Analyzed: 5/20/2015
Proj: 123220304/ATLIN BARGE

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: AB-SL-01 **Lab Sample ID:** 551505081-0001

Sample Description: EAST PERIMETER/SEAM LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/19/2015	Brown	80%	20%	None Detected	

Client Sample ID: AB-SL-02 **Lab Sample ID:** 551505081-0002

Sample Description: SOUTH PERIMETER/SEAM LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/19/2015	Brown	30%	70%	None Detected	

Client Sample ID: AB-SL-03 **Lab Sample ID:** 551505081-0003

Sample Description: WEST PERIMETER/SEAM LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/20/2015	Gray	80%	20%	None Detected	

Analyst(s):

John Biesiadecki PLM (2)
Nicole Yeo PLM (1)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. 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 of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 05/20/2015 09:48:29



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Customer ID: 55JACQ30L
Customer PO: 123220304
Project ID:

Attn: Steve Chou
Stantec Consulting, Ltd.
500 - 4730 Kingsway
Burnaby, BC V5H 0C6
Phone: (604) 412-3004
Fax:
Collected:
Received: 5/13/2015
Analyzed: 5/21/2015
Proj: 123220304/SS KLONDLIKE

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: SK-PCS-01A **Lab Sample ID:** 551505082-0001

Sample Description: BOAT DECK/GREY PERIMETER CANVAS SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SK-PCS-01B **Lab Sample ID:** 551505082-0002

Sample Description: BOAT DECK/GREY PERIMETER CANVAS SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SK-PCS-01C **Lab Sample ID:** 551505082-0003

Sample Description: BOAT DECK/GREY PERIMETER CANVAS SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SK-PC-01A **Lab Sample ID:** 551505082-0004

Sample Description: SALOON DECK/BLACK PENETRATION CANVAS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SK-PC-01B **Lab Sample ID:** 551505082-0005

Sample Description: SALOON DECK/BLACK PENETRATION CANVAS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SK-PC-01C **Lab Sample ID:** 551505082-0006

Sample Description: SALOON DECK/BLACK PENETRATION CANVAS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SK-SS-01A **Lab Sample ID:** 551505082-0007

Sample Description: SKYLIGHT DECK/GREY SKYLIGHT SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray/Black	0.0%	100%	None Detected	



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Customer ID: 55JACQ30L
Customer PO: 123220304
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: SK-SS-01B **Lab Sample ID:** 551505082-0008
Sample Description: SKYLIGHT DECK/GREY SKYLIGHT SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SK-SS-01C **Lab Sample ID:** 551505082-0009
Sample Description: SKYLIGHT DECK/GREY SKYLIGHT SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SK-WC-01A **Lab Sample ID:** 551505082-0010
Sample Description: EXTERIOR OF BOAT DECK CABIN/WHITE WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	White	0.0%	99.7%	0.25% Chrysotile	

Client Sample ID: SK-WC-01B **Lab Sample ID:** 551505082-0011
Sample Description: EXTERIOR OF BOAT DECK CABIN/WHITE WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015		Positive Stop (Not Analyzed)			

Client Sample ID: SK-WC-01C **Lab Sample ID:** 551505082-0012
Sample Description: EXTERIOR OF BOAT DECK CABIN/WHITE WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015		Positive Stop (Not Analyzed)			

Client Sample ID: SK-FI-01A **Lab Sample ID:** 551505082-0013
Sample Description: BOILER ROOM/GREY FITTING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/20/2015	Gray	7%	93%	None Detected	

Client Sample ID: SK-FI-01B **Lab Sample ID:** 551505082-0014
Sample Description: BOILER ROOM/GREY FITTING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/20/2015	Gray	7%	93%	None Detected	

Client Sample ID: SK-FI-01C **Lab Sample ID:** 551505082-0015
Sample Description: BOILER ROOM/GREY FITTING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	5/21/2015	Gray	30%	70%	None Detected	



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EMSL Canada Order 551505082
Customer ID: 55JACQ30L
Customer PO: 123220304
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: SK-PDS-01A **Lab Sample ID:** 551505082-0016
Sample Description: MAIN DECK/GREY PERIMETER DECK SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Brown/Gray	0.0%	100%	None Detected	

Client Sample ID: SK-PDS-01B **Lab Sample ID:** 551505082-0017
Sample Description: MAIN DECK/GREY PERIMETER DECK SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Gray	0.0%	100%	None Detected	

Client Sample ID: SK-PDS-01C **Lab Sample ID:** 551505082-0018
Sample Description: MAIN DECK/GREY PERIMETER DECK SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Brown/Gray	0.0%	100%	None Detected	

Client Sample ID: SK-WL-01A **Lab Sample ID:** 551505082-0019
Sample Description: MAIN DECK/GREY WAREDECK LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black	0.0%	100%	None Detected	No sample present in bag

Client Sample ID: SK-WL-01B **Lab Sample ID:** 551505082-0020
Sample Description: MAIN DECK/GREY WAREDECK LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black/Blue	0.0%	100%	None Detected	

Client Sample ID: SK-WL-01C **Lab Sample ID:** 551505082-0021
Sample Description: MAIN DECK/GREY WAREDECK LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black	0.0%	100%	None Detected	

Client Sample ID: SK-PS-01A **Lab Sample ID:** 551505082-0022
Sample Description: ENGINE ROOM/LIGHT BLUE PIPE SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	White/Blue	1.2%	98.8%	None Detected	

Client Sample ID: SK-PS-01B **Lab Sample ID:** 551505082-0023
Sample Description: ENGINE ROOM/LIGHT BLUE PIPE SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	White/Blue	1.4%	98.6%	None Detected	



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EMSL Canada Order 551505082
Customer ID: 55JACQ30L
Customer PO: 123220304
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: SK-PS-01C **Lab Sample ID:** 551505082-0024
Sample Description: ENGINE ROOM/LIGHT BLUE PIPE SEALANT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Brown/Red	0.0%	100%	None Detected	

Client Sample ID: SK-MG-01A **Lab Sample ID:** 551505082-0025
Sample Description: ENGINE ROOM/BLACK MECHANICAL GASKET

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015	Black	0.0%	58.4%	41.6% Chrysotile	

Client Sample ID: SK-MG-01B **Lab Sample ID:** 551505082-0026
Sample Description: ENGINE ROOM/BLACK MECHANICAL GASKET

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015				Positive Stop (Not Analyzed)	

Client Sample ID: SK-MG-01C **Lab Sample ID:** 551505082-0027
Sample Description: ENGINE ROOM/BLACK MECHANICAL GASKET

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	5/21/2015				Positive Stop (Not Analyzed)	

Analyst(s):

- Arabee Sathiasaelan PLM Grav. Reduction (7)
- John Biesiadecki PLM (1)
- Nicole Dimou PLM (2)
- Nicole Yeo PLM Grav. Reduction (13)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. 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 of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 05/21/2015 17:11:45

HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix C Certificate of Analysis – Paint Samples
October 22, 2015

Appendix C CERTIFICATE OF ANALYSIS – PAINT SAMPLES

**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	551505074
CustomerID:	55JACQ30L
CustomerPO:	123220304
ProjectID:	

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

Phone: (604) 412-3004
 Fax:
 Received: 05/13/15 1:53 PM
 Collected:

Project: 123220304/ATLIN BARGE

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

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
AB-P-01	551505074-0001 Site: HANDRAILS Desc: WHITE	5/19/2015		130 ppm
AB-P-02	551505074-0002 Site: NEW DECK Desc: BROWN	5/19/2015		4600 ppm
AB-P-03	551505074-0003 Site: EXTERIOR Desc: RED	5/19/2015		110 ppm
AB-P-04	551505074-0004 Site: OLD DECK Desc: DARK BROWN	5/19/2015		5400 ppm
AB-P-05	551505074-0005 Site: HANDRAILS Desc: PINK	5/19/2015		<90 ppm

 Lisa Podzyhun
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. 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. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 05/20/2015 12:10:39

**EMSL Canada Inc.**

2756 Slough Street, Mississauga, ON L4T 1G3

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Attn: **Tiffany Waite**
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500 - 4730 Kingsway
Burnaby, BC V5H 0C6

Phone: (604) 412-3004
 Fax:
 Received: 05/13/15 1:53 AM
 Collected:

Project: 123220304/SS KLONDLIKE

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

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Lead Concentration</i>
SK-P-01	551505073-0001 Site: WAREDECK Desc: GREY/WHITE	5/19/2015	5/19/2015	130 ppm
SK-P-02	551505073-0002 Site: TRIM ON MAIN DECK Desc: BLACK	5/19/2015	5/19/2015	1200 ppm
SK-P-03	551505073-0003 Site: INTERIOR Desc: WHITE	5/19/2015	5/19/2015	4300 ppm
SK-P-04	551505073-0004 Site: PIPES IN ENGINE ROOM Desc: YELLOW	5/19/2015	5/19/2015	71000 ppm
SK-P-05	551505073-0005 Site: PIPES IN ENGINE ROOM Desc: ORANGE	5/19/2015	5/19/2015	260 ppm
SK-P-06	551505073-0006 Site: EXTERIOR Desc: WHITE	5/19/2015	5/19/2015	7800 ppm
SK-P-07	551505073-0007 Site: INTERIOR Desc: BLACK	5/19/2015	5/19/2015	340 ppm
SK-P-08	551505073-0008 Site: EXTERIOR Desc: GREY	5/19/2015	5/19/2015	370 ppm

 Lisa Podzyhun
 or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. 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. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 05/20/2015 12:08:05

ANNEX B4



**Pre-Renovation Hazardous
Building Materials Assessment**

S.S. Klondike, 10 Robert Service Way,
Whitehorse, Yukon Territory, Y1A 1V8

October 15, 2018

Prepared for:

Parks Canada Agency
635 8th Avenue S.W., Suite 1300
Calgary, AB, T2P 3M3

Prepared by:

Stantec Consulting Ltd.
500 - 4730 Kingsway
Burnaby, BC, V5H 0C6

Project No.: 144902686

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Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by Parks Canada (the Client) to conduct a pre-renovation hazardous building materials assessment of the S.S. Klondike (subject vessel) located at 10 Robert Service Way, Whitehorse, Yukon Territory (YT).

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the applicable federal and territorial regulations as well as Parks Canada's internal asbestos management policies and programs, prior to planned renovation activities.

The work was carried out in accordance with the requirements of the Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR), the Yukon Workers' Compensation Health and Safety Board (WCB), and the current version of the Yukon Territory *Occupational Health and Safety Act* and Regulations (YT OHS Reg.), and to supplement the information provided in the following reports (Previous Reports):

- Tetra Tech Report No. ENW.WENW03038 entitled *Asbestos Air Clearance and Visual Inspection—SS Klondike*, dated April 24, 2017, prepared for Parks Canada
- Stantec Consulting Ltd. Report No. 123220304 entitled *Hazardous Materials Building Assessment: Atlin Barge and Limited Areas of the SS Klondike*, dated September 28, 2015, prepared for Parks Canada.

The hazardous building materials considered during this assessment included 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) and silica.

Based on Stantec's visual assessment and the laboratory analyses performed on the samples collected, as well as a review of previous reports or sampling records/reports, 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.



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Table ES 1 Summary of Findings

Building Materials	Comments
Asbestos	<p>A summary of the ACMs that were identified within the subject vessel as indicated in the Previous Reports reviewed is provided below:</p> <ul style="list-style-type: none"> • White window caulking on the exterior of the boat deck cabin is asbestos-containing • Black mechanical gasket in the engine room is asbestos-containing • Vermiculite insulation used as a fire-proof fill material inside display items such as wooden crates, burlap sacks, and historical food containers (presumed ACM—no analytical data available) <p>The previously identified ACMs that were accessible and observed were noted to be in good condition.</p> <p>Asbestos was detected through laboratory analysis of bulk samples of the following additional materials:</p> <ul style="list-style-type: none"> • White window caulking applied to the exterior of windows throughout (identified in the Previous Reports and confirmed to contain greater than 1% chrysotile asbestos by sampling conducted as part of the current assessment) • Fibrous mechanical gaskets in various pipe flanges throughout (interspersed with various types of non-ACM gaskets as described in the table in Appendix B) including the majority of gaskets present in the valve house • One small piece of white cement panel present in the engine room parts storage area • Brown fibrous debris below the main deck in the boiler room, around the base of the mast (debris in poor condition) • Joint compound applied to drywall walls and ceilings throughout the valve house • Joint compound applied to seams and screw heads of particle board walls throughout, including patch compound applied to the kitchen storage room walls on the saloon deck • Large brown mechanical gasket present in the flange on the main boiler stack and the white seam sealant applied to this gasket • Grey seam sealant applied around the bottom of the mast, below the main deck in the boiler room • Small granule vermiculite filling material inside various crates, bags and barrels as follows: <ul style="list-style-type: none"> – 8 crates labeled vegetables and fruits in the produce locker – 1 small barrel labeled powdered milk in the pantry – 31 bags labeled sugar in the main deck storage area – 9 small barrels labeled powdered milk or unlabeled in the main deck storage area – 7 crates labeled shredded whole wheat in the main deck storage area – 9 crates labeled vegetables and fruits in the main deck storage area – 16 crates labeled SWIFT in the main deck storage area – 50 crates labeled in various different ways in the main deck storage area – 12 crates labeled dry gin in the main deck storage area – 71 crates labeled gasoline in the main deck storage area – 100 large barrels labeled beer or unlabeled in the main deck storage area – Presumed to be present in containers filled with unknown materials, until confirmed otherwise – NOTE: That “larger granule” vermiculite was observed in various containers but was determined by analytical testing to be non-ACM. <p>Unless otherwise noted above, the materials that were accessible and observed were noted to be in good condition.</p>



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Table ES 1 Summary of Findings

Building Materials	Comments
Lead	<p>A summary of the LCPs that were identified within the subject vessel as part of the Previous Reports is provided below:</p> <ul style="list-style-type: none"> • Black paint on the trim on the main deck • White paint on the interior • Yellow paint on the pipes in the engine room • White paint on the exterior <p>Analysis of the 11 additional samples submitted as part of the current assessment indicated that 9 (82%) of the surface coatings/paint applications sampled contain concentrations of lead in excess of 1,000 ppm and should be considered LCPs.</p> <p>Based on these results, on the findings of the Previous Assessment, and on our observations pertaining to the inconsistency of paint colours throughout the subject vessel, it is not practical to delineate between lead-containing and non-lead-containing paints, for the following reasons:</p> <ul style="list-style-type: none"> • Surfaces are covered with multiple coats of paint. Although attempts were made to collect all layers in samples, if all layers were not collected, there is potential that lead-containing layers may be present beneath paints deemed to be non-lead-containing. • Samples from similar exposed/surface paint colours have yielded different results <p>As such, paint on surfaces throughout the subject vessel should be considered lead- containing.</p> <p>Lead may also be present in the following materials:</p> <ul style="list-style-type: none"> • Lead-acid batteries used in emergency lighting • Older electrical wiring materials and sheathing • Solder used on domestic water lines • Solder used in bell fittings for cast iron pipes and in electrical equipment • Vent and pipe flashings
Polychlorinated biphenyls (PCBs)	No suspected PCB-containing equipment was observed within the subject vessel.
Mould	No suspect mould or moisture impacted building materials were observed within the subject vessel.
Mercury	One thermostat with a mercury-containing switch was observed in the valve house.
Ozone-depleting substance (ODS)	No suspected ODS-containing equipment was observed within the subject vessel.
Silica	<p>Silica is expected to be present in the following, which were observed in various locations throughout:</p> <ul style="list-style-type: none"> • Cement products such as: <ul style="list-style-type: none"> – Concrete foundation of the valve house – Panels and boards • Refractory brick, mortar, units and castables • Gypsum and associated wall/ceiling finish materials

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.



Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	asbestos-containing material
AIHA	American Industrial Hygiene Association
BAPAT	bulk asbestos proficiency analytical testing
CFC	Chlorofluorocarbons
COHSR	Canada Occupational Health and Safety Regulations
ELLAP	Environmental Lead Laboratory Approval Program
EMSL	EMSL Canada Inc.
HUD	Housing and Urban Development
IHPAT	industrial hygiene proficiency analytical testing
LCP	lead-containing paint
NVLAP	National Voluntary Laboratory Accreditation Program
ODS	ozone-depleting substance
OEL	occupational exposure limit
OHS	Occupational Health and Safety
PCB	polychlorinated biphenyl
PLM	polarized light microscopy
WCB	Yukon Workers' Compensation Health and Safety Board
YT	Yukon Territory



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Introduction
October 15, 2018

1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by Parks Canada (the Client) to conduct a pre-renovation hazardous building materials assessment of the S.S. Klondike (subject vessel) located at 10 Robert Service Way, Whitehorse, Yukon Territory (YT).

The purpose of the assessment was to check for potential hazardous building materials that may require special attention in accordance with the applicable federal and territorial regulations as well as Parks Canada's internal asbestos management policies and programs, prior to planned renovation activities.

The work was carried out in accordance with the requirements of the Canada Labour Code, Part II Canada Occupational Health and Safety Regulations (COHSR), the Yukon Workers' Compensation Health and Safety Board (WCB), and the current version of the Yukon Territory *Occupational Health and Safety Act* and Regulations (YT OHS Reg.), and to supplement the information provided in the following reports (Previous Reports):

- Tetra Tech Report No. ENW.WENW03038 entitled *Asbestos Air Clearance and Visual Inspection—SS Klondike*, dated April 24, 2017, prepared for Parks Canada
- Stantec Consulting Ltd. Report No. 123220304 entitled *Hazardous Materials Building Assessment: Atlin Barge and Limited Areas of the SS Klondike*, dated September 28, 2015, prepared for Parks Canada.

The hazardous building materials considered during this assessment included 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) and silica.

The site work was conducted by Keith Irwin on July 9 and 10, 2018.

1.1 UNDERSTANDING OF THE PROJECT

Stantec understands that the information pertaining to the identity, location and approximate extent of hazardous building materials within the subject vessel was preliminary in nature, specific to localized renovation projects, and not sufficiently intrusive to allow for large-scale renovation planning. As such, and as various options for renovations to the subject vessel are being considered (some of which may be extensive), the Client commissioned this assessment as a measure of diligence in maintaining compliance with the COHSR, WCB, and the current version of the YT OHS Reg. pertaining to the identification of hazardous materials prior to planned renovation work.



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope
October 15, 2018

2.0 SCOPE

The scope of work for this assessment involved the following:

- Review of existing information, including site drawings, previous assessment and/or abatement documentation and discussions with site personnel, where available
- 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
- Submission of samples collected for laboratory analysis
- Evaluation and interpretation of field findings along with current and previous 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 accessed areas of the subject vessel and the results of analyses performed on specific materials sampled during the assessment and previously sampled by Stantec. Analytical results reflect the sampled materials at the specific sample locations.

This report has been prepared for the exclusive use of the Client for the purpose of assessing general conditions in the subject vessel. Any use that a third party makes of this report, or reliance on, or decisions to be made on it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third-party as a result of decisions made or actions based on this report.

2.1.1 Physical and Sampling Limitations

Sampling was conducted pertaining to suspected ACMs and suspected LCPs only. 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, solid ceilings, walls, flooring and structural elements were not removed to access concealed areas.

Due to limitations on the agreed to scope of work for this project as well as physical limitations in accessing concealed areas and limitations associated with working in occupied/operational spaces, there are specific limitations to the information that can be provided for 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:
 - Sub-grade materials (e.g., asbestos cement drainage pipe)
 - Flooring material concealed beneath existing sub-floors
 - Insulation material present inside walls



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Scope

October 15, 2018

- Drywall and/or wall plaster and associated finish materials concealed behind new and/or additional walls
- Mechanical (e.g., piping and ducting) insulation within wall cavities, crawlspaces tunnels or other concealed spaces
- Insulation materials inside fire-rated doors
- Heat protection materials inside mechanical installations and light fixtures
- 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.
- Conclusions and recommendations regarding the presence of PCBs within the subject vessel are based on Stantec's limited observations and are presented to provide guidance regarding the likelihood that PCB- containing equipment is or is not present within the subject vessel.
 - 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).
 - This assessment does not constitute a building envelope/building systems assessment for the subject vessel, which would include an intrusive investigation to assess the internal condition, potential moisture sources, and expected remaining service life of the various components and systems comprising the envelope of a building.
- Potential presence of mercury or mercury-containing equipment in inaccessible areas or as internal parts of heating, ventilation and air conditioning 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 included as part of this assessment but that may contain ODSs included, but were not limited to, portable equipment (including domestic-type refrigerators and water coolers), 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: wall cavities, crawlspaces, and buried materials.



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Hazardous Building Materials Assessment
October 15, 2018

2.1.2 Areas Not Accessed

The following areas were not accessed, for the reasons indicated:

- Roof of the wheelhouse (fall protection would be required and was not available)
- Some portions of the crawlspace below the main deck (some portions are not readily accessible through main deck hatches)
- Interior of the boiler and the boiler stack (confined space procedures and equipment would be required and were not planned/available)

As such, limited comments, if any, will be provided regarding the presence, quantity or condition of hazardous building materials within the above-noted areas.

2.1.3 Information from Previous Reports

Stantec reviewed the previous report(s) outlined herein for information purposes, and the information provided was considered in developing the current assessment and sampling plan.

Supplemental sampling of previously sampled materials was conducted in those instances where such sampling was required to bring the information into compliance with current regulations as they pertain to minimum sample numbers to appropriately characterize the sampled building material(s).

Where previous sampling and analytical data indicated the presence of a hazardous building material (e.g., asbestos, lead), additional sampling was not conducted, and the material was considered to be hazardous.

3.0 HAZARDOUS BUILDING MATERIALS ASSESSMENT

Building information and a summary of the documents reviewed as part of this assessment are provided in the following sub-sections, along with the results of the assessment for each of the considered hazardous building materials.

Floor plans showing the locations of samples collected during this assessment as well as identified hazardous building materials (where practical) are provided in Appendix A.

3.1 VESSEL DESCRIPTION

The subject vessel is located at 10 Robert Service Way, Whitehorse, YT and consists of wooden sternwheeler steamship. The reported construction date of the vessel was 1937. This construction time period is consistent with those dates when hazardous building materials were commonly used.

The typical structural components and finishes associated with the vessel consist of wood decks, vinyl sheet floors particle board walls and wood ceilings.



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Hazardous Building Materials Assessment
October 15, 2018

3.2 DOCUMENT REVIEW

The following documentation was reviewed prior to undertaking the assessment:

- Tetra Tech Report No. ENW.WENW03038 entitled *Asbestos Air Clearance and Visual Inspection—SS Klondike*, dated April 24, 2017, prepared for Parks Canada
- Stantec Consulting Ltd. Report No. 123220304 entitled *Hazardous Materials Building Assessment: Atlin Barge and Limited Areas of the SS Klondike*, dated September 28, 2015, prepared for Parks Canada

According to the above-noted document(s), the following hazardous building materials were previously identified:

- ACMs
 - White window caulking on the exterior of the boat deck cabin
 - Black mechanical gasket in the engine room
 - Vermiculite insulation used as a fire-proof fill material inside display items such as wooden crates, burlap sacks, and historical food containers (presumed ACM—no analytical data available)
- Lead and LCPs
 - Black paint on the trim on the main deck is lead-containing
 - White paint on the interior is lead-containing
 - Yellow paint on the pipes in the engine room is lead-containing
 - White paint on the exterior is lead-containing
 - Lead is expected to be present in older electrical wiring materials and sheathing and solder used in electrical equipment

3.3 ASBESTOS

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

Based on our observations of vessel construction (estimated vintage of interior finishes and uniformity of building material use) and on our interpretations of the analytical results of suspected ACMs collected through this assessment as well as the previous documentation reviewed as outlined herein, the materials presented in the table in Appendix D were identified as ACMs. The following information is included for each identified ACM:

- Type of material that contains asbestos
- Location/approximate extent of the ACM within the building
- Asbestos type and percentage identified
- Friability
- Condition
- Representative photographs, where available

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



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Hazardous Building Materials Assessment
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3.3.1 Methodology

ACMs 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 federal workplaces and pertaining to federally regulated workers is governed by the COHSR. According to the COHSR, ACM means:

- Any article that is manufactured and contains 1% or more asbestos (by weight) at the time of manufacture, or any material that contains 1% or more asbestos when tested in accordance with accepted methods.

The presence of asbestos in the workplace in the Yukon pertaining to territorially regulated workers is governed by the WCB, with provisions published in the current version of the YT OHS Reg. According to current version of the YT OHS Reg., ACM means any material which is found to contain any asbestos.

As both federally regulated workers and territorially regulated workers (e.g., contractors) are expected to carry out work activities within the subject vessel, although the more stringent territorial definition of ACM was used, the assessment overall was conducted to meet the requirements of the COHSR, which has more prescriptive requirements pertaining to 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, British Columbia 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 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).

3.3.1.1 Potential Asbestos-Containing Vermiculite Insulation

As part of the assessment, Stantec assessed the subject vessel 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. Where masonry or brick walls were observed, destructive assessment (drilling) was not conducted to assess the cavity for the presence of vermiculite.



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Where vermiculite was identified, samples were submitted to Wes-Har Asbestos Analysis and Consulting Ltd. of Richmond, British Columbia (Wes-Har) for analysis of asbestos content (presence/absence only) in accordance with the following:

- National Institute for Occupational Safety and Health (NIOSH) Analytical Method 9002 *Asbestos (bulk) by PLM* for fibrous/mineral components
- United States Environmental Protection Agency (USEPA) method 600/R-04/004 (January 2004) *Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation*

Wes-Har is accredited through the American Industrial Hygiene Association's (AIHA) bulk asbestos proficiency analytical testing (BAPAT) and industrial hygiene proficiency analytical testing (IHPAT) programs.

The rationale for having the samples analyzed for presence/absence of asbestos only (as opposed to analysis for percent weight) is outlined below:

- Territorial regulations indicate that materials containing any asbestos are considered ACMs
- Asbestos that is generally present in vermiculite insulating materials is friable, and is present as a contaminant of the product, not as a manufactured additive or ingredient. As such, if low concentrations of asbestos are detected in one discrete sample of vermiculite insulation, it is still possible that higher concentrations of friable asbestos fibres are present in the vermiculite insulation in other locations.
- Hazardous materials abatement industry, Health Canada, various occupational health and safety administrations across Canada recommend that if disturbance to vermiculite insulation containing any concentration of asbestos fibres is required, that appropriate asbestos abatement precautions (including the use of proper personal protective equipment, containment and handling procedures, etc.) be employed.

3.3.1.2 Sample Results Interpretation

When asbestos is detected in any concentrations 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.

In addition to the above, a "positive stop" option was used during the laboratory analysis of the building material samples submitted for asbestos analysis. The "positive stop" option is utilized by the laboratory when asbestos is detected in one of the samples within a set that was collected to represent a "homogenous application" of that material (or in any concentration, for vermiculite). At this point, further analysis of subsequent samples within the set is deemed to be unnecessary (as the entire set will be considered an ACM, per above), and the remainder of the samples within the set are not analyzed.

3.3.1.3 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).



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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, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container via courier.

3.3.1.4 Assessment of Material Condition

A visual assessment of the condition and accessibility was also completed for each occurrence of suspect ACM. A description of the criteria used in evaluating the condition, accessibility and exposure risk of ACMs is provided below. The criteria are generally based on the June 5, 2017 Public Services and Procurement Canada "Asbestos Management Standard", and industry standards of practice.

Friable Asbestos-Containing Materials other than Mechanical Insulation

In evaluating the condition of friable ACMs other than mechanical insulation (e.g., spray-applied as fireproofing, texture, decorative or acoustic finishes), the following criteria apply:

- **Good**
 - Surface of material shows no significant signs of damage, deterioration or delamination. Up to one percent visible damage to surface is allowed within range of GOOD. Evaluation of sprayed fireproofing requires the Assessor to be familiar with the irregular surface texture typical of sprayed asbestos products. GOOD condition includes un-encapsulated or un-painted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.
- **Poor**
 - Sprayed materials show signs of damage, delamination or deterioration. More than one percent damage to surface of ACM spray.

In observation areas, where damage exists in isolated locations, both GOOD and POOR condition may be reported. The extent or percentage of each condition will be recorded on the Assessor's assessment form.

Fair condition is not utilized or considered as a valid criterion in the evaluation of sprayed fireproofing, sprayed insulation, or texture coat finishes.

The evaluation of ACM spray-applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes, which are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height walls that obstruct the above ceiling observations. Persons entering the ceiling area are advised to be watchful for ACM debris prior to accessing or working above ceilings in areas of building with ACM, regardless of the reported condition.



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Mechanical Insulation

In evaluating the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment, etc.) the following criteria are used:

- **Good**
 - Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e., scuffs or stains), but the jacketing is not penetrated.
- **Fair**
 - Minor penetration damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.
- **Poor**
 - Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed, and significant areas have been dislodged. Damage cannot be readily repaired. The evaluation of mechanical insulation may be limited by the number of observations made and building components such as ducts or full height walls that obstruct observations. In these circumstances, it is not possible to observe each foot of mechanical insulation from all angles.

Non-Friable and Potentially Friable Materials

Non-friable materials generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials, i.e., exterior asbestos cement products, may have deteriorated so that the binder no longer effectively contains the asbestos fibres. In such cases of significantly deteriorated non-friable material, the material will be treated as a friable product, and evaluated per the above criteria.

3.3.2 Findings

A summary of the ACMs that were identified within the subject vessel as indicated in the Previous Reports is provided below:

- White window caulking on the exterior of the boat deck cabin
- Black mechanical gasket in the engine room
- Vermiculite insulation used as a fire-proof fill material inside display items such as wooden crates, burlap sacks, and historical food containers (presumed ACM – no analytical data available)

The previously identified ACMs that were accessible and observed were noted to be in good condition.

Asbestos was detected through laboratory analysis of bulk samples of the following additional materials:

- White window caulking applied to the exterior of windows throughout (identified in the previous assessment and confirmed to contain greater than 1% chrysotile asbestos by sampling conducted as part of the current assessment)
- Fibrous mechanical gaskets in various pipe flanges throughout (interspersed with various types of non-ACM gaskets as described in the table in Appendix B) including the majority of gaskets present in the valve house
- One small piece of white cement panel present in the engine room parts storage area
- Brown fibrous debris below the main deck in the boiler room around the base of the mast (debris in poor condition)
- Joint compound applied to drywall walls and ceilings throughout the valve house



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- Joint compound applied to seams and screw heads of particle board walls throughout including patch compound applied to the kitchen storage room walls on the saloon deck
- Large brown mechanical gasket present in the flange on the main boiler stack and the white seam sealant applied to this gasket
- Grey seam sealant applied around the bottom of the mast below the main deck in the boiler room
- Small granule vermiculite filling material inside various crates, bags and barrels as follows:
 - 8 crates labeled vegetables and fruits in the produce locker
 - 1 small barrel labeled powdered milk in the pantry
 - 31 bags labeled sugar in the main deck storage area
 - 9 small barrels labeled powdered milk or unlabeled in the main deck storage area
 - 7 crates labeled shredded whole wheat in the main deck storage area
 - 9 crates labeled vegetables and fruits in the main deck storage area
 - 16 crates labeled SWIFT in the main deck storage area
 - 50 crates labeled in various different ways in the main deck storage area
 - 12 crates labeled dry gin in the main deck storage area
 - 71 crates labeled gasoline in the main deck storage area
 - 100 large barrels labeled beer or unlabeled in the main deck storage area
 - Presumed to be present in containers filled with unknown materials, until confirmed otherwise.
 - NOTE: That “larger granule” vermiculite was observed in various containers but was determined by analytical testing to be non-ACM. Representative photos for example are provided below:



Photo 1 Typical Asbestos-Containing
“Small Granule” Vermiculite



Photo 2 Typical Non-ACM “Large Granule”
Vermiculite

Unless otherwise noted above, the ACMs that were accessible and observed were noted to be in good condition.

3.3.2.1 Materials Containing Less Than 1% Asbestos

Samples of fibrous debris and non-friable seam sealants identified as ACMs above were found to contain asbestos in concentrations less than 1% (the COHSR threshold for definition as an ACM). As indicated herein, the ACM definition



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utilized for this assessment was the most stringent, which in this case is the YT OHS Reg. definition that ACM means any material which is found to contain any asbestos.

Based on the limited amounts of these materials available and the inconsistent nature of asbestos content of materials like these, they should be considered ACMs.

However, the following should be noted, particularly with respect to the seam sealant:

- Asbestos-related provisions of regulations and guidance documents within other provinces in Canada (e.g., BC, AB, NWT/NU), as well as the COHSR, non-friable materials with these low detections of asbestos would not be considered an ACM and would not require asbestos abatement precautions during demolition (or waste disposal).
- Section 34 (General Provisions for Asbestos Control) of the YT OHS Reg. indicates the following:
 - “Approval for deviation from these regulations may be granted by the Chief Safety Officer prior to the work commencing, provided an acceptable alternate level of protection is provided to the workers.”

Based on the above, if work was required that would disturb the ACM seam sealant materials, the contractor conducting the work could contact the WCB Chief Safety Officer to provide a summary of the results as outlined herein pertaining to the sealant materials to be disturbed, along with their proposed methods for disturbance, and request approval for deviation from the YT OHS Reg., allowing disturbance of the ACM seam sealant materials without asbestos control provisions.

3.3.2.2 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 B.

Refer to the documentation in section 3.2 for materials that have been previously sampled and identified as non- asbestos-containing through sampling and laboratory analysis.

3.3.2.3 Potential for Vermiculite Insulation

As part of the assessment, Stantec assessed the subject vessel for structure-related 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. Structure-related locations that may potentially contain vermiculite (that could not otherwise be assessed) were not observed. As noted above, ACM vermiculite was identified in various locations, used as a packing material.

3.3.3 Recommendations

Based on the visual assessment and results of laboratory analyses and review of the Previous Reports, Stantec recommends the following with regards to meeting the requirements of the COHSR, the WCB, the YT OHS Reg. and Parks Canada’s internal asbestos management policies and programs as they pertain to managing asbestos during renovation projects:

- ACMs in poor condition should be abated by appropriately trained personnel (e.g., asbestos abatement contractor personnel), in accordance with the requirements of the COHSR, the WCB and the YT OHS Reg.



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This would involve removing the brown fibrous debris below the main deck in the boiler room around the base of the mast.

- ACMs that may be impacted during renovations activities should be removed by appropriately trained personnel (e.g., asbestos abatement contractor personnel), in accordance with the requirements of the COHSR, the WCB and the YT OHS Reg., and prior to the initiation of project work that will disturb them. Some considerations for large-scale renovation planning associated with the identified ACMs that may require significant work or budget are provided below:
 - Appropriate asbestos exposure control processes will be required for any work that will involve disturbance to:
 - o Walls finished with ACM joint compound
 - Options for large-scale renovations would typically include removal of sufficient wall material to allow for other work to proceed, or removal of wall materials throughout, to avoid having to deal with this ACM in the future.
 - o Windows with ACM caulking
 - Options for large-scale renovations would typically include either removing just the ACM caulking (labour-intensive) or removing the window units in-tact for disposal as asbestos waste (less labour intensive; greater quantity of waste). The appropriate option may depend on the structural integrity of the window units and surrounding building materials.
 - o Vermiculite in various containers
 - Consideration should be given to removing asbestos-containing vermiculite that was used as packing material throughout the subject vessel, due to the potential for release if and when crates and other items are moved. Options for “full removal” during large-scale renovations would typically include:
 - Disposal of entire containers with vermiculite inside. Stantec understands that this is the “least preferred” option for Parks Canada, given the heritage value of the containers/artifacts.
 - Careful dismantling of containers for separate removal/disposal of vermiculite, and re-construction of the containers for continued use on display. A significant challenge associated with this option is that there are not cost effective, timely and universally accepted standards for “verification surface sampling” subsequent to vermiculite removal. As such, the containers could not necessarily be “verified” as “clean” subsequent to this task, which could be expensive and time-consuming to begin with. Because of this, there is a risk to Parks Canada for “perceptions” of potential exposure to users and staff, without the cleaning “verified”.
 - Alternatively, Parks Canada staff can be provided with adequate training such that they understand the risks and hazards, along with the methods, tools and personal protective equipment to use such that vermiculite exposures are minimized and releases addressed to allow for continued management of this ACM in-place, including for tasks that may involve moving containers with vermiculite from one area of the subject vessel to another.
- Due to the confirmed presence of asbestos within the subject vessel, and in accordance with the requirements of the COHSR, the WCB and the YT OHS Reg., an asbestos exposure control plan (also known as an Asbestos Management Plan [AMP] or Asbestos Operations and Management Plan) must be developed and implemented for the subject vessel. The AMP would serve to compile the available data, results and reports regarding the presence, extent, handling, removal, and disposal of ACMs within the subject vessel. The AMP would also provide sections for information regarding future sampling and analysis of suspected ACMs, if required, asbestos-abatement projects, if undertaken, and other information regarding the management of asbestos within the subject vessel.
- Identified ACMs in good condition can be managed in place, upon development and implementation of an AMP. The process of managing ACMs in place includes routine surveillance of ACM condition such that damage and/or potential release issues are dealt with in an appropriate timeframe. Depending on the intentions of Parks Canada, the AMP can be developed such that key Parks Canada staff members receive sufficient training such that they can perform various low-risk tasks that may involve handling of ACMs (e.g., moving containers filled with ACM vermiculite; painting/repairing walls with ACM joint compound).



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- Should a material suspected to contain asbestos fibres become uncovered during renovation 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.
- Suspected ACMs deemed visually similar to the ACMs identified in this report should be considered asbestos-containing and handled as such, unless proven otherwise, through analytical testing.
- Asbestos-containing cement pipe may be present below ground—caution should be used at any time when excavation is required.
- Ensure asbestos containing waste is handled, stored, transported and disposed of in accordance with the requirements of the Federal Transportation of Dangerous Goods Regulation, the *Asbestos Abatement Code of Practice* (May 2012) and Yukon Environment Special Waste & Solid Waste Regulations document entitled *Asbestos Disposal* (2010).
- This report should be added to the AMP and referred to as the current ACM record.

3.4 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, as well as the Previous Reports, paints throughout the subject vessel should be considered LCP.

Sampled paints confirmed to contain greater than 1,000 ppm lead are presented in the table in Appendix G. The following information is included for each paint:

- Paint colour
- Substrate to which paint is applied
- Location/approximate extent of the LCP within the building
- Lead content of paint
- Condition
- Representative photographs, where available

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

3.4.1 Methodology

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

3.4.1.1 Lead in Paint

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, various occupational health and safety administrations have indicated that working with materials coated with paint that has a lead content that exceeds 600 ppm can lead to exposures in excess of 50% of the occupational exposure limit (OEL) for lead, when the OEL is 0.05 mg/m³ as it is per the COHSR (the OEL for lead in the Yukon, according to the current version of the YT OHS Reg., is 0.15 mg/m³).



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Prior to disposal, Yukon Environment recommends that analytical results for building materials should be compared to the territorial soil guideline value of 1,000 ppm as found in the Contaminated Sites Regulations.

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 for analysis of total lead content using EPA Method SW 846 3050B*/7000B. EMSL's analytical laboratory is also accredited by the AIHA Environmental Lead Laboratory Approval Program (ELLAP).

3.4.1.2 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.



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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 ft ²	More than 10 ft ²
Interior components with large surface areas (walls, ceilings, floors, doors).	Entire surface is intact.	Less than or equal to 2 ft ²	More than 2 ft ²
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
<p>NOTES:</p> <p>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 ft² of deteriorated paint is in “fair” condition, even if the other three walls in a room are intact).</p> <p>² Surfaces in “fair” condition should be repaired and/or monitored but are not considered to be “LCP hazards”.</p> <p>³ Surfaces in “poor” condition are considered to be “LCP hazards” and should be addressed through abatement or interim controls.</p>			

3.4.2 Findings

Lead is expected to be present in the following within the subject vessel:

- Lead-acid batteries used in emergency lighting
- Older electrical wiring materials and sheathing
- Solder used on domestic water lines
- Solder used in bell fittings for cast iron pipes and in electrical equipment
- Vent and pipe flashings

3.4.2.1 Lead in Paint

A summary of the LCPs that were identified within the subject vessel as part of the previous assessment is provided below:

- Black paint on the trim on the main deck
- White paint on the interior
- Yellow paint on the pipes in the engine room
- White paint on the exterior

Analysis of the 11 samples submitted as part of the current assessment indicated that 9 (82%) of the surface coatings/paint applications sampled contain concentrations of lead in excess of both 600 ppm (criterion for exposure consideration) and 1,000 ppm (criterion for disposal consideration) and should be considered LCPs.



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Based on these results, on the findings of the Previous Assessment, and on our observations pertaining to the inconsistency of paint colours throughout the subject vessel, it is not practical to delineate between lead-containing and non-lead-containing paints, for the following reasons:

- Surfaces are covered with multiple coats of paint. Although attempts were made to collect all layers in samples, if all layers were not collected, there is potential that lead-containing layers may be present beneath paints deemed to be non-lead-containing.
- Samples from similar exposed/surface paint colours have yielded different results

As such, paint on surfaces throughout the subject vessel should be considered lead-containing.

Additional information regarding extent and current condition of sampled paints confirmed to contain greater than 600 ppm lead, including photographs is provided in Appendix G.

3.4.3 Recommendations

Paints in poor condition should be addressed. This would include removal of loose/flaking paint from surfaces. Consideration should be given to re-painting surfaces where LCPs are delaminating, to mitigate the potential for additional delamination and distribution of LCP waste within the area.

Lead-containing materials, including paints, can be managed in place, where in good condition. If LCPs or other lead-containing equipment/materials within the subject vessel are to be disturbed and/or removed, including in instances where delaminating or “poor condition” paints are addressed, ensure compliance with the following:

- Occupational exposure control requirements of the COHSR and the WCB
- Disposal requirements of Yukon Environment – Contaminated Sites Regulations and the Yukon Government Special Waste Regulations
- 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 COHSR 8-hour OEL of 0.05 milligram per cubic metre (mg/m^3) during the removal of paints and products containing any concentration of lead. This can be achieved by:

- Providing workers with protective clothing and personal protective equipment or devices as necessary to protect the worker 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 it
- 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



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

3.5 POLYCHLORINATED BIPHENYLS

3.5.1 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.

3.5.2 Findings

No suspected PCB-containing equipment was observed within the subject vessel.

3.5.3 Recommendations

As no PCB-containing equipment was identified within the subject vessel, no recommendations have been developed.

3.6 MOULD

3.6.1 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 pertaining to mould 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: Health 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



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3.6.2 Findings

No suspect mould or moisture impacted building materials were observed within the subject vessel.

3.6.3 Recommendations

As no mould or moisture damage was identified within the subject vessel, no recommendations have been developed.

3.7 MERCURY

3.7.1 Methodology

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. Exposure to mercury in workplaces is governed by the COHSR and the WCB.

An assessment for equipment that is likely to contain mercury 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.

3.7.2 Findings

One thermostat with a mercury-containing switch was observed in the valve house as indicated on the floor plan drawings in Appendix A.

3.7.3 Recommendations

For either renovation or demolition, if mercury-containing materials (e.g., thermostats) are to be removed from service, ensure all mercury waste is handled, stored and disposed of in accordance with the requirements of the requirements of the Yukon Government Special Waste Regulations and the Transportation of Dangerous Goods Regulation.

For continued operations and maintenance, identified mercury-containing materials can be managed in place. Mercury vapour within light fixtures and/or liquid mercury in thermostat switches or thermometers pose no risk to workers or occupants provided the mercury containers remain intact and undisturbed. No further action is currently required.



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Hazardous Building Materials Assessment
October 15, 2018

3.8 OZONE DEPLETING SUBSTANCES

3.8.1 Methodology

Chlorofluorocarbons (CFCs) and other ODSs are often found in refrigeration units associated with air-conditioning or other refrigeration equipment. In September 1987, forty-seven countries agreed to the Montreal Protocol on Substances that Deplete the Ozone Layer. Disposal of ODSs are regulated in the Yukon by the Yukon Government's 'Special Waste Regulations' (2010) and the Federal Halocarbon Regulations, 2003 (FHR 2003).

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.

3.8.2 Findings

No suspected ODS-containing equipment was observed within the subject vessel.

3.8.3 Recommendations

As no ODS-containing equipment was identified within the subject vessel, no recommendations have been developed.

3.9 SILICA

3.9.1 Methodology

Exposure to silica dust is governed by the WCB, with applicable exposure limits indicated in the current version of the YT OHS Reg., depending on the type of silica to be considered (quartz, cristobalite or tridymite).

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.

3.9.2 Findings

Silica is expected to be present in the following, which were observed in various locations throughout:

- Cement products such as:
 - Concrete foundation of the valve house
 - Panels and boards
- Refractory brick, mortar, units and castables
- Gypsum and associated wall/ceiling finish materials



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
October 15, 2018

3.9.3 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 vessel 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 8-hour exposure limit as stipulated by the COHSR, which has a more stringent OEL than that of the YT OHS Reg. (cristobalite and quartz—each 0.025 mg/m³). This would include, but not be limited to, the following:

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

4.0 CLOSURE

This report has been prepared for the sole benefit of Parks Canada. 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, weather, 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.



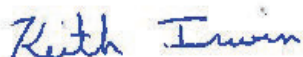
PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Closure
October 15, 2018

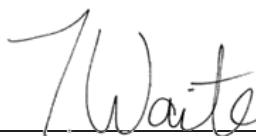
We trust that the above is satisfactory for your purposes at this time. Should you have any questions or concerns, or require additional information, please do not hesitate to contact the Stantec Project Manager at your convenience.

Regards,

STANTEC CONSULTING LTD.



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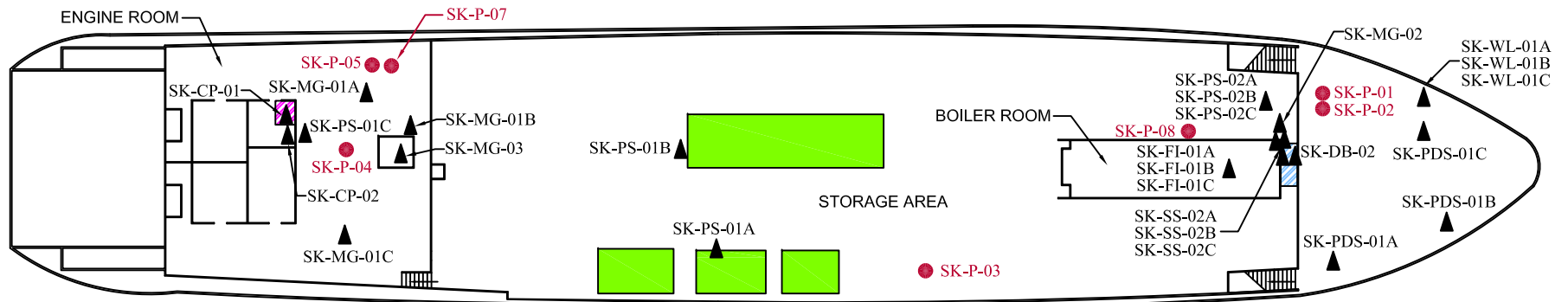
This report was approved for transmittal by:



Sean Brigden, B.Sc., P.B.Dipl., CRSP
Senior Reviewer
Phone: (250) 655-6062
Sean.Brigden@stantec.com



APPENDIX A FLOOR PLANS



MAIN DECK

LEGEND

- ACM VERMICULITE FILLED CRATES AND BARRELS
- ACM WHITE CEMENT PANEL
- ACM FIBROUS DEBRIS AND GREY SEAM SEALANT
- BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

- NOTES:** 1. WHITE WINDOW CAULKING APPLIED TO EXTERIOR OF WINDOWS THROUGHOUT IS ASBESTOS-CONTAINING.
 2. MECHANICAL GASKETS IN VARIOUS PIPE FLANGES THROUGHOUT ARE ASBESTOS-CONTAINING.
 3. JOINT COMPOUND APPLIED TO SEAMS AND SCREW HEADS OF PARTICLE BOARD WALLS THROUGHOUT IS ASBESTOS-CONTAINING.
 4. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

10 ROBERT SERVICE WAY, WHITEHORSE, YT

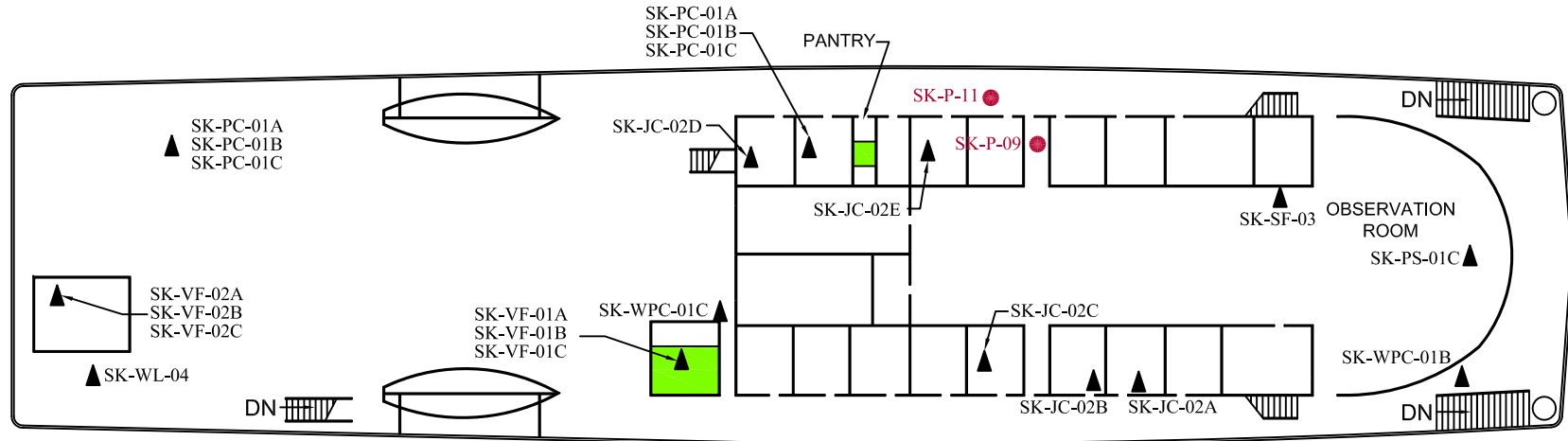
Client: PARKS CANADA

Project No.:	144902686
Scale:	N.T.S.
Date:	18/07/19
Dwn. By:	CD <small>SL2018070048</small> <small>DM</small>
App'd By:	TW

Dwg. No.:

1





SALOON DECK

LEGEND

- ACM VERMICULITE FILLED CRATES AND BARRELS
- BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

- NOTES:** 1. WHITE WINDOW CAULKING APPLIED TO EXTERIOR OF WINDOWS THROUGHOUT IS ASBESTOS-CONTAINING.
 2. MECHANICAL GASKETS IN VARIOUS PIPE FLANGES THROUGHOUT ARE ASBESTOS-CONTAINING.
 3. JOINT COMPOUND APPLIED TO SEAMS AND SCREW HEADS OF PARTICLE BOARD WALLS THROUGHOUT IS ASBESTOS-CONTAINING.
 4. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

10 ROBERT SERVICE WAY, WHITEHORSE, YT

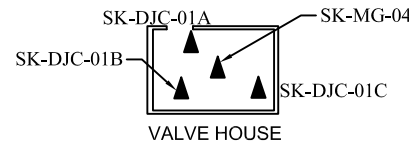
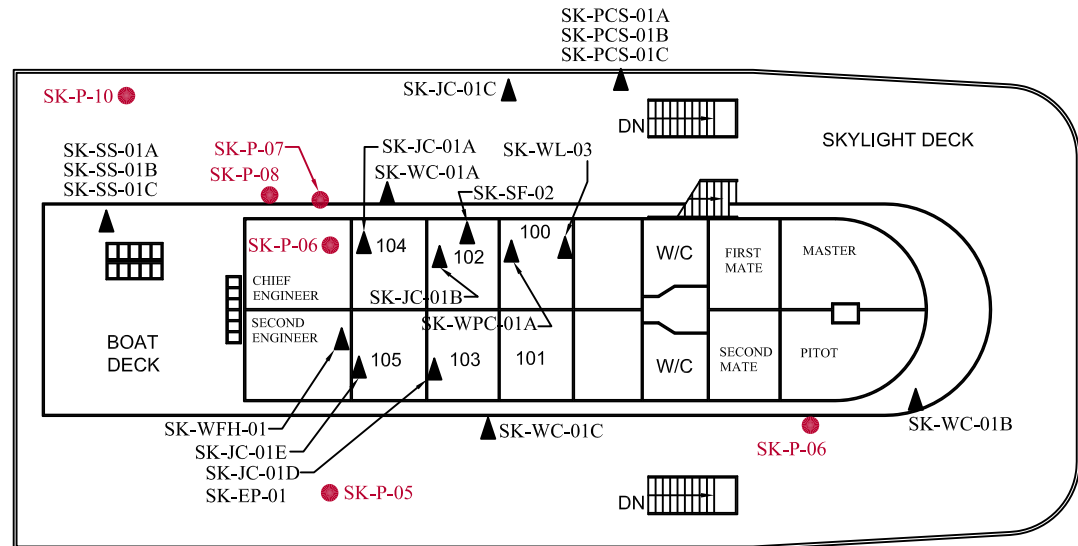
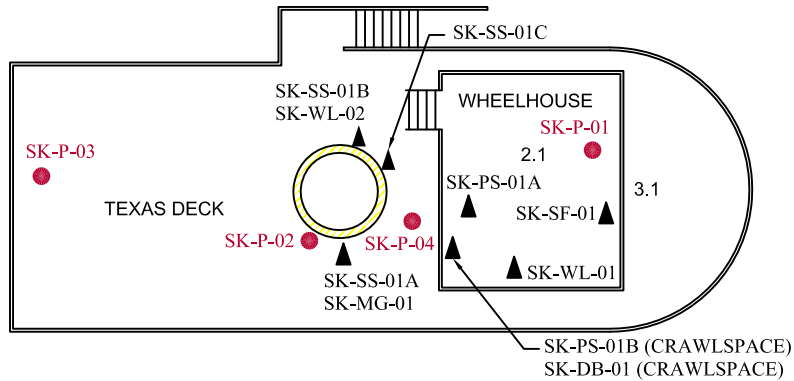
Client: PARKS CANADA

Project No.:	144902686
Scale:	N.T.S.
Date:	18/07/19
Dwn. By:	CD <small>DM</small> <small>SL2018070049</small>
App'd By:	TW

Dwg. No.:

2





LEGEND

- ACM BROWN GASKET AND WHITE SEAM SEALANT
- BULK SAMPLE LOCATION
- PAINT CHIP SAMPLE LOCATION

- NOTES:**
1. WHITE WINDOW CAULKING APPLIED TO EXTERIOR OF WINDOWS THROUGHOUT IS ASBESTOS-CONTAINING.
 2. MECHANICAL GASKETS IN VARIOUS PIPE FLANGES THROUGHOUT ARE ASBESTOS-CONTAINING.
 3. DRYWALL JOINT COMPOUND APPLIED TO WALLS AND CEILINGS THROUGHOUT THE VALVE HOUSE IS ASBESTOS-CONTAINING
 4. JOINT COMPOUND APPLIED TO SEAMS AND SCREW HEADS OF PARTICLE BOARD WALLS THROUGHOUT IS ASBESTOS-CONTAINING.
 5. THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

FLOOR PLAN SHOWING HAZARDOUS BUILDING MATERIALS AND BULK SAMPLE LOCATIONS

10 ROBERT SERVICE WAY, WHITEHORSE, YT

Client: PARKS CANADA

Project No.:	144902686
Scale:	N.T.S.
Date:	18/07/19
Dwn. By:	CD <small>SL2018070050</small> <small>DM</small>
App'd By:	TW

Dwg. No.:
3



APPENDIX B
SUMMARY OF RESULTS: ANALYSIS OF
BULK SAMPLES FOR ASBESTOS

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix B Summary of Results: Analysis of Bulk Samples for Asbestos
October 15, 2018

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

Table B-1 Suspected ACM Bulk Sample and Analytical Results Summary—S.S. Klondike, Whitehorse, YT, Y1A 1V8

Material/Homogenous Application Description	Sample Number	Sample Location	Result (% Asbestos)
Cement panel—Dark	CP-01	Engine Room—Electrical Panel	None Detected
Cement panel—White	CP-02	Engine Room—Electrical Panel	45% Chrysotile
Debris—Grey plaster/putty, hard	DB-01	Wheelhouse crawlspace	None Detected
Debris—Brown fibrous material	DB-02	Mast below main deck at boiler	<0.66% Chrysotile
Debris—Tan rubbery material	DB-03	Underneath the subject vessel	None Detected
Drywall joint compound—White	DJC-01A	Valve house	1% Chrysotile
	DJC-01B	Valve house	Positive Stop (Not Analyzed)
	DJC-01C	Valve house	Positive Stop (Not Analyzed)
Electrical panel plug—Black	EP-01	Skylight deck—Electrical panel	None Detected
Electrical wire	EW-01	Into incandescent light fixture in a boat deck suite	None Detected
Joint compound—Chip board walls—White	JC-01A	Boat Deck	2% Chrysotile
	JC-01B	Boat Deck—102	Positive Stop (Not Analyzed)
	JC-01C	Boat Deck—100	Positive Stop (Not Analyzed)
	JC-01D	Boat Deck—105	Positive Stop (Not Analyzed)
	JC-01E	Boat Deck—2nd engine room	Positive Stop (Not Analyzed)
Joint compound—Chip board walls—White	JC-02A	Saloon Deck	None Detected
	JC-02B	Saloon Deck	None Detected
	JC-02C	Saloon Deck	None Detected
	JC-02D	Saloon Deck	None Detected
	JC-02E	Saloon Deck	None Detected
Mechanical Gasket—Brown with multiple paints, hard	MG-01	Top deck—Flange on main stack	<0.25% Chrysotile
Mechanical Gasket—Blue, fibrous	MG-02	Sprinkler pipe flange under main deck—Blue	None Detected
Mechanical Gasket—Red with yellow paint, soft	MG-03	Engine room—Boiler pipe	None Detected



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix B Summary of Results: Analysis of Bulk Samples for Asbestos
 October 15, 2018

Table B-1 Suspected ACM Bulk Sample and Analytical Results Summary—S.S. Klondike, Whitehorse, YT, Y1A 1V8

Material/Homogenous Application Description	Sample Number	Sample Location	Result (% Asbestos)
Mechanical Gasket—Brown with red paint, fibrous, hard	MG-04	Valve house	45.8% Chrysotile
Pipe Sealant—Sprinkler pipe fittings—Blue	PS-01A	Wheelhouse	None Detected
	PS-01B	Wheelhouse	None Detected
	PS-01C	Saloon deck observation room	None Detected
Pipe Sealant—Cast iron pipes	PS-02A	Below main deck	None Detected
	PS-02B	Below main deck	None Detected
	PS-02C	Below main deck	None Detected
Sheet flooring—Red with black	SF-01 [F]	Wheelhouse	None Detected
Sheet flooring mastic—Black	SF-01 [M]	Wheelhouse	None Detected
Sheet flooring—Brown	SF-02	Boat deck—Cabin rooms	None Detected
Sheet flooring—Green	SF-03	Saloon deck observation room	None Detected
Seam sealant—White	SS-01A	Top deck—Boiler stack	0.37% Chrysotile
	SS-01B	Top deck—Boiler stack	0.30% Chrysotile
	SS-01C	Top deck—Boiler stack	<0.25% Chrysotile
Seam sealant—Grey	SS-02A	Under main deck—Around mast	0.30% Chrysotile
	SS-02B	Under main deck—Around mast	<0.25% Chrysotile
	SS-02C	Under main deck—Around mast	<0.25% Chrysotile
Woven fire hose	WFH-01	Skylight deck	None Detected
Woven liner	WL-01	Wheelhouse—Stack penetration	None Detected
Woven liner	WL-02	Top deck—Base of main stack	None Detected
Woven liner	WL-03	Boat deck room 100—Pipe penetration	None Detected
Woven liner	WL-04	Saloon deck—Smoke house exterior	None Detected
Window pane caulking—White	WPC-01A	Saloon deck	None Detected
	WPC-01B	Saloon deck—Front of cabins	1.2% Chrysotile
	WPC-01C	Saloon deck—Rear of cabins	Positive Stop (Not Analyzed)
Patch compound—White	PC-01A	Saloon deck—Kitchen storage room walls	2% Chrysotile
	PC-01B	Saloon deck—Kitchen storage room walls	Positive Stop (Not Analyzed)
	PC-01C	Saloon deck—Kitchen storage room walls	Positive Stop (Not Analyzed)



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix B Summary of Results: Analysis of Bulk Samples for Asbestos
 October 15, 2018

Table B-1 Suspected ACM Bulk Sample and Analytical Results Summary—S.S. Klondike, Whitehorse, YT, Y1A 1V8

Material/Homogenous Application Description	Sample Number	Sample Location	Result (% Asbestos)
Vermiculite filling—Small granule	VF-01A	Produce locker inside vegetable crates	Asbestiform Amphibole (Detected Not Quantified)
	VF-01B	Produce locker inside vegetable crates	Positive Stop (Not Analyzed)
	VF-01C	Produce locker inside vegetable crates	Positive Stop (Not Analyzed)
Vermiculite filling—Large granule	VF-02A	Meat locker inside butter crates	None Detected
	VF-02B	Meat locker inside butter crates	None Detected
	VF-02C	Meat locker inside butter crates	None Detected
NOTE: Bold, highlighted text indicates confirmed ACM			



APPENDIX C
LABORATORY ANALYTICAL REPORT—
ASBESTOS: POLARIZED LIGHT
MICROSCOPY



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EMSL Canada Order 691801902
 Customer ID: 55JACQ30L
 Customer PO: 144902686
 Project ID:

Attn: Luke Sweet Phone: (604) 412-3004
 Stantec Consulting Ltd. Fax:
 500 - 4730 Kingsway Collected:
 Burnaby, BC V5H 0C6 Received: 7/18/2018
 Analyzed: 7/25/2018

Proj: 144902686

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: CP-01 **Lab Sample ID:** 691801902-0001

Sample Description: ENGINE ROOM - ELECTRICAL PANEL/CEMENT PANEL - DARK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray	0%	100%	None Detected	

Client Sample ID: CP-02 **Lab Sample ID:** 691801902-0002

Sample Description: ENGINE ROOM - ELECTRICAL PANEL/CEMENT PANEL - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray	50%	5%	45% Chrysotile	

Client Sample ID: DB-01 **Lab Sample ID:** 691801902-0003

Sample Description: WHEELHOUSE CRAWLSPACE/DEBRIS - GREY PLASTER/PUTTY, HARD

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray	0%	100%	None Detected	

Client Sample ID: DB-02 **Lab Sample ID:** 691801902-0004

Sample Description: MAST BELOW FREIGHT DECK AT BOILER/DEBRIS - BROWN FIBROUS MATERIAL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Brown/Black	0.0%	100%	<0.66% Chrysotile	

Client Sample ID: DB-03 **Lab Sample ID:** 691801902-0005

Sample Description: UNDERNEATH THE SUBJECT VESSEL/DEBRIS - TAN RUBBERY MATERIAL

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray	0.0%	100%	None Detected	

Client Sample ID: DJC-01A **Lab Sample ID:** 691801902-0006

Sample Description: SPRINKLER SHED/DRYWALL JOINT COMPOUND - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	White	0%	99%	1% Chrysotile	

Client Sample ID: DJC-01B **Lab Sample ID:** 691801902-0007

Sample Description: SPRINKLER SHED/DRYWALL JOINT COMPOUND - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018				Positive Stop (Not Analyzed)	



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EMSL Canada Order 691801902
Customer ID: 55JACQ30L
Customer PO: 144902686
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: DJC-01C **Lab Sample ID:** 691801902-0008
Sample Description: SPRINKLER SHED/DRYWALL JOINT COMPOUND - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)

Client Sample ID: EP-01 **Lab Sample ID:** 691801902-0009
Sample Description: SKYLIGHT DECK - ELECTRICAL PANEL/ELECTRICAL PANEL PLUG - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Black	0.0%	100%	None Detected	

Client Sample ID: EW-01 **Lab Sample ID:** 691801902-0010
Sample Description: INTO INCANDESCENT LIGHT FIXTURE IN A BOAT DECK SUITE/ELECTRICAL WIRE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Black	0.0%	100%	None Detected	

Client Sample ID: JC-01A **Lab Sample ID:** 691801902-0011
Sample Description: BOAT DECK/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	White	0%	98%	2% Chrysotile	

Client Sample ID: JC-01B **Lab Sample ID:** 691801902-0012
Sample Description: BOAT DECK - 102/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)

Client Sample ID: JC-01C **Lab Sample ID:** 691801902-0013
Sample Description: BOAT DECK - 100/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)

Client Sample ID: JC-01D **Lab Sample ID:** 691801902-0014
Sample Description: BOAT DECK - 105/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)

Client Sample ID: JC-01E **Lab Sample ID:** 691801902-0015
Sample Description: BOAT DECK - 2ND ENGINE ROOM/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)



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EMSL Canada Order 691801902
 Customer ID: 55JACQ30L
 Customer PO: 144902686
 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: JC-02A **Lab Sample ID:** 691801902-0016
Sample Description: SALOON DECK/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray	0%	100%	None Detected	

Client Sample ID: JC-02B **Lab Sample ID:** 691801902-0017
Sample Description: SALOON DECK/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray/White	0%	100%	None Detected	

Client Sample ID: JC-02C **Lab Sample ID:** 691801902-0018
Sample Description: SALOON DECK/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray	0%	100%	None Detected	

Client Sample ID: JC-02D **Lab Sample ID:** 691801902-0019
Sample Description: SALOON DECK/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Beige	0%	100%	None Detected	

Client Sample ID: JC-02E **Lab Sample ID:** 691801902-0020
Sample Description: SALOON DECK/JOINT COMPOUND - CHIP BOARD WALLS - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Beige	0%	100%	None Detected	

Client Sample ID: MG-01 **Lab Sample ID:** 691801902-0021
Sample Description: TOP DECK - FLANGE ON MAIN STACK/MECHANICAL GASKET - BROWN WITH MULTIPLE PAINTS, HARD

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Beige	0.0%	100%	<0.25% Chrysotile	

Client Sample ID: MG-02 **Lab Sample ID:** 691801902-0022
Sample Description: SPRINKLER PIPE FLANGE UNDER FREIGHT DECK - BLUE/MECHANICAL GASKET - BLUE, FIBROUS

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Blue/Green	70%	30%	None Detected	

Client Sample ID: MG-03 **Lab Sample ID:** 691801902-0023
Sample Description: ENGINE ROOM - BOILER PIPE/MECHANICAL GASKET - RED WITH YELLOW PAINT, SOFT

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Red/Yellow	0.0%	100%	None Detected	



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EMSL Canada Order 691801902
Customer ID: 55JACQ30L
Customer PO: 144902686
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: MG-04 **Lab Sample ID:** 691801902-0024

Sample Description: SPRINKLER SHED VALVE/MECHANICAL GASKET - BROWN WITH RED PAINT, FIBROUS, HARD

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Red	0.0%	54.2%	45.8% Chrysotile	

Client Sample ID: PS-01A **Lab Sample ID:** 691801902-0025

Sample Description: WHEELHOUSE/PIPE SEALANT - SPRINKLER PIPE FITTINGS - BLUE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Blue	<0.61%	100%	None Detected	

Client Sample ID: PS-01B **Lab Sample ID:** 691801902-0026

Sample Description: WHEELHOUSE/PIPE SEALANT - SPRINKLER PIPE FITTINGS - BLUE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Blue	0.75%	99.2%	None Detected	

Client Sample ID: PS-01C **Lab Sample ID:** 691801902-0027

Sample Description: SALOON DECK OBSERVATION ROOM/PIPE SEALANT - SPRINKLER PIPE FITTINGS - BLUE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Blue	1.5%	98.5%	None Detected	

Client Sample ID: PS-02A **Lab Sample ID:** 691801902-0028

Sample Description: BELOW FREIGHT DECK/PIPE SEALANT - CAST IRON PIPES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray	0.0%	100%	None Detected	

Client Sample ID: PS-02B **Lab Sample ID:** 691801902-0029

Sample Description: BELOW FREIGHT DECK/PIPE SEALANT - CAST IRON PIPES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray	0.0%	100%	None Detected	

Client Sample ID: PS-02C **Lab Sample ID:** 691801902-0030

Sample Description: BELOW FREIGHT DECK/PIPE SEALANT - CAST IRON PIPES

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray/White	0.0%	100%	None Detected	

Client Sample ID: SF-01 (F) **Lab Sample ID:** 691801902-0031

Sample Description: WHEELHOUSE/SHEET FLOORING - RED WITH BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Red	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 691801902
Customer ID: 55JACQ30L
Customer PO: 144902686
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: SF-01 (M) **Lab Sample ID:** 691801902-0032
Sample Description: WHEELHOUSE/MASTIC - BLACK

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Black	0.0%	100%	None Detected	

Client Sample ID: SF-02 **Lab Sample ID:** 691801902-0033
Sample Description: BOAT DECK - CABIN ROOMS/SHEET FLOORING - BROWN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Brown	0.0%	100%	None Detected	

Client Sample ID: SF-03 **Lab Sample ID:** 691801902-0034
Sample Description: SALOON DECK OBSERVATION ROOM/SHEET FLOORING - GREEN

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Green	0.0%	100%	None Detected	

Client Sample ID: SS-01A **Lab Sample ID:** 691801902-0035
Sample Description: TOP DECK - BOILER STACK/SEAM SEALANT - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray/Yellow	0.0%	99.6%	0.37% Chrysotile	

Client Sample ID: SS-01B **Lab Sample ID:** 691801902-0036
Sample Description: TOP DECK - BOILER STACK/SEAM SEALANT - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray/Yellow	0.0%	99.7%	0.30% Chrysotile	

Client Sample ID: SS-01C **Lab Sample ID:** 691801902-0037
Sample Description: TOP DECK - BOILER STACK/SEAM SEALANT - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray/Yellow	0.0%	100%	<0.25% Chrysotile	

Client Sample ID: SS-02A **Lab Sample ID:** 691801902-0038
Sample Description: UNDER FREIGHT DECK - AROUND MAST/SEAM SEALANT - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray	0.0%	99.7%	0.30% Chrysotile	

Client Sample ID: SS-02B **Lab Sample ID:** 691801902-0039
Sample Description: UNDER FREIGHT DECK - AROUND MAST/SEAM SEALANT - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray	0.0%	100%	<0.25% Chrysotile	



EMSL Canada Inc.

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<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 691801902
 Customer ID: 55JACQ30L
 Customer PO: 144902686
 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: SS-02C **Lab Sample ID:** 691801902-0040
Sample Description: UNDER FREIGHT DECK - AROUND MAST/SEAM SEALANT - GREY

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray	0.0%	100%	<0.25% Chrysotile	

Client Sample ID: WFH-01 **Lab Sample ID:** 691801902-0041
Sample Description: SKYLIGHT DECK/WOVEN FIRE HOSE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray	95%	5%	None Detected	

Client Sample ID: WL-01 **Lab Sample ID:** 691801902-0042
Sample Description: WHEELHOUSE - STACK PENETRATION/WOVEN LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	White	95%	5%	None Detected	

Client Sample ID: WL-02 **Lab Sample ID:** 691801902-0043
Sample Description: TOP DECK - BASE OF MAIN STACK/WOVEN LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Black	0.0%	100%	None Detected	

Client Sample ID: WL-03 **Lab Sample ID:** 691801902-0044
Sample Description: BOAT DECK ROOM 100 - PIPE PENETRATION/WOVEN LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Gray/White	80%	20%	None Detected	

Client Sample ID: WL-04 **Lab Sample ID:** 691801902-0045
Sample Description: SALOON DECK - SMOKE HOUSE EXTERIOR/WOVEN LINER

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Beige	95%	5%	None Detected	

Client Sample ID: WPC-01A **Lab Sample ID:** 691801902-0046
Sample Description: SALOON DECK/WINDOW PANE CAULKING - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray/White	0.0%	100%	None Detected	

Client Sample ID: WPC-01B **Lab Sample ID:** 691801902-0047
Sample Description: SALOON DECK - FRONT OF CABINS/WINDOW PANE CAULKING - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/24/2018	Gray/White	0.0%	98.8%	1.2% Chrysotile	



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<http://www.EMSL.com> / vancouverlab@EMSL.com

EMSL Canada Order 691801902
Customer ID: 55JACQ30L
Customer PO: 144902686
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: WPC-01C **Lab Sample ID:** 691801902-0048

Sample Description: SALOON DECK - REAR OF CABINS/WINDOW PANE CAULKING - WHITE

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	7/25/2018					Positive Stop (Not Analyzed)

Client Sample ID: PC-01A **Lab Sample ID:** 691801902-0049

Sample Description: SALOOD DECK- KITCHEN STORAGE ROOM WALLS/PATCH COMPOUND (WHITE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018	Green/Beige	0%	98%	2% Chrysotile	

Client Sample ID: PC-01B **Lab Sample ID:** 691801902-0050

Sample Description: SALOOD DECK- KITCHEN STORAGE ROOM WALLS/PATCH COMPOUND (WHITE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)

Client Sample ID: PC-01C **Lab Sample ID:** 691801902-0051

Sample Description: SALOOD DECK- KITCHEN STORAGE ROOM WALLS/PATCH COMPOUND (WHITE)

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	7/24/2018					Positive Stop (Not Analyzed)

Analyst(s):

Chloe Huang	PLM (2) PLM Grav. Reduction (4)
Kathleen Cruz	PLM (14) PLM Grav. Reduction (22)

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 of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Initial report from: 07/25/2018 10:12:41

Bulk Summary Report

For Stantec [Burnaby]
500 - 4730 Kingsway,
Burnaby, BC, V5H 0C6

Location : S.S. Klondike, Whitehorse, YT
144902686.205.180
Project : 144902686

17525 205.180	Sample Location / Description	Result(s)	TP
1	VF-01A Small Granule Vermiculite, Produce Locker in Vegetable Crates	DNQ Asbestiform Amphibole See Detailed Vermiculite Report	.T.
4	VF-02A Large Granule Vermiculite, Produce Locker in Vegetable Crates	Asbestos Fibres Not Detected	---

Comments

See Detailed Bulk Specific Report for Analytical Method and Associated Detection Limit

July 20, 2018

[Facsimile]

Reviewed By G. Nawrocki

Unit 115 13988 Maycrest Way
Richmond British Columbia
Canada V6V 3C3 (604) - 279 - 9445

Summary of Analysis Report

For Stantec [Burnaby]

500 - 4730 Kingsway,
Burnaby, BC, V5H 0C6

**Location : S.S. Klondike, Whitehorse, YT
144902686.205.180**

Project : 144902686

Total Number of Submitted Samples for this Report : 2

Number of ACM Samples for this Report : 1

Number of Non ACM Asbestos Samples for this Report : 1

Total Number of Tested Positive Samples for this Location : 1

Comments

See Detailed Bulk Specific Report for Analytical Method and Associated Detection Limit
Samples Submitted Will Be Retained For 30 Days After Receipt And Will Be Disposed Of Thereafter Unless Otherwise Notified In Writing
Sample Submitted By Stantec [Burnaby]

July 20, 2018

Reviewed By: G. Nawrocki

Detailed Bulk Asbestos in Vermiculite Report

For Stantec [Burnaby]
 500 - 4730 Kingsway,
 Burnaby, BC, V5H 0C6

Location : S.S. Klondike, Whitehorse, YT
144902686.205.180
Project : 144902686

17525	205.180	Sample Location / Description	Result(s)	Analyzed	Analyst	ACM
1	VF-01A	Small Granule Vermiculite, Produce Locker in Vegetable Crates	DNQ Asbestiform Amphibole DNQ Vermiculite DNQ Non-fibrous	Jul 20 2018	GN .T.	
4	VF-02A	Large Granule Vermiculite, Produce Locker in Vegetable Crates	Asbestos Fibres Not Detected DNQ Cellulose Fibres DNQ Vermiculite DNQ Non-fibrous	Jul 20 2018	GN ---	
*		Subjected to Duplicate Analysis, Consumed All Sample Submitted, Approximately 26 Grams				

Comments

Fibrous / Mineral Components Analyzed In Accordance With The NIOSH ASBESTOS (bulk) by PLM Method 9002 [15 August 1994] Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation EPA/600/R-04/004 January 2004
 Detection Limit for Asbestiform Amphibole 'Rapid Screening' is less than 0.01 % (by weight) , Dependant on Original Sample Size
 Samples Submitted Will Be Retained For 30 Days After Receipt And Will Be Disposed Of Thereafter Unless Otherwise Notified In Writing
 Sample Submitted By Stantec [Burnaby]

July 20, 2018

[Facsimile]

Analyst: G. Nawrocki

Reviewed By: G. Nawrocki

LP - Means Percent : Layer or Phase of Whole Sample DNQ - Means Detected Not Quantitated ACM Means Asbestos Containing Material; T - Present

< Means - Less Than > Means - Greater Than

Lab File 17525

Unit 115 13988 Maycrest Way, Richmond British Columbia V6V 3C3 (604) - 279 - 9445

Client Id : 205.180

American Industrial Hygiene Association BAATP Lab. Id. No. 149340

Client Reference Id: 144902686.20

144902686.205.180 . VF-01A

S.S. Klondike, Whitehorse, YT

Small Granule Vermiculite

Produce Locker in Vegetable Crates

WH17525 . 01



washed & sieved

asbestos fibres
[asbestiform amphibole]

stereo binocular microscopy ~ 25x

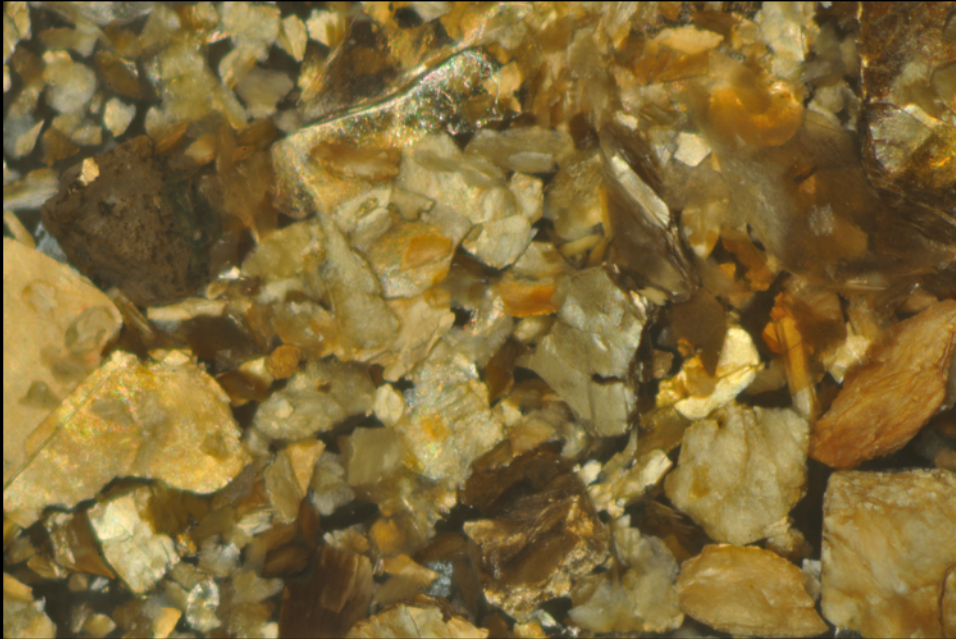


slightly uncrossed polars
polarized light microscopy ~ 90x



submitted sample

144902686.205.180 . VF-02A
S.S. Klondike, Whitehorse, YT
Large Granule Vermiculite
Produce Locker in Vegetable Crates
WH17525 . 04



stereo binocular microscopy ~ 25x

washed & sieved



submitted sample

REQUEST FOR BULK ANALYSIS / CHAIN OF CUSTODY

Submit By Email

Reset Form

Print Form

Company: Stantec
Address: 500 - 4730 Kingsway
Contact Phone # 604 369 0055
Job #: 144902686.205.180
PO #: 144902686.205.180
Location: S.S. Klondike, Whitehorse, YT
Manager: Keith Irwin
Email: keith.irwin@stantec.com

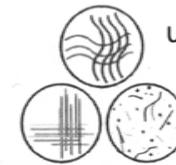
Relinquished By: Keith Irwin
Received by:
Date/Time:

office use only

Samples held as requested

Lab File 17525 BULK Project: 144902686
 StanB 205.180
 07/16/2018

S.S. Klondike, Whitehorse, YT



Wes-Har
 Unit 115-13988 Maycrest Way
 Richmond, BC, Canada
 V6V 3C3
 Phone: (604) 279-9445
 Fax: (604) 279-9447
 info@weshar.com

Sample No.	Date Sampled	Sample Description	Sample Location	Hold	NOW	1 Day	2 Day	3 Day	5 Day		Method
VF-01A	07/09/2018	Small granule vermiculite	Produce locker in vegetable crates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-01B	07/09/2018	Small granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-01C	07/09/2018	Small granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-02A	07/09/2018	Large granule vermiculite	Produce locker in vegetable crates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-02B	07/09/2018	Large granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-02C	07/09/2018	Large granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Keith Irwin
 Authorization Signature
 07/13/2018
 Date

- Methods
- 1 Tiles, Linos, Tars, Mastics, Cementitious
 - 2 Normal [DWJC, Pipe Lagging, Ceiling Textures]
 - 3 Other [Dust Tape Lifts Point Count]
 - 4 Vermiculite [%wt] 5 Vermiculite [DNQ]
 - 6 Debris / Dusts / Wipes 7 Lead Paint

Bulk Summary Report

For Stantec [Burnaby]
500 - 4730 Kingsway,
Burnaby, BC, V5H 0C6

Location : S.S. Klondike, Whitehorse, YT
144902686.205.180
Project : 144902686

17525 205.180	Sample Location / Description	Result(s)	TP
5 VF-02B	Large Granule Vermiculite, Produce Locker in Vegetable Crates	Asbestos Fibres Not Detected	---
6 VF-02C	Large Granule Vermiculite, Produce Locker in Vegetable Crates	Asbestos Fibres Not Detected	---

Comments

See Detailed Bulk Specific Report for Analytical Method and Associated Detection Limit

July 25, 2018

[Facsimile]

Reviewed By H. He

Unit 115 13988 Maycrest Way
Richmond British Columbia
Canada V6V 3C3 (604) - 279 - 9445

Summary of Analysis Report

For Stantec [Burnaby]

500 - 4730 Kingsway,
Burnaby, BC, V5H 0C6

**Location : S.S. Klondike, Whitehorse, YT
144902686.205.180**

Project : 144902686

Total Number of Submitted Samples for this Report : 2

Number of Non ACM Asbestos Samples for this Report : 2

Comments

See Detailed Bulk Specific Report for Analytical Method and Associated Detection Limit
Samples Submitted Will Be Retained For 30 Days After Receipt And Will Be Disposed Of Thereafter Unless Otherwise Notified In Writing
Sample Submitted By Stantec [Burnaby]

July 25, 2018

Reviewed By: H. He

Detailed Bulk Asbestos in Vermiculite Report

For Stantec [Burnaby]
 500 - 4730 Kingsway,
 Burnaby, BC, V5H 0C6

Location : S.S. Klondike, Whitehorse, YT
144902686.205.180
Project : 144902686

17525	205.180	Sample Location / Description	Result(s)	Analyzed	Analyst	ACM
5	VF-02B	Large Granule Vermiculite, Produce Locker in Vegetable Crates	Asbestos Fibres Not Detected DNQ Vermiculite DNQ Non-fibrous	Jul 25 2018	GN	---
* Subjected To A Duplicate Analysis, Consumed All Sample Submitted Approx 29g						
6	VF-02C	Large Granule Vermiculite, Produce Locker in Vegetable Crates	Asbestos Fibres Not Detected DNQ Vermiculite DNQ Non-fibrous	Jul 25 2018	GN	---
* Subjected To A Duplicate Analysis, Consumed All Sample Submitted Approx 36g						

Comments

Fibrous / Mineral Components Analyzed In Accordance With The NIOSH ASBESTOS (bulk) by PLM Method 9002 [15 August 1994] Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation EPA/600/R-04/004 January 2004
 Detection Limit for Asbestiform Amphibole 'Rapid Screening' is less than 0.01 % (by weight) , Dependant on Original Sample Size
 Samples Submitted Will Be Retained For 30 Days After Receipt And Will Be Disposed Of Thereafter Unless Otherwise Notified In Writing
 Sample Submitted By Stantec [Burnaby]

July 25, 2018

[Facsimile]

Analyst: G. Nawrocki

Reviewed By: H. He

LP - Means Percent : Layer or Phase of Whole Sample DNQ - Means Detected Not Quantitated ACM Means Asbestos Containing Material; T - Present

< Means - Less Than > Means - Greater Than

Lab File 17525

Unit 115 13988 Maycrest Way, Richmond British Columbia V6V 3C3 (604) - 279 - 9445

Client Id : 205.180

American Industrial Hygiene Association BAATP Lab. Id. No. 149340

Client Reference Id: 144902686.20

144902686.205.180 . VF-02B

S.S. Klondike, Whitehorse, YT

Large Granule Vermiculite, Produce Locker in Vegetable Crates

WH17525 . 05



stereo binocular microscopy ~ 25x

washed & sieved



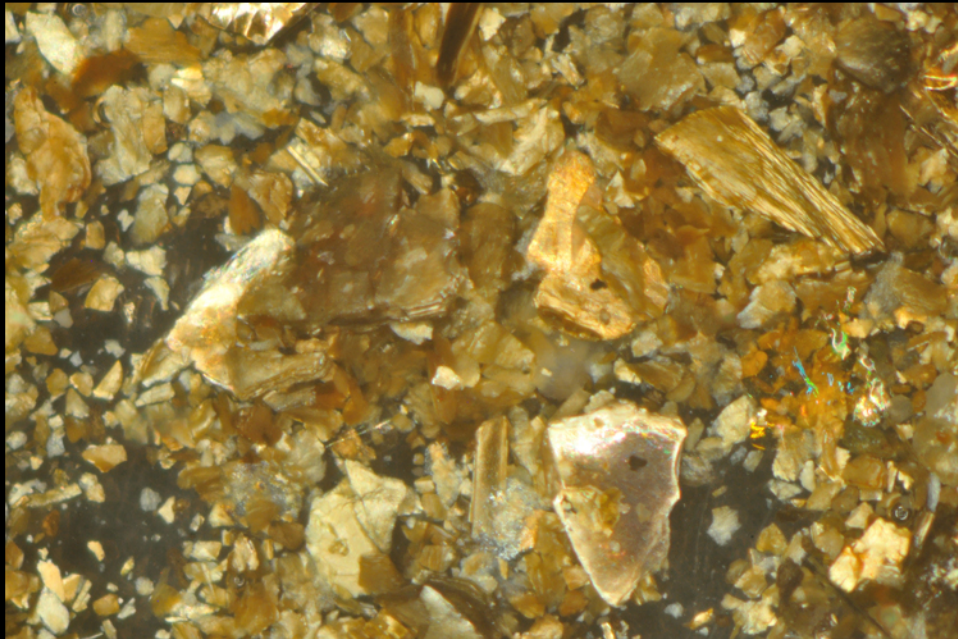
submitted sample

144902686.205.180 . VF-02C

S.S. Klondike, Whitehorse, YT

Large Granule Vermiculite, Produce Locker in Vegetable Crates

WH17525 . 06



stereo binocular microscopy ~ 25x

washed & sieved



submitted sample

REQUEST FOR BULK ANALYSIS / CHAIN OF CUSTODY

Submit By Email

Reset Form

Print Form

Company: Stantec
Address: 500 - 4730 Kingsway
Contact Phone # 604 369 0055
Job #: 144902686.205.180
PO #: 144902686.205.180
Location: S.S. Klondike, Whitehorse, YT
Manager: Keith Irwin
Email: keith.irwin@stantec.com

Relinquished By: Keith Irwin

Received by:

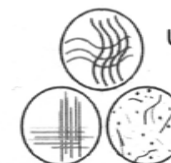
Date/Time

office use only

Samples held as requested

Lab File 17525 BULK Project: 144902686
StanB 205.180
07/16/2018

S.S. Klondike, Whitehorse, YT



Wes-Har
 Unit 115-13988 Maycrest Way
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 V6V 3C3
 Phone: (604) 279-9445
 Fax: (604) 279-9447
 info@weshar.com

Sample No.	Date Sampled	Sample Description	Sample Location	Hold	NOW	1 Day	2 Day	3 Day	5 Day		Method
VF-01A	07/09/2018	Small granule vermiculite	Produce locker in vegetable crates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-01B	07/09/2018	Small granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-01C	07/09/2018	Small granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-02A	07/09/2018	Large granule vermiculite	Produce locker in vegetable crates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-02B	07/09/2018	Large granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
VF-02C	07/09/2018	Large granule vermiculite	Produce locker in vegetable crates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	5
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Keith Irwin
 Authorization Signature
 07/13/2018
 Date

- Methods**
 1 Tiles, Linos, Tars, Mastics, Cementitious
 2 Normal [DWJC, Pipe Lagging, Ceiling Textures]
 3 Other [Dust Tape Lifts Point Count]
 4 Vermiculite [%wt] 5 Vermiculite [DNQ]
 6 Debris / Dusts / Wipes 7 Lead Paint

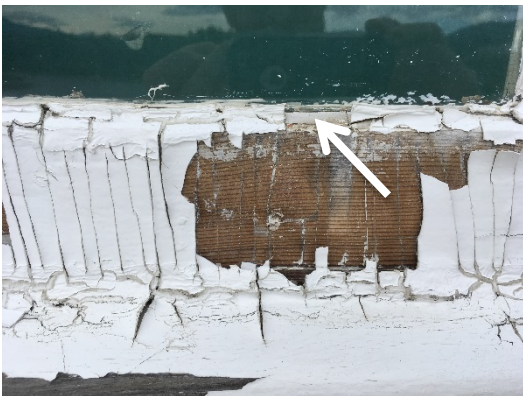
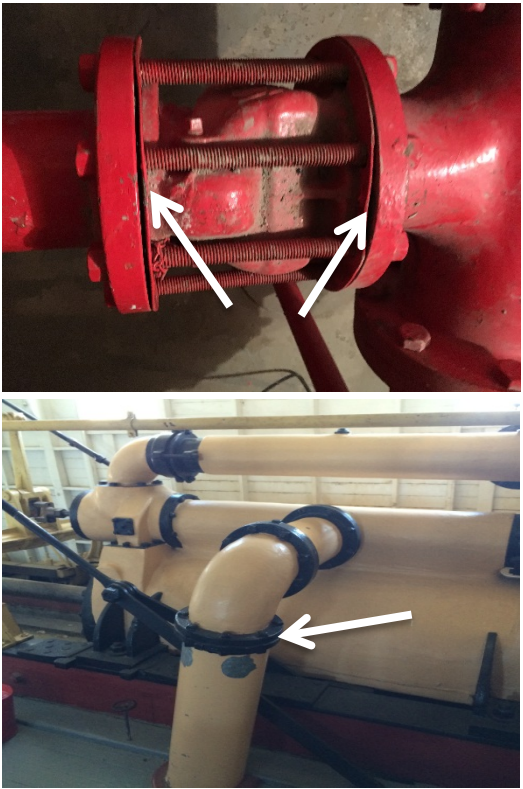
APPENDIX D
SUMMARY OF IDENTIFIED ASBESTOS-
CONTAINING MATERIALS

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix D Summary of Identified Asbestos-Containing Materials
 October 15, 2018

Appendix D SUMMARY OF IDENTIFIED ASBESTOS-CONTAINING MATERIALS

**Table D-4-1 Summary of Identified Asbestos-Containing Materials
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**



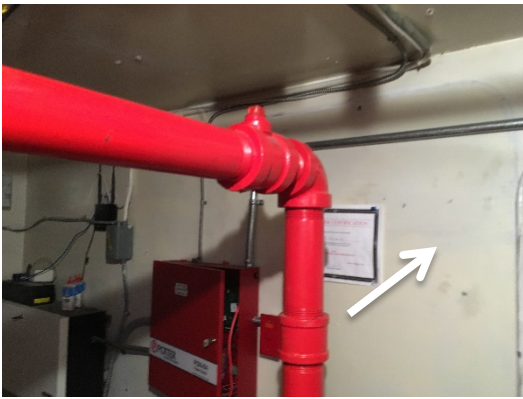
Identified ACM Description and Condition Information	
<p>White window caulking applied to the exterior of windows throughout.</p>	
Friability	Non-friable
Condition	Good
Content	Current Assessment—1.2% Chrysotile Previous Assessment—0.25% Chrysotile
	
<p>Fibrous mechanical gaskets in various pipe flanges throughout (interspersed with various types of non-ACM gaskets as described in the table in Appendix B) including the majority of gaskets present in the valve house.</p>	
Friability	Non-friable
Condition	Good
Content	Current Assessment—45.8% Chrysotile Previous Assessment—41.6% Chrysotile
	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix D Summary of Identified Asbestos-Containing Materials
 October 15, 2018

**Table D-4-1 Summary of Identified Asbestos-Containing Materials
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**

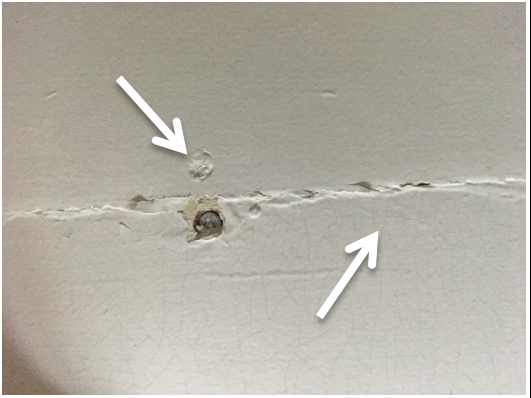
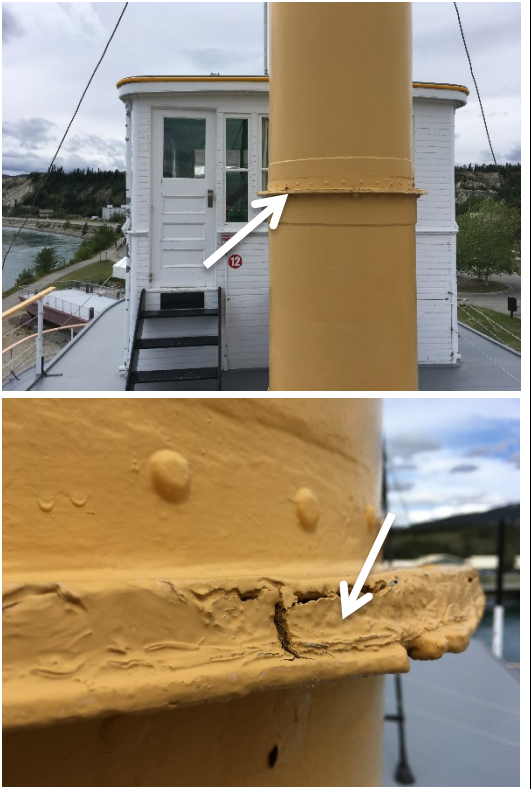
Identified ACM Description and Condition Information		
One small piece of white of cement panel present in the engine room parts storage area.		
Friability	Non-friable	
Condition	Good	
Content	45% Chrysotile	
Brown fibrous debris below the main deck in the boiler room around the base of the mast.		
Friability	Friable	
Condition	Poor (debris)	
Content	<0.66% Chrysotile	
Joint compound applied to drywall walls and ceilings throughout the valve house.		
Friability	Non-friable in situ; potentially friable during removal	
Condition	Good	
Content	1% Chrysotile	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix D Summary of Identified Asbestos-Containing Materials
 October 15, 2018

**Table D-4-1 Summary of Identified Asbestos-Containing Materials
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**




Identified ACM Description and Condition Information	
<p>Joint compound applied to seams and screw heads of particle board walls throughout, including patch compound applied to the kitchen storage room walls on the saloon deck.</p>	
Friability	Non-friable in situ; potentially friable during removal
Condition	Good
Content	2% Chrysotile
	
<p>Large brown mechanical gasket present in the flange on the main boiler stack and the white seam sealant applied to this gasket.</p>	
Friability	Non-friable
Condition	Good
Content	Gasket—<0.25% Chrysotile Sealant—<0.25 to 0.37% Chrysotile
	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix D Summary of Identified Asbestos-Containing Materials
October 15, 2018

**Table D-4-1 Summary of Identified Asbestos-Containing Materials
S.S. Klondike, Whitehorse, YT, Y1A 1V8**

Identified ACM Description and Condition Information	
<p>Grey seam sealant applied around the bottom of the mast below the main deck in the boiler room.</p>	
Friability	Non-friable
Condition	Good
Content	<0.25 to 0.30% Chrysotile
	
<p>Small granule vermiculite filling material inside various crates, bags and barrels as follows:</p> <ul style="list-style-type: none"> • Eight crates labeled vegetables and fruits in the produce locker • One small barrel labeled powdered milk in the pantry • 31 bags labeled sugar in the main deck storage area • Nine small barrels labeled powdered milk or unlabeled in the main deck storage area • Seven crates labeled shredded whole wheat in the main deck storage area • Nine crates labeled vegetables and fruits in the main deck storage area • 16 crates labeled SWIFT in the main deck storage area • 50 crates labeled in various different ways in the main deck storage area • 12 crates labeled dry gin in the main deck storage area • 71 crates labeled gasoline in the main deck storage area • 100 large barrels labeled beer or unlabeled in the main deck storage area <p>Any containers filled with unknown materials should be presumed to containing ACM vermiculite until confirmed otherwise.</p> <p>Note that large granule vermiculite was observed in various containers, but it was determined by analytical testing to be non-ACM.</p>	
	
	
Friability	Friable
Condition	Friable filling material
Content	Asbestiform Amphibole (Detected Not Quantified)



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix D Summary of Identified Asbestos-Containing Materials
 October 15, 2018

Table D-4-2 Instances of Vermiculite Used as Filling/Packing Material




Instances of vermiculite used as filling/packing material—additional photos		
<p>31 bags labeled sugar in the main deck storage area</p>	<p>Nine small barrels labeled powdered milk or unlabeled in the main deck storage area</p>	<p>Seven crates labeled shredded whole wheat in the main deck storage area</p>
<p>Nine crates labeled vegetables and fruits in the main deck storage area</p>	<p>16 crates labeled SWIFT in the main deck storage area</p>	<p>50 crates labeled in various different ways in the main deck storage area</p>
<p>12 crates labeled dry gin in the main deck storage area</p>	<p>71 crates labeled gasoline in the main deck storage area</p>	<p>100 large barrels labeled beer or unlabeled in the main deck storage area</p>



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix D Summary of Identified Asbestos-Containing Materials
October 15, 2018

Table D-4-2 Instances of Vermiculite Used as Filling/Packing Material

Instances of vermiculite used as filling/packing material—additional photos		
		
Eight crates labeled vegetables and fruits in the produce locker	One small barrel labeled powdered milk in the pantry	Garbage bags in small barrels in the main deck storage area



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

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix E Summary of Results: Analysis of Paint Chip Samples for Lead
October 15, 2018

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

**Table E-1 Suspected Lead-Containing Paint Sample and Analytical Results Summary
S.S. Klondike, Whitehorse, YT, Y1A 1V8**

Sample Number	Paint Colour/Application	Sample Location	Result (ppm)
P-01	Green	Wheelhouse	11,000
P-02	Yellow	Top deck—Main stack	15,000
P-03	Black	Top deck—Mast	1,100
P-04	Grey	Top deck - Exterior trim	1,100
P-05	Grey	Boat deck - Life boat cover	420
P-06	Green	Boat deck—Cabin doors	2,300
P-07	Red/Brown	Boat deck—Cabin doors	2,400
P-08	Red	Main deck—Boiler	22,000
P-09	White	Saloon deck—Interior	35,000
P-10	Yellow	Boat Deck - Trim and life boats	370
P-11	White	Saloon deck—Exterior sprinkler pipes	6,000
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	551808357
CustomerID:	55JACQ30L
CustomerPO:	144902686
ProjectID:	

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

Phone: (604) 412-3004
 Fax:
 Received: 07/18/18 10:52 AM
 Collected:

Project: 144902686

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

<i>Client SampleDescription</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
P-01 551808357-0001	Site: Wheelhouse Desc: Green	7/19/2018	0.2407 g	4200 ppm	110000 ppm
P-02 551808357-0002	Site: Top Deck - Main Stack Desc: Yellow	7/19/2018	0.2453 g	410 ppm	15000 ppm
P-03 551808357-0003	Site: Top Deck - Mast Desc: Black	7/19/2018	0.2437 g	82 ppm	1100 ppm
P-04 551808357-0004	Site: Top Deck - Exterior Trim Desc: Grey	7/19/2018	0.2481 g	81 ppm	1100 ppm
P-05 551808357-0005	Site: Boat Deck - Life Boat Cover Desc: Grey	7/19/2018	0.2462 g	81 ppm	420 ppm
P-06 551808357-0006	Site: Boat Deck - Cabin Doors Desc: Green	7/19/2018	0.2453 g	82 ppm	2300 ppm
P-07 551808357-0007	Site: Boat Deck - Cabin Doors Desc: Red/ Brown	7/19/2018	0.2475 g	81 ppm	2400 ppm
P-08 551808357-0008	Site: Freight Deck - Boiler Desc: Red	7/19/2018	0.2104 g	950 ppm	22000 ppm
P-09 551808357-0009	Site: Saloon Deck - Interior Desc: White	7/19/2018	0.2414 g	1700 ppm	35000 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 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. 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. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/25/2018 08:45:16



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 551808357
CustomerID: 55JACQ30L
CustomerPO: 144902686
ProjectID:

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

Phone: (604) 412-3004
Fax:
Received: 07/18/18 10:52 AM
Collected:

Project: 144902686

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

<i>Client SampleDescription</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>RDL</i>	<i>Lead Concentration</i>
P-10 551808357-0010		7/19/2018	0.2430 g	82 ppm	370 ppm
	Site: Boat Deck - Trim and Life Boats Desc: Yellow				
P-11 551808357-0011		7/19/2018	0.2451 g	410 ppm	6000 ppm
	Site: Saloon Deck - Exterior Sprinkler Pipes Desc: White				

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 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. 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. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 07/25/2018 08:45:16




APPENDIX G
**SUMMARY OF IDENTIFIED LEAD-
CONTAINING PAINTS**

PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix G Summary of Identified Lead-Containing Paints
 October 15, 2018

Appendix G SUMMARY OF IDENTIFIED LEAD-CONTAINING PAINTS

**Table G-1 Summary of Identified LCPs
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**




LCP Description		Photo
Paint colour	Black	
Substrate	Wood	
Location/approx. extent	Trim throughout	
Lead content	1,200 (Previous Assessment)	
Condition	Good in general Poor (flaking and peeling) in various locations	
Paint colour	White	
Substrate	Wood and particle board	
Location/approx. extent	Interior walls and ceilings	
Lead content	4,300 (Previous Assessment)	
Condition	Good in general Poor (flaking and peeling) in various locations	
Paint colour	Yellow	
Substrate	Cast iron and canvass pipe wrap	
Location/approx. extent	Pipes in the engine room	
Lead content	71,000 (Previous Assessment)	
Condition	Good	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix G Summary of Identified Lead-Containing Paints
 October 15, 2018

**Table G-1 Summary of Identified LCPs
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**

LCP Description		Photo
Paint colour	White	
Substrate	Wood	
Location/approx. extent	Exterior	
Lead content	7,800 (Previous Assessment)	
Condition	Good in general Poor (flaking and peeling) in various locations	
Paint colour	Green	
Substrate	Wood and particle board	
Location/approx. extent	Interior of wheelhouse and kitchen area	
Lead content	11,000	
Condition	Good	
Paint colour	Yellow	
Substrate	Cast iron	
Location/approx. extent	Exterior of main stack	
Lead content	15,000	
Condition	Good	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix G Summary of Identified Lead-Containing Paints
 October 15, 2018

**Table G-1 Summary of Identified LCPs
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**




LCP Description		Photo
Paint colour	Black	
Substrate	Metal and wood	
Location/approx. extent	Mast	
Lead content	1,100	
Condition	Good in general Poor (flaking and peeling) in various locations	
Paint colour	Grey	
Substrate	Wood	
Location/approx. extent	Exterior trim	
Lead content	1,100	
Condition	Good	
Paint colour	Green	
Substrate	Wood	
Location/approx. extent	Cabin screen doors	
Lead content	2,300	
Condition	Good	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix G Summary of Identified Lead-Containing Paints
 October 15, 2018

**Table G-1 Summary of Identified LCPs
 S.S. Klondike, Whitehorse, YT, Y1A 1V8**


LCP Description		Photo
Paint colour	Red/brown	
Substrate	Wood	
Location/approx. extent	Cabin doors	
Lead content	2,400	
Condition	Good	
Paint colour	Red	
Substrate	Metal	
Location/approx. extent	Main deck boiler	
Lead content	22,000	
Condition	Good	
Paint colour	White	
Substrate	Wood and particle board	
Location/approx. extent	Interior walls and ceilings	
Lead content	35,000	
Condition	Good in general Poor (flaking and peeling) in various locations	



PRE-RENOVATION HAZARDOUS BUILDING MATERIALS ASSESSMENT

Appendix G Summary of Identified Lead-Containing Paints
October 15, 2018

**Table G-1 Summary of Identified LCPs
S.S. Klondike, Whitehorse, YT, Y1A 1V8**

LCP Description		Photo
Paint colour	White	
Substrate	Cast iron	
Location/approx. extent	Sprinkler system pipes	
Lead content	6,000	
Condition	Poor	



ANNEX B5

27 November 2018

Reference No.1786835-001-L-Rev0

Ms. Rae-Ann Sharp

Public Works and Government Services Canada
1230 Government St. Unit 401
Victoria, BC V8W 3X4

ASSESSMENT TO DELINEATE LEAD CONTAMINATION IN SOIL, SS KLONDIKE NATIONAL HISTORICAL SITE, WHITEHORSE, YT

Golder Associates Ltd. (“Golder”) was retained by Public Services and Procurement Canada (PSPC) to conduct an additional assessment to further delineate lead contamination in soil surrounding the SS Klondike sternwheeler at the SS Klondike National Historical Site located at 10 Robert Service Way in Whitehorse, YT (the Site).

Figure 1 shows the Site location.

This report was prepared in accordance with a request for work plan from PSPC dated 26 July 2017, terms and conditions of the Public Works Government Services Canada (PWGSC) ESC Site Characterization CTA Contract #EZ897-1707620/004/PWY, dated 7 December 2017 and the scope of work described in Golder’s work plan “*Work Plan and Cost Estimate for Additional Assessment to Further Delineate Lead Contamination in Soil at the SS Klondike National Historic Site, Whitehorse, Yukon Territory*” P1786835-001-L-Rev1, dated 22 September 2017. Approval to proceed was provided by PSPC as Task Authorization; TA #: 700414442, dated July 3, 2018.

1.0 BACKGROUND

The Site is located at the intersection of 2nd Avenue and Robert Service Way, in the downtown core of Whitehorse, YT. The Yukon River is located adjacent to the Site, approximately 15 to 25 metres (m) from the SS Klondike. The Site consists of the historic SS Klondike sternwheeler, a Visitor Reception Center and a restored barge. The Site also contains a wooden wharf and concrete utility vault. Golder understands that the SS Klondike was donated to Parks Canada after it was decommissioned in 1955. It was restored and then moved to the Site in 1966. The Site was designated a National Historic Site in 1967 and is currently open to the public during the summer. In 1973, the SS Klondike boat was moved approximately 100 m north, to its current location.

In 2001, EBA Engineering Consultants Ltd. (EBA) was retained by Parks Canada to complete a Phase I and Phase II environmental assessment of the soil quality at the SS Klondike (EBA 2002). Soil sampling conducted as part of this investigation indicated that one of the 19 soil samples (15178-S10E5) collected in the vicinity of the SS Klondike contained a concentration of lead (196 mg/kg) that exceeded the Canadian Council of Ministers of the Environment (CCME) standard for Parkland (PL) use (140 mg/kg). The exceedance was measured in a sample collected from 0.15 to 0.30 m below ground surface at the stern of the boat, below the paddlewheel.

A representative of Parks Canada conducted additional soil sampling at the stern of the SS Klondike in August 2011. The Parks Canada study measured concentrations of lead in surficial soil (upper 5 cm) that exceeded the CCME PL guideline in one of the three sampling locations (SSKS-1104/SSKS-1105) collected below the paddlewheel. The concentration was 935 mg/kg and 3350 mg/kg in the duplicate sample. Based on the soil sampling conducted by EBA and Parks Canada, soil concentrations of lead around the SS Klondike were found to be highly variable, with the highest concentrations being observed in the area of the paddlewheel at the stern of the boat.

2.0 OBJECTIVE AND SCOPE OF WORK

The objective of the project was to delineate the contamination in soil related to surface deposition of lead based paint from the SS Klondike Sternwheeler, determine the volume of contaminated soil and whether the lead is considered leachable. To fulfill this objective, the scope of work included a surficial soil sampling program to evaluate soil quality in the area surrounding the SS Klondike in addition to acquiring samples of paint from various locations on the SS Klondike to compare paint types with locations of soil exceedances. The soil with the highest concentration of lead was also analyzed for TCLP metals concentrations to determine the leachability.

3.0 REGULATORY CONSIDERATIONS

The Site is located on federally-administered lands and is therefore subject to federal regulations and guidelines. Yukon Territory standards may be used as guidelines to evaluate off-Site disposal options.

The primary federal regulatory document for the evaluation of soil quality are the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (“CEQG”; CCME, 1999; updated from time to time). The site and surrounding area is zoned Parks and Recreation by the City of Whitehorse, thus the parkland use guidelines were considered applicable.

In the Yukon Territory, environmental matters pertaining to contaminated sites generally fall under the jurisdiction of Environment Yukon, pursuant to the Environment Act. The two key regulations under the Environment Act relating to the assessment and remediation of contaminated sites are the Contaminated Sites Regulation (“CSR”; Environment Yukon, O.I.C. 2002/171), and the Special Waste Regulations (“SWR”; Environment Yukon, O.I.C. 1995/047). In addition to the Yukon CSR, the Government of Canada Justice Department specifies regulated limits for substances under the Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005 – 149). The hazardous constituents controlled under leachate test and regulated limits are outlined in Schedule 6 of the regulation. The Schedule 6 limits are considered applicable to identify potentially special waste-quality soil (if warranted).

4.0 METHODS

Prior to the field work, Golder prepared a Site-specific Health and Safety, Environment Plan (HaSEP) to address and mitigate the potential hazards associated with the work.

Soil sampling at each location at the stern of the boat required the removal of the surface landscaping boulders and geotextile. Both items were replaced at the completion of sampling. In addition, a layer of broken glass was

also present above the geotextile. A small number of paint chip flakes were observed over the landscaping; no paint chips were noted in between the rocks and geotextile. Soil samples were collected at 0.3 m depth within a sand and gravel unit with some fines. In some sampling locations, paint flecks were observed within the soil, but were too small to remove from the sample. Photos of the sampling conditions and locations are shown on Figure 2 and provided in **Attachment 1**.

Soil samples were collected on 12 July 2018 from near surface (upper 0.3 m). Sampling targeted two areas: the paddlewheel, where soil concentrations of lead greater than the CCME Parkland (PL) standard have been previously measured, and the bow (northwest corner) where soil concentrations were elevated in the past but not greater than the CCME PL standard. The rationale for sampling was to re-sample at a slightly deeper depth in locations where there were previously high lead concentrations, and to conduct step-out sampling from these locations. The previous sampling locations were determined based on the field measurements provided. The sample with the highest lead concentration was selected for toxicity characteristic leaching procedure (TCLP) analysis.

Each soil sample was collected using stainless steel tools. All sampling tools was decontaminated with Alconox™ detergent and subsequently rinsed with de-ionized water prior to retrieving the next sample to prevent cross contamination. A total of 14 samples were collected in pre-cleaned and labeled laboratory-supplied glass jars and submitted to Maxxam Analytics laboratory in Burnaby, BC for analysis of total metals, including lead. A minimum of one field duplicate was collected for every 10 field samples for each target analyte for quality assurance and quality control (QA/QC) purposes.

Samples of paint from the SS Klondike were collected from the hull, paddlewheel, and side of the boat. Three samples were collected, one from each location. Stainless steel tools (tweezers) were used to remove chips of paint which were collected in pre-cleaned, laboratory sealed jars. All sampling tools were decontaminated with Alconox™ detergent and subsequently rinsed with de-ionized water prior to retrieving another sample to prevent cross contamination. Paint samples were submitted to Maxxam Analytics laboratory in Burnaby, BC for analysis of total lead.

5.0 RESULTS

5.1 Soil Quality

A summary of the laboratory analytical results for soil samples are presented in **Table 1**. Laboratory Certificate of Analysis (COA) for the soil samples is appended in **Attachment 2**. All soil samples were collected at 0.3 m depth.

One sample (10024-10) collected from beneath the paddlewheel contained a concentration of lead of 166 mg/kg, greater than the CCME PL standard of 140 mg/kg. A field duplicate (sample 10024-11) was collected at this location and had a concentration of 34.7 mg/kg indicating the soil is highly variable in regard to lead concentration. In general, the lead concentrations near the bow of the boat ranged between 15 and 60 mg/kg and near the paddlewheel ranged between 12 and 166 mg/kg.

Sample 10024-10 had the highest lead concentration found in soil samples collected in 2018; therefore this sample was submitted for additional chemical analysis using TCLP. Metal concentrations were below laboratory method detection limits with the exception of barium (430 µg/L) and lead (190 µg/L). These concentrations did not exceed the federal regulated limits for constituents controlled under the leachate test (100,000 µg/L and 5000 µg/L respectively).

One sample (10024-04) collected from near the bow of the boat contained a concentration of arsenic of 13.4 mg/kg, slightly greater than the CCME PL standard of 12 mg/kg.

Five of the 12 sampling locations exceeded the CCME PL standard for pH (6 to 8.5) with pH's slightly greater than 8.5.

5.2 Paint Chip Quality

A summary of the laboratory analytical results for paint chip samples are presented in **Table 2**. Laboratory Certificate of Analysis (COA) for the paint chip samples is appended in **Attachment 2**.

The paint chip sample collected from the paddlewheel had the highest concentration of lead at 18,300 mg/kg. The paddlewheel appears to be different paint (besides the difference in colour) based on the lead concentrations. In comparison the lead concentrations in paint from the bow was 2,000 mg/kg and from the side was 3.5 mg/kg.

5.3 Quality Assurance/Quality Control

The analytical results for the QA/QC samples, including the field duplicates, are included with the soil and analytical results in **Table 1**. The laboratory QA/QC results are provided in the soil laboratory Certificates of Analysis (**Attachment 2**).

The quality of the duplicate samples was assessed based on relative percent difference ("RPD") between the primary and the duplicate samples. The RPD is estimated as follows:

$$RPD (\%) = \frac{\text{absolute}(\text{concentration of primary sample} - \text{concentration of duplicate sample})}{\text{average}(\text{concentration of primary sample, concentration of duplicate sample})} \times 100$$

An RPD value of less 35% for soil is considered an indication of acceptable sample variability, and represented a good correlation between the duplicate samples. As the measured concentrations of the primary and duplicate samples approach the laboratory reporting limit, the uncertainty associated with the RPD increases; as such, the acceptance limits only apply to samples where the average of the primary and duplicate samples is greater than five times the laboratory reporting limit ("LRL"). For parameters with concentrations less than five times the LRL, the Difference Factor ("DF") is evaluated. The DF is defined as the absolute value between two values, divided by the method detection limit, and an acceptable target for a DF is considered to be less than 2.0.

The field duplicate analytical results, as well as the calculated RPDs and DFs, are presented in **Table 3**.

Two duplicate soil samples were collected from and submitted for analyses of total metals including lead. The RPD and DF values calculated for the primary and duplicate soil samples were within acceptable limits with the following exceptions:

- Samples 10024-10/11: lead RPD of 130.8%; tin RPD of 197.8%.

Based on the QA/QC results, soil analytical results can generally be considered reliable; however the concentrations of lead and tin may not be able to be replicated.

6.0 DISCUSSION

Previous sampling by EBA Engineering near the bow of the boat contained a lead concentration just below the CCME PL guideline in sample 15178-S70E5 (134 mg/kg) at between 0.15 and 0.3 m depth. This location was re-sampled at 0.3 m depth, and step-out samples were collected in three directions at distances of 3.5 m. In the original sample location and in two surrounding samples, tiny white paint flecks were observed within the soil at the sampling depth. The flecks could not be removed from the soil samples due to their small size. The lead concentrations of the samples collected in 2018 were all below the CCME PL guideline.

Based on the analysis of the paint chips collected from the bow and from the side of the SS Klondike, the lead concentration in the paint at the bow is much higher (2,000 mg/kg) than the concentration in paint chips sampled from the side of the boat (3.5 mg/kg) suggesting different paint was used.

Previous 2011 sampling by Parks Canada beneath the paddlewheel indicated a lead exceedance (935 and 3,350 mg/kg) in duplicate samples SSKS-04/05 at 2 cm depth. The previous location was resampled at 0.3 m depth (sample 10024-09) which contained a concentration of lead (72 mg/kg) which is less than the CCME PL guideline. Previous 2001 sampling by EBA Engineering indicated a lead exceedance (196 mg/kg) on the west side of the paddlewheel in sample 15178-S10E5, between 0.15 and 0.3 m depth. The approximate location of the previous sample by EBA was resampled at 0.3 m depth (sample 10025-01), which contained a concentration of lead (11.8 mg/kg) that is less than the CCME PL guideline. Additional samples were collected in the vicinity of the previous sampling locations and beneath the paddlewheel. The one exceedance in sample 10024-10 (166 mg/kg) was collected from a location 2 m to the east of the previous Parks Canada sample location. Based on the variation of the results there does not seem to be a defined area of high lead concentrations. It is likely that the spread of lead is not uniform, and we may not have sampled at the exact same location as the previous exceedance due to the accuracy of measurement methods. GPS locations were provided by EBA, however the accuracy of a handheld GPS unit is usually ± 3 m. Measurements from the edge of the paddlewheel were provided by Parks Canada, which would be accurate, however, the reference point of the measurements was not clear. Based on the sampling grid conducted by EBA Engineering, and the refinement of the grid with additional sampling by Parks Canada and Golder near the paddlewheel and at the bow, the overall coverage appears to provide a broad delineation of the elevated concentrations. Paint chip sampling of the paint on the paddlewheel indicated a lead concentration of 18,300 mg/kg. Due to the high concentration of lead in the paint, it appears that portions of the surrounding soil have been impacted in the area of the paddlewheel with the likely source of the lead in soil being the paint. Based on the combined data, the impacted location appears to be limited to the edge of the paddlewheel (a distance of 5.25 m north of the stern of the boat) and on the west side of the paddlewheel.

The one occurrence of an arsenic exceedance (13.4 mg/kg) collected from the bow side of the boat likely represents background soil conditions. The arsenic concentrations in the other samples ranged between 7.2 and 11.4 mg/kg. Other sites in Whitehorse and throughout Yukon have conducted background metals studies as per Yukon Contaminated Sites Regulation Protocol 9 and concluded that arsenic is due to background concentrations.

7.0 CONCLUSIONS

The field investigations for this additional assessment were carried out on 12 July 2018. The program consisted of sampling using hand tools at 12 locations to a depth of 0.3 m bgs. Soil samples were collected from each of the test locations and submitted to Maxxam Analytics laboratory for the analyses of total metals and pH. The laboratory soil results were compared to the CCME PL soil guidelines. Based on the results, the objective of the project to delineate the contamination in soil related to surface deposition of lead-based paint from the SS Klondike has been met.

The following summarizes the findings of this additional sampling conducted at the SS Klondike in Whitehorse, YT:

- Soil sampling at each location near the stern of the boat required the removal of the surface landscaping boulders and geotextile. Both items were replaced at the completion of sampling. In addition, a layer of broken glass was also present above the geotextile. The area sampled at the bow of the boat was grass covered. Soil samples were collected at 0.3 m depth within a sand and gravel unit with some fines.
- One sample (10024-10) collected from beneath the paddlewheel contained a concentration of lead of 166 mg/kg, greater than the CCME PL standard of 140 mg/kg. A field duplicate (sample 10024-11) was collected at this location and had a concentration of 34.7 mg/kg indicating the soil is highly variable in regard to lead concentration.
- Sample 10024-10 was submitted for TCLP for chemical analysis. Metals concentrations were below method detection limits with the exception of barium (430 µg/L) and lead (190 µg/L). These concentrations did not exceed the federal regulated limits for constituents controlled under the leachate test.
- One sample (10024-04) collected from near the bow of the boat contained a concentration of arsenic of 13.4 mg/kg, greater than the CCME PL standard of 12 mg/kg. This concentration likely represents background concentrations for the area.
- The paint chip sample collected from the paddlewheel had the highest concentration of lead at 18,300 mg/kg. In comparison the lead concentrations in paint chips from the bow was 2,000 mg/kg and from the side was 3.5 mg/kg. The paint used on the paddlewheel appears to have much greater lead content than the paint used for the rest of the boat. Thus the paddlewheel appears to have been painted with different paint (besides the difference in colour) based on the lead concentrations.

Based on the information obtained during this additional assessment program, the following recommendations can be made:

- The bow and paddlewheel should be stripped and re-painted in a controlled manner to prevent further lead paint chips from accumulating on the surface of the soils. The paint contains high concentrations of lead and is chipping; thus removal will require special precautions to ensure the safety of workers and visitors to the site as well as avoidance of resulting dust impacting the surrounding area further. A hazardous materials specialist should be retained to plan and oversee the paint removal.

- The deterioration of the paint and resulting chipping has impacted the surrounding soil quality, primarily in the area of the paddlewheel. The soil in this area is now covered with geotextile and landscaping rock which acts as a physical barrier to reduce exposure to workers and visitors provided that recent paint chips on the landscaping and the paint on the paddlewheel will be removed. A risk assessment could be conducted to determine whether this approach is acceptable in terms of risk or whether additional physical barriers are required.
- If the impacted shallow soils beneath the paddlewheel are removed it is estimated that the volume of soil would be 50 m³ (representing the area of soil beneath the paddlewheel to a depth of 0.5 m). Results from a leachate test suggest that the soil would not be considered hazardous waste under Federal Law.

8.0 NOTICE TO READERS

This report was prepared in accordance with a request for work plan from PSPC dated 26 July 2017, terms and conditions of the Public Works Government Services Canada (PWGSC) ESC Site Characterization CTA Contract #EZ897-1707620/004/PWY, dated 7 December 2017 and the scope of work described in Golder's work plan "Work Plan and Cost Estimate for Additional Assessment to Further Delineate Lead Contamination in Soil at the SS Klondike National Historic Site, Whitehorse, Yukon Territory" P1786835-001-L-Rev1, dated 22 September 2017. Approval to proceed was provided by PSPC as Task Authorization; TA #: 700414442, dated July 3 2018.

The inferences concerning the Site conditions contained in this report are based on information obtained during the assessment conducted by Golder personnel, and are based solely on the condition of the property at the time of the Site reconnaissance, supplemented by historical and interview information obtained by Golder, as described in this report.

This report was prepared, based in part, on information obtained from historic information sources. In evaluating the subject Site, Golder has relied in good faith on information provided. We accept no responsibility for any deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information.

The findings and conclusions documented in this report have been prepared for the specific application to this project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, these should be reviewed.

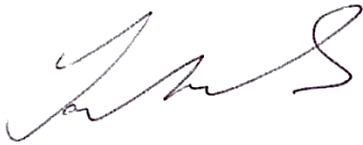
If new information is discovered during future work, the conclusions of this report should be re-evaluated, and the report amended, as required, prior to any reliance upon the information presented herein.

9.0 CLOSURE

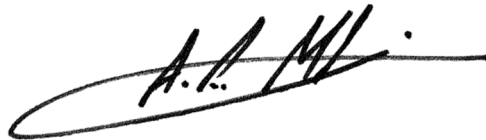
We trust that the contents of this letter are sufficient for your current review purposes. Should you have questions regarding this report, please do not hesitate to contact Tamra Reynolds at 867-633-6076.

Yours very truly,

Golder Associates Ltd.



Tamra Reynolds, MSc, PGeo
Associate, Senior Hydrogeologist



Ahmadreza Mehjoo, PEng, PMP
Principal, Senior Reviewer

TR/AM/asd

Attachments: Table 1: Soil Analytical Data
Table 2: Soil TCLP Data
Table 3: Paint Chip Analytical Data
Table 4: QA/QC
Figure 1: Location Plan
Figure 2: Site Plan with Sampling Locations
Attachment 1: Photographs
Attachment 2: Certificates of Analysis and Chain of Custody

[https://golderassociates.sharepoint.com/sites/30087g/deliverables/issued to client - for wp/1786835-001-l-rev0/1786835-001-l-rev0-ss klondike 27nov_18.docx](https://golderassociates.sharepoint.com/sites/30087g/deliverables/issued%20to%20client%20-%20for%20wp/1786835-001-l-rev0/1786835-001-l-rev0-ss%20klondike%2027nov_18.docx)

Table 1: Analytical Results for Soil - Metals
SS Klondike Historical Site
Whitehorse, Yukon

Location	Bow	Bow	Bow	Bow	Bow	Paddle Wheel	Paddle Wheel		
Sample Media	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
SCN	10024-01	10024-02	10024-03	10024-04	10024-05	10024-09	10024-10		
Date Sampled	2018-07-12 11:45	2018-07-12 11:55	2018-07-12 11:55	2018-07-12 12:10	2018-07-12 12:20	2018-07-12 17:10	2018-07-12 17:30		
QAQC		FDA	FD				FDA		
Physical Tests	units	CCME CEQG (PL)							
Soluble (2:1) pH	pH	6 - 8.5	8.71	8.55	8.64	8.59	8.43	8.27	8.22
Total Metals									
Total Aluminum (Al)	mg/kg		13000	13000	13300	13900	10700	10300	9020
Total Antimony (Sb)	mg/kg	20	0.75	0.83	0.98	0.85	0.82	0.71	0.55
Total Arsenic (As)	mg/kg	12	9.3	9.89	11.4	13.4	7.72	7.41	8.2
Total Barium (Ba)	mg/kg	500	143	150	165	160	95.3	105	64.5
Total Beryllium (Be)	mg/kg	4	0.35	0.37	0.36	0.4	0.27	0.27	0.26
Total Bismuth (Bi)	mg/kg		0.15	0.16	0.18	0.18	0.1	0.1	<0.10
Total Boron (B)	mg/kg		2.1	2.2	2.3	2.2	2	2.5	1.2
Total Cadmium (Cd)	mg/kg	10	0.215	0.269	0.308	0.29	0.273	0.236	0.209
Total Calcium (Ca)	mg/kg		18400	18400	21500	22300	10400	7650	13100
Total Chromium (Cr)	mg/kg	64	37	41.8	40.2	41.7	32.4	35.6	24.3
Total Cobalt (Co)	mg/kg	50	9.02	9.83	10.4	10.5	7.48	7.78	6.54
Total Copper (Cu)	mg/kg	63	34	40.4	43.9	39.4	23.9	24	22.8
Total Iron (Fe)	mg/kg		22300	22700	25000	25500	20400	19900	18200
Total Lead (Pb)	mg/kg	140	15.6	43.9	55.7	42	60.5	72	166
Total Lithium (Li)	mg/kg		10.5	11	11.1	11.9	8.8	8.8	8.3
Total Magnesium (Mg)	mg/kg		8680	9780	9970	10600	6600	6690	6020
Total Manganese (Mn)	mg/kg		395	401	444	465	310	298	249
Total Mercury (Hg)	mg/kg	6.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Molybdenum (Mo)	mg/kg	10	0.78	0.71	0.82	0.95	0.67	0.87	0.69
Total Nickel (Ni)	mg/kg	45	31.1	37	33.4	33.6	25.7	28.3	17.1
Total Phosphorus (P)	mg/kg		780	818	922	824	736	701	644
Total Potassium (K)	mg/kg		1150	1200	1290	1300	911	804	828
Total Selenium (Se)	mg/kg	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Silver (Ag)	mg/kg	20	0.108	0.181	0.199	0.138	0.166	0.123	0.065
Total Sodium (Na)	mg/kg		233	248	276	290	237	232	222
Total Strontium (Sr)	mg/kg		54	52.3	55.4	72.6	36	33	46
Total Thallium (Tl)	mg/kg	1	0.098	0.093	0.109	0.108	0.078	0.069	0.08
Total Tin (Sn)	mg/kg	50	0.48	0.45	0.64	0.44	4.79	0.74	0.31
Total Titanium (Ti)	mg/kg		815	743	809	852	658	655	498
Total Tungsten (W)	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Uranium (U)	mg/kg	23	1.06	0.934	1.04	1.15	0.927	0.958	0.641
Total Vanadium (V)	mg/kg	130	46.1	46.3	49.8	53.5	43	41.8	41.1
Total Zinc (Zn)	mg/kg	250	52.9	74.4	81.3	69	60.9	55.6	40.3
Total Zirconium (Zr)	mg/kg		5.42	4.36	4.19	4.9	2.84	2.8	2.69

Notes:

Standards are the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) (CCME, 1999; updated to 2018).

Landuse abbreviations: Parkland (PL)

Sample exceeding CCME CEQG

13.4

Table 1: Analytical Results for Soil - Metals
SS Klondike Historical Site
Whitehorse, Yukon

Location	Paddle Wheel	Paddle Wheel	Paddle Wheel	Paddle Wheel	Paddle Wheel	Paddle Wheel	Paddle Wheel		
Sample Media	Soil	Soil	Soil	Soil	Soil	Soil	Soil		
SCN	10024-11	10024-12	10025-01	10025-02	10025-03	10025-04	10025-05		
Date Sampled	2018-07-12 17:30	2018-07-12 18:10	2018-07-13 09:15	2018-07-13 09:35	2018-07-13 09:55	2018-07-13 10:10	2018-07-13 10:30		
QAQC	FD								
Physical Tests	units	CCME CEQG (PL)							
Soluble (2:1) pH	pH	6 - 8.5	8.21	8.22	8.49	8.47	8.22	8.51	8.58
Total Metals									
Total Aluminum (Al)	mg/kg		8750	9550	10700	10500	10400	10200	10100
Total Antimony (Sb)	mg/kg	20	0.53	0.81	0.57	0.53	0.63	0.65	0.5
Total Arsenic (As)	mg/kg	12	7.73	8.1	9	8.44	8.07	7.47	7.18
Total Barium (Ba)	mg/kg	500	71.6	103	119	90.7	112	111	118
Total Beryllium (Be)	mg/kg	4	0.22	0.26	0.3	0.26	0.27	0.26	0.28
Total Bismuth (Bi)	mg/kg		0.11	0.11	0.12	<0.10	<0.10	<0.10	<0.10
Total Boron (B)	mg/kg		<1.0	1.9	3	1.6	2.2	2.1	1.9
Total Cadmium (Cd)	mg/kg	10	0.17	0.24	0.178	0.169	0.164	0.183	0.13
Total Calcium (Ca)	mg/kg		12300	9240	7140	8320	6090	7950	6130
Total Chromium (Cr)	mg/kg	64	24.5	37.1	34.4	31.9	36.1	39.7	34.8
Total Cobalt (Co)	mg/kg	50	6.6	7.51	8.04	8.12	7.53	7.81	7.18
Total Copper (Cu)	mg/kg	63	29.4	25.3	23.7	30.3	20.3	21.6	19.1
Total Iron (Fe)	mg/kg		18200	19100	21300	20500	20300	19400	19400
Total Lead (Pb)	mg/kg	140	34.7	31.3	11.8	28.8	48.3	63.8	12.5
Total Lithium (Li)	mg/kg		8.1	7.9	9.4	9.7	7.7	7.9	7.5
Total Magnesium (Mg)	mg/kg		5840	6230	7020	6990	6420	6860	6040
Total Manganese (Mn)	mg/kg		242	280	315	328	316	286	267
Total Mercury (Hg)	mg/kg	6.6	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Total Molybdenum (Mo)	mg/kg	10	0.67	0.75	0.93	0.71	0.77	0.77	0.67
Total Nickel (Ni)	mg/kg	45	16.9	25.8	27.7	28.3	28.9	34.2	27
Total Phosphorus (P)	mg/kg		683	692	639	688	637	651	642
Total Potassium (K)	mg/kg		890	870	969	799	921	859	909
Total Selenium (Se)	mg/kg	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Silver (Ag)	mg/kg	20	0.087	0.127	0.064	0.114	0.07	0.077	0.067
Total Sodium (Na)	mg/kg		229	229	218	216	190	205	181
Total Strontium (Sr)	mg/kg		43.8	36.2	34.1	33.6	27.7	30.9	27.8
Total Thallium (Tl)	mg/kg	1	0.073	0.083	0.084	0.065	0.08	0.072	0.067
Total Tin (Sn)	mg/kg	50	56.6	0.91	0.32	0.33	0.37	0.38	0.33
Total Titanium (Ti)	mg/kg		455	583	660	630	645	640	604
Total Tungsten (W)	mg/kg		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Total Uranium (U)	mg/kg	23	0.717	1.01	0.927	0.696	0.825	0.819	0.697
Total Vanadium (V)	mg/kg	130	41.2	42	46.2	44.1	43.2	40.3	40.6
Total Zinc (Zn)	mg/kg	250	44.5	52.3	43.6	47.6	47.2	50.1	36.2
Total Zirconium (Zr)	mg/kg		2.37	2.75	3.74	3.3	3.65	3.24	3.94

Notes:

Standards are the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG) (CCME, 1999; updated to 2018).

Landuse abbreviations: Parkland (PL)

Sample exceeds CCME CEQG

13.4

Table 2: Analytical Results for Soil - Leachable Metals
SS Klondike Historical Site
Whitehorse, Yukon

		Location	Paddle Wheel
		Sample Media	Soil
		SCN	10024-10
		Date Sampled	2018-07-12 17:30
Leachable Metals	units	EIHWHRMR Schedule 6	
Antimony (Sb)	ug/L		<100
Arsenic (As)	ug/L	2500	<100
Barium (Ba)	ug/L	100000	430
Beryllium (Be)	ug/L		<100
Boron (B)	ug/L	500000	<100
Cadmium (Cd)	ug/L	500	<100
Chromium (Cr)	ug/L	5000	<100
Cobalt (Co)	ug/L		<100
Copper (Cu)	ug/L		<100
Iron (Fe)	ug/L		<500
Lead (Pb)	ug/L	5000	190
Mercury (Hg)	ug/L	100	<2
Molybdenum (Mo)	ug/L		<100
Nickel (Ni)	ug/L		<100
Selenium (Se)	ug/L	1000	<100
Silver (Ag)	ug/L		<10
Thallium (Tl)	ug/L		<100
Uranium (U)	ug/L	10000	<100
Vanadium (V)	ug/L		<100
Zinc (Zn)	ug/L		<100
Zirconium (Zr)	ug/L		<100

Notes:

Standards are the Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulation Guidelines (EIHWHRMR, Schedule 6, updated to 2016).

Sample exceeding CCME CEQG

Table 3: Analytical Results for Paint - Lead
SS Klondike Historical Site
Whitehorse, Yukon

	Location	Bow	Paddle Wheel	Side
	Sample Media	Paint Chip	Paint Chip	Paint Chip
	SCN	10024-06	10024-07	10024-08
	Date Sampled	2018-07-12 12:50	2018-07-12 13:15	2018-07-13 10:45
Total Lead (Pb)	mg/kg	2000 (1)	18300 (2)	3.5

Notes:

- (1) Duplicate RPD above control limit - Non-homogenous sample - Increased variability of results. Reanalysis yields similar results.
- (2) Detection limits raised due to dilution to bring analyte within the calibrated range.

**Table 4: Results of Duplicate Analysis
SS Klondike Historical Site
Whitehorse, Yukon**

	Location	Bow	Bow	Method Detection Limit	Relative Percent Difference	Difference Factor	Paddle Wheel	Paddle Wheel	Method Detection Limit	Relative Percent Difference	Difference Factor
	Sample Media	Soil	Soil				Soil	Soil			
	SCN	10024-02	10024-03				10024-10	10024-11			
	Date Sampled	2018-07-12 11:55	2018-07-12 11:55				2018-07-12 17:30	2018-07-12 17:30			
	QA/QC	FDA	FD				FDA	FD			
Physical Tests	units										
Soluble (2:1) pH	pH	8.55	8.64	-	1.0	-	8.22	8.21	-	0.1	
Total Metals											
Total Aluminum (Al)	mg/kg	13000	13300	100	2.3	NA	9020	8750	100	3.0	NA
Total Antimony (Sb)	mg/kg	0.83	0.98	0.1	16.6	NA	0.55	0.53	0.1	3.7	NA
Total Arsenic (As)	mg/kg	9.89	11.4	0.5	14.2	NA	8.2	7.73	0.5	5.9	NA
Total Barium (Ba)	mg/kg	150	165	0.1	9.5	NA	64.5	71.6	0.1	10.4	NA
Total Beryllium (Be)	mg/kg	0.37	0.36	0.2	2.7	NA	0.26	0.22	0.2	16.7	NA
Total Bismuth (Bi)	mg/kg	0.16	0.18	0.1	11.8	NA	<0.10	0.11	0.1	nc	NA
Total Boron (B)	mg/kg	2.2	2.3	1	4.4	NA	1.2	<1.0	1	nc	NA
Total Cadmium (Cd)	mg/kg	0.269	0.308	0.05	13.5	NA	0.209	0.17	0.05	20.6	NA
Total Calcium (Ca)	mg/kg	18400	21500	100	15.5	NA	13100	12300	100	6.3	NA
Total Chromium (Cr)	mg/kg	41.8	40.2	1	3.9	NA	24.3	24.5	1	0.8	NA
Total Cobalt (Co)	mg/kg	9.83	10.4	0.3	5.6	NA	6.54	6.6	0.3	0.9	NA
Total Copper (Cu)	mg/kg	40.4	43.9	0.5	8.3	NA	22.8	29.4	0.5	25.3	NA
Total Iron (Fe)	mg/kg	22700	25000	100	9.6	NA	18200	18200	100	0.0	NA
Total Lead (Pb)	mg/kg	43.9	55.7	0.1	23.7	NA	166	34.7	0.1	130.8	NA
Total Lithium (Li)	mg/kg	11	11.1	5	0.9	NA	8.3	8.1	5	2.4	NA
Total Magnesium (Mg)	mg/kg	9780	9970	100	1.9	NA	6020	5840	100	3.0	NA
Total Manganese (Mn)	mg/kg	401	444	0.2	10.2	NA	249	242	0.2	2.9	NA
Total Mercury (Hg)	mg/kg	<0.050	<0.050	0.05	nc	NA	<0.050	<0.050	0.05	nc	NA
Total Molybdenum (Mo)	mg/kg	0.71	0.82	0.1	14.4	NA	0.69	0.67	0.1	2.9	NA
Total Nickel (Ni)	mg/kg	37	33.4	0.8	10.2	NA	17.1	16.9	0.8	1.2	NA
Total Phosphorus (P)	mg/kg	818	922	10	12.0	NA	644	683	10	5.9	NA
Total Potassium (K)	mg/kg	1200	1290	100	7.2	NA	828	890	100	7.2	NA
Total Selenium (Se)	mg/kg	<0.50	<0.50	0.5	nc	NA	<0.50	<0.50	0.5	nc	NA
Total Silver (Ag)	mg/kg	0.181	0.199	0.05	9.5	NA	0.065	0.087	0.05	29.0	NA
Total Sodium (Na)	mg/kg	248	276	100	10.7	NA	222	229	100	3.1	NA
Total Strontium (Sr)	mg/kg	52.3	55.4	0.1	5.8	NA	46	43.8	0.1	4.9	NA
Total Thallium (Tl)	mg/kg	0.093	0.109	0.05	15.8	NA	0.08	0.073	0.05	9.2	NA
Total Tin (Sn)	mg/kg	0.45	0.64	0.1	34.9	NA	0.31	56.6	0.1	197.8	NA
Total Titanium (Ti)	mg/kg	743	809	1	8.5	NA	498	455	1	9.0	NA
Total Tungsten (W)	mg/kg	<0.50	<0.50	0.5	nc	NA	<0.50	<0.50	0.5	nc	NA
Total Uranium (U)	mg/kg	0.934	1.04	0.05	10.7	NA	0.641	0.717	0.05	11.2	NA
Total Vanadium (V)	mg/kg	46.3	49.8	2	7.3	NA	41.1	41.2	2	0.2	NA
Total Zinc (Zn)	mg/kg	74.4	81.3	1	8.9	NA	40.3	44.5	1	9.9	NA
Total Zirconium (Zr)	mg/kg	4.36	4.19	0.5	4.0	NA	2.69	2.37	0.5	12.6	NA

notes:

Method Detection Limit indicates the minimum concentration that could be measured by laboratory instrumentation for a specific sample.

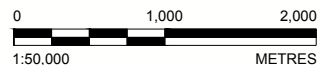
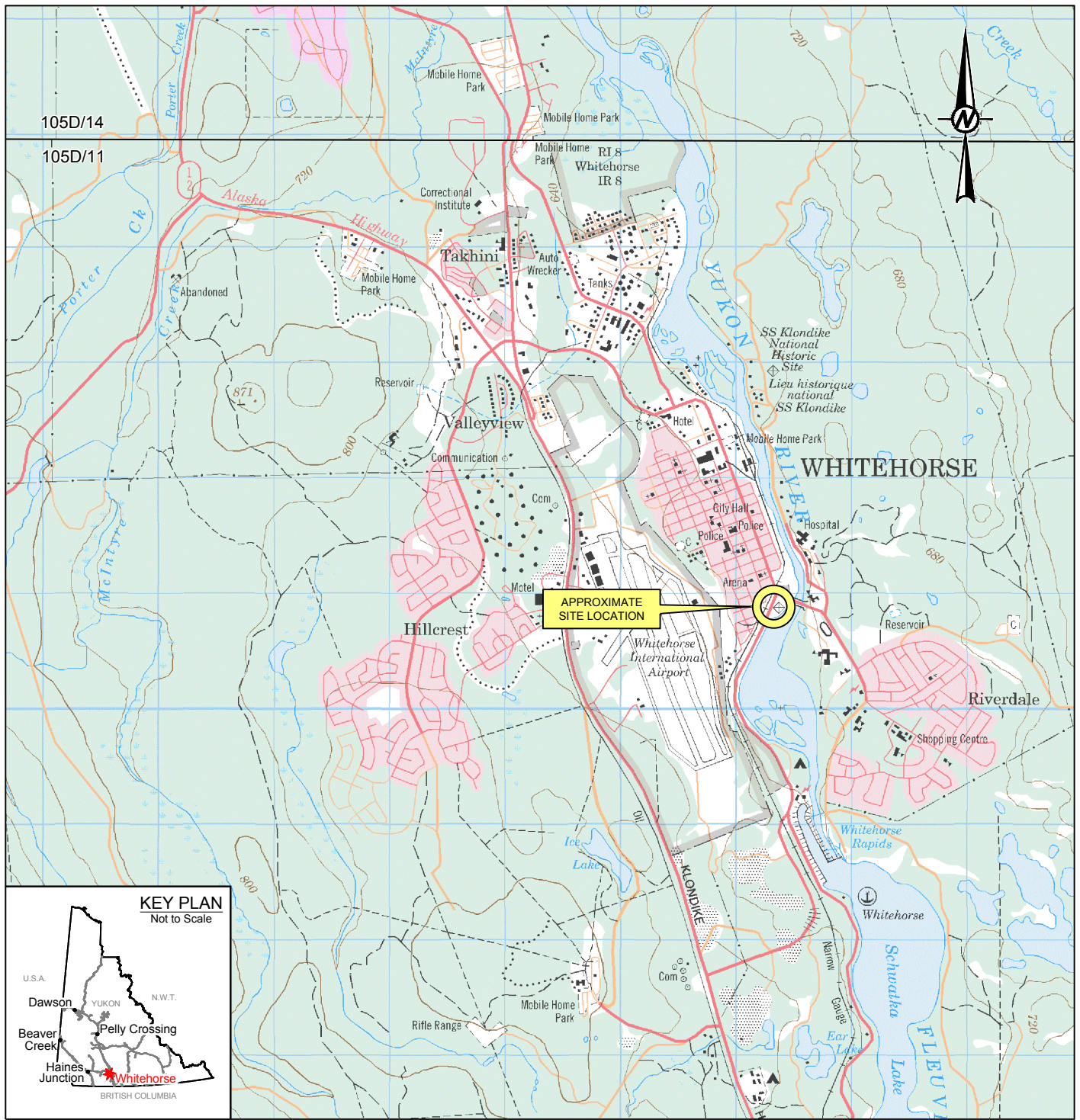
Relative Percent Difference is calculated when the mean value is greater than five times the method detection limit; Golder's internal QA/QC target for soil is less than 35%.

Difference Factor is calculated when the mean value is less than five times the method detection limit; Golder's internal QA/QC target is less than 2.


FDA/FD = field duplicate available/field duplicate; QA/QC = quality assurance/quality control

(-) = parameter not analyzed; NC = Not Calculated; NA = not applicable

BOLD font indicates the parameter analysed exceeds Golder's internal QA/QC targets.



LEGEND

 APPROXIMATE SITE LOCATION

REFERENCES

BASE DATA FROM CANMATRIX 1: 50000 NTS - 105D/11, 105D/14
 CANVEC DATA OBTAINED FROM GEORATIS, CENTRE FOR TOPOGRAPHIC INFORMATION (NRCAN, ESS) DEPARTMENT OF NATURAL RESOURCES, CANADA.
 DATUM: NAD83, PROJECTION: UTM ZONE 8

CLIENT
PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT
**ADDITIONAL ASSESSMENT FOR LEAD
 S.S. KLONDIKE NATIONAL HISTORIC SITE
 WHITEHORSE, YT**

CONSULTANT

YYYY-MM-DD	2018-11-27
PREPARED	RTJ
DESIGN	MM
REVIEW	TR
APPROVED	TR

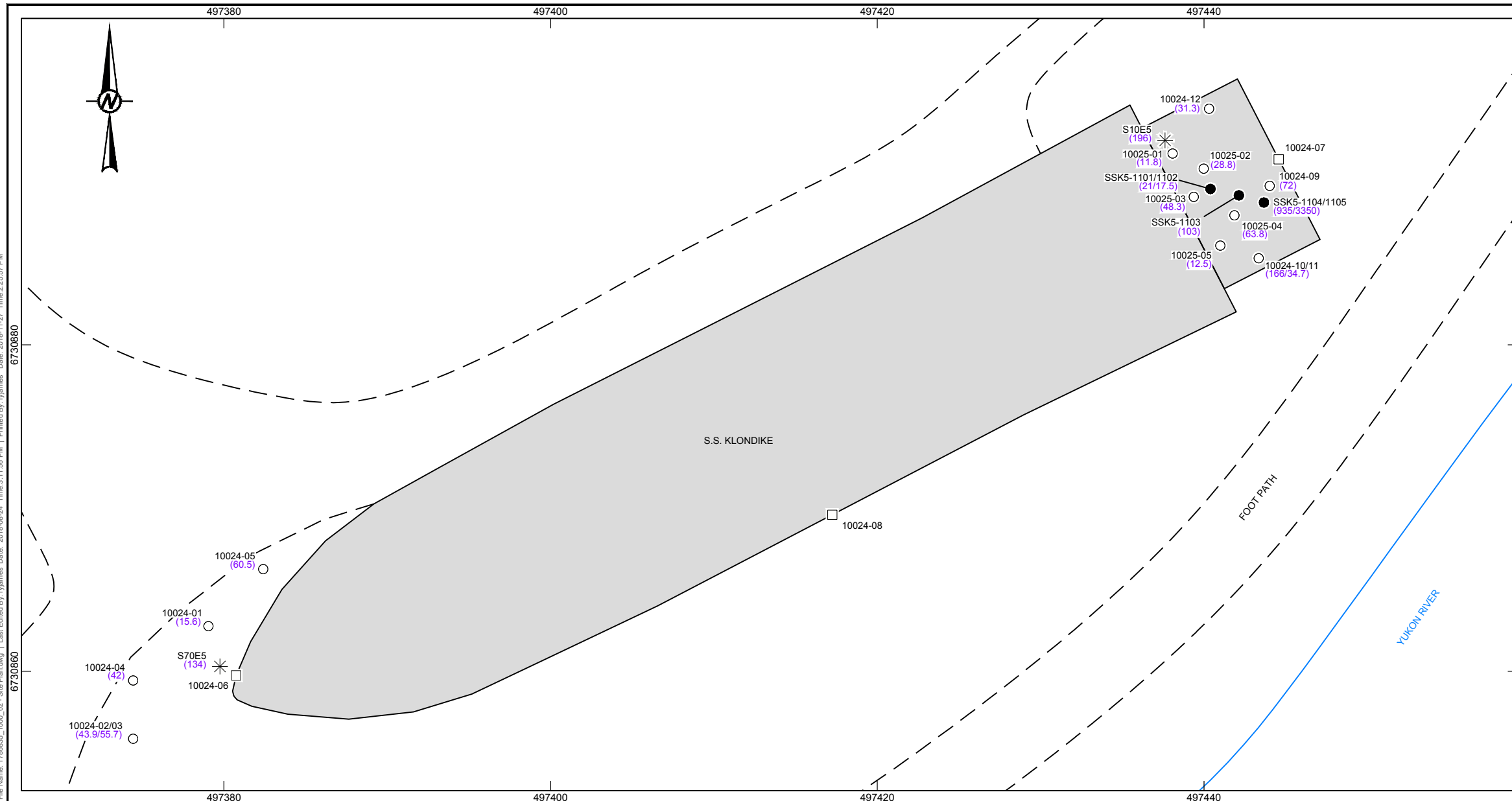
 **GOLDER**

TITLE
KEY PLAN

PROJECT No.	PHASE	Rev.	FIGURE
1786835	1000	0	1

Path: \\golder-gis\gpk\down\CAD-GIS\Client\PIV\GSCSS_Klondike_Whitehorse\99_PROJECTS\1786835_EN\VRD02_PRODUCTION\1786835_1000_1 - Key Plan.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSIA 26 mm



LEGEND

- S.S. KLONDIKE FOOTPRINT (APPROXIMATE)
- GOLDER 2018 SAMPLING LOCATION (30 cm DEPTH)
- PARKS CANADA 2011 SAMPLING LOCATION (0-3 cm DEPTH)
- EBA 2001 SAMPLING LOCATION (15-30 cm DEPTH)
- GOLDER PAINT CHIP 2018 SAMPLING LOCATION
- LEAD CONCENTRATION IN SOIL (mg/kg)

REFERENCE(S)
 BASE DATA DIGITIZED FROM SATELLITE IMAGERY
 DATUM: NAD83, PROJECTION: UTM ZONE 8

REFERENCE(S)
 BASE DATA DIGITIZED FROM SATELLITE IMAGERY
 DATUM: NAD83, PROJECTION: UTM ZONE 8



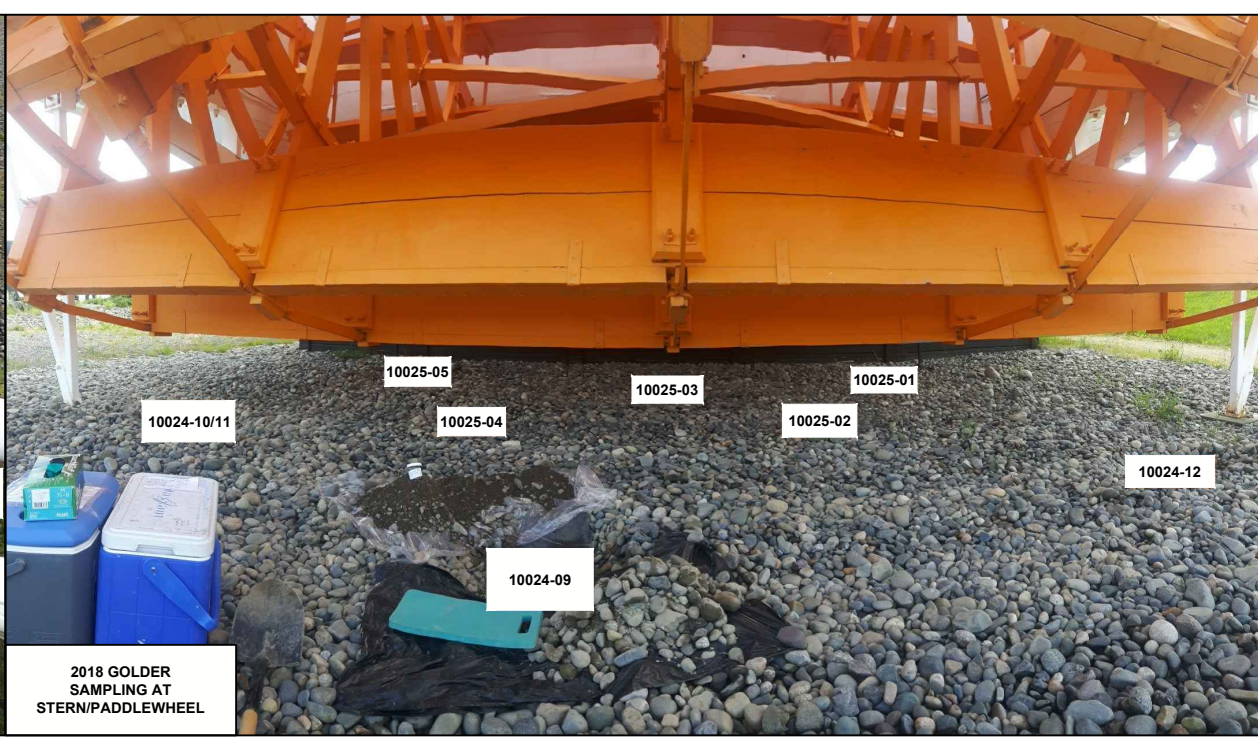
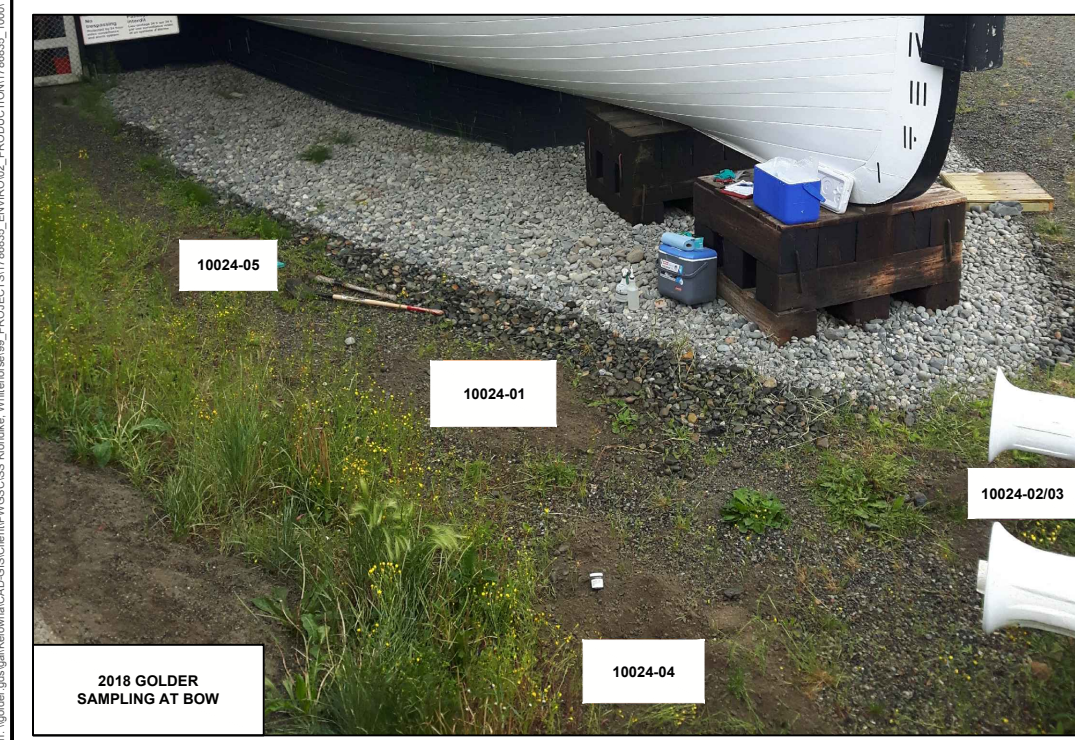
CLIENT
 PUBLIC SERVICES AND PROCUREMENT CANADA

PROJECT
 ADDITIONAL ASSESSMENT FOR LEAD
 S.S. KLONDIKE NATIONAL HISTORIC SITE
 WHITEHORSE, YT

TITLE
 SITE PLAN WITH SAMPLING LOCATIONS

CONSULTANT	YYYY-MM-DD	2018-11-27
	DESIGNED	MM
	PREPARED	RTJ
	REVIEWED	TR
	APPROVED	TR

PROJECT NO. 1786835 PHASE 1000 REV. 0 FIGURE 2



Path: \\golder\gpc\gpc\kldm\CAD\Clients\PC\GSCSS_Klondike_Whitehorse\99_PROJECTS\1786835_1000_1_File_Name_1786835_1000_02_Site_Plan.dwg | Last Edited By: rjames Date: 2018-09-24 Time: 3:11:56 PM | Printed By: rjames Date: 2018-11-27 Time: 2:25:57 PM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A4.

ATTACHMENT 1

Photographs



Photo 1: Locations of Samples at the Bow of the Boat



Photo 2: Sample Locations at the Bow of the Boat



Photo 3: Sample 10024-02 showing paint chips in the soil



Photo 4: Sample locations below the Paddlewheel



Photo 5: Sample location 10024-12 showing the process of sample collection



Photo 6: Location of paint sample from the Bow



Photo 7: Paint chip sample locations from the Paddlewheel



Photo 8: Paint chip sample locations from the side

ATTACHMENT 2

**Certificates of Analysis and Chain
of Custody**

Your Project #: 1786835
Your C.O.C. #: 10024, 10025

Attention: Tamra Reynolds

GOLDER ASSOCIATES LTD.
Suite 201C, 170 Titanium Way
Whitehorse, YT
CANADA Y1A 0G1

Report Date: 2018/07/18

Report #: R2591190

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B858205

Received: 2018/07/13, 13:30

Sample Matrix: PAINT
Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICP-AES (acid extr. solid)	2	2018/07/17	2018/07/17	BBY7SOP-00018	EPA 6010c R3 m
Elements by ICP-AES (acid extr. solid)	1	2018/07/17	2018/07/18	BBY7SOP-00018	EPA 6010c R3 m

Sample Matrix: Soil
Samples Received: 14

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICPMS (total)	14	2018/07/17	2018/07/17	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
pH (2:1 DI Water Extract)	14	2018/07/17	2018/07/17	BBY6SOP-00028	BCMOE BCLM Mar2005 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your Project #: 1786835
Your C.O.C. #: 10024, 10025

Attention: Tamra Reynolds

GOLDER ASSOCIATES LTD.
Suite 201C, 170 Titanium Way
Whitehorse, YT
CANADA Y1A 0G1

Report Date: 2018/07/18
Report #: R2591190
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B858205

Received: 2018/07/13, 13:30

Encryption Key



Letitia Prefontaine
Senior Project Manager
18 Jul 2018 18:05:42

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Letitia Prefontaine, B.Sc., Senior Project Manager
Email: LPrefontaine@maxxam.ca
Phone# (604)639-2616

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1777	TW1778	TW1779	TW1780	TW1781	TW1785	TW1786		
Sampling Date		2018/07/12 11:45	2018/07/12 11:55	2018/07/12 11:55	2018/07/12 12:10	2018/07/12 12:20	2018/07/12 17:10	2018/07/12 17:30		
COC Number		10024	10024	10024	10024	10024	10024	10024		
	UNITS	10024-01	10024-02	10024-03	10024-04	10024-05	10024-09	10024-10	RDL	QC Batch

Physical Properties

Soluble (2:1) pH	pH	8.71	8.55	8.64	8.59	8.43	8.27	8.22	N/A	9066321
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Total Metals by ICPMS

Total Aluminum (Al)	mg/kg	13000	13000	13300	13900	10700	10300	9020	100	9066298
Total Antimony (Sb)	mg/kg	0.75	0.83	0.98	0.85	0.82	0.71	0.55	0.10	9066298
Total Arsenic (As)	mg/kg	9.30	9.89	11.4	13.4	7.72	7.41	8.20	0.50	9066298
Total Barium (Ba)	mg/kg	143	150	165	160	95.3	105	64.5	0.10	9066298
Total Beryllium (Be)	mg/kg	0.35	0.37	0.36	0.40	0.27	0.27	0.26	0.20	9066298
Total Bismuth (Bi)	mg/kg	0.15	0.16	0.18	0.18	0.10	0.10	<0.10	0.10	9066298
Total Boron (B)	mg/kg	2.1	2.2	2.3	2.2	2.0	2.5	1.2	1.0	9066298
Total Cadmium (Cd)	mg/kg	0.215	0.269	0.308	0.290	0.273	0.236	0.209	0.050	9066298
Total Calcium (Ca)	mg/kg	18400	18400	21500	22300	10400	7650	13100	100	9066298
Total Chromium (Cr)	mg/kg	37.0	41.8	40.2	41.7	32.4	35.6	24.3	1.0	9066298
Total Cobalt (Co)	mg/kg	9.02	9.83	10.4	10.5	7.48	7.78	6.54	0.30	9066298
Total Copper (Cu)	mg/kg	34.0	40.4	43.9	39.4	23.9	24.0	22.8	0.50	9066298
Total Iron (Fe)	mg/kg	22300	22700	25000	25500	20400	19900	18200	100	9066298
Total Lead (Pb)	mg/kg	15.6	43.9	55.7	42.0	60.5	72.0	166	0.10	9066298
Total Lithium (Li)	mg/kg	10.5	11.0	11.1	11.9	8.8	8.8	8.3	5.0	9066298
Total Magnesium (Mg)	mg/kg	8680	9780	9970	10600	6600	6690	6020	100	9066298
Total Manganese (Mn)	mg/kg	395	401	444	465	310	298	249	0.20	9066298
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9066298
Total Molybdenum (Mo)	mg/kg	0.78	0.71	0.82	0.95	0.67	0.87	0.69	0.10	9066298
Total Nickel (Ni)	mg/kg	31.1	37.0	33.4	33.6	25.7	28.3	17.1	0.80	9066298
Total Phosphorus (P)	mg/kg	780	818	922	824	736	701	644	10	9066298
Total Potassium (K)	mg/kg	1150	1200	1290	1300	911	804	828	100	9066298
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Silver (Ag)	mg/kg	0.108	0.181	0.199	0.138	0.166	0.123	0.065	0.050	9066298
Total Sodium (Na)	mg/kg	233	248	276	290	237	232	222	100	9066298
Total Strontium (Sr)	mg/kg	54.0	52.3	55.4	72.6	36.0	33.0	46.0	0.10	9066298
Total Thallium (Tl)	mg/kg	0.098	0.093	0.109	0.108	0.078	0.069	0.080	0.050	9066298
Total Tin (Sn)	mg/kg	0.48	0.45	0.64	0.44	4.79	0.74	0.31	0.10	9066298
Total Titanium (Ti)	mg/kg	815	743	809	852	658	655	498	1.0	9066298

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1777	TW1778	TW1779	TW1780	TW1781	TW1785	TW1786		
Sampling Date		2018/07/12 11:45	2018/07/12 11:55	2018/07/12 11:55	2018/07/12 12:10	2018/07/12 12:20	2018/07/12 17:10	2018/07/12 17:30		
COC Number		10024	10024	10024	10024	10024	10024	10024		
	UNITS	10024-01	10024-02	10024-03	10024-04	10024-05	10024-09	10024-10	RDL	QC Batch
Total Tungsten (W)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Uranium (U)	mg/kg	1.06	0.934	1.04	1.15	0.927	0.958	0.641	0.050	9066298
Total Vanadium (V)	mg/kg	46.1	46.3	49.8	53.5	43.0	41.8	41.1	2.0	9066298
Total Zinc (Zn)	mg/kg	52.9	74.4	81.3	69.0	60.9	55.6	40.3	1.0	9066298
Total Zirconium (Zr)	mg/kg	5.42	4.36	4.19	4.90	2.84	2.80	2.69	0.50	9066298
RDL = Reportable Detection Limit										

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1787	TW1788	TW1793	TW1794	TW1795	TW1796	TW1797		
Sampling Date		2018/07/12 17:30	2018/07/12 18:10	2018/07/13 09:15	2018/07/13 09:35	2018/07/13 09:55	2018/07/13 10:10	2018/07/13 10:30		
COC Number		10024	10024	10025	10025	10025	10025	10025		
	UNITS	10024-11	10024-12	10025-01	10025-02	10025-03	10025-04	10025-05	RDL	QC Batch

Physical Properties

Soluble (2:1) pH	pH	8.21	8.22	8.49	8.47	8.22	8.51	8.58	N/A	9066321
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Total Metals by ICPMS

Total Aluminum (Al)	mg/kg	8750	9550	10700	10500	10400	10200	10100	100	9066298
Total Antimony (Sb)	mg/kg	0.53	0.81	0.57	0.53	0.63	0.65	0.50	0.10	9066298
Total Arsenic (As)	mg/kg	7.73	8.10	9.00	8.44	8.07	7.47	7.18	0.50	9066298
Total Barium (Ba)	mg/kg	71.6	103	119	90.7	112	111	118	0.10	9066298
Total Beryllium (Be)	mg/kg	0.22	0.26	0.30	0.26	0.27	0.26	0.28	0.20	9066298
Total Bismuth (Bi)	mg/kg	0.11	0.11	0.12	<0.10	<0.10	<0.10	<0.10	0.10	9066298
Total Boron (B)	mg/kg	<1.0	1.9	3.0	1.6	2.2	2.1	1.9	1.0	9066298
Total Cadmium (Cd)	mg/kg	0.170	0.240	0.178	0.169	0.164	0.183	0.130	0.050	9066298
Total Calcium (Ca)	mg/kg	12300	9240	7140	8320	6090	7950	6130	100	9066298
Total Chromium (Cr)	mg/kg	24.5	37.1	34.4	31.9	36.1	39.7	34.8	1.0	9066298
Total Cobalt (Co)	mg/kg	6.60	7.51	8.04	8.12	7.53	7.81	7.18	0.30	9066298
Total Copper (Cu)	mg/kg	29.4	25.3	23.7	30.3	20.3	21.6	19.1	0.50	9066298
Total Iron (Fe)	mg/kg	18200	19100	21300	20500	20300	19400	19400	100	9066298
Total Lead (Pb)	mg/kg	34.7	31.3	11.8	28.8	48.3	63.8	12.5	0.10	9066298
Total Lithium (Li)	mg/kg	8.1	7.9	9.4	9.7	7.7	7.9	7.5	5.0	9066298
Total Magnesium (Mg)	mg/kg	5840	6230	7020	6990	6420	6860	6040	100	9066298
Total Manganese (Mn)	mg/kg	242	280	315	328	316	286	267	0.20	9066298
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9066298
Total Molybdenum (Mo)	mg/kg	0.67	0.75	0.93	0.71	0.77	0.77	0.67	0.10	9066298
Total Nickel (Ni)	mg/kg	16.9	25.8	27.7	28.3	28.9	34.2	27.0	0.80	9066298
Total Phosphorus (P)	mg/kg	683	692	639	688	637	651	642	10	9066298
Total Potassium (K)	mg/kg	890	870	969	799	921	859	909	100	9066298
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Silver (Ag)	mg/kg	0.087	0.127	0.064	0.114	0.070	0.077	0.067	0.050	9066298
Total Sodium (Na)	mg/kg	229	229	218	216	190	205	181	100	9066298
Total Strontium (Sr)	mg/kg	43.8	36.2	34.1	33.6	27.7	30.9	27.8	0.10	9066298
Total Thallium (Tl)	mg/kg	0.073	0.083	0.084	0.065	0.080	0.072	0.067	0.050	9066298
Total Tin (Sn)	mg/kg	56.6	0.91	0.32	0.33	0.37	0.38	0.33	0.10	9066298
Total Titanium (Ti)	mg/kg	455	583	660	630	645	640	604	1.0	9066298

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1787	TW1788	TW1793	TW1794	TW1795	TW1796	TW1797		
Sampling Date		2018/07/12 17:30	2018/07/12 18:10	2018/07/13 09:15	2018/07/13 09:35	2018/07/13 09:55	2018/07/13 10:10	2018/07/13 10:30		
COC Number		10024	10024	10025	10025	10025	10025	10025		
	UNITS	10024-11	10024-12	10025-01	10025-02	10025-03	10025-04	10025-05	RDL	QC Batch
Total Tungsten (W)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Uranium (U)	mg/kg	0.717	1.01	0.927	0.696	0.825	0.819	0.697	0.050	9066298
Total Vanadium (V)	mg/kg	41.2	42.0	46.2	44.1	43.2	40.3	40.6	2.0	9066298
Total Zinc (Zn)	mg/kg	44.5	52.3	43.6	47.6	47.2	50.1	36.2	1.0	9066298
Total Zirconium (Zr)	mg/kg	2.37	2.75	3.74	3.30	3.65	3.24	3.94	0.50	9066298
RDL = Reportable Detection Limit										

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		TW1782		TW1783		TW1784		
Sampling Date		2018/07/12 12:50		2018/07/12 13:15		2018/07/13 10:45		
COC Number		10024		10024		10024		
	UNITS	10024-06	RDL	10024-07	RDL	10024-08	RDL	QC Batch
Total Metals by ICP								
Total Lead (Pb)	mg/kg	2000 (1)	2.0	18300 (2)	20	3.5	2.0	9066401
RDL = Reportable Detection Limit								
(1) Duplicate RPD above control limit - Non-homogenous sample - Increased variability of results. Reanalysis yields similar results.								
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.								

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Job #: B858205
Report Date: 2018/07/18

QUALITY ASSURANCE REPORT

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9066298	Total Aluminum (Al)	2018/07/17					<100	mg/kg	4.1	40	110	70 - 130
9066298	Total Antimony (Sb)	2018/07/17	91	75 - 125	96	75 - 125	<0.10	mg/kg	7.7	30	129	70 - 130
9066298	Total Arsenic (As)	2018/07/17	94	75 - 125	94	75 - 125	<0.50	mg/kg	3.4	30	94	70 - 130
9066298	Total Barium (Ba)	2018/07/17	NC	75 - 125	99	75 - 125	0.13, RDL=0.10 (3)	mg/kg	30	40	112	70 - 130
9066298	Total Beryllium (Be)	2018/07/17	92	75 - 125	96	75 - 125	<0.20	mg/kg	2.7	30	110	70 - 130
9066298	Total Bismuth (Bi)	2018/07/17					<0.10	mg/kg	NC	30		
9066298	Total Boron (B)	2018/07/17					<1.0	mg/kg	8.3	30		
9066298	Total Cadmium (Cd)	2018/07/17	93	75 - 125	95	75 - 125	<0.050	mg/kg	2.7	30	103	70 - 130
9066298	Total Calcium (Ca)	2018/07/17					<100	mg/kg	6.4	30	103	70 - 130
9066298	Total Chromium (Cr)	2018/07/17	84	75 - 125	95	75 - 125	<1.0	mg/kg	1.2	30	107	70 - 130
9066298	Total Cobalt (Co)	2018/07/17	91	75 - 125	95	75 - 125	<0.30	mg/kg	3.7	30	102	70 - 130
9066298	Total Copper (Cu)	2018/07/17	85	75 - 125	96	75 - 125	<0.50	mg/kg	9.7	30	107	70 - 130
9066298	Total Iron (Fe)	2018/07/17					<100	mg/kg	1.8	30	107	70 - 130
9066298	Total Lead (Pb)	2018/07/17	NC	75 - 125	106	75 - 125	<0.10	mg/kg	17	40	119	70 - 130
9066298	Total Lithium (Li)	2018/07/17	87	75 - 125	94	75 - 125	<5.0	mg/kg	5.8	30	102	70 - 130
9066298	Total Magnesium (Mg)	2018/07/17					<100	mg/kg	12	30	109	70 - 130
9066298	Total Manganese (Mn)	2018/07/17	NC	75 - 125	92	75 - 125	<0.20	mg/kg	0.094	30	106	70 - 130
9066298	Total Mercury (Hg)	2018/07/17	98	75 - 125	101	75 - 125	<0.050	mg/kg	NC	40	101	70 - 130
9066298	Total Molybdenum (Mo)	2018/07/17	95	75 - 125	96	75 - 125	<0.10	mg/kg	22	40	110	70 - 130
9066298	Total Nickel (Ni)	2018/07/17	87	75 - 125	95	75 - 125	<0.80	mg/kg	19	30	110	70 - 130
9066298	Total Phosphorus (P)	2018/07/17					<10	mg/kg	5.2	30	108	70 - 130
9066298	Total Potassium (K)	2018/07/17					<100	mg/kg	3.8	40	93	70 - 130
9066298	Total Selenium (Se)	2018/07/17	94	75 - 125	97	75 - 125	<0.50	mg/kg	NC	30		
9066298	Total Silver (Ag)	2018/07/17	93	75 - 125	96	75 - 125	<0.050	mg/kg	39	40	135 (2)	70 - 130
9066298	Total Sodium (Na)	2018/07/17					<100	mg/kg	20	40	101	70 - 130
9066298	Total Strontium (Sr)	2018/07/17	86	75 - 125	94	75 - 125	<0.10	mg/kg	22	40	111	70 - 130
9066298	Total Thallium (Tl)	2018/07/17	95	75 - 125	100	75 - 125	<0.050	mg/kg	0.78	30	95	70 - 130
9066298	Total Tin (Sn)	2018/07/17	52 (1)	75 - 125	97	75 - 125	<0.10	mg/kg	17	40	116	70 - 130
9066298	Total Titanium (Ti)	2018/07/17	NC	75 - 125	94	75 - 125	<1.0	mg/kg	5.4	40		
9066298	Total Tungsten (W)	2018/07/17					<0.50	mg/kg	NC	30		

Maxxam Job #: B858205
Report Date: 2018/07/18

QUALITY ASSURANCE REPORT(CONT'D)

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9066298	Total Uranium (U)	2018/07/17	97	75 - 125	99	75 - 125	<0.050	mg/kg	12	30	121	70 - 130
9066298	Total Vanadium (V)	2018/07/17	85	75 - 125	94	75 - 125	<2.0	mg/kg	1.4	30	109	70 - 130
9066298	Total Zinc (Zn)	2018/07/17	NC	75 - 125	94	75 - 125	<1.0	mg/kg	1.2	30	110	70 - 130
9066298	Total Zirconium (Zr)	2018/07/17					<0.50	mg/kg	11	30		
9066321	Soluble (2:1) pH	2018/07/17			100	97 - 103			0.95	20		
9066401	Total Lead (Pb)	2018/07/17					<2.0	mg/kg	103 (1)	40	96	80 - 120

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) RefMat outside acceptance criteria (10% of analytes failure allowed).

(3) Method Blank exceeds acceptance limits for (Ba). Sample values for Ba are >10x the concentration of the method blank and the contamination is considered irrelevant.

Maxxam Job #: B858205
Report Date: 2018/07/18

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Ph.D., P.Chem., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10024 page L of L

Project Number: 1786835		Laboratory Name: MAXXAM	
Short Title: SE Klondike	Golder Contact: Tamara Kayuk	Address:	
Golder E-mail Address 1: @golder.com	Golder E-mail Address 2: @golder.com	Telephone/Fax:	Contact: [Signature]

Office Name: Whitehorse					EQUIS Facility Code: _____					EQUIS upload: <input type="checkbox"/>					Analyse Required				
Turnaround Time: <input type="checkbox"/> 24 hr <input type="checkbox"/> 48 hr <input type="checkbox"/> 72 hr <input checked="" type="checkbox"/> Regular (5 Days)					Criteria: <input type="checkbox"/> CSR <input type="checkbox"/> CCME <input type="checkbox"/> BC Water Quality <input type="checkbox"/> Other					 8858205_COC					RECEIVED IN WHITEHORSE BY: [Signature] @ 1330 2018-07-13 TEMP: 2 / 2 / 2				
Note: Final Reports to be issued by e-mail					Quote No.:														
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Acids + pH	Lead in paint	RU						
10024-01	BOW	1	0.3	SO	12 JUL	1145	GRAB			1	α								
-02	BOW	2	0.3			1155		FDA 10024-02		1	α								
-03	BOW	2	0.3			1155		FD 10024-02		1	α								
-04	BOW	3	0.3			1210				1	α								
-05	BOW	4	0.3	↓		1220	↓			1	α								
-06	BLIV	A	-	PAINT		1250	COMP			1	α								
-07	PADDLE	B	-			1315				1	α								
-08	SIDE	C	-	↓	13 JUL	1045	↓			1	α								
-09	SSKS-04	1	0.3	SO	12 JUL	1710	GRAB			1	α								
-10	PADDLE	2	0.3			1730		FDA 10024-11		1	α								
-11	PADDLE	2	0.3			1730		FD 10024-10		1	α								
-12	PADDLE	3	0.3	↓		1810	↓			1	α								

Sampler's Signature: [Signature]	Relinquished by: Signature: [Signature]	Company: GOLDER	Date: July 13 @ 1330	Time: 1330	Received by: Signature: [Signature]	Company: MAXXAM
Comments:	Method of Shipment:	Waybill No.:	Received for Lab by: KEVIN CHONG	Date: 2018/07/14	Time: 09:45	
	Shipped by:	Shipment Condition: Seal Intact: PRESENT YES INTACT	Temp (°C): 4, 4, 4	Cooler opened by: KEVIN CHONG	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy

54

ESED



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10025 page 2 of 2

Project Number: <u>Same as page 1</u>		Laboratory Name:	
Short Title:		Golder Contact:	
Golder E-mail Address 1: <u>@golder.com</u>		Golder E-mail Address 2: <u>@golder.com</u>	
Address:		Telephone/Fax:	
Contact:			

Office Name:		EQUIS Facility Code:		EQUIS upload: <input type="checkbox"/>		Analyses Required					
Turnaround Time: <input type="checkbox"/> 24 hr <input type="checkbox"/> 48 hr <input type="checkbox"/> 72 hr <input checked="" type="checkbox"/> Regular (5 Days)		Criteria: <input type="checkbox"/> CSR <input type="checkbox"/> CCME <input type="checkbox"/> BC Water Quality <input type="checkbox"/> Other		Quote No.:		RECEIVED IN WHITEHORSE					
Note: Final Reports to be issued by e-mail		BY: <u>84jcm@1330</u>		2018-07-11		TEMP: <u>2 1 2</u>					
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Remarks (over)
10025-01	PADDLE	4	0.3	SO	13 Jun	9:15	GRAB			1	
-02	↓	5	↓	↓	↓	9:35	↓			1	
-03	↓	6	↓	↓	↓	9:55	↓			1	
-04	↓	7	↓	↓	↓	10:10	↓			1	
-05	↓	8	↓	↓	↓	10:30	↓			1	
-06											
-07											
-08											
-09											
-10											
-11											
-12											

Sampler's Signature: <u>[Signature]</u>	Relinquished by: Signature <u>[Signature]</u>	Company: <u>GOLDER</u>	Date: <u>July 13 @</u>	Time: <u>1330</u>	Received by: Signature <u>[Signature]</u>	Company: <u>MAXXAM</u>
Comments:	Method of Shipment:	Waybill No.:	Received for Lab by: <u>KEVIN CHAN</u>	Date: <u>2018/07/14</u>	Time: <u>09:45</u>	
Shipped by:	Shipment Condition: <u>PRESENT YES</u>	Temp (°C): <u>4.4</u>	Cooler opened by: <u>KEVIN CHAN</u>	Date:	Time:	



B858205_COC

WHITE: Golder Copy YELLOW: Lab Copy

ESED

Your Project #: 1786835
Your C.O.C. #: 10024, 10025

Attention: Tamra Reynolds

GOLDER ASSOCIATES LTD.
Suite 201C, 170 Titanium Way
Whitehorse, YT
CANADA Y1A 0G1

Report Date: 2018/09/20
Report #: R2622706
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B858205

Received: 2018/07/13, 13:30

Sample Matrix: PAINT
Samples Received: 3

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICP-AES (acid extr. solid)	2	2018/07/17	2018/07/17	BBY7SOP-00018	EPA 6010c R3 m
Elements by ICP-AES (acid extr. solid)	1	2018/07/17	2018/07/18	BBY7SOP-00018	EPA 6010c R3 m

Sample Matrix: Soil
Samples Received: 14

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Elements by ICPMS (total)	14	2018/07/17	2018/07/17	BBY7SOP-00004 / BBY7SOP-00001	EPA 6020b R2 m
Metals - TCLP	1	2018/09/20	2018/09/20	BBY7SOP-00005,	EPA 1311, 6020bR2 m
pH (2:1 DI Water Extract)	14	2018/07/17	2018/07/17	BBY6SOP-00028	BCMOE BCLM Mar2005 m
TCLP pH Measurements	1	N/A	2018/09/20	BBY7SOP-00005	EPA 1311

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

Your Project #: 1786835
Your C.O.C. #: 10024, 10025

Attention: Tamra Reynolds

GOLDER ASSOCIATES LTD.
Suite 201C, 170 Titanium Way
Whitehorse, YT
CANADA Y1A 0G1

Report Date: 2018/09/20
Report #: R2622706
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B858205

Received: 2018/07/13, 13:30

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key



Tim Li
Project Manager
21 Sep 2018 16:38:40

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Namita Sahni, Burnaby Project Manager

Email: NSahni@maxxam.ca

Phone# (604)639-2614

=====
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		TW1786	
Sampling Date		2018/07/12 17:30	
COC Number		10024	
	UNITS	10024-10	QC Batch

TCLP Extraction Procedure			
Initial pH of Sample	pH	8.60	9149912
pH after HCl	pH	1.11	9149912
Final pH of Leachate	pH	5.38	9149912
pH of Leaching Fluid	pH	4.96	9149912

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1777	TW1778	TW1779	TW1780	TW1781	TW1785	TW1786		
Sampling Date		2018/07/12 11:45	2018/07/12 11:55	2018/07/12 11:55	2018/07/12 12:10	2018/07/12 12:20	2018/07/12 17:10	2018/07/12 17:30		
COC Number		10024	10024	10024	10024	10024	10024	10024		
	UNITS	10024-01	10024-02	10024-03	10024-04	10024-05	10024-09	10024-10	RDL	QC Batch

Physical Properties

Soluble (2:1) pH	pH	8.71	8.55	8.64	8.59	8.43	8.27	8.22	N/A	9066321
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Total Metals by ICPMS

Total Aluminum (Al)	mg/kg	13000	13000	13300	13900	10700	10300	9020	100	9066298
Total Antimony (Sb)	mg/kg	0.75	0.83	0.98	0.85	0.82	0.71	0.55	0.10	9066298
Total Arsenic (As)	mg/kg	9.30	9.89	11.4	13.4	7.72	7.41	8.20	0.50	9066298
Total Barium (Ba)	mg/kg	143	150	165	160	95.3	105	64.5	0.10	9066298
Total Beryllium (Be)	mg/kg	0.35	0.37	0.36	0.40	0.27	0.27	0.26	0.20	9066298
Total Bismuth (Bi)	mg/kg	0.15	0.16	0.18	0.18	0.10	0.10	<0.10	0.10	9066298
Total Boron (B)	mg/kg	2.1	2.2	2.3	2.2	2.0	2.5	1.2	1.0	9066298
Total Cadmium (Cd)	mg/kg	0.215	0.269	0.308	0.290	0.273	0.236	0.209	0.050	9066298
Total Calcium (Ca)	mg/kg	18400	18400	21500	22300	10400	7650	13100	100	9066298
Total Chromium (Cr)	mg/kg	37.0	41.8	40.2	41.7	32.4	35.6	24.3	1.0	9066298
Total Cobalt (Co)	mg/kg	9.02	9.83	10.4	10.5	7.48	7.78	6.54	0.30	9066298
Total Copper (Cu)	mg/kg	34.0	40.4	43.9	39.4	23.9	24.0	22.8	0.50	9066298
Total Iron (Fe)	mg/kg	22300	22700	25000	25500	20400	19900	18200	100	9066298
Total Lead (Pb)	mg/kg	15.6	43.9	55.7	42.0	60.5	72.0	166	0.10	9066298
Total Lithium (Li)	mg/kg	10.5	11.0	11.1	11.9	8.8	8.8	8.3	5.0	9066298
Total Magnesium (Mg)	mg/kg	8680	9780	9970	10600	6600	6690	6020	100	9066298
Total Manganese (Mn)	mg/kg	395	401	444	465	310	298	249	0.20	9066298
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9066298
Total Molybdenum (Mo)	mg/kg	0.78	0.71	0.82	0.95	0.67	0.87	0.69	0.10	9066298
Total Nickel (Ni)	mg/kg	31.1	37.0	33.4	33.6	25.7	28.3	17.1	0.80	9066298
Total Phosphorus (P)	mg/kg	780	818	922	824	736	701	644	10	9066298
Total Potassium (K)	mg/kg	1150	1200	1290	1300	911	804	828	100	9066298
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Silver (Ag)	mg/kg	0.108	0.181	0.199	0.138	0.166	0.123	0.065	0.050	9066298
Total Sodium (Na)	mg/kg	233	248	276	290	237	232	222	100	9066298
Total Strontium (Sr)	mg/kg	54.0	52.3	55.4	72.6	36.0	33.0	46.0	0.10	9066298
Total Thallium (Tl)	mg/kg	0.098	0.093	0.109	0.108	0.078	0.069	0.080	0.050	9066298
Total Tin (Sn)	mg/kg	0.48	0.45	0.64	0.44	4.79	0.74	0.31	0.10	9066298
Total Titanium (Ti)	mg/kg	815	743	809	852	658	655	498	1.0	9066298

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1777	TW1778	TW1779	TW1780	TW1781	TW1785	TW1786		
Sampling Date		2018/07/12 11:45	2018/07/12 11:55	2018/07/12 11:55	2018/07/12 12:10	2018/07/12 12:20	2018/07/12 17:10	2018/07/12 17:30		
COC Number		10024	10024	10024	10024	10024	10024	10024		
	UNITS	10024-01	10024-02	10024-03	10024-04	10024-05	10024-09	10024-10	RDL	QC Batch
Total Tungsten (W)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Uranium (U)	mg/kg	1.06	0.934	1.04	1.15	0.927	0.958	0.641	0.050	9066298
Total Vanadium (V)	mg/kg	46.1	46.3	49.8	53.5	43.0	41.8	41.1	2.0	9066298
Total Zinc (Zn)	mg/kg	52.9	74.4	81.3	69.0	60.9	55.6	40.3	1.0	9066298
Total Zirconium (Zr)	mg/kg	5.42	4.36	4.19	4.90	2.84	2.80	2.69	0.50	9066298
RDL = Reportable Detection Limit										

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1787	TW1788	TW1793	TW1794	TW1795	TW1796	TW1797		
Sampling Date		2018/07/12 17:30	2018/07/12 18:10	2018/07/13 09:15	2018/07/13 09:35	2018/07/13 09:55	2018/07/13 10:10	2018/07/13 10:30		
COC Number		10024	10024	10025	10025	10025	10025	10025		
	UNITS	10024-11	10024-12	10025-01	10025-02	10025-03	10025-04	10025-05	RDL	QC Batch

Physical Properties

Soluble (2:1) pH	pH	8.21	8.22	8.49	8.47	8.22	8.51	8.58	N/A	9066321
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Total Metals by ICPMS

Total Aluminum (Al)	mg/kg	8750	9550	10700	10500	10400	10200	10100	100	9066298
Total Antimony (Sb)	mg/kg	0.53	0.81	0.57	0.53	0.63	0.65	0.50	0.10	9066298
Total Arsenic (As)	mg/kg	7.73	8.10	9.00	8.44	8.07	7.47	7.18	0.50	9066298
Total Barium (Ba)	mg/kg	71.6	103	119	90.7	112	111	118	0.10	9066298
Total Beryllium (Be)	mg/kg	0.22	0.26	0.30	0.26	0.27	0.26	0.28	0.20	9066298
Total Bismuth (Bi)	mg/kg	0.11	0.11	0.12	<0.10	<0.10	<0.10	<0.10	0.10	9066298
Total Boron (B)	mg/kg	<1.0	1.9	3.0	1.6	2.2	2.1	1.9	1.0	9066298
Total Cadmium (Cd)	mg/kg	0.170	0.240	0.178	0.169	0.164	0.183	0.130	0.050	9066298
Total Calcium (Ca)	mg/kg	12300	9240	7140	8320	6090	7950	6130	100	9066298
Total Chromium (Cr)	mg/kg	24.5	37.1	34.4	31.9	36.1	39.7	34.8	1.0	9066298
Total Cobalt (Co)	mg/kg	6.60	7.51	8.04	8.12	7.53	7.81	7.18	0.30	9066298
Total Copper (Cu)	mg/kg	29.4	25.3	23.7	30.3	20.3	21.6	19.1	0.50	9066298
Total Iron (Fe)	mg/kg	18200	19100	21300	20500	20300	19400	19400	100	9066298
Total Lead (Pb)	mg/kg	34.7	31.3	11.8	28.8	48.3	63.8	12.5	0.10	9066298
Total Lithium (Li)	mg/kg	8.1	7.9	9.4	9.7	7.7	7.9	7.5	5.0	9066298
Total Magnesium (Mg)	mg/kg	5840	6230	7020	6990	6420	6860	6040	100	9066298
Total Manganese (Mn)	mg/kg	242	280	315	328	316	286	267	0.20	9066298
Total Mercury (Hg)	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.050	9066298
Total Molybdenum (Mo)	mg/kg	0.67	0.75	0.93	0.71	0.77	0.77	0.67	0.10	9066298
Total Nickel (Ni)	mg/kg	16.9	25.8	27.7	28.3	28.9	34.2	27.0	0.80	9066298
Total Phosphorus (P)	mg/kg	683	692	639	688	637	651	642	10	9066298
Total Potassium (K)	mg/kg	890	870	969	799	921	859	909	100	9066298
Total Selenium (Se)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Silver (Ag)	mg/kg	0.087	0.127	0.064	0.114	0.070	0.077	0.067	0.050	9066298
Total Sodium (Na)	mg/kg	229	229	218	216	190	205	181	100	9066298
Total Strontium (Sr)	mg/kg	43.8	36.2	34.1	33.6	27.7	30.9	27.8	0.10	9066298
Total Thallium (Tl)	mg/kg	0.073	0.083	0.084	0.065	0.080	0.072	0.067	0.050	9066298
Total Tin (Sn)	mg/kg	56.6	0.91	0.32	0.33	0.37	0.38	0.33	0.10	9066298
Total Titanium (Ti)	mg/kg	455	583	660	630	645	640	604	1.0	9066298

RDL = Reportable Detection Limit

N/A = Not Applicable

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

CSR/CCME METALS IN SOIL WITH HG (SOIL)

Maxxam ID		TW1787	TW1788	TW1793	TW1794	TW1795	TW1796	TW1797		
Sampling Date		2018/07/12 17:30	2018/07/12 18:10	2018/07/13 09:15	2018/07/13 09:35	2018/07/13 09:55	2018/07/13 10:10	2018/07/13 10:30		
COC Number		10024	10024	10025	10025	10025	10025	10025		
	UNITS	10024-11	10024-12	10025-01	10025-02	10025-03	10025-04	10025-05	RDL	QC Batch
Total Tungsten (W)	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	9066298
Total Uranium (U)	mg/kg	0.717	1.01	0.927	0.696	0.825	0.819	0.697	0.050	9066298
Total Vanadium (V)	mg/kg	41.2	42.0	46.2	44.1	43.2	40.3	40.6	2.0	9066298
Total Zinc (Zn)	mg/kg	44.5	52.3	43.6	47.6	47.2	50.1	36.2	1.0	9066298
Total Zirconium (Zr)	mg/kg	2.37	2.75	3.74	3.30	3.65	3.24	3.94	0.50	9066298
RDL = Reportable Detection Limit										

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

TCLP METALS (SOIL)

Maxxam ID		TW1786		
Sampling Date		2018/07/12 17:30		
COC Number		10024		
	UNITS	10024-10	RDL	QC Batch
TCLP Extraction Procedure				
LEACHATE Antimony (Sb)	mg/L	<0.10	0.10	9152056
LEACHATE Arsenic (As)	mg/L	<0.10	0.10	9152056
LEACHATE Barium (Ba)	mg/L	0.43	0.10	9152056
LEACHATE Beryllium (Be)	mg/L	<0.10	0.10	9152056
LEACHATE Boron (B)	mg/L	<0.10	0.10	9152056
LEACHATE Cadmium (Cd)	mg/L	<0.10	0.10	9152056
LEACHATE Chromium (Cr)	mg/L	<0.10	0.10	9152056
LEACHATE Cobalt (Co)	mg/L	<0.10	0.10	9152056
LEACHATE Copper (Cu)	mg/L	<0.10	0.10	9152056
LEACHATE Iron (Fe)	mg/L	<0.50	0.50	9152056
LEACHATE Lead (Pb)	mg/L	0.19	0.10	9152056
LEACHATE Mercury (Hg)	mg/L	<0.0020	0.0020	9152056
LEACHATE Molybdenum (Mo)	mg/L	<0.10	0.10	9152056
LEACHATE Nickel (Ni)	mg/L	<0.10	0.10	9152056
LEACHATE Selenium (Se)	mg/L	<0.10	0.10	9152056
LEACHATE Silver (Ag)	mg/L	<0.010	0.010	9152056
LEACHATE Thallium (Tl)	mg/L	<0.10	0.10	9152056
LEACHATE Uranium (U)	mg/L	<0.10	0.10	9152056
LEACHATE Vanadium (V)	mg/L	<0.10	0.10	9152056
LEACHATE Zinc (Zn)	mg/L	<0.10	0.10	9152056
LEACHATE Zirconium (Zr)	mg/L	<0.10	0.10	9152056
RDL = Reportable Detection Limit				

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		TW1782		TW1783		TW1784		
Sampling Date		2018/07/12 12:50		2018/07/12 13:15		2018/07/13 10:45		
COC Number		10024		10024		10024		
	UNITS	10024-06	RDL	10024-07	RDL	10024-08	RDL	QC Batch

Total Metals by ICP								
Total Lead (Pb)	mg/kg	2000 (1)	2.0	18300 (2)	20	3.5	2.0	9066401

RDL = Reportable Detection Limit
 (1) Duplicate RPD above control limit - Non-homogenous sample - Increased variability of results. Reanalysis yields similar results.
 (2) Detection limits raised due to dilution to bring analyte within the calibrated range.

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.0°C
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Version 2: Report reissued to include results for TCLP metals on sample 10024-10 as per request from client on 2018/09/13.

Results relate only to the items tested.

Maxxam Job #: B858205
Report Date: 2018/09/20

QUALITY ASSURANCE REPORT

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9066298	Total Aluminum (Al)	2018/07/17					<100	mg/kg	4.1	40	110	70 - 130
9066298	Total Antimony (Sb)	2018/07/17	91	75 - 125	96	75 - 125	<0.10	mg/kg	7.7	30	129	70 - 130
9066298	Total Arsenic (As)	2018/07/17	94	75 - 125	94	75 - 125	<0.50	mg/kg	3.4	30	94	70 - 130
9066298	Total Barium (Ba)	2018/07/17	NC	75 - 125	99	75 - 125	0.13, RDL=0.10 (3)	mg/kg	30	40	112	70 - 130
9066298	Total Beryllium (Be)	2018/07/17	92	75 - 125	96	75 - 125	<0.20	mg/kg	2.7	30	110	70 - 130
9066298	Total Bismuth (Bi)	2018/07/17					<0.10	mg/kg	NC	30		
9066298	Total Boron (B)	2018/07/17					<1.0	mg/kg	8.3	30		
9066298	Total Cadmium (Cd)	2018/07/17	93	75 - 125	95	75 - 125	<0.050	mg/kg	2.7	30	103	70 - 130
9066298	Total Calcium (Ca)	2018/07/17					<100	mg/kg	6.4	30	103	70 - 130
9066298	Total Chromium (Cr)	2018/07/17	84	75 - 125	95	75 - 125	<1.0	mg/kg	1.2	30	107	70 - 130
9066298	Total Cobalt (Co)	2018/07/17	91	75 - 125	95	75 - 125	<0.30	mg/kg	3.7	30	102	70 - 130
9066298	Total Copper (Cu)	2018/07/17	85	75 - 125	96	75 - 125	<0.50	mg/kg	9.7	30	107	70 - 130
9066298	Total Iron (Fe)	2018/07/17					<100	mg/kg	1.8	30	107	70 - 130
9066298	Total Lead (Pb)	2018/07/17	NC	75 - 125	106	75 - 125	<0.10	mg/kg	17	40	119	70 - 130
9066298	Total Lithium (Li)	2018/07/17	87	75 - 125	94	75 - 125	<5.0	mg/kg	5.8	30	102	70 - 130
9066298	Total Magnesium (Mg)	2018/07/17					<100	mg/kg	12	30	109	70 - 130
9066298	Total Manganese (Mn)	2018/07/17	NC	75 - 125	92	75 - 125	<0.20	mg/kg	0.094	30	106	70 - 130
9066298	Total Mercury (Hg)	2018/07/17	98	75 - 125	101	75 - 125	<0.050	mg/kg	NC	40	101	70 - 130
9066298	Total Molybdenum (Mo)	2018/07/17	95	75 - 125	96	75 - 125	<0.10	mg/kg	22	40	110	70 - 130
9066298	Total Nickel (Ni)	2018/07/17	87	75 - 125	95	75 - 125	<0.80	mg/kg	19	30	110	70 - 130
9066298	Total Phosphorus (P)	2018/07/17					<10	mg/kg	5.2	30	108	70 - 130
9066298	Total Potassium (K)	2018/07/17					<100	mg/kg	3.8	40	93	70 - 130
9066298	Total Selenium (Se)	2018/07/17	94	75 - 125	97	75 - 125	<0.50	mg/kg	NC	30		
9066298	Total Silver (Ag)	2018/07/17	93	75 - 125	96	75 - 125	<0.050	mg/kg	39	40	135 (2)	70 - 130
9066298	Total Sodium (Na)	2018/07/17					<100	mg/kg	20	40	101	70 - 130
9066298	Total Strontium (Sr)	2018/07/17	86	75 - 125	94	75 - 125	<0.10	mg/kg	22	40	111	70 - 130
9066298	Total Thallium (Tl)	2018/07/17	95	75 - 125	100	75 - 125	<0.050	mg/kg	0.78	30	95	70 - 130
9066298	Total Tin (Sn)	2018/07/17	52 (1)	75 - 125	97	75 - 125	<0.10	mg/kg	17	40	116	70 - 130
9066298	Total Titanium (Ti)	2018/07/17	NC	75 - 125	94	75 - 125	<1.0	mg/kg	5.4	40		
9066298	Total Tungsten (W)	2018/07/17					<0.50	mg/kg	NC	30		

Maxxam Job #: B858205
Report Date: 2018/09/20

QUALITY ASSURANCE REPORT(CONT'D)

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9066298	Total Uranium (U)	2018/07/17	97	75 - 125	99	75 - 125	<0.050	mg/kg	12	30	121	70 - 130
9066298	Total Vanadium (V)	2018/07/17	85	75 - 125	94	75 - 125	<2.0	mg/kg	1.4	30	109	70 - 130
9066298	Total Zinc (Zn)	2018/07/17	NC	75 - 125	94	75 - 125	<1.0	mg/kg	1.2	30	110	70 - 130
9066298	Total Zirconium (Zr)	2018/07/17					<0.50	mg/kg	11	30		
9066321	Soluble (2:1) pH	2018/07/17			100	97 - 103			0.95	20		
9066401	Total Lead (Pb)	2018/07/17					<2.0	mg/kg	103 (1)	40	96	80 - 120
9149912	Final pH of Leachate	2018/09/20					4.96	pH	0.20	N/A		
9149912	Initial pH of Sample	2018/09/20					4.96	pH	0.46	N/A		
9149912	pH of Leaching Fluid	2018/09/20					4.96	pH	0	N/A		
9152056	LEACHATE Antimony (Sb)	2018/09/20	100	75 - 125	99	75 - 125	<0.10	mg/L				
9152056	LEACHATE Arsenic (As)	2018/09/20	97	75 - 125	98	75 - 125	<0.10	mg/L				
9152056	LEACHATE Barium (Ba)	2018/09/20	93	75 - 125	93	75 - 125	<0.10	mg/L				
9152056	LEACHATE Beryllium (Be)	2018/09/20	97	75 - 125	97	75 - 125	<0.10	mg/L				
9152056	LEACHATE Boron (B)	2018/09/20					<0.10	mg/L				
9152056	LEACHATE Cadmium (Cd)	2018/09/20	96	75 - 125	94	75 - 125	<0.10	mg/L				
9152056	LEACHATE Chromium (Cr)	2018/09/20	94	75 - 125	93	75 - 125	<0.10	mg/L				
9152056	LEACHATE Cobalt (Co)	2018/09/20	96	75 - 125	93	75 - 125	<0.10	mg/L				
9152056	LEACHATE Copper (Cu)	2018/09/20	95	75 - 125	92	75 - 125	<0.10	mg/L				
9152056	LEACHATE Iron (Fe)	2018/09/20					<0.50	mg/L				
9152056	LEACHATE Lead (Pb)	2018/09/20	91	75 - 125	90	75 - 125	<0.10	mg/L				
9152056	LEACHATE Mercury (Hg)	2018/09/20	97	75 - 125	95	75 - 125	<0.0020	mg/L				
9152056	LEACHATE Molybdenum (Mo)	2018/09/20	97	75 - 125	98	75 - 125	<0.10	mg/L				
9152056	LEACHATE Nickel (Ni)	2018/09/20	95	75 - 125	91	75 - 125	<0.10	mg/L				
9152056	LEACHATE Selenium (Se)	2018/09/20	98	75 - 125	98	75 - 125	<0.10	mg/L				
9152056	LEACHATE Silver (Ag)	2018/09/20	95	75 - 125	94	75 - 125	<0.010	mg/L				
9152056	LEACHATE Thallium (Tl)	2018/09/20	92	75 - 125	93	75 - 125	<0.10	mg/L				
9152056	LEACHATE Uranium (U)	2018/09/20	95	75 - 125	95	75 - 125	<0.10	mg/L				
9152056	LEACHATE Vanadium (V)	2018/09/20	98	75 - 125	96	75 - 125	<0.10	mg/L				
9152056	LEACHATE Zinc (Zn)	2018/09/20	95	75 - 125	94	75 - 125	<0.10	mg/L				

Maxxam Job #: B858205
Report Date: 2018/09/20

QUALITY ASSURANCE REPORT(CONT'D)

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
9152056	LEACHATE Zirconium (Zr)	2018/09/20					<0.10	mg/L				

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

(2) RefMat outside acceptance criteria (10% of analytes failure allowed).

(3) Method Blank exceeds acceptance limits for (Ba). Sample values for (Ba) are >10x the concentration of the method blank and the contamination is considered irrelevant.

Maxxam Job #: B858205
Report Date: 2018/09/20

GOLDER ASSOCIATES LTD.
Client Project #: 1786835
Sampler Initials: ER

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Ph.D., P.Chem., Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10024 page L of L

Project Number: 1786835		Laboratory Name: MAXXAM	
Short Title: SE Klondike	Golder Contact: Tamara Kayuk	Address:	
Golder E-mail Address 1: @golder.com	Golder E-mail Address 2: @golder.com	Telephone/Fax:	Contact: [Signature]

Office Name: Whitehorse					EQUIS Facility Code: _____					EQUIS upload: <input type="checkbox"/>					Analysees Required				
Turnaround Time: <input type="checkbox"/> 24 hr <input type="checkbox"/> 48 hr <input type="checkbox"/> 72 hr <input checked="" type="checkbox"/> Regular (5 Days)					Criteria: <input type="checkbox"/> CSR <input type="checkbox"/> CCME <input type="checkbox"/> BC Water Quality <input type="checkbox"/> Other					 8858205_COC					RECEIVED IN WHITEHORSE BY: [Signature] @ 1330 2018-07-13 TEMP: 2 / 2 / 2				
Note: Final Reports to be issued by e-mail					Quote No.:														
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Acids + pH	Lead in paint	RU						
10024-01	BOW	1	0.3	SO	12 JUL	1145	GRAB			1	α								
-02	BOW	2	0.3			1155		FDA 10024-02		1	α								
-03	BOW	2	0.3			1155		FD 10024-02		1	α								
-04	BOW	3	0.3			1210				1	α								
-05	BOW	4	0.3	↓		1220	↓			1	α								
-06	BLIV	A	-	POINT		1250	COMP			1	α								
-07	PADDLE	B	-	↓		1315	↓			1	α								
-08	SIDE	C	-	↓	13 JUL	1045	↓			1	α								
-09	SSKS-04	1	0.3	SO	12 JUL	1710	GRAB			1	α								
-10	PADDLE	2	0.3			1730		FDA 10024-11		1	α								
-11	PADDLE	2	0.3			1730		FD 10024-10		1	α								
-12	PADDLE	3	0.3	↓		1810	↓			1	α								

Sampler's Signature: [Signature]	Relinquished by: Signature: [Signature]	Company: GOLDER	Date: July 13	Time: 1330	Received by: Signature: [Signature]	Company: MAXXAM
Comments:	Method of Shipment:	Waybill No.:	Received for Lab by: KEVIN CHONG		Date: 2018/07/14	Time: 09:45
	Shipped by:	Shipment Condition: Seal intact: PRESENT YES INTACT	Temp (°C): 4.4	Cooler opened by: KEVIN CHONG	Date:	Time:

WHITE: Golder Copy YELLOW: Lab Copy

654

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200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10025 page 2 of 2

Project Number: <u>Same as page 1</u>		Laboratory Name:	
Short Title:		Golder Contact:	
Golder E-mail Address 1: <u>@golder.com</u>		Golder E-mail Address 2: <u>@golder.com</u>	
Address:		Telephone/Fax:	
Contact:			

Office Name:					EQUIS Facility Code: _____ EQUIS upload: <input type="checkbox"/>					Analyses Required				
Turnaround Time: <input type="checkbox"/> 24 hr <input type="checkbox"/> 48 hr <input type="checkbox"/> 72 hr <input checked="" type="checkbox"/> Regular (5 Days)					Criteria: <input type="checkbox"/> CSR <input type="checkbox"/> CCME <input type="checkbox"/> BC Water Quality <input type="checkbox"/> Other					RECEIVED IN WHITEHORSE BY: <u>kyjcm@1330</u> 2018-07-14 TEMP: 2 1 2 RUSH (Select YAT above)				
Note: Final Reports to be issued by e-mail					Quote No.:									
Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Remarks (over)			
10025-01	PADDLE	4	0.3	SO	13 Jun	9:15	GRAB			1	 (The following rows are crossed out with a large diagonal line) 			
-02		5				9:35				1				
-03		6				9:55				1				
-04		7				10:10				1				
-05		8				10:30				1				
-06														
-07														
-08														
-09														
-10														
-11														
-12														

Sampler's Signature: <u>[Signature]</u>	Relinquished by: Signature <u>[Signature]</u>	Company <u>GOLDER</u>	Date <u>July 13 @</u>	Time <u>1330</u>	Received by: Signature <u>[Signature]</u>	Company <u>MAXXAM</u>
Comments:	Method of Shipment:	Waybill No.:	Received for Lab by: <u>KEVIN CHAN</u>		Date <u>2018/07/14</u>	Time <u>09:45</u>
Shipped by:	Shipment Condition: Seal Intact: <u>PRESENT YES</u>	Temp (°C) <u>4.4</u>	Cooler opened by: <u>KEVIN CHAN</u>		Date	Time



B858205_COC

WHITE: Golder Copy YELLOW: Lab Copy

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ANNEX B6

21 December 2020

Reference No. 20147682-002-L-Rev0

Ms. Makrina Haffey

Environmental Specialist, Environmental Services
Public Services and Procurement Canada
800 Burrard Street
Vancouver, BC V6Z 0B9

RESULTS OF LEAD PAINT SAMPLING, SS KLONDIKE STERNWHEELER, WHITEHORSE, YUKON

Dear Makrina,

Golder Associates Ltd. (Golder) was retained by Public Services and Procurement Canada (PSPC) to conduct lead paint sampling at the SS Klondike National Historic Site (NHS, the Site). The Site is located at 10 Robert Service Way in Whitehorse, Yukon (the Site). The purpose of the sampling was to support development of specifications for future abatement work at the Site.

The scope of work was undertaken according to the rates, terms and conditions outlined in the PSPC Contaminated Sites Remediation Services Contract Task Authorizations (CTA) #EZ897-192499/005/VAN, dated 31 January 2020, PSPC Task Authorization TA700521500 and PSPC project No. R.113311.001.

1.0 PROJECT CONTEXT

The Site is located at the intersection of 2nd Avenue and Robert Service Way, in the downtown core of Whitehorse, YT. The Yukon River is located adjacent to the Site, approximately 15 to 25 metres (m) from the SS Klondike NHS. The Site consists of the historic SS Klondike sternwheeler and a Visitor Reception Center. In 2018, Golder was retained by PSPC to conduct an additional assessment to delineate lead contamination in soil surrounding the SS Klondike sternwheeler at the Site. The findings of the assessment work identified concentrations of lead in soil that exceeded the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines for Parkland (PL) use. It was estimated that approximately 50 cubic metres (m³) of contaminated soil was present beneath the SS Klondike, based on the results of the soil assessment work.

In July 2020, Golder was retained by PSPC to develop remediation specifications related to excavation of lead-contaminated soil at the Site, while Stantec was retained by PSPC to develop specifications related to abatement of hazardous materials. Golder's role includes incorporation of the specifications prepared by Stantec into a final, compiled specification that is sufficiently detailed for the tendering process.

During development of the specifications, it was determined that additional paint samples from the paddlewheel of the SS Klondike would be beneficial to inform the overall tendering process.

2.0 OBJECTIVES AND SCOPE OF WORK

The overall objective of the sampling was to support future abatement work at the Site. In order to meet this objective, Golder implemented a scope of work that included the collection of 10 paint samples from the paddlewheel of the SS Klondike. Sampling locations and sampling method instructions were provided to Golder by Stantec prior to implementing the scope of work.

The following samples were collected as part of the program:

- 2 samples of orange paint on metal
- 2 samples of black paint on metal
- 6 samples of orange paint on wood

A summary of sampling methods and results is provided in Section 3.0.

3.0 SUMMARY OF METHODS AND RESULTS

Paint samples were collected using hand tools (e.g., paint scraper) and collected in sealable plastic bags. Hand tools were decontaminated between each sample location using disinfectant wipes. At each sample location, Golder field staff collected photographs and documented observations including the paint colour, substrate, and sample location. A summary of the sampling locations is shown on Table 1, with photographs of each sample location provided in Attachment 1.

Table 1: Summary of Paint Sample Locations

Sample ID #	Sample Name	Description
10201-01	P20-01	Orange paint on metal, port side of paddlewheel
10201-02	P20-02	Orange paint on wood, top layer of paint (bright orange), on main rudder
10201-03	P20-03	Same location as P20-02, under layer of paint, reddish ¹ color
10201-04	P20-04	Orange paint on wood, middle of port side of paddlewheel
10201-05	P20-05	Orange paint on wood, starboard monkey rudder, starboard side of rudder
10201-06	P20-06	Black paint on metal, underside of "V" holding starboard monkey rudder
10201-07	P20-07	Black paint on metal, underside of "V" holding port monkey rudder
10201-08	P20-08	Orange paint on metal, starboard rings, stern side of ring
10201-09	P20-09	Orange paint on wood, on starboard side of paddlewheel, bow side
10201-10	P20-10	Orange paint on wood, main rudder, starboard side

Table notes:

1. P20-03 was also inferred to be orange paint, though due to the age of the paint, the color was faded.

Lead paint samples were submitted to ALS Laboratory (ALS) in Burnaby, BC, for analysis of total lead in paint. ALS is certified by the Canadian Association for Laboratory Accreditation (CALA). Total lead concentrations ranged from 115 mg/kg to 119,000 mg/kg, as shown on Table 2.

Table 2: Lead Concentrations in Paint

Sample ID #	Sample Name	Lead Concentration (mg/kg)	Description
10201-01	P20-01	96,800	Orange paint on metal, port side of paddlewheel
10201-02	P20-02	10,700	Orange paint on wood, top layer of paint (bright orange), on main rudder
10201-03	P20-03	92,500	Same location as P20-02, under layer of paint, reddish color
10201-04	P20-04	239	Orange paint on wood, middle of port side of paddlewheel
10201-05	P20-05	123	Orange paint on wood, starboard monkey rudder, starboard side of rudder
10201-06	P20-06	23,000	Black paint on metal, underside of "V" holding starboard monkey rudder
10201-07	P20-07	12,400	Black paint on metal, underside of "V" holding port monkey rudder
10201-08	P20-08	119,000 ^a	Orange paint on metal, starboard rings, stern side of ring
10201-09	P20-09	115	Orange paint on wood, on starboard side of paddlewheel, bow side
10201-10	P20-10	7,890	Orange paint on wood, main rudder, starboard side

Notes

a. Final result exceeds test range. Refer to analytical report for further detail.

A copy of the laboratory analytical report is included in Attachment 2.

4.0 NOTICE TO READER

This scope of work was completed for Canada in accordance with the terms and conditions of the Public Works Government Services Canada (PWGSC) Contaminated Sites Remediation Services Contract Task Authorizations (CTA) #EZ897-192499/005/VAN, dated 31 January 2020. The scope of work was described in the following document prepared by Golder for PSPC: "Request for Amendment (#1) to Task Authorization 700521500 – Remediation Specifications and Monitoring for SS Klondike, Whitehorse, YT", dated 1 December 2020.

The inferences contained in this report concerning conditions at the Site are based on information obtained during the assessment conducted by Golder personnel, and are based solely on the condition of the Site at the time of the Site visits, supplemented by historical and interview information obtained by Golder, as described in this report.

This report was prepared, based in part, on information obtained from historic information sources. In evaluating the Site, Golder has relied in good faith on information provided. We accept no responsibility for any deficiency or inaccuracy contained in this report as a result of our reliance on the aforementioned information.

The findings and conclusions documented in this report have been prepared for the specific application to this project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time, these should be reviewed.

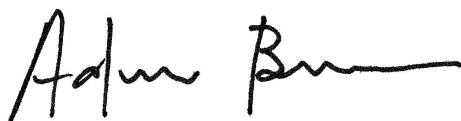
If new information is discovered during future work, the conclusions of this report should be re-evaluated, and the report amended, as required, prior to any reliance upon the information presented herein

5.0 CLOSURE

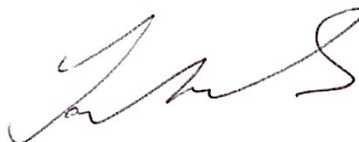
We trust that the contents of this letter are sufficient for your current review purposes. Should you have any questions, or require any further information, please do not hesitate to contact the undersigned at 867-633-6076.

Sincerely,

Golder Associates Ltd.



Andrew Bruemmer, PEng
Project Manager



Tamra Reynolds, MSc, PGeo
Associate, Senior Hydrogeologist

AB/TJR/lmk

Attachments: Attachment #1 – Photo Log
Attachment #2 – Laboratory Analytical Report

[https://golderassociates.sharepoint.com/sites/130877/project files/6 deliverables/issued to client_for wp/20147682-002-l-rev0/20147682-002-l-rev0-lead paint results-21dec_20.docx](https://golderassociates.sharepoint.com/sites/130877/project%20files/6%20deliverables/issued%20to%20client_for/wp/20147682-002-l-rev0/20147682-002-l-rev0-lead%20paint%20results-21dec_20.docx)

ATTACHMENT 1
Photo Log



Photo 1: P20-02/-03 (top right, upper and lower layers of paint)



Photo 2: P20-02/-03 – Close-Up

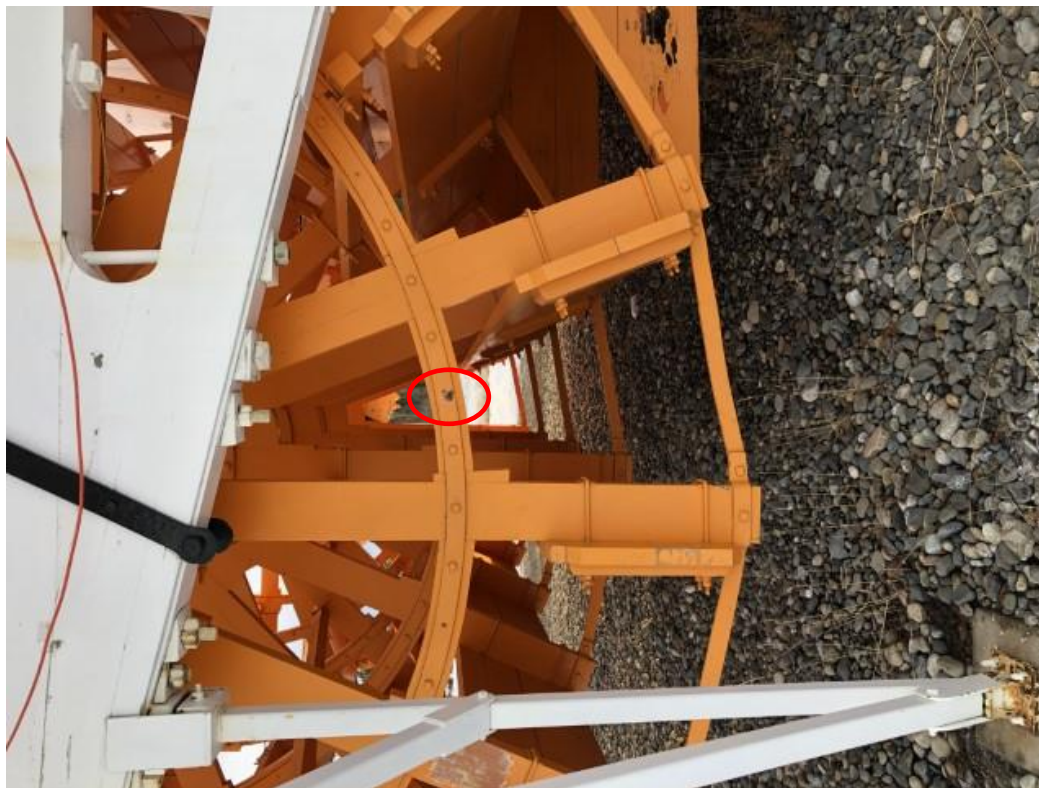


Photo 3: P20-01 – General Vicinity



Photo 4: P20-01 – Close-up



Photo 5: P20-04 – General Vicinity



Photo 6: P20-04 – Close-Up



Photo 7: P20-05 – General Vicinity



Photo 8: P20-05 – Close-up

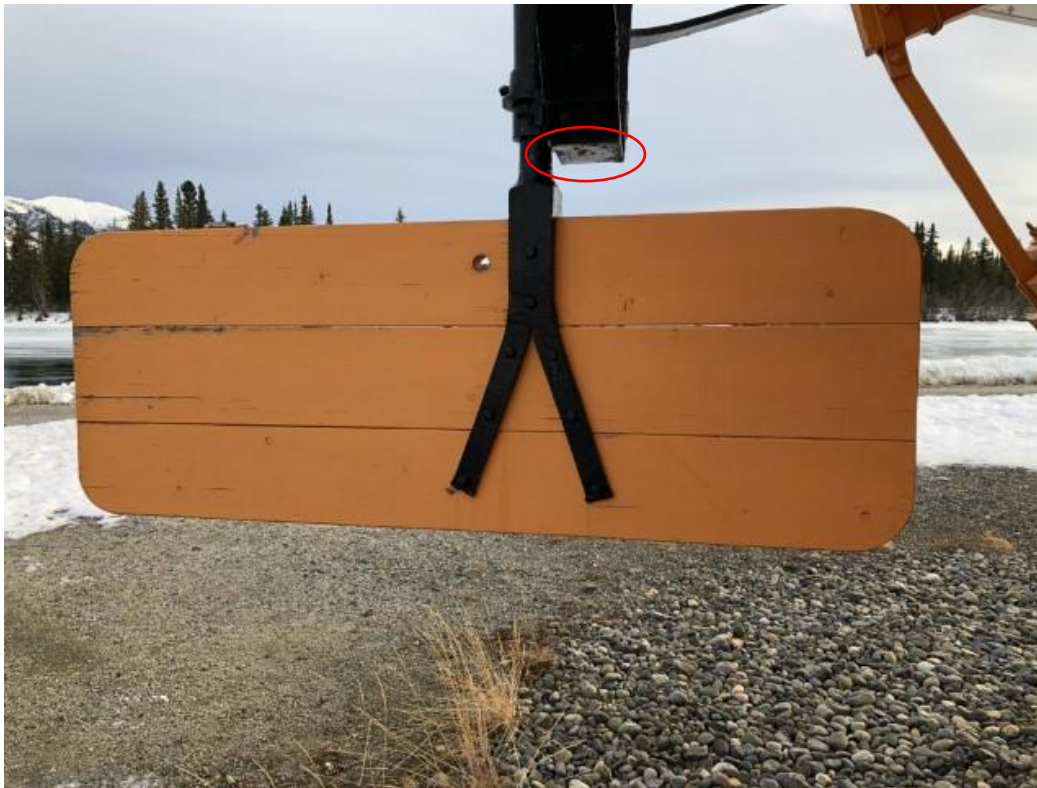


Photo 9: P20-06 – General Vicinity



Photo 10: P20-06 – Close-Up



Photo 11: P20-07 - General Vicinity



Photo 12: P20-07 - Close-Up



Photo 13: P20-08 - General Vicinity



Photo 14: P20-08 – Close-Up



Photo 15: P20-09 - General Vicinity



Photo 16: P20-09 – Close-up



Photo 17: P20-10 – General Vicinity



Photo 18: P20-10 - Close-Up

ATTACHMENT 2

Laboratory Analytical Report



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **WR2001284**
Client : **Golder Associates Ltd.**
Contact : Andrew Bruemmer
Address : 151 Industrial Road Unit 13
Whitehorse YT Canada Y1A2V3
Telephone : 604 298 6623
Project : 20147682/1000/1600
PO : ----
C-O-C number : 10201
Sampler : ----
Site : ----
Quote number : Vancouver Standing Offer
No. of samples received : 10
No. of samples analysed : 10

Page : 1 of 3
Laboratory : Whitehorse - Environmental
Account Manager : Amber Springer
Address : #12 151 Industrial Road
Whitehorse YT Canada Y1A 2V3
Telephone : +1 867 668 6689
Date Samples Received : 04-Dec-2020 10:35
Date Analysis Commenced : 06-Dec-2020
Issue Date : 07-Dec-2020 16:44

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.



Analytical Results

Sub-Matrix: Paint Chips

Client sample ID

(Matrix: Soil/Solid)

					10201-01	10201-02	10201-03	10201-04	10201-05
Client sampling date / time					03-Dec-2020 14:10	03-Dec-2020 14:20	03-Dec-2020 15:00	03-Dec-2020 15:15	03-Dec-2020 15:30
Analyte	CAS Number	Method	LOR	Unit	WR2001284-001	WR2001284-002	WR2001284-003	WR2001284-004	WR2001284-005
					Result	Result	Result	Result	Result
Metals									
lead	7439-92-1	E494.Pb	5.0	mg/kg	96800	10700	92500	239	123

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Paint Chips

Client sample ID

(Matrix: Soil/Solid)

					10201-06	10201-07	10201-08	10201-09	10201-10
Client sampling date / time					03-Dec-2020 15:45	03-Dec-2020 15:55	03-Dec-2020 16:00	03-Dec-2020 16:05	03-Dec-2020 16:15
Analyte	CAS Number	Method	LOR	Unit	WR2001284-006	WR2001284-007	WR2001284-008	WR2001284-009	WR2001284-010
					Result	Result	Result	Result	Result
Metals									
lead	7439-92-1	E494.Pb	5.0	mg/kg	23000	12400	119000	115	7890

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WR2001284	Page	: 1 of 6
Client	: Golder Associates Ltd.	Laboratory	: Whitehorse - Environmental
Contact	: Andrew Bruemmer	Account Manager	: Amber Springer
Address	: 151 Industrial Road Unit 13 Whitehorse YT Canada Y1A2V3	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: 604 298 6623	Telephone	: +1 867 668 6689
Project	: 20147682/1000/1600	Date Samples Received	: 04-Dec-2020 10:35
PO	: ----	Issue Date	: 07-Dec-2020 16:44
C-O-C number	: 10201		
Sampler	: ----		
Site	: ----		
Quote number	: Vancouver Standing Offer		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

RIGHT SOLUTIONS | RIGHT PARTNER



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-01	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-02	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-03	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-04	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-05	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-06	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	
Metals : Lead in Paint by CRC ICPMS											
Compliant container 10201-07	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓	



Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Lead in Paint by CRC ICPMS										
Compliant container 10201-08	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓
Metals : Lead in Paint by CRC ICPMS										
Compliant container 10201-09	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓
Metals : Lead in Paint by CRC ICPMS										
Compliant container 10201-10	E494.Pb	03-Dec-2020	06-Dec-2020	----	----		07-Dec-2020	0 days	0 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Lead in Paint by CRC ICPMS	E494.Pb	126874	1	14	7.1	5.0	✔
Laboratory Control Samples (LCS)							
Lead in Paint by CRC ICPMS	E494.Pb	126874	2	14	14.2	10.0	✔
Method Blanks (MB)							
Lead in Paint by CRC ICPMS	E494.Pb	126874	1	14	7.1	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Lead in Paint by CRC ICPMS	E494.Pb Vancouver - Environmental	Soil/Solid	EPA 200.2/6020B	This analysis is carried out using procedures adapted from EPA Method 200.2. The sample is manually homogenized and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020B).
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Lead	EP494.Pb Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	This analysis is carried out using procedures adapted from EPA Method 200.2. The sample is manually homogenized and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids.

QUALITY CONTROL REPORT

Work Order	: WR2001284	Page	: 1 of 3
Client	: Golder Associates Ltd.	Laboratory	: Whitehorse - Environmental
Contact	: Andrew Bruemmer	Account Manager	: Amber Springer
Address	: 151 Industrial Road Unit 13 Whitehorse YT Canada Y1A2V3	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: 604 298 6623	Telephone	: +1 867 668 6689
Project	: 20147682/1000/1600	Date Samples Received	: 04-Dec-2020 10:35
PO	: ----	Date Analysis Commenced	: 06-Dec-2020
C-O-C number	: 10201	Issue Date	: 07-Dec-2020 16:44
Sampler	: ----		
Site	: ----		
Quote number	: Vancouver Standing Offer		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
- DQO = Data Quality Objective.
- LOR = Limit of Reporting (detection limit).
- RPD = Relative Percentage Difference
- # = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 126874)											
VA20C2451-001	Anonymous	lead	7439-92-1	E494.Pb	5.0	mg/kg	434	400	8.21%	40%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 126874)						
lead	7439-92-1	E494.Pb	5	mg/kg	<5.0	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 126874)									
lead	7439-92-1	E494.Pb	5	mg/kg	50 mg/kg	105	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 126874)									
QC-126874-003	SCP SS-2	lead	7439-92-1	E494.Pb	267 mg/kg	103	70.0	130	----



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 298-4200 Fax (604) 298-5293

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Project Number: 20147-211000/1000	Golder Contact: 250-298-4200	Laboratory Name: 215
Short Title: 250-298-4200	Golder E-mail Address 1: @golder.com	Address: 12751 Greenwood Rd
Golder E-mail Address 2: @golder.com	Golder E-mail Address 2: @golder.com	Telephone/Fax: 250-298-4200
		Contact: A. Baker

Office Name: Whitehorse

Turnaround Time: 24 hr 48 hr 72 hr Regular (5 Days)

Criteria: CSR CCME BC Water Quality Other

Quote No.: _____

EQUIS Facility Code: _____

EQUIS upload:

Analyses Required: RUSH - P

Sample Control Number (SCN)	Sample Location	Sa-#	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Remarks (over)
-01	20-01	24			12/16	14:16				X	Lead (Total)
-02	20-02	25			12/16	14:26				X	
-03	20-03	26			12/16	15:00				X	
-04	20-04	27			12/16	15:15				X	
-05	20-05	28			12/16	15:30				X	
-06	20-06	29			12/16	15:45				X	
-07	20-07	30			12/16	16:00				X	
-08	20-08	31			12/16	16:08				X	
-09	20-09	32			12/16	16:15				X	
-10	20-10	33			12/16	16:15				X	
-11	20-11	34			12/16	16:15				X	
-12	20-12	35			12/16	16:15				X	

Environmental Division
 Whitehorse
 Work Order Reference
WR2001284
 Telephone: +1 867 868 6699

Sampler's Signature: _____

Relinquished by: Signature _____

Company: _____ Date: _____

Waybill No.: _____

Shipment Condition: _____ Seal Intact: _____

Received for Lab by: _____ Date: Dec 4

Temp (°C): _____ Cooler opened by: _____ Date: _____

Received by: Signature _____ Date: _____

Company: _____ Time: 9:35

Comments: _____

Shipped by: _____



CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10201 page 1 of 1

200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: 20147682/1000/1600		Laboratory Name: ALS	
Short Title: SS Klondike Point Sampling Area		Golder Contact: Andrew	
Golder E-mail Address 1: @golder.com		Golder E-mail Address 2: @golder.com	
Address: 12151 Industrial Rd.		Telephone/Fax: 668-	Contact: Amber

Office Name: Whitehorse			EQUIS Facility Code: EQUIS upload: <input type="checkbox"/>			Analyses Required							
Turnaround Time: <input checked="" type="checkbox"/> 24 hr Criteria: <input type="checkbox"/> CSR <input type="checkbox"/> CCME <input type="checkbox"/> BC Water Quality <input type="checkbox"/> Other			<input type="checkbox"/> 48 hr <input type="checkbox"/> 72 hr <input type="checkbox"/> Regular (5 Days)			RUSH - P1							
Note: Final Reports to be issued by e-mail			Quote No.:			Number of Containers							
Sample Control Number (SCN)	Sample Location	wt -Sa-# Field	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D/M/Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Lead (Total)	RUSH	Remarks (over)
10201-01	20-01	2g		Paint	03/12/20	14:10				X	X	X	24hr
-02	20-02	4g				14:20				X	X	X	TAT
-03	20-03	3g				15:00				X	X	X	
-04	20-04	1g				15:15				X	X	X	
-05	20-05	1g				15:30				X	X	X	
-06	20-06	1g				15:45				X	X	X	
-07	20-07	1g				15:55				X	X	X	
-08	20-08	3g				16:00				X	X	X	
-09	20-09	1g				16:08				X	X	X	
-10	20-10	1g				16:15				X	X	X	
-11													
-12													

Environmental Division
 Whitehorse
 Work Order Reference
WR2001284



Telephone: +1 867 668 6689

Sampler's Signature: <i>Adam B...</i>	Relinquished by: Signature <i>Adam B...</i>	Company Golder	Date 4 DEC 20	Time	Received by: Signature	Company
Comments: TOTAL LEAD IN PAINT.	Method of Shipment:	Waybill No.:	Received for Lab by: <i>R</i>		Date DEC 4	Time 9:35
	Shipped by:	Shipment Condition: Seal Intact:	Temp (°C) //	Cooler opened by:	Date	Time

WHITE: Golder Copy YELLOW: Lab Copy

JG 5 DEC 3:25 PM
 Ice packs 5, 5°C
 ESED

ANNEX B7

June 18, 2021

Public Services and Procurement Canada
Suite 401, 1230 Government Street
Victoria, BC, V8W 3X4

Attention: Erin Rosenthal
Environmental Services

Re: Leachate Sample Results
SS Klondike Paddle Wheel, Lead Abatement, Whitehorse, Yukon
Arcadis Project File: 30087850

INTRODUCTION

Arcadis Canada Inc. (Arcadis) conducted leachate testing of the main wood rudders of the SS Klondike Sternwheeler. The rudders are coated with leaded paint and are scheduled to be removed and disposed. The leachate test was conducted for the classification of waste materials for disposal purposes.

METHODOLOGY

A representative discrete sample was collected of the wood rudders coated with leaded paint. The sample was submitted to ALS Environmental laboratory for analysis. The analysis was carried out in accordance with the extraction procedure outlined in SW-846 EPA Method 1311 and the extract was analyzed in accordance with EPA 6020, published by the United States Environmental Protection Agency (EPA).

RESULTS

One sample of orange painted wood was collected and submitted to the laboratory. Upon the completion of the test, the total concentration of metals in the waste extract was compared to Schedule 4, Table 1 of the Hazardous Waste Regulation.

Based on the results, lead exceeded the criteria of 5.0 mg/L, and the waste is considered leachable toxic waste and therefore are a hazardous waste. These materials must be removed and disposed of at a licensed hazardous waste disposal facility.

Leachate Sample Results

SS Klondike Sternwheeler, Whitehorse, Yukon
Public Services and Procurement Canada

June 18, 2021
Arcadis File: 30087850

CLOSURE

This letter, prepared for Public Services and Procurement Canada on behalf of Parks Canada does not provide certification or warranty, expressed or implied, that the referenced investigation identified all hazardous materials associated with the subject site. This letter is not intended to be used as a scope of work or technical specification for remediation of hazardous materials. This letter was prepared by Arcadis for Public Services and Procurement Canada on behalf of Parks Canada. Any use which any other party makes of the letter, or reliance on, or decisions to be based on it, is the responsibility of such parties.

Sincerely,

Arcadis Canada Inc

Prepared by:



Jerry Botti, AScT

Senior Project Manager

jerry.botti@arcadis.com

Encl: Laboratory Results

CERTIFICATE OF ANALYSIS

Work Order : **WR2100603**
Client : **Arcadis Canada Inc.**
Contact : Jerry Botti
Address : # 308 - 1080 Mainland Street
 Vancouver BC Canada V6B 2T4
Telephone : ----
Project : 30087850
PO : ----
C-O-C number : 17-773678
Sampler : ----
Site : Western Canada MSA
Quote number : VA20-ARCA100-007
No. of samples received : 1
No. of samples analysed : 1

Page : 1 of 3
Laboratory : Whitehorse - Environmental
Account Manager : Hilary Woods
Address : #12 151 Industrial Road
 Whitehorse YT Canada Y1A 2V3
Telephone : +1 867 668 6689
Date Samples Received : 11-Jun-2021 15:47
Date Analysis Commenced : 14-Jun-2021
Issue Date : 17-Jun-2021 15:38

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.



Analytical Results

Sub-Matrix: Solid					Client sample ID	11-TCLP-001	----	----	----	----
(Matrix: Soil/Solid)						Rudder Waste Stream				
					Client sampling date / time	11-Jun-2021 15:30	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	WR2100603-001	-----	-----	-----	-----	-----
					Result	---	---	---	---	---
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	4.26	---	---	---	---	---
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	4.26	---	---	---	---	---
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	4.93	---	---	---	---	---
pH, TCLP final	----	EPP444	0.010	pH units	4.93	---	---	---	---	---
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	---	---	---	---	---
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	---	---	---	---	---
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	---	---	---	---	---
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	---	---	---	---	---
boron, TCLP	7440-42-8	E444	0.50	mg/L	<0.50	---	---	---	---	---
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	<0.050	---	---	---	---	---
calcium, TCLP	7440-70-2	E444	10	mg/L	30	---	---	---	---	---
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	---	---	---	---	---
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	<0.050	---	---	---	---	---
copper, TCLP	7440-50-8	E444	0.050	mg/L	<0.050	---	---	---	---	---
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	---	---	---	---	---
lead, TCLP	7439-92-1	E444	0.25	mg/L	23.3	---	---	---	---	---
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	---	---	---	---	---
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	---	---	---	---	---
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	---	---	---	---	---
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	---	---	---	---	---
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	---	---	---	---	---
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	---	---	---	---	---
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	---	---	---	---	---
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	---	---	---	---	---
zinc, TCLP	7440-66-6	E444	0.50	mg/L	0.92	---	---	---	---	---
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	---	---	---	---	---

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WR2100603	Page	: 1 of 4
Client	: Arcadis Canada Inc.	Laboratory	: Whitehorse - Environmental
Contact	: Jerry Botti	Account Manager	: Hilary Woods
Address	: # 308 - 1080 Mainland Street Vancouver BC Canada V6B 2T4	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: ----	Telephone	: +1 867 668 6689
Project	: 30087850	Date Samples Received	: 11-Jun-2021 15:47
PO	: ----	Issue Date	: 17-Jun-2021 15:38
C-O-C number	: 17-773678		
Sampler	: ----		
Site	: Western Canada MSA		
Quote number	: VA20-ARCA100-007		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) 11-TCLP-001 Rudder Waste Stream	E512	14-Jun-2021	----	----	----		16-Jun-2021	28 days	5 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) 11-TCLP-001 Rudder Waste Stream	E444	14-Jun-2021	----	----	----		16-Jun-2021	180 days	6 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) 11-TCLP-001 Rudder Waste Stream	EPP444	11-Jun-2021	14-Jun-2021	----	----		----	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
<i>Analytical Methods</i>							
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	222323	1	1	100.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	222324	1	1	100.0	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	222323	1	1	100.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	222324	1	1	100.0	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : **WR2100603**

Page : 1 of 4

Client : Arcadis Canada Inc.
 Contact : Jerry Botti
 Address : # 308 - 1080 Mainland Street
 Vancouver BC Canada V6B 2T4
 Telephone : ----
 Project : 30087850
 PO : ----
 C-O-C number : 17-773678
 Sampler : ----
 Site : Western Canada MSA
 Quote number : VA20-ARCA100-007
 No. of samples received : 1
 No. of samples analysed : 1

Laboratory : Whitehorse - Environmental
 Account Manager : Hilary Woods
 Address : #12 151 Industrial Road
 Whitehorse, Yukon Canada Y1A 2V3
 Telephone : +1 867 668 6689
 Date Samples Received : 11-Jun-2021 15:47
 Date Analysis Commenced : 14-Jun-2021
 Issue Date : 17-Jun-2021 15:38

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia

Page : 2 of 4
Work Order : WR2100603
Client : Arcadis Canada Inc.
Project : 30087850



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
TCLP Metals (QCLot: 222323)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 222324)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 222323)										
WR2100603-001	11-TCLP-001 Rudder Waste Stream	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	87.4	50.0	140	----
TCLP Metals (QCLot: 222324)										
WR2100603-001	11-TCLP-001 Rudder Waste Stream	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	97.8	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.4 mg/L	5 mg/L	87.9	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	101	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.250 mg/L	0.25 mg/L	100	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.93 mg/L	10 mg/L	99.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.223 mg/L	0.25 mg/L	89.1	50.0	140	----
		calcium, TCLP	7440-70-2	E444	264 mg/L	250 mg/L	106	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.13 mg/L	1.25 mg/L	90.3	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	0.239 mg/L	0.25 mg/L	95.6	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.25 mg/L	2.5 mg/L	90.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	231 mg/L	250 mg/L	92.3	50.0	140	----
		lead, TCLP	7439-92-1	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	231 mg/L	250 mg/L	92.4	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.25 mg/L	2.5 mg/L	90.0	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.46 mg/L	5 mg/L	89.2	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.115 mg/L	0.1 mg/L	115	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	96.1	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.02 mg/L	5 mg/L	100	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.69 mg/L	0.75 mg/L	92.5	50.0	140	----
		zinc, TCLP	7440-66-6	E444	8.90 mg/L	10 mg/L	89.0	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	93.7	50.0	150	----

ANNEX B8

16 July 2021

Reference No. 20147682-008-L-Rev0

Erin Rosenthal

Public Services and Procurement Canada
401-1230 Government Street
Victoria, BC V8W 3X4

SUPPLEMENTAL SOIL SAMPLING DATA – S.S. KLONDIKE REMEDIATION, WHITEHORSE, YT


Dear Ms. Rosenthal:

Golder Associates Ltd. (Golder) provide the attached supplemental soil sampling data, relating to soil samples collected within the S.S. Klondike Remediation area on 30 June 2021 and 07 July 2021 to provide additional vertical and lateral soil characterization. The sampling locations are presented in Drawings 103, 104, and 105 of the Specification package. This deliverable is submitted to fulfill the scope of work developed for planning the soil remediation at the S.S. Klondike, being undertaken under TA 700521500, and in accordance with the rates, terms and conditions outlined in Public Works and Government Services Canada's Contaminated Sites Remediation Services Task Authorization No. EZ897-192499/005/VAN dated 31 January 2020.

We trust the attached meets with your requirements. Should there be any questions, please contact Andrew Bruemmer at 1-867-633-6076.

Yours very truly,

Golder Associates Ltd.



Andrew Bruemmer, PEng
Project Manager



Erik von Krogh, RPBio, PMP
Associate, Senior Program Coordinator

EvK/AB/lc

Attachments: COA – 30 June 2021
COA – 7 July 2021

[https://golderassociates.sharepoint.com/sites/130877/project/files/6/deliverables/_issued to client_for wp/20147682-008-l-rev0/20147682-008-l-rev0-cover letter-16july_2020.docx](https://golderassociates.sharepoint.com/sites/130877/project/files/6/deliverables/_issued%20to%20client_for%20wp/20147682-008-l-rev0/20147682-008-l-rev0-cover%20letter-16july_2020.docx)



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **WR2100738**
Client : **Golder Associates Ltd.**
Contact : Andrew Bruemmer
Address : 151 Industrial Road Unit 13
Whitehorse YT Canada Y1A 2V3
Telephone : 604 298 6623
Project : 20147682
PO : ----
C-O-C number : 10133, 10134
Sampler : ----
Site :
Quote number : Vancouver Standing Offer
No. of samples received : 24
No. of samples analysed : 24

Page : 1 of 4
Laboratory : Whitehorse - Environmental
Account Manager : Amber Springer
Address : #12 151 Industrial Road
Whitehorse YT Canada Y1A 2V3
Telephone : +1 867 668 6689
Date Samples Received : 02-Jul-2021 09:35
Date Analysis Commenced : 06-Jul-2021
Issue Date : 07-Jul-2021 17:05

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.



Analytical Results

Sub-Matrix: Soil					Client sample ID	SS21-01	SS21-02	SS21-03	SS21-04	SS21-05
(Matrix: Soil/Solid)										
Client sampling date / time					30-Jun-2021 09:50	30-Jun-2021 10:20	30-Jun-2021 10:45	30-Jun-2021 11:00	30-Jun-2021 12:30	
Analyte	CAS Number	Method	LOR	Unit	WR2100738-001	WR2100738-002	WR2100738-003	WR2100738-004	WR2100738-005	
					Result	Result	Result	Result	Result	
Metals										
lead	7439-92-1	E440	0.50	mg/kg	11.6	4.50	11.1	15.1	79.4	

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil					Client sample ID	SS21-06	SS21-07	SS21-08	SS21-09	SS21-10
(Matrix: Soil/Solid)										
Client sampling date / time					30-Jun-2021 12:45	30-Jun-2021 13:00	30-Jun-2021 14:15	30-Jun-2021 14:30	30-Jun-2021 14:45	
Analyte	CAS Number	Method	LOR	Unit	WR2100738-006	WR2100738-007	WR2100738-008	WR2100738-009	WR2100738-010	
					Result	Result	Result	Result	Result	
Metals										
lead	7439-92-1	E440	0.50	mg/kg	38.3	40.4	51.6	63.0	15.2	

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil					Client sample ID	SS21-11	SS21-12	SS21-13	SS21-14	SS21-15
(Matrix: Soil/Solid)										
Client sampling date / time					30-Jun-2021 15:00	30-Jun-2021 15:15	30-Jun-2021 15:30	30-Jun-2021 15:45	30-Jun-2021 17:00	
Analyte	CAS Number	Method	LOR	Unit	WR2100738-011	WR2100738-012	WR2100738-013	WR2100738-014	WR2100738-015	
					Result	Result	Result	Result	Result	
Metals										
lead	7439-92-1	E440	0.50	mg/kg	39.4	18.5	27.1	43.4	23.6	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil					Client sample ID	SS21-16	SS21-17	SS21-18	SS21-19	SS21-20
(Matrix: Soil/Solid)										
					Client sampling date / time	30-Jun-2021 17:15	30-Jun-2021 17:40	30-Jun-2021 17:50	30-Jun-2021 18:05	30-Jun-2021 18:20
Analyte	CAS Number	Method	LOR	Unit	WR2100738-016	WR2100738-017	WR2100738-018	WR2100738-019	WR2100738-020	
					Result	Result	Result	Result	Result	
Metals										
lead	7439-92-1	E440	0.50	mg/kg	31.2	54.2	69.2	55.6	8.98	

Please refer to the General Comments section for an explanation of any qualifiers detected.

Analytical Results

Sub-Matrix: Soil					Client sample ID	SS21-21	SS21-22	SS21-23	SS21-24	----
(Matrix: Soil/Solid)										
					Client sampling date / time	30-Jun-2021 18:35	30-Jun-2021 18:50	30-Jun-2021 19:20	30-Jun-2021 19:40	----
Analyte	CAS Number	Method	LOR	Unit	WR2100738-021	WR2100738-022	WR2100738-023	WR2100738-024	-----	
					Result	Result	Result	Result	----	
Metals										
lead	7439-92-1	E440	0.50	mg/kg	11.7	15.5	11.6	11.8	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WR2100738	Page	: 1 of 6
Client	: Golder Associates Ltd.	Laboratory	: Whitehorse - Environmental
Contact	: Andrew Bruemmer	Account Manager	: Amber Springer
Address	: 151 Industrial Road Unit 13 Whitehorse YT Canada Y1A 2V3	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: 604 298 6623	Telephone	: +1 867 668 6689
Project	: 20147682	Date Samples Received	: 02-Jul-2021 09:35
PO	: ----	Issue Date	: 07-Jul-2021 17:05
C-O-C number	: 10133, 10134		
Sampler	: ----		
Site	:		
Quote number	: Vancouver Standing Offer		
No. of samples received	: 24		
No. of samples analysed	: 24		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-01	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-02	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-03	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-04	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-05	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-06	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-07	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✓



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-08	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-09	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-10	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-11	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-12	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-13	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-14	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-15	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-16	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	



Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-17	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-18	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-19	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-20	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-21	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-22	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-23	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
Glass soil jar/Teflon lined cap SS21-24	E440	30-Jun-2021	06-Jul-2021	----	----		07-Jul-2021	180 days	7 days	✔	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Metals in Soil/Solid by CRC ICPMS	E440	236806	2	30	6.6	5.0	✔
Laboratory Control Samples (LCS)							
Metals in Soil/Solid by CRC ICPMS	E440	236806	4	30	13.3	10.0	✔
Method Blanks (MB)							
Metals in Soil/Solid by CRC ICPMS	E440	236806	2	30	6.6	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.



QUALITY CONTROL REPORT

Work Order	:WR2100738	Page	: 1 of 3
Client	: Golder Associates Ltd.	Laboratory	: Whitehorse - Environmental
Contact	: Andrew Bruemmer	Account Manager	: Amber Springer
Address	: 151 Industrial Road Unit 13 Whitehorse YT Canada Y1A 2V3	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: 604 298 6623	Telephone	: +1 867 668 6689
Project	: 20147682	Date Samples Received	: 02-Jul-2021 09:35
PO	: ----	Date Analysis Commenced	: 06-Jul-2021
C-O-C number	: 10133, 10134	Issue Date	: 07-Jul-2021 17:05
Sampler	: ----		
Site	:		
Quote number	: Vancouver Standing Offer		
No. of samples received	: 24		
No. of samples analysed	: 24		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
- DQO = Data Quality Objective.
- LOR = Limit of Reporting (detection limit).
- RPD = Relative Percentage Difference
- # = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 236806)											
WR2100738-001	SS21-01	lead	7439-92-1	E440	0.50	mg/kg	11.6	11.2	3.31%	40%	----
Metals (QC Lot: 236807)											
WR2100738-021	SS21-21	lead	7439-92-1	E440	0.50	mg/kg	11.7	11.1	4.95%	40%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 236806)						
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Metals (QCLot: 236807)						
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 236806)									
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.6	80.0	120	----
Metals (QCLot: 236807)									
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 236806)									
QC-236806-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	92.8	70.0	130	----
Metals (QCLot: 236807)									
QC-236807-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10133 page 1 of 2

Project Number: 20147682
 Short Title: SS KNOXDIKE SOIL SAMPLING
 Golder E-mail Address 1: GOLDER@GOLDER.COM
 Golder E-mail Address 2: ANDREW_BRUEMMER@GOLDER.COM
 Laboratory Name: ALS ENVIRONMENTAL
 Address: UNIT 12-151 INDUSTRIAL LO
 Telephone/Fax: _____
 Contact: _____

Office Name: **GOLDER WHITEHORSE**

EQUIS Facility Code: _____
 EQUIS upload:

Turnaround Time: 24 hr 48 hr 72 hr Other
 Criteria: CSR CCME BC Water Quality

Note: Final Reports to be issued by e-mail

Quote No.: _____

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D/M/Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Remarks (over)
SS21-01	SS21-01		0.2	SO	20 JUL 21	9:50				2	
	SS21-02		0.3			10:20				X	TOTAL LEAD
			0.35			10:45				X	
			0.35			11:00				X	
			0.3			12:30				X	
			0.3			12:45				X	
			0.3			13:00				X	
			0.3			14:15				X	
			0.3			14:30				X	
			0.3			14:45				X	
			0.3			15:00				X	
			0.3			15:15				X	

RUSH

Environmental Division
 Whitehorse
 Work Order Reference
WR2100738
 Telephone: +1 867 688 6399

Sampler's Signature: _____
 Relinquished by: Signature _____
 Company: **GOLDER**
 Date: **2 JULY 21**
 Time: **9:35**
 Received by: Signature _____
 Date: _____
 Company: **ALS**

Comments: **PLEASE RUN DUPLICATE ANALYSIS ON SS21-10**

Method of Shipment: **TRUCK**
 Shipped by: _____
 Waybill No.: _____
 Shipment Condition: _____
 Seal Intact: _____
 Received for Lab by: _____
 Temp (°C): **6/5**
 Cooler opened by: _____
 Date: _____
 Time: _____

WHITE: Golder Copy YELLOW: Lab Copy



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Project Number: 20147682 20147682
 Short Title: SS KLONDIKE SOIL SAMPLING - BRUENNER
 Golder E-mail Address 1: ANDREW_BRUENNER@golder.com
 Golder E-mail Address 2: ANDREW_BRUENNER@golder.com
 Laboratory Name: _____ Address: _____
 Telephone/Fax: _____ Contact: _____

Office Name: GOLDER WHITEHORSE

EQUIS Facility Code: _____
 EQUIS upload: Regular (5 Days)

Turnaround Time: 24 hr 48 hr 72 hr Other
 Criteria: CSR CCME BC Water Quality

Note: Final Reports to be issued by e-mail

Quote No.:

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	Analyses Required	RUSH (Select TAT above)	Remarks (over)
SS21-B-01			0.3	SO	20140721	1530							
-14-02			0.3			1545				X	TOTAL LEAD		
-15-03			0.3			1700				X			
-16-04			0.3			1715				X			
-17-05			0.6			1740				X			
-18-06			0.3			1750				X			
-19-07			0.5			1805				X			
-20-08			0.3			1820				X			
-21-09			0.22			1830 1835				X			
-22-10			0.2			1850				X			
-23-11			0.3			1920				X			
-24-12			0.3			1940				X			

Sampler's Signature: _____
 Relinquished by: Signature _____
 Company: GOLDER Date: 2 JULY 21
 Method of Shipment: _____
 Waybill No.: _____
 Shipped by: _____
 Shipment Condition: _____
 Seal Intact: _____
 Received for Lab by: _____
 Temp (°C): _____ Cooler opened by: _____
 Received by: Signature _____ Date: _____
 Company: _____ Date: _____

Comments: Please RUN DUE DATE ANALYSIS ON 5521-17.

WHITE: Golder Copy YELLOW: Lab Copy

ESED



CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

No. 10133 page 1 of 2

200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0G4
 Telephone (604) 296-4200 Fax (604) 298-5253

Project Number: **20147682** Laboratory Name: **ALS ENVIRONMENTAL**
 Short Title: **SS KLONDIKE SOIL SAMPLING** Golder Contact: **ANDREW BRUEMMER** Address: **Unit 12 - 1st Industrial Co**
 Golder E-mail Address 1: **ABRUEMMER@golder.com** Golder E-mail Address 2: **ANDREW_BRUEMMER@golder.com** Telephone/Fax: Contact:

Office Name: **GOLDER WHITEHORSE** EQUIS Facility Code: EQUIS upload: **AI** **RUSH**

Turnaround Time: 24 hr 48 hr 72 hr Regular (5 Days)
 Criteria: CSR CCME BC Water Quality Other

Note: Final Reports to be issued by e-mail Quote No.:

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)	Number of Containers	TOTAL LEAD	RUSH (Select TAT)	Remarks (over)
SS21-01	SS21-01		0.2	SO	30 JUN 21	9:50				2	X		
-02	SS21-02		0.3			1020					X		
-03			0.35			1045					X		
-04			0.35			1100					X		
-05			0.3			1230					X		
-06			0.3			1245					X		
-07			0.3			1300					X		
-08			0.3			1415					X		
-09			0.3			1430					X		
-10			0.3			1445					X		
-11	o		0.3			1500					X		
-12			0.3			1515					X		

Environmental Division
 Whitehorse
 Work Order Reference
WR2100738

Telephone : +1 867 668 6189

Sampler's Signature: *[Signature]* Relinquished by: Signature *[Signature]* Company: **GOLDER** Date: **2 July 21** Time: **9:35** Received by: Signature *[Signature]* Company: **ALS**

Comments: **PLEASE RUN DUPLICATE ANALYSIS ON SS21-10** Method of Shipment: Shipped by: Waybill No.: Shipment Condition: Seal Intact: Temp (°C): **16.5** Cooler opened by: **JG** Date: **3 July** Time: **2:45 PM**

WHITE: Golder Copy "YELLOW: Lab Copy

18°C Ice Packs



CERTIFICATE OF ANALYSIS

Work Order : **WR2100762**
Client : **Golder Associates Ltd.**
Contact : Andrew Bruemmer
Address : 200-2920 Virtual Way
Vancouver BC Canada V5M 0C4
Telephone : 604 298 6623
Project : 20147682
PO : ----
C-O-C number : 10162
Sampler : ----
Site : ----
Quote number : Vancouver Standing Offer
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 2
Laboratory : Whitehorse - Environmental
Account Manager : Amber Springer
Address : #12 151 Industrial Road
Whitehorse YT Canada Y1A 2V3
Telephone : +1 867 668 6689
Date Samples Received : 07-Jul-2021 17:30
Date Analysis Commenced : 10-Jul-2021
Issue Date : 12-Jul-2021 14:49

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
 LOR: Limit of Reporting (detection limit).

Unit	Description
mg/kg	milligrams per kilogram

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: Soil

(Matrix: Soil/Solid)

					Client sample ID	SS21-25	SS21-26	SS21-27	SS21-28	SS21-29
					Client sampling date / time	07-Jul-2021 14:45	07-Jul-2021 15:05	07-Jul-2021 15:15	07-Jul-2021 15:30	07-Jul-2021 15:45
Analyte	CAS Number	Method	LOR	Unit	WR2100762-001	WR2100762-002	WR2100762-003	WR2100762-004	WR2100762-005	
					Result	Result	Result	Result	Result	
Metals										
lead	7439-92-1	E440	0.50	mg/kg	19.8	36.8	20.1	8.08	10.8	

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: WR2100762	Page	: 1 of 5
Client	: Golder Associates Ltd.	Laboratory	: Whitehorse - Environmental
Contact	: Andrew Bruemmer	Account Manager	: Amber Springer
Address	: 200-2920 Virtual Way Vancouver BC Canada V5M 0C4	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: 604 298 6623	Telephone	: +1 867 668 6689
Project	: 20147682	Date Samples Received	: 07-Jul-2021 17:30
PO	: ----	Issue Date	: 12-Jul-2021 14:49
C-O-C number	: 10162		
Sampler	: ----		
Site	: ----		
Quote number	: Vancouver Standing Offer		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	Anonymous	Anonymous	lead	7439-92-1	E440	47.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-25	E440	07-Jul-2021	10-Jul-2021	----	----		12-Jul-2021	180 days	5 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-26	E440	07-Jul-2021	10-Jul-2021	----	----		12-Jul-2021	180 days	5 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-27	E440	07-Jul-2021	10-Jul-2021	----	----		12-Jul-2021	180 days	5 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-28	E440	07-Jul-2021	10-Jul-2021	----	----		12-Jul-2021	180 days	5 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap SS21-29	E440	07-Jul-2021	10-Jul-2021	----	----		12-Jul-2021	180 days	5 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Metals in Soil/Solid by CRC ICPMS	E440	240320	1	7	14.2	5.0	✔
Laboratory Control Samples (LCS)							
Metals in Soil/Solid by CRC ICPMS	E440	240320	2	7	28.5	10.0	✔
Method Blanks (MB)							
Metals in Soil/Solid by CRC ICPMS	E440	240320	1	7	14.2	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

<i>Analytical Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.



QUALITY CONTROL REPORT

Work Order	:WR2100762	Page	: 1 of 3
Client	: Golder Associates Ltd.	Laboratory	: Whitehorse - Environmental
Contact	: Andrew Bruemmer	Account Manager	: Amber Springer
Address	: 200-2920 Virtual Way Vancouver BC Canada V5M 0C4	Address	: #12 151 Industrial Road Whitehorse, Yukon Canada Y1A 2V3
Telephone	: 604 298 6623	Telephone	: +1 867 668 6689
Project	: 20147682	Date Samples Received	: 07-Jul-2021 17:30
PO	: ----	Date Analysis Commenced	: 10-Jul-2021
C-O-C number	: 10162	Issue Date	: 12-Jul-2021 14:49
Sampler	: ----		
Site	: ----		
Quote number	: Vancouver Standing Offer		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

- Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
- CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
- DQO = Data Quality Objective.
- LOR = Limit of Reporting (detection limit).
- RPD = Relative Percentage Difference
- # = Indicates a QC result that did not meet the ALS DQO.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 240320)											
VA21B4077-001	Anonymous	lead	7439-92-1	E440	0.50	mg/kg	3.49	5.68	47.7%	40%	DUP-H

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 240320)						
lead	7439-92-1	E440	0.5	mg/kg	<0.50	---



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 240320)									
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.6	80.0	120	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 240320)									
QC-240320-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----



200 - 2920 Virtual Way
 Vancouver, British Columbia, Canada V5M 0C4
 Telephone (604) 296-4200 Fax (604) 298-5253

CHAIN OF CUSTODY RECORD/ANALYSIS REQUEST

Project Number: **2014-3687**
 Short Title: **35 KLONDIKE SOIL SAMPLING**
 Golder E-mail Address 1: **ABRUENM@GOLDER.COM**
 Golder E-mail Address 2: **ANDREW.BRUENM@GOLDER.COM**
 Laboratory Name: **A2S ENVIRONMENTAL**
 Address: **12-151 INDUSTRIAL RD**
 Telephone/Fax: _____
 Contact: _____

Office Name: **GOLDER WHITEHORSE**
 Turnaround Time: 24 hr 48 hr 72 hr Regular (5 Days)
 Criteria: CSR CCME BC Water Quality Other
 Quote No.: _____
 EQUIS Facility Code: _____
 EQUIS upload:

Note: Final Reports to be issued by e-mail
 Number of Containers: **TOTAL LEAD**
 Analyses Requi: _____

Sample Control Number (SCN)	Sample Location	Sa. #	Sample Depth (m)	Sample Matrix (over)	Date Sampled (D / M / Y)	Time Sampled (HH:MM)	Sample Type (over)	QAQC Code (over)	Related SCN (over)
5521-25-01			0.35		07/02/11	1445			2
-26-02			0.4			1505			
-27-03			0.33			1515			
-28-04			0.3			1530			
-29-05			0.35			1545			
-06									
-07									
-08									
-09									
-10									
-11									
-12									

Sampler's Signature: _____
 Relinquished by: Signature _____
 Company _____ Date _____
 Method of Shipment: _____
 Waybill No.: _____
 Shipped by: _____
 Shipment Condition: _____
 Seal Intact: _____
 Received for Lab by: _____
 Temp (°C) _____
 Cooler opened by: _____
 Received by: Signature _____
 Date _____
 Company _____
 Date _____
 Time _____

Environmental Division
 Whitehorse
 Work Order Reference
WR2100762
 Telephone: +1 867 688 6889

WHITE: Golder Copy YELLOW: Lab Copy